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A complexity thinking exploration of the maternal health care system in East New Britain, Papua New Guinea

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A thesis submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy in Development Studies, University of Auckland, June 2016

When you pick up one piece of this planet, you find that, one way or another, it's attached to everything else – if you jiggle over here, something is going to wiggle over there … We need this sense of the continuing interconnectedness of the system, as part of the common knowledge, so that politicians feel it and believe it, and so that voters feel it and believe it, and so that kids feel it and believe it, so that they'll grow up with an ethic.

Sylvia Earle, Marine Biologist

(White, 1989)

Abstract

This thesis uses a complexity thinking approach to investigate the implementation of development strategies to improve maternal health taking the province of East New Britain, in Papua New Guinea, as a case study. A key global strategy for improving maternal and neonatal health is that every woman and baby receives assistance from an appropriately qualified and skilled health worker with midwifery skills. However, globally there continues to be a lack of universal care, with one in four births occurring in the absence of skilled assistance. In Papua New Guinea, access to skilled care remains inequitable and, since independence, there has been little reduction in the numbers of women and babies experiencing poor outcomes.

Using a qualitative inquiry approach, the thesis employs a range of methods including analysis of historical and contemporary documents, interviews, and observation of clinical and administrative practice, to better understand the maternal health care system. Selected conceptual tools from complexity thinking guide analysis, namely path dependence and system lock-ins; connectivity and nonlinearity; and self-organisation and emergence.

This work contributes to building knowledge of implementation of development strategies by highlighting the multiple ways that the maternal health care system intersects with other systems. It argues that these systems are all dynamic constructs shaped by historical, social and political conditions. As such, midwifery and health management practice are constrained by system constructs which do not recognise the importance of the role of midwives in protecting maternal and neonatal health. Constraints include inadequate prioritisation of maternal health to ensure midwives are enabled to provide care across their full scope of practice; non-establishment of maternal health review committees; and little agreement regarding education for cadres of health workers expected to provide women and neonates with midwifery care during pregnancy, labour and birth, and postpartum.

In order to ensure all women receive skilled midwifery care, and thus improve maternal and neonatal health, this thesis argues it is crucial for development strategies to remain cognisant of, and engage with, the broader health system and other intersecting social systems. In addition to building technical midwifery capacity, development strategies must constructively disrupt the status quo to generate sufficient endogenous system change to enable the prioritisation of maternal health. This requires a balance between international recommendations, and existing systems realities and endogenous, context-dependent solutions.

Acknowledgments

Finally, on a more personal note, to my PhD colleagues and friends from the University of Auckland, thank you for sharing the journey. Heartfelt thanks to my mother, Dr Barbara Jordan for enduring support and being an inspirational role model for lifelong learning. To my son Jason Crabtree, thanks for the reminders to keep working on the thesis - yes, I have finished it. And most of all, I could not have taken this journey without my partner David Gifford-Moore. Thank you my friend for your ever-present support and belief in me, now it is time for us to embark on our next adventure together.

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Glossary

ADB	Asian Development Bank
AIDS	Acquired Immunodeficiency Syndrome
Antenatal care	Health care provided during or related to pregnancy
Antepartum	Latin phrase meaning 'before birth'
APH	Antepartum haemorrhage - bleeding during pregnancy
CBSC	Capacity Building Service Centre
CHP	Community Health Post
CHW	Community Health Worker
CMF	Clinical Midwifery Facilitator (with MCHI)
GDP	Gross Domestic Product – indicator of a country's economy
HEO	Health Extension Officer
HIV	Human Immunodeficiency Virus
HSIP	Health Sector Improvement Project
ICM	International Confederation of Midwives
ICPD	International Conference on Population and Development, Cairo, 1994
Intrapartum	Time period between onset of labour to the birth of placenta
LLG	Local Level Government
LNG	Liquefied Natural Gas
MCH	Maternal and Child Health
MCHI	Maternal and Child Health Initiative
MDGs	Millennium Development Goals
MMR	Maternal Mortality Ratio
MPAs	Minimum Priority Activities
MRAC	Medical Research Advisory Committee
Multip	Multiparous - second or subsequent pregnancy
NHP	National Health Plan

ODA	Overseas Development Assistance
OECD	Organisation for Economic Co-operation and Development
PEPE	Promoting Effective Public Expenditure
PHC	Primary Health Care
Postnatal care	Health care for women and babies for 6 weeks after birth
Postpartum	Latin phrase meaning 'after birth' – extends for six weeks post birth
PPH	Post-partum haemorrhage – excessive bleeding following childbirth
Primip	Primipara/primiparous - first pregnancy
PSRH	Pacific Society for Reproductive Health
RMNCH	Reproductive, maternal, newborn and child health
SBA	Skilled Birth Attendant
SDGs	Sustainable Development Goals
SMI	Safe Motherhood Initiative
SRHR	Sexual and reproductive health and rights
STI	Sexually transmitted infection
SWAp	Sector Wide Approach
TB	Tuberculosis –a bacterial infection
TBA	Traditional Birth Attendant
UNICEF	United Nations Children's Emergency Fund
UNFPA	United Nations Population Fund
VBA	Village Birth Attendant
WHO	World Health Organisation

CHAPTER ONE: Introduction

> There's a way of playing safe, there's a way of using tricks and there's the way I like to play, which is dangerously, where you're going to take a chance on making mistakes in order to create something you haven't created before.
>
> Dave Brubeck, Jazz pianist (H. Smith, 2001)

Introduction

Some life experiences bind all of humanity – birth is one of these. Every one of us, regardless of gender, ethnicity, religion or class has experienced the process of birth to arrive into the world, albeit in many different circumstances and settings. All women who become pregnant, by choice or otherwise, and continue with the process of pregnancy and birth, have a right to the highest attainable level of care and support. Gaskin (2011, p. 1) argues that:

> a society that places a low value on its mothers and the process of birth will suffer an array of negative repercussions for doing so. Good beginnings make a positive difference to the world, so it is worth our while to provide the best possible care for mothers and babies throughout this extraordinarily influential part of life.

Maternal mortality has been called a litmus test of the status of women, their access to health care, and the adequacy of the health system to respond to their needs (World Health Organisation, 2004a). Yamin (2013, p. 1) suggests that the root causes of poor maternal health lie both 'within and beyond health systems … including poverty, gender inequality, and structural violence against women'. Therefore, strategies for improving maternal health span all facets of development. This thesis focuses on health system strategies, as well as broader intersecting social systems. It is unique in that it uses concepts from complexity thinking, informed by development and midwifery literature. Specific attention is given to the implementation of global recommendations for universal access to skilled birth attendance in functioning health systems.

This first chapter introduces the thesis by exploring maternal health within the broader development discourse. The origins of the thesis and the rationale for the importance of maternal health as an area for development research are then shared. The country of Papua New Guinea and the case study province of East New Britain are briefly introduced, followed by an introduction to the research question and the thesis contributions. The final section outlines the thesis structure.

Maternal health

In this thesis, maternal health is defined using the World Health Organisation (2015b) definition: 'the health of women during pregnancy, childbirth and postpartum'. Maternal health care aims to prevent maternal and neonatal mortality and morbidity. This research investigates the system providing health care for women and their babies during labour and birth, and childbirth related services offered during pregnancy and in the first 42 days (6 weeks) after birth. It encompasses care of the baby at birth, and for the first six weeks of life. Maternal health is acknowledged as one aspect of the wider area of women's health, which encompasses women's general health, as well as their sexual and reproductive health.

Complications during pregnancy and childbirth are the leading cause of death of women of reproductive age in the developing world (World Health Organisation, 2015a). For every woman who dies, an estimated 20 - 30 women suffer from injury or other childbirth related morbidity. These women, their children and families experience both physical and social effects, with repercussions such as ongoing ill health, poverty and malnutrition (Gill, Pande, & Malhotra, 2007; Langer et al., 2015). Protecting the health of women and babies during pregnancy and childbirth is intricately connected with all areas of development, but is ultimately reliant on adequately funded strong health systems (World Health Organisation, 2000) that are able to provide essential interventions when required.

In the recent Lancet Midwifery Series, Homer et al. (2014) argues that 83% of all maternal deaths, stillbirths and neonatal deaths could be averted with quality midwifery care provided close to communities where women live, while even more women and babies can expect good outcomes in the context of functional health systems with effective referral and transfer mechanisms when required. This thesis focuses the broader intersecting social systems, as well as the health system providing maternal and neonatal health care. Health system strategies do not stand alone; they are ultimately reliant on the complex interplay of socio-economic, cultural and other intersecting social systems factors. For some women, these factors can conspire to determine life-threatening delays in seeking and accessing quality care. While most interventions that will protect the lives of women and their babies can be provided at the community level by midwives with the appropriate skills, motivation and support (Homer et al., 2014), the organisation, priority and resources given to these health workers is dependent on the wider system. Health is political. Health workforce decisions sit at the intersection of education, labour, employment, gender, finance and health agendas. Estimates suggest that 75% of health workers are women (World Health Organisation, 2008b). Yet, women seldom hold significant state or institutional decision making power relative to these roles. All too

often, decisions taken neglect or under-invest in the health workforce resulting in the continuing short-falls in practice and unavailability of services for the most vulnerable.

International Development

International development forms one part of the maternal health care system. Development is ultimately about change and a belief that intentional interventions can change the realities of people's lives for the better. Although it is a contested concept (Sumner & Tribe, 2008b), various forms of 'development' have shaped the world for centuries, such as trade and exchange between different communities; the advancement of capitalism; or, from the mid-1950s, the intentional mechanisms of various actors (e.g. policies, projects and other interventions of development agencies). Development economist Amartya Sen argues that development aims to expand people's freedoms or choices. He suggests that 'development requires the removal of major sources of unfreedom: poverty as well as tyranny, poor economic opportunities as well as systematic social deprivation, neglect of public facilities as well as intolerance or overactivity of repressive states' (A. Sen, 1999, p. 3).

The focus of development programmes is to give 'hope to ordinary people that their children will live in a society that has caught up with the rest of the world' (Collier, 2008, p. 12). And, although the idea of progress is complex and people are not always in agreement, those working in development programmes share a belief in the ideas of 'freedom, equality and justice' (Lange, 2011).

Thesis origins

My interest in developing countries and international development grew from my experiences as a young adult travelling in Africa and Asia. Many years later, in 2005, I attended the 27th Triennial International Congress of the International Confederation of Midwives in Brisbane as a practising midwife. At this conference I was profoundly moved by midwives from Afghanistan, India and other developing countries who shared stories of their immense challenge providing care in hugely under-resourced and challenging circumstances. This was the genesis of uniting my personal passion for gender equality and social justice, with my interest in developing countries and my professional passion for women-centred midwifery care. Following the conference, I completed a Post Graduate Diploma in Development Studies and the focus of this research has developed over time with my increasing knowledge and interest in the nexus between development and maternal health.

Why is maternal health important?

Although maternal health care only represents a tiny portion of the global aid budget, an estimated 1% (Filippi et al., 2006), it is an important human rights obligation and key driver for development (Gill et al., 2007; Hunt & De Mesquita, 2007; Yamin & Boulanger, 2014). It is now well documented that the repercussions of poor maternal health go well beyond individuals to substantially affect the wellbeing, health and survival of children and livelihoods of families (Langer et al., 2015), with indirect costs on a country's gross domestic product (GDP) and economic growth (Kirigia, Mwabu, Orem, & Muthuri, 2014). Langer et al. (2015, p. 1165) argue:

> women who are healthy throughout their lives experience gender equality and are enabled, empowered, and valued in their societies, including in their roles as caregivers, are well prepared to achieve their potential and make substantial contributions to their own health and wellbeing, to that of their families and communities, and, ultimately, to sustainable development.

Good health is essential for women's equal and full participation within society and is intricately linked to multiple aspects of women's lives and important for development more broadly (Gill et al., 2007; Langer et al., 2015; Yamin & Boulanger, 2014). The death of a woman in childbirth deprives a family of a mother and wife (partner/companion), and has intergenerational impacts on the nutritional status, health, and education of surviving children, as well as the economic capacity of families (Yamin, Boulanger, Falb, Shuma, & Leaning, 2013).

Ending preventable maternal mortality is noted to be a 'pillar of sustainable development, considering the critical role of women in families, economics, societies, and in the development of future generations and communities' (World Health Organisation, 2015d, p. 8). The United Nations estimates that the global financial impact of maternal and newborn deaths to be US$15 billion per year in lost productivity (World Health Organisation, 2010a). Spending just US$5 per person per annum until 2035 in high risk countries to improve maternal health could yield up to nine times that value in social and economic benefits (World Health Organisation, 2015d, p. 8).

Sustainable Development Goals

Since 1990 the global maternal mortality ratio is estimated to have declined by 45%, with most of the reduction occurring since 2000 (Souza et al., 2014; United Nations, 2015b). However, the Millennium Development Goal (MDG) 5 target which aimed to reduce the maternal mortality ratio by 75% fell far short. Only 18 countries (of 189 signatories) are expected to meet the target of maternal mortality

reduction and 15 countries are on target to reach the related infant mortality goal by the end of 2015 (World Bank, 2015). Differences in levels of preventable maternal mortality and morbidity are strong indicators of other disparities present in societies and of unequal access to quality health care, both between women in developed and developing countries and among women in the same country. Every day, hundreds of women continue to die from pregnancy or childbirth-related complications. Maternal mortality is noted to be 14 times higher in developing regions, where one in four women birth without the assistance of skilled health personnel (United Nations, 2015b).

As I write this, in September 2015, Heads of State and Government leaders are meeting at the United Nations General Assembly for a special summit to agree the new development agenda, 2016 – 2030, known as the Sustainable Development Goals (SDGs). These goals will guide global development for the next 15 years. The SDG agenda proposes a plan of action for the 'people, planet and prosperity' (United Nations, 2015c, para 3) which aims:

> between now and 2030, to end poverty and hunger everywhere; to combat inequalities within and among countries; to build peaceful, just and inclusive societies; to protect human rights and promote gender equality and the empowerment of women and girls; and to ensure the lasting protection of the planet and its natural resources.

The SDGs broaden and continue the work of the MDGs. El-Noush, Silver, Pamba, and Singer (2015) suggest almost all of the SDGs have some relevance to the determinants of reproductive, maternal, neonatal, child, and adolescent health. Two specific goals are directly applicable to maternal health. Goal Three aims to 'Ensure healthy lives and promote well-being for all at all ages' (United Nations, 2015c, Goal 3) and Goal Five aims to 'Achieve gender equality and empower all women and girls' (United Nations, 2015c, Goal 5).

The SDGs provide a normative framework for improving maternal health, within the context of the wider development agenda. However, as Collier (2008, p. 12) argues, although international policies may offer a focus for countries' efforts, 'change is going to have to come from within the societies'. Attainment of the global goals is reliant on diverse societal systems and multiple layers in different contexts, which encompass policy formulation and implementation, and complex interactions in human societies. Meadowcroft (2007, p. 302) argues sustainable development 'requires goal-directed intervention by governments and other actors'. Transformative change to improve maternal and neonatal health and prevent avoidable tragic outcomes presents a complex challenge, and strategies must be implemented as part of existing multifaceted systems.

Thesis focus and research question

Childbirth constitutes an important physiological function and social role for most women, imbued with significant social and cultural components, and for most, proceeds without complication. Yet, for some, childbirth does not proceed as expected. Protecting women's and babies' lives, once a life-threatening complication arises, is dependent on the recognition of a complication, first line management and access and availability of higher level care when required. Health systems are argued by Atun (2012) to be social systems, that intersect with other systems within the context they are situated. Strategies to improve maternal health are implemented within existing social systems in societies, and are linked to political leadership, management and adequate resourcing (Nyamtema, Urassa, Pembe, Kisanga, & van Roosmalen, 2010). Important health system factors for improving maternal health include skilled health workers, infrastructure and supplies, information and communication, referral systems and finances, and population-centred service delivery; all of these factors require good governance mechanisms for effective implementation (van Olmen, Marchal, van Damme, Kegels, & Hill, 2012).

The overriding research question guiding this research is: what are the complexities of implementing international development strategies to improve maternal health in developing countries such as Papua New Guinea?

The research uses a case study approach selecting one province as a case for investigation – East New Britain. The aim of the research is to understand better the existing maternal health care system in the province, which is framed by national and provincial policy, and explore to what degree policy and practice aligns to international frameworks and partnerships. It does not explicitly examine the implementation of international strategies, but focuses on the realities of the existing system within which international recommendations for improving maternal health are implemented. International development strategies are not the focus of the research; alternatively, the selected tools drawn from complexity thinking[1] are used to enable an in-depth examination of the endogenous system. By better understanding this dynamic, interconnected system within which international development interventions are implemented, Ramalingam (2013, p. 243) suggests development efforts can shift from ignoring real-world complexity, to taking better account of its impact and working to navigate it.

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[1] The selected tools are: path dependence and system lock-ins; connectivity and nonlinearity; and self-organisation and emergence.

Papua New Guinea

The case study province of East New Britain is in Papua New Guinea, a developing country in the south west of the Pacific (see Figure 1, p.57). It has an estimated population of almost 7 million people (B. Allen, 2014) and is one of the most diverse countries in the world – geographically, biologically, linguistically, and culturally (Luker, 2013). Only 12% of the population are based in urban areas, while the majority of people (87.5%) live in widely scattered, heterogeneous rural communities in mountainous regions and remote islands. Many people rely on the informal sector and subsistence agriculture (James, Nadaraiah, Haive, & Stead, 2012). An estimated 40% of the population experiences poverty, with over 90% of the nation's poor living in rural areas (Cahn & Liu, 2008). On the latest United Nations Human Development Index, Papua New Guinea is placed in the 'low human development category', at 157 out of 187 ranked countries (United Nations Development Programme, 2014b, p. 162).

East New Britain

East New Britain (see Figure 2, p.75), is one of five provinces in the Islands region of Papua New Guinea. The province has four districts: Kokopo and Rabaul which are small semi-urban districts, and Gazelle and Pomio which are large rural districts characterised by mountainous highlands and coastal plains (see Figure 3, p.77). There are 18 local level governments (LLGs), serving many villages and hamlets, some of which are among the poorest in the country, particularly in Pomio (Bauze, Morgan, & Kitau, 2009). The population comprises many different cultural groups and is estimated to be around 300,000 people (National Research Institute, 2010). The East New Britain provincial administration vision is: 'to have an educated, healthy and wealthy people living in a socially peaceful and wise community' (East New Britain Provincial Administration, 2011, p. v).

Complexity thinking and thesis contributions

The maternal health care system is investigated using selected concepts from complexity thinking. Systems theories are one large and influential approach to understanding how human societies operate. Human systems are interconnected and the health system and individual health workers do not operate in a vacuum, separate from other social systems. The ability of health workers to provide health care is strongly influenced by, and influences, the institutions, structures and systems within which health workers operate (Bates, Boyd, Smith, & Cole, 2014; World Health Organisation, 2000). Health systems and policy-related interventions are noted by Chapman et al. (2014) to be important contributing factors for maternal health and some of the most critical and neglected areas requiring further research (Kendall, 2015).

The relationships, networks and structures at the organisational level, as well as the context of health workers all affect how they are able to function and their ability to provide health care services. Paina and Peters (2012, p. 367) suggest that to date 'there has been almost no analysis' of the challenges involved in translating research findings and recommendations into health services in developing countries. Further, 'little attention has been given to a micro-perspective which recognises the role of health system actors in governance, or to considering the operational level of the health system' (V. Scott et al., 2014, p. ii59).

This thesis, using tools from complexity thinking, undertakes an analysis of the social systems within which health system interventions are implemented, recognising that causes and effects of interventions are always dependent on a variety of influences. Kuhn (2008, p. 185) proposes that a whole-of-system approach, focusing on interrelated processes, relationships, emergence and self-organisation can enable 'a space for thinking otherwise' about complex systems. This approach can foster a different understanding of the more unpredictable and disorderly aspects of capacity development (Land, Hauck, & Baser, 2009; Ramalingam, 2013). Travis et al. (2004) point out that while systems and health-policy research cannot address all the barriers to improving health services, it can contribute to building knowledge and understanding of health systems in different contexts.

This research makes a contribution to maternal health care scholarship, with the aim of improving the systems providing maternal health care and subsequently improving maternal and neonatal health outcomes. The research additionally contributes to empirical scholarship and policy development from a complexity thinking perspective, focused on international development assistance for maternal and reproductive health programmes.

Key interventions to improve maternal health and reduce maternal mortality are well known. Lule et al. (2005, p. 19) argue that these include complementary and mutually reinforcing strategies such as:

> (a) mobilising political commitment and an enabling policy environment; (b) investing in social and economic development such as female education, poverty reduction, and improvements in women's status; (c) providing family planning services; (d) ensuring quality antenatal care, skilled attendance during childbirth, and the availability of emergency obstetric services for pregnancy complications; and (e) strengthening health systems and community involvement.

This study aims to build knowledge and demonstrate the importance of international development agencies giving greater consideration to intersecting social systems implementing these strategies. By better understanding existing system realities, engaging with a different way of seeing the problem, a

space for new ideas to emerge is offered, which in turn aims to contribute to more effective development strategies to improve neonatal and maternal health, and reproductive health more broadly.

Ramalingam (2013, p. xviii) explains complexity thinking does not offer a 'gleaming toolkit for how to deal with a complex adaptive world'. Rather, the focus is on the potential for solutions and on the new mind-sets needed for seeing solutions. In this way, by revealing the hidden strengths alongside the fragility of systems, development planners and implementers who seek change, can find new and creative ways of looking at issues, tapping into the potential inherent within communities. 'Asking the right questions rather than providing the right solutions' (Ramalingam, 2013, p. 362).

The findings from this research may come as a surprise for some people. East New Britain proudly holds a position as one of the most developed provinces of the country (Errington & Gewertz, 1993). The province has a 'reputation for being a relatively well-run, prosperous and safe province' (Larcom, 2015, p. 78). It is promoted as a tourist destination and the site for national and international meetings, festivals and events (East New Britain Provincial Administration, 2011). In a recent project, the Promoting Effective Public Expenditure (PEPE) project, Howes et al. (2014, p. x) note that East New Britain 'stood out as a top performer, with the most [health] patrols, and highest maintenance levels and proportion of positions filled'. Yet, maternal health outcomes in East New Britain reflect the national rates, with an estimated maternal mortality ratio (MMR) of 733 deaths per 100,000 live births (East New Britain Provincial Administration, 2011; National Statistical Office of Papua New Guinea, 2009). This is very high globally and places Papua New Guinea among the 75 highest-burden countries for maternal deaths (World Health Organisation, 2014c, 2015e).

International evidence suggests that midwifery care or other skilled birth attendance and access to emergency care, when required, are key factors for optimal outcomes for women and their babies (O. Campbell & Graham, 2006; Fauveau, Sherratt, & Bernis, 2008; Filippi et al., 2006; Renfrew et al., 2014; Ronsmans & Graham, 2006). However, while the international evidence is compelling, implementation is context dependent and neither straightforward nor easy in developing countries. Baraté and Temmerman (2009, p. 235) suggest that 'the same strategy cannot be applied in all situations and must be able to respond to evolving environments'. Moreover, it is argued that while there is fundamentally sound national health policy in Papua New Guinea, in the past 'implementation has fallen short of intended objectives' (Bolger, Mandie-Filer, & Hauck, 2005, p. 6). This study contributes to better understanding the system challenges and realities of implementing international recommendations in East New Britain.

It is not my intention to make any claim that individuals are responsible for poor maternal health outcomes in East New Britain or other provinces of Papua New Guinea; the focus of this research is on the collective system implementing international strategies. How health care is provided is more than merely a 'technical area' for the health system and international development, rather, the implementation of strategies, and application of technical knowledge are interdependent and intricately informed by the social system and the context of these development interventions.

Thesis outline

Chapter one has introduced the thesis and the geographical location of the research. It discussed how maternal health intersects with international development and other systems, introduced the research question, and provided the rationale for the research.

Chapter two introduces complexity thinking used in this thesis as an 'exploratory process' (Preiser & Cilliers, 2010, p. 269). It introduces the maternal health care system that I have defined, based on international definitions, for investigation in this research. The system encompasses the health care services, professionals, initiatives and policies designed to provide pregnant women with health care services during pregnancy and birth. The chapter outlines the history of complexity thinking, key complexity thinking concepts, and the specific concepts selected in this research, namely path dependence, connectivity and nonlinearity, and self-organisation and emergence.

Chapter three presents the methodological tools used in this research. It describes the process of conducting the research and considers the interdisciplinary nature of the project, which is informed by international development, midwifery, and complexity thinking. The chapter describes the qualitative case study research approach used and how the research was undertaken. How data were collected, managed and analysed is explored to ensure trustworthiness and dependability of findings. The chapter also considers ethics, limitations of the methodology and my positionality as the researcher.

Chapters four and five introduce the context of the research. In chapter four the country context of Papua New Guinea and the provincial context of East New Britain are introduced. In chapter five, selected literature is reviewed to introduce the global maternal health discourse and recommended global strategies to improve maternal health in the developing world. A final section in chapter five brings together these two contexts, by examining the historical and contemporary responses to maternal health in Papua New Guinea

Chapters six, seven, and eight present the empirical findings. Chapter six uses the complexity thinking concept of path dependence. It analyses the system response to many reports detailing the poor

state of maternal health and identifies a locked-in system position where the status quo is maintained and minimal policy and practice attention is given to improving maternal health. Chapter seven continues the examination using the concepts of connectivity and nonlinearity to look at the implementation of recommendations arising from the Ministerial Taskforce of Maternal Health (National Department of Health, 2009b), specifically focusing on the implementation of maternal health review committees. Chapter eight uses the complexity thinking concepts of self-organisation and emergence to examine the Papua New Guinean interpretation of midwifery and skilled birth attendance. A key finding in this chapter is that minimally trained and largely unsupported health workers, who are mostly women, are working at the lowest level of the health system, typically caring for women in the poorest sectors of the population (Langer et al., 2015). There has been little engagement with the recommendations for universal access to midwifery care or other skilled birth attendance.

The final chapter, chapter nine, presents a summary of the research and its findings, and discusses the implications for development agencies working to improve maternal health. Areas for further research arising from this study for maternal health and development work in the Papua New Guinean context are identified. Finally, I discuss research limitations and offer closing reflections.

CHAPTER Two: Theoretical tools

Everyone shares the blame and the solution to the 'silent emergency' that faces too many women.

Sara E. Davies (2010, p. 403)

Introduction

The broad research question guiding this research is: what are the complexities of implementing international strategies to improve maternal health in developing countries such as Papua New Guinea? In this chapter I introduce complexity thinking, the theoretical framework selected to consider this question. The chapter commences by broadly introducing complexity thinking and exploring its core concepts and tenets. Following this, the importance of system boundaries is explored, and recent empirical research employing a complexity thinking approach is then reviewed to demonstrate the wide application of complexity thinking tools. I discuss a number of challenges posited and offer some responses by examining the ontology and epistemology guiding this project. The complexity thinking tools selected to explore the maternal health care system: path dependence; connectivity and nonlinearity; and self-organisation and emergence are then introduced and defined. Finally, I offer a definition of the maternal health care system and explore how complexity thinking is used to investigate this system.

Complexity theory/complexity thinking

Complexity theory has developed over the past 60 years from interdisciplinary origins such as the natural sciences, biology, chemistry, mathematics, and economics. It has become an umbrella term integrating ideas from ecology and evolutionary biology, chaos theory, cognitive psychology, organisational and behavioural theory, computer science and fuzzy logic, information theory, and general systems theory (Cilliers, 1998; Kauffman, 1993; Waldrop, 1992). Geyer (2003, p. 238) suggests it is 'a simple title for a broad range of nonlinear, complex and chaotic systems theories'. Other authors suggest it is a 'cross-pollination between natural and social sciences' (Kavalski, 2007, p. 450), or 'an emerging approach or framework… a set of theoretical and conceptual tools; not a single theory to be adopted holistically' (Walby, 2007, p. 456).

Complexity theory has been embraced by multiple disciplines resulting in multiple interpretations and many different strands. The literature reflects the multiple interpretations in the wide variety of

terms used, such as complexity science, system science, complexity theory, complexity thinking and others. The different strands share a focus of seeking to understand the dynamics of change and the persistence of continuity within systems. Unsurprisingly, there is no agreement on how to conceptualise, define or measure complexity, and Cairney (2012, p. 352) suggests there continues to be 'terminological and conceptual variation', and little 'agreement about what a complex system is'. In this thesis I have elected to use the term 'complexity thinking', the rationale for this is examined shortly.

Complexity thinking offers a set of diverse theoretical concepts and tools to study complex evolving human systems. It is interested in how systems change and how they remain resistant to change, by exploring both stability and transformation. Cilliers (1998) contends that complex systems change with time as a result of dynamic interactions between different agents within systems. However, change can be subtle or evolutionary; it can be catastrophic or revolutionary, or sometimes barely recognisable emerging from periods of calm enmeshed with gradual iterative change (Guastello, 1995). The range of tools employed helps make sense of existing realities and helps to better understand how systems or institutions change dramatically in some ways, yet remain remarkably stable in others (Ramalingam, 2013; Thelen, 2003).

Complexity thinking seeks to understand systems by better understanding the multiple relationships and interactions between the system components (Anderson, Crabtree, Steele, & McDaniel, 2005), whilst recognising that systems and relationships are shaped by history and by the internal and external environment within which they are embedded (Willis, Riley, Best, & Ongolo-Zogo, 2012). As systems are nested within larger systems and interact with other systems, everything always influences everything else. In this way, complexity thinking presents a way of thinking which is intrinsically different from traditional science (Heylighen, Cilliers, & Gershenson, 2007). However, 'complexity theory does not render past paradigms obsolete. Instead, it goes a step beyond these paradigms while remaining complementary to them' (Chiles, Meyer, & Hench, 2004, p. 501).

Human systems are made up of many actors or agents, functioning within formal and informal institutions, with formal and informal/unspoken rules, social norms, conventions, practices and behaviours which underlie how systems function. Agents exert both normative and cognitive influence, guided by both formal and informal institutions and constraints. Piotti, Chilundo, and Sahay (2006) contend informal constraints can shape how formal institutions or systems act in practice. Who holds the power in a system is determined by the ways that multiple agents within the system relate, respond and communicate with each other. Van Uden, Richardson, and Cilliers (2001) argue that complex systems are incompressible and irreducible, meaning that it is impossible to have a

complete account of a complex system and that they cannot be reduced to distinct identifiable parts. Rather, any examination of a complex system must consider both individual parts and the overall system as a whole (Ramalingam, 2013).

In the social sciences, complexity thinking has developed to become broad and interdisciplinary, sitting across qualitative and quantitative paradigms, and positivist and post-positivist epistemologies (Anderson et al., 2005; Levy, 2000; Lewin, 2000; Wheatley, 2010). Cilliers (2013, p. 29) argues that over the last three or so decades, an interest in complexity thinking has blossomed and increasingly over the past decade empirical work has been conducted in the social sciences, using a 'complexity frame of reference' (Walton, 2014, p. 120). Particularly, in the health care field, there has been a transition from a largely theoretical engagement with complexity, towards its pragmatic application (Sturmberg, Martin, & Katerndahl, 2014). Shani and Mohrman (2012, p. 229) argue that health 'is a complex system with one of the most varied sets of actors of any sector of the economy'.

Complexity schools of thought

Richardson and Cilliers (2001), building on an earlier account (Checkland, 1999), identify three broad, though intertwined, schools of complexity theory: new reductionism; soft complexity; and complexity thinking. The new reductionism school is otherwise known as 'hard complexity science', which seeks to uncover principles of complex systems, which Richardson and Cilliers (2001, p. 5) equate to 'the quest for a theory of everything'. This school is used in physics and other sciences and seeks to mathematically model complex systems in order to reveal simple rules to understand the world. This school of thought has also been termed restricted complexity (Morin, 2007) or simplistic (general) complexity (D. Byrne, 2005) and is consistent with the epistemology of positivist classical science. This school of thought is argued to be problematic and unproductive in the social sciences (Cilliers, 2005; Heylighen et al., 2007) as simple rules cannot account for the complexity of human systems. This is not the application of complexity used in this thesis.

Richardson and Cilliers (2001) describe a second school of thought, known as 'soft complexity', which emerged in the 1970s. Soft complexity sits outside of mathematical modelling or naturalistic science, and uses a variety of metaphorical tools to theorise social systems, such as organisations (Wheatley, 2010) and healthcare (e.g. Kernick, 2006; Plsek & Wilson, 2001; Zimmerman, Lindberg, & Plsek, 1998). D. Byrne (2005) calls this complex (situated) complexity, while Morin (2007) refers to it as general complexity. Soft or general complexity goes beyond mathematical modelling and extends the reach of complexity to the social world (Bousquet & Curtis, 2011). Richardson and Cilliers (2001, p. 7) argue that while the theories of complexity developed for use in the natural sciences are not directly applicable to the social sciences, they can provide language and metaphor to trigger insight into social

systems. Metaphors can be a powerful and important means for generating new knowledge and a way of understanding complex phenomena (Sturmberg et al., 2014). This school of thought is essentially a post-positivist interpretation of complexity (Richardson & Cilliers, 2001). However, soft complexity uses a variety of metaphorical tools to theorise social systems which I have not employed in this thesis; thus while the thesis uses a form of 'soft complexity' in coming from a post-positivist paradigm, it does not use metaphorical tools.

The third complexity school outlined by Richardson and Cilliers (2001, p. 7) is known as 'complexity thinking', which better reflects the conceptual framing in this research. Complexity thinking 'considers the limits of our knowledge in the light of complexity' (Richardson & Cilliers, 2001, p. 7) and attends to the relationships between the whole and the individual parts. Gatrell (2005) explains complexity thinking represents a move away from classical systems approaches. These approaches emphasise stability as the optimum state of systems, and seek prediction and control, in a similar fashion to reductionism and classical science. Alternatively, complexity thinking emphasises explanation and understanding, recognising that environments are dynamic and constantly evolving. It 'views individuals, organisations, populations and environments as interrelating, self-organising, dynamic and emergent; they are messy, unpredictable and small changes potentially have major consequences' (Kuhn, 2009, p. 11).

Kuhn (2009, p. 12) further argues complexity thinking does three things, it 'removes simplistic hopes of an ordered and controllable existence'; provides a way of 'discerning and identifying underlying patterns of order'; and, introduces 'potentiality' (possible future emergences). Kuhn suggests this lens allows for deeper understanding, which unlocks the possibility of harnessing potential to some extent, noting that interventions are themselves likely to generate 'unexpected self-organising behaviour' (p.12).

Preiser and Cilliers (2010, p. 285) propose that while a complexity thinking approach offers no clear-cut solutions, it 'enables a fundamentally critical position'. Knowledge arising from a complexity analysis comes from a 'careful and critical consideration of the dynamic interactions of the components of the system' (Preiser & Cilliers, 2010, p. 285). The knowledge and new insights gained can help development practitioners 'make sense of our existing realities' to enable different conversations and 'new ways of thinking about problems' (Ramalingam, 2013, p. 361), although he cautions this is not an all-purpose panacea to 'fix' problems. Cilliers and Preiser (2010, p. 269) argue it is an 'exploratory process', and that the knowledge generated, 'like all scientific endeavours', may be limited in what it tells us about what to do with the implications generated (Ramalingam, 2013, p. 361).

Basic tenets of complexity thinking

There is broad agreement between theorists regarding the core characteristics of complex systems, and the different tools used. In this section, I discuss Cilliers' (1998, 2013) interpretations, which provide a guiding frame for this thesis. The selected concepts employed in the thesis are elaborated on at the beginning of each substantive chapter. This interpretation focuses on the multitude of richly correlated, interconnected and mutually reinforcing elements of a system, which Cilliers argues is one strength of the theory. Other authors, such as Mitleton-Kelly (2003b)[2], Ramalingam, Jones, Reba, and Young (2008)[3], and Kuhn (2009)[4], have identified similar characteristics and concepts utilising a complexity frame. Cilliers (1998, pp. 3 - 4, italics in original) outlines his ten basic assumptions as follows:

1. 'Complex systems consist of a large number of elements'.
2. 'In order to constitute a complex system, the elements have to interact, and this interaction must be dynamic', furthermore, 'a complex system changes with time'.
3. Interaction in complex systems are rich, 'any element in the system influences and is influenced by, quite a few other ones'.
4. 'Interactions are non-linear. Non-linearity also guarantees that small causes can have large results, and vice versa. It is a precondition for complexity'.
5. Information is received in short range, and proximity is usually important. 'Long-range interaction is not impossible, but practical constraints usually force this consideration'.
6. 'There are loops in the interaction. The effect of any activity can feed back onto itself, sometimes directly, sometimes after a number of intervening stages. This feedback can be positive (enhancing, stimulating) or negative (detracting, inhibiting). Both kinds are necessary.'
7. 'Complex systems are usually open systems, i.e. they interact with their environment. The scope of the system is usually determined by the purpose or the *description* of the system, and is thus often influenced by the position of the observer. This process is called framing'.

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[2] Self-organisation, emergence, connectivity, interdependence, feedback, far-from-equilibrium, space of possibilities, co-evolution, historicity and, time and path-dependence.

[3] Interconnectedness and interdependence, feedback processes, emergence, non-linearity, sensitivity to initial conditions, trajectory in phase space, relevance of chaos and the edge of chaos, adaptive agents, self-organisation and co-evolution.

[4] Phase space – phrase space, communicative connectedness, sensitive dependence on initial conditions, edge of chaos-chaotic edge, attractors and fractality.

8. 'Complex systems operate under conditions far from equilibrium. There has to be a constant flow of energy to maintain the organisation of the system'.

9. 'Complex systems have a history. Not only do they evolve through time, but their past is co-responsible for their present behaviour. Any analysis of a complex system that ignores the dimension of time is incomplete'.

10. 'When we look at the behaviour of a complex system as a whole, our focus shifts from the individual elements in the system to the complex *structure* of the system. The complexity emerges as a result of the patterns of interaction between the elements'.

These 10 basic assumptions underpin the interpretation of complexity thinking in this research. In sum, the research is guided by the notion that social systems are open systems made up of diverse interacting parts that together form the whole (Cilliers, 1998) and that these individual parts have an ability to change and learn (Zimmerman et al., 1998). Components within the system may be added or removed, or interactions between parts of the system may change, however the overall system continues to self-organise to maintain its macro properties with negligible effects on system outputs. The output of a system, therefore, may not be proportionate to the input (Gatrell, 2005). System diversity, roughly matching the system's environment, is important to allow a system to be optimally prepared for any contingency (Ashby & Goldstein, 2011). Complex systems demonstrate stability over time, although they are ultimately dynamic, meaning that they exhibit perpetual change based on the actions and behaviours of the individuals in the system (Kuhn, 2009; Richardson & Cilliers, 2001). Individuals within systems are guided by rules and structures (formal and informal, and sometimes unacknowledged) which regulate individual behaviour and choices. Interactions among the different parts of the system are usually, though not necessarily, local and rich; they can be both informational and material exchanges (D. Byrne, 2005; Cilliers, 2013; Morin, 2007).

This interpretation of complexity thinking highlights how micro-behaviour or individual responses in human systems can lead to macro-level emergent patterns, properties and phenomena which arise at the level of the system. This happens despite the absence of overriding coordination (Maguire, Allen, & McKelvey, 2011; Room, 2015). Keys to understanding the system are contained in patterns of relationships and in the interactions of the system's parts (Anderson et al., 2005), and recognition that relationships and behaviours are shaped by the environment in which they are embedded (Willis et al., 2012). Room (2015, p. 24) additionally suggests that institutions are important as they articulate and constrain agent interaction and behaviour. Research guided by complexity thinking seeks to understand social systems, and explain how they remain static over time or how they change and evolve.

Framing or system boundaries

Cilliers and Preiser (2010, p. 8) argue that in order for systems to function, they must be constrained in some way, stating that 'on the epistemological level (our descriptions of complex systems) as well as the ontological level (the functioning of complex systems in the real world), boundaries are required'. However, in a circular argument, complexity thinking conceptualises systems as possessing 'living' and incorporated boundaries, that is, while boundaries connect the system with its environment, they are open boundaries that are created, maintained and degraded by the system (Cilliers, 2001). Although interactions take place across and between system boundaries (Cilliers, 2002), framing of the system under examination in relation to other complex systems and the environment is required (Cilliers, 1998; Eppel, Matheson, & Walton, 2011; Walby, 2007). This is because, in order to be recognisable as a system, the 'system must be bounded in some way' (Cilliers, 2001, p. 140; Cilliers & Preiser, 2010).

Multiple factors and processes outside the system boundary contribute to the system by forming its environment and these can be labelled as exogenous or external factors (Norberg & Cumming, 2008). However, Cilliers (2000, p. 43) warns that simplifying system boundaries has the potential to omit something and it is not possible to 'predict the significance of what is suppressed'. Cilliers (2001, p. 141), in a subsequent article, explains that:

> we frame the system by describing it in a certain way (for a certain reason), but we are constrained in where the frame can be drawn. The boundary of the system is therefore neither purely a function of our description, nor is it a purely natural thing. We can never be sure that we have 'found' or 'defined' it clearly and therefore the closure of the system is not something that can be described objectively. An overemphasis on closure will also lead to an understanding of the system that may underplay the role of the environment. However, we can certainly not do away with the notion of a boundary.

Likewise, Plsek and Greenhalgh (2001) contend that in complex systems thinking boundaries can tend to be somewhat fuzzy. It can therefore be difficult to specify exactly where the boundary of a complex system lies (Cilliers, 1998, p. 4). Social systems provide a rich and complex use of the concept of boundaries as these systems consist of people. People are simultaneously part of many different systems or groups (such as a family, language, religious, professional, political, social and so on), with multiple sets of intersecting social relations (Walby, 2007). Participation in different groups leads to interactions and influences from disparate sources. Moreover, systems can also be over-lapping and non-nested or nested and integrated with other systems (Walby, 2007). Geyer and Rihani (2010, p. 53) suggest a 'cascade of complexity', where they argue it is important to examine how smaller

systems operate within larger complex systems. Parts of a system may exist in many different locations or be dispersed as a function of the system activity (Cilliers, 2001).

Boundaries in complex systems are therefore confining and separating, although also enabling and productive of exchange between the system and the environment (Cilliers, 2001). It is important that researchers identify boundaries as a way to define the system under examination, its dynamics and the questions that they seek to answer (Heylighen et al., 2007; Riley, 2008). Kernick (2006, p. 387) suggests that while 'it is difficult to determine the boundaries of a complex system', boundaries may be based on the needs and prejudices of observers or researchers, 'rather than the intrinsic property of the system itself'. Cilliers (2002) concurs, and warns that while borders between the system and its environment may be framed by an observer for the purpose of description, the frame must be constrained by the function of the system (Cilliers, 2001, p. 141). Framing, therefore, is not entirely free from relating in an intelligible and verifiable way with perceived reality and a description of the boundaries of the system under examination in this research are discussed shortly.

Empirical research vis-à-vis complexity thinking

Complexity thinking aims to better understand processes of change and the dynamics of stasis in a complex system. Yet, Morçöl (2012, p. xii) suggests that it may not be possible to develop an overarching framework, as such a framework would have to encompass all realms of human experience, including both the natural and social worlds, which is not possible. Alternatively, he suggests that researchers focus on the issues and problems in a particular area to conceptualise their complexity in a coherent manner. Over the past decade there has been a growing utilisation of complexity thinking tools in health systems and development research (P. Morgan, 2005; Sturmberg et al., 2014; Walton, 2014). Curtis and Riva (2010) argue scholarship has moved beyond abstract theorising toward a greater emphasis on empirical applications. Healthcare and healthcare systems are commonly regarded as complex systems and the research base is becoming well established (Anderson et al., 2005; Begun, Zimmerman, & Dooley, 2003; Curtis & Riva, 2010; Plsek & Greenhalgh, 2001; Sturmberg et al., 2014; Trenholm & Ferlie, 2013; Walton, 2014). In this section I review some recently published health and development research demonstrating the range of applications employing complexity inspired approaches.

Complexity thinking can be utilised as a general whole-of-system approach, acknowledging the importance of context, rather than isolating individuals or issues. Using this approach, Signal et al. (2013) explore food security and physical activity among Maori, Pacific, and other low-income New Zealanders. They identify interventions highlighting the importance of the environment while taking account of the views of the community and the concerns of the policy environment. A major focus of

the research was to listen to the voices of less privileged communities and develop interventions using an intentional 'equity filter' (Signal et al., 2013, p. 88). Signal et al. (2013, p. 84) summarise that 'the complex environmental approach used in this research provides a method to identify how to intervene in complex systems that may be relevant to other 'wicked' health promotion problems'.

Hannigan (2013) uses a general complexity-informed analysis to investigate mental health services in Wales. His analysis reveals the interrelationships and tensions running between and within health and social care systems, as well as unanticipated consequences, and the positive and negative impacts of policy changes. For example, introduced system changes prompted experienced professional mental health workers to move away from hospital-based services to newly created community-based teams. This resulted in a significant loss of expertise in the hospital-based service, which provides care for the most complex cases. Hannigan (2013, p. 218) concludes that 'unintended consequences may always emerge, but a service development perspective which pays heed to interdependence and interaction across system interfaces is likely to help minimise these'.

Xiao, Zhao, Bishai, and Peters (2013) use a complexity thinking lens to explore implementation of the essential drugs policy in three counties in China. Data from interviews, policy documents and reports were analysed using complexity inspired concepts. Findings suggest divergent and unpredicted outcomes of policy implementation; adaptive and self-organisational behaviours of key actors; and nonlinear and dynamic changes in the implementation process. Reflecting a complex and unpredictable implementation process, Xiao et al. (2013) note different unintended outcomes in each of the three counties examined, plus self-organising adaptive behaviours and dynamic, nonlinear distribution processes. They summarise that complexity concepts were helpful to identify relevant actors, and their different relationships and divergent policy responses, providing a useful framework to better understand heterogeneous pathways and outcomes.

In Ghana, Agyepong, Kodua, Adjei, and Adam (2012) use concepts from complexity thinking to better understand industrial action that effectively brought the entire health system to a standstill for a decade. They use a case study methodology and mainly secondary data sources such as grey and published literature, policy documents and memoranda, and additionally drew on primary data from observations. Their analytic framework uses systems thinking concepts to create causal loop diagrams. The research findings demonstrate how an introduced policy of paying an additional duty hours allowance to doctors in military hospitals resulted in industrial action across the health sector through a series of unintended consequences and feedback loops. Agyepong et al. (2012) conclude that tools, particularly developing causal loop diagrams, were valuable for researchers and

practitioners interested in capacity building in lower and middle income countries and for strengthening health systems to achieve health goals.

In their London-based longitudinal case study of the inter-organisational 'system' responsible for managing a resurgence of tuberculosis (TB), Trenholm and Ferlie (2013) utilise five aspects of complexity theory: self-organisation, emergence of novelty versus perpetuation of the status quo, nonlinearity, absence of a single, formal leader, and diversity. Their analysis identifies how different teams self-organise, working across and outside of traditional boundaries, providing patient-centred care, well beyond TB treatment. The authors propose that significant emergence arose in response to challenges faced by the different teams. The self-organisation of one team resulted in local innovation and, since 2004, a falling incidence of TB. Analysis reveals nonlinearity showing how significant public expenditure on screening new UK entrants on long-term visas using a port-of-entry X-ray, has had minimal positive impact across the system. Trenholm and Ferlie (2013) conclude that while a complexity perspective offers an interesting framework, it was by itself partial. They additionally use a New Public Management paradigm analysis, which was necessary to incorporate the wider organisational and policy context, and enabled a more robust understanding of the system.

Nugus et al. (2010) undertook interviews and observation at emergency departments in Sydney hospitals. They argue a complexity thinking perspective uniquely accounted for the dynamism of patient trajectories in the context of shifting institutional processes. The authors particularly explore the notion of porous, shifting and negotiable boundaries in health services. Nugus et al. (2010) suggest that the significance of boundary-work was identified using this perspective, focusing on the multiple interactive systems components, rather than examining the different parts in isolation. They further argue that an understanding of linearity and complexity are critical to understanding health service delivery, particularly in relation to dynamic interaction and communication between parts of a system. The authors call for complexity theory to be used in health system research in order 'to be unshackled from traditional ways of categorising and framing' (Nugus et al., 2010, p. 2003).

Tolley (2012), in her doctoral project, uses tenets of complexity thinking to investigate the extent to which the international aid agenda has shaped education in the Solomon Islands and Tonga. She examines development as a complex adaptive system of dynamic, self-organising agents, which co-evolve, allowing certain actions to emerge over others, dependent on the stability of the system and on the initial conditions. Tolley (2012) argues that change was dominated by the agents in each context who self-organised, and co-evolved in relation to associated systems and networks in their environments. She concludes that a complexity perspective was highly flexible, and that the principles

were helpful to reflect on the overall system and to review past initiatives and 'encourages us to refocus our attention' on how change happens in a development context (Tolley, 2012, p. 226).

In another recent doctoral project, de Coning (2012) explores the utility of using complexity as a framework to understand peacebuilding in situations of violent conflict, focusing on the nexus among development, governance, politics and security. Utilising a qualitative, reflective and explorative methodological framework, de Coning undertook document analysis of reports, planning documents, evaluations and so forth, alongside other secondary material. On the basis of the application of the general characteristics of complexity to peacebuilding, de Coning concludes that peacebuilders cannot analyse complex conflicts and design solutions on behalf of local society. Alternatively, he recommends supporting emergence of local processes, subject to continuous refinement and adaptation. He argues that peace is directly linked to, and influenced by, the capacity of society to self-organise in self-sustainable ways. Further, de Coning (2012) suggests that peacebuilders cannot rely on predetermined models or lessons from other contexts, rather interventions have to be considered in the local context, and the effects, intended and unintended, assessed against the societies peacebuilders are attempting to assist. De Coning calls for a significant re-balancing between international influence and local agency in situations of conflict, limiting the role of external agents to assisting, facilitating and stimulating the capacity of local society to self-organise.

The above examples of complexity-inspired empirical work demonstrate considerable diversity in interpretation, methodologies and methods utilised in health and development applications. This diversity reflects what Kuhn (2009, p. 42) acknowledges as a contested discourse, however she makes no apology for this. On the contrary, she argues that the diversity brings richness, depth and informs 'a particular way of seeing' complex systems. This is a strength arising from the collection of ideas, concepts and language, which ensures that researchers thoughtfully engage, refine and build on the ideas inherent in the system under examination. Despite the diversity presented, these studies serve as useful methodological guides and templates for the current research.

Complexity thinking critiques/limitations

A number of scholars have critiqued complexity thinking/theory and in this section I discuss some of these challenges. Pollitt (2009) argues that applying complexity theory/thinking can be problematic because it is, 'for the most part – very abstract and very general' (Pollitt, 2009, p. 211), sporting a wide variety of definitions and interpretations. There are challenges as to whether it is a theory, theories or simply a framework (Heylighen et al., 2007, p. 2; Morçöl, 2012). Pollitt (2009, p. 222) is outspoken in his critique, stating that 'complexity 'theory' may actually be no more than a bunch of descriptive concepts in search of a theory, able to lend itself to a range of alternative theoretical

'stuffings''. He goes on to expound that this may be why there are 'so few clear and testable propositions' as complexity 'theory' is actually a set of descriptive categories, not an engine for generating explanations'.

Specific challenges offered by Pollitt (2009) are that complexity theory neglects power relations, that researchers often fail to clarify and focus on their epistemological basis, and that its concepts are not original. Walby (2007), Morçöl (2012) and Room (2015) agree that complexity theory pays insufficient attention to power. Walby (2007) adds that it additionally neglects the way knowledge is produced in systems and how knowledge is subsequently used. Morçöl (2012) agrees that complexity theory does not sufficiently emphasise social power relations, and fails to offer unique conceptualisation of power, however, he argues that power is not entirely omitted. Morçöl (2012, p. 15) acknowledges that while many of the concepts are not original, he posits that most, if not all, theories are adopted from other theorists, claiming that 'old concepts in new frameworks can help advance our understanding of phenomena'. Many of these criticisms are acknowledged as a part of the history of the complexity thinking lens.

In addition, a number of critics also question the translation of 'hard' science concepts to human systems. Houchin and MacLean (2005), for example, question how the translation 'can account for the intricacies of human behaviour', given the role emotional responses play in human interaction, and the options humans have to interpret, adjust or simply break rules. As discussed previously, the interpretation in this work is not aligned to a 'hard complexity science' school of thought (Cilliers, 2005; Heylighen et al., 2007). Moreover, as identified by Tolley (2012) the flexibility inherent in the different complexity thinking concepts allow for considerable flexibility in examining the intricacies of human behaviour.

Other critics question the value of a complexity theory analysis, arguing it lacks rigour, clear definition, holds little predictive value, can be relativist or is merely a novelty, rather than a detailed way of understanding the world (Gatrell, 2005; Morrison, 2010; Paley & Eva, 2011). Gatrell (2005, p. 2669) argues there are at least three missing 'elements' in complexity scholarship. Firstly, he suggests 'the human voice seems to be missing', arguing that while there are qualitative accounts these omit the nature of the embodied actor and offer relatively little for understanding the lived worlds of communities. Secondly, he questions the absence of gender debates in complexity thinking, arguing it seems to be a 'singularly male enterprise, with women invisible' (Gatrell, 2005, p. 2669). Finally, he suggests that despite assertions of interconnectedness and globalisation, complexity theory fails to engage with the reality that the impact of issues, such as poverty or disease burden, is many times greater for those in the poorest regions of the world. Moreover, issues of power and inequality

appear to be absent from complexity inspired analysis. Walby (2007) rebuts Gatrell's challenge, and argues that complexity theory constitutes an explanatory framework which helps explain the intersection of multiple complex inequalities, including gender, race and class. Walby's scholarship represents the increasing body of feminist scholarship present in complexity literature (Walby, 2003, 2007, 2009).

Ontology and epistemology

This section responds to Pollitt's foregoing critique of complexity theory and outlines the ontological and epistemological position taken in this thesis. Pollitt (2009) rightly suggests that complexity researchers are not in full agreement regarding the epistemological implications of complexity thinking. As Morçöl (2014, p. 11) outlines, many researchers take opposing positions, however they generally agree that the theory offers a different way of knowing. Maguire et al. (2011, p. 8) argue complexity theory represents 'incredible diversity in terms of ontological and epistemological assumptions, levels of analysis, focal phenomena theorised, complexity science concepts harnessed, research methods used, and so on'. Maguire et al. (2011, p. 8) further suggest 'there is no single best way of approaching complexity which, by its very nature, is constituted by competing descriptions from multiple perspectives'. Alternatively, they argue complexity theory's lack of coherence is reflected in its meta-theoretical positions, with some literature suggesting that it draws on both positivist and post-positivist standpoints (Buijs, Eshuis, & Byrne, 2009). In this thesis, I am guided by Bashkar (1997), who argues that complexity thinking has its foundation in critical realism (Callaghan, 2008, p. 401). Within this frame, my interpretation of complexity thinking aligns with post-positivism.

Critical realism holds that individuals and social practices cannot be studied in isolation. Rather, Bashkar (1997) outlines a stratified ontology with three levels: the 'empirical', the 'actual' and the 'real'. The empirical is that which is able to be seen or experienced. Below that is the actual, and while not observable, is regulating the empirical. The final layer is the 'real', hidden but nevertheless informing the actual and empirical. Critical realism acknowledges that effects arising from the 'real' or hidden, can be discerned in the empirical or actual, by being mindful of the generative mechanisms, traced from the actions and behaviours of agents (Walsh & Evans, 2014). Buijs et al. (2009) explains this position enables a balance between an ontology that stresses only contingency and randomness on the one hand and regularities and patterns on the other.

Corresponding to the critical realist ontology, my epistemological position is that perception of reality involves interpretation. From this stance, knowledge of the world is actively constructed by people, rather than being passively received or imprinted. This means that individuals 'construct their interpretations in a particular social context, influenced by practices, language, ambitions, cultural

values, and so forth' (Buijs et al., 2009, p. 42). Kuhn, Woog, and Salner (2011, p. 254) likewise suggest that 'the epistemological explanation of complexity is that reality is spontaneous, irregular, and operating along a continuum from stasis to chaos, rather than inherently stable, orderly, and at equilibrium'.

In contrast to the foregoing criticisms, complexity thinking guided by a constructionist epistemology enables significant explanatory power, as it attempts to explore and elucidate beyond surface level findings, to reveal tendencies that underpin phenomena (Walsh & Evans, 2014). Walsh and Evans (2014, p. e3) explain, the 'constructed' knowledge gained from the analysis of generative mechanisms operating in the social sphere can contribute 'to our understanding of knowledge as power', perhaps even more effectively than positivist or interpretivist approaches.

This epistemological position requires a careful reflexive engagement in the process of constructing knowledge. I heed the warning from Buijs et al. (2009) who argue that while 'knowledge can be formed … all aspects of that formation must be subject to critical reflection'. Finally, this lends itself to a further epistemological assumption of complexity theory that I believe is important to acknowledge, that is, that any knowledge claims regarding a complex system are always partial and provisional. Cilliers (2005, p. 256) cautions researchers of the importance of being 'careful about the reach of the claims being made and of the constraints that make these claims possible'. Buijs et al. (2009, p. 50) conclude, 'to say anything valuable about complex systems and their workings requires both a large amount of detail and a thorough understanding of the contexts'.

Selected complexity thinking concepts

The above examples demonstrate that complexity thinking is a highly flexible theoretical framework that has been embraced by multiple disciplines to better understand processes of change and the dynamics of stasis in complex social systems. In this section, I introduce selected complexity thinking tools utilised in this research, namely: path dependence, self-organisation, emergence, attractors, connectivity, nonlinearity, feedback, and requisite variety. These concepts are used in the substantive chapters that follow, and are discussed in more detail at the beginning of each relevant chapter (Chapters 6, 7, and 8).

Path dependence

Zimmerman et al. (1998) argue it is important to understand complex systems in the context of their history as they are shaped from past decisions and actions. History is an important element in any system as the history of a system will influence future change. Cilliers (1998, p. 122) explains that 'the history of a complex system … is a collection of traces distributed over the system'. In other words,

'the interactions that are taking place at any moment in time have evolved from a previous moment in time, that is, all interactions are contingent on an historical process' (Ramalingam et al., 2008, p. 27). Complexity thinking uses the concept of path dependence to explore the potential reasons 'why things have emerged in the way that they have' (Kuhn, 2009, p. 58). The emphasis is on generating 'theoretical propositions', as an essentially 'interpretive exercise' (Kang, 2014, p. 223).

Path dependence is used to reveal how interactions and events in a system accumulate over time (which denotes non-reversible paths), constrain possible future directions and contribute to system stasis (Agyepong et al., 2012, p. iv21; Crichlow, 2013, p. 563). Exploring the ways that path dependent processes have developed from initial conditions can provide tools to decipher how certain ideas and practices have become irreversibly 'locked in' by feedback mechanisms. A path dependence analysis offers a useful way to understand how the hidden layers of systems contribute to outward behaviours and outcomes of systems.

Self-organisation

Self-organisation is a key concept in complexity thinking. It refers to the ability of a complex system to organise, regulate and maintain itself without an overall controlling agent (Cilliers, 1998). Self-organisation is driven by the actions of individuals within systems in response to the internal and external system environment (Ramalingam, 2013). It is the daily micro-level processes of individual agents making and remaking the world, and involves the sense-making and learning of all agents within a system (Callaghan, 2008; Kuhn, 2009). However, Ramalingam et al. (2008) argue that self-organisation is not only about change, it is also a reflection of resilience in a system, in the face of change. Kavalski (2007) points out that there are two types of self-organisation – adaptation and co-evolution. Adaptation refers to a system's ability to learn and adapt from changes in both the internal and external environments, while co-evolution refers to the capacity of a system to change with the environment. Adaptation and co-evolution are complementary (and often simultaneous) processes (Kavalski, 2007, p. 440).

Morçöl (2012, p. 11) cautions that while the notion of self-organisation connotes self-management, local control and perhaps democracy, it does not preclude hierarchical structures, as self-organising processes can create hierarchical institutions and structures. Institutions reflect 'ideas about the world that arguably come into being through the aggregated and increasingly standardised interactions of people' (Rice, 2013, p. 6). Institutions and self-organisation do not stand outside of one another, but are both part of the same system. Moreover, as analysis of historical patterns reveals, a break-down of institutions and self-organisation can lead to the collapse of societies and civilisations (Diamond, 2005; Morris, 2011; Tainter, 1990).

Emergence

Emergence describes the capacity of systems to evolve in new, unexpected or unpredictable ways in response to challenges arising from self-organisation (Kuhn, 2009; Mason, 2008; Trenholm & Ferlie, 2013). It is the result of individual components in a system making a multitude of small changes, from a variety of inputs. Individual decisions and changes can, collectively, magnify into significant systemic change (Mitleton-Kelly, 2003b). Processes of emergence and co-evolution cannot be predicted and can be described as 'more than the sum of the parts' (Mitleton-Kelly, 2006).

Lichtenstein and McKelvey (2011, p. 343) define emergence as 'a systemic process through which properties and or structures come into being that are unexpected given the known attributes of component agents and environmental forces'. Reflecting the wide range of interpretations in complexity science, which was discussed earlier in this chapter, Goldstein (2011, p. 63) argues that the phenomenon of emergence in complex systems has given rise to different conceptualisations and theoretical underpinnings. These include phase transitions, dissipative structures, far-from-equilibrium conditions, phase space and edge-of-chaos. He suggests, however, that these different interpretations share common characteristics of novel macro-level outcomes arising from the micro-level, which are dynamic in the sense of coming to be over time, and are unpredictable and non-deducible.

Attractors

Attractors are important for understanding how systems tend to behave. They can explain how systems shift and move from one pattern into another (Geyer & Rihani, 2010). Kuhn (2009, p. 60) describes attractors as 'energies that motivate' or the 'organising forces that guide behaviour'. Identification of attractors is a complexity thinking tool that can be used to make sense of emergent properties in systems, to reveal complex unpredictable behaviour or reveal clues of how the system tends to behave (Geyer & Rihani, 2010, p. 38). As attractors change, individual behaviour correspondingly changes, which in turn leads to collective shifts and emergent phenomena (Room, 2011; Walton, 2014).

Connectivity

Complex social systems are comprised of diverse and interconnected agents that interact (Begun et al., 2003; Cilliers, 1998). Understanding interconnections and interactions in a system can provide explanations for overall system behaviour (Begun et al., 2003). Ideas and actions are communicated throughout the system via interconnections. Identifying system connectivity and interdependence can reveal how decisions or actions of agents affect other agents, and in turn how the overall system

functions (Mitleton-Kelly, 2006). System interconnectivity means that there is always motion, and in human systems social, cultural, physical, technical, economic and political dimensions are intricately intertwined and impinge and influence each other (Mitleton-Kelly, 2003b; Ramalingam et al., 2008).

The degrees of connectivity can vary over time and across parts of the system. Systems can appear less than 'system-like in their responsiveness: situation and policies can box them in and facilitate action; constraint can be induced by foreclosing options and severing interconnections' (Jervis, 1997, p. 587). Agents within systems can be tightly coupled or loosely coupled. Ramalingam et al. (2008) suggest that degrees of connectedness can have implications for the ability of systems to absorb change. In tightly coupled systems, relatively trivial changes can spread rapidly and unpredictably throughout the system and have dramatic effects. Conversely, in loosely coupled systems there may be little or no impact. Alternatively, individual elements can influence the system over longer timeframes and in more diffuse and subtle ways.

The interconnectivity of agents gives rise to co-evolution arising from self-organisation as discussed above. Furthermore, individuals are involved in multiple institutions and systems, therefore, creating a 'messy web of many interacting institutions' (Woodhill, 2010, p. 52). As individuals adapt and evolve, they are in turn contributing to, and affected by, a dynamic system with ongoing change (Kuhn, 2009; Miller, Crabtree, McDaniel, & Stange, 1998; Trochim, Cabrera, Milstein, Gallagher, & Leischow, 2006). The pattern or web of relationships is in a continual state of flux in relation to new inputs or changes.

Nonlinearity

Nonlinearity describes situations that fail to demonstrate a direct cause-and-effect relationship. In the real world most situations are nonlinear, so that when change happens, it is frequently disproportionate and unpredictable (Miller et al., 1998). Complexity thinking emphasises the importance of nonlinear change, where a small stimulus or event can create large or rapid change (Walby, 2007). Alternatively, there can be a lack of proportionality between inputs and outputs where significant stimulus or input can fail to initiate any change. That is, outcomes are not proportional to inputs, nor can they be predicted (Eppel et al., 2011). The concept of nonlinearity recognises that in a system of interconnected and interrelated elements subject to feedback, individual action, and unpredictable emergent properties, it is impossible to make direct cause and effect links. Instead, the 'dynamics of change are highly context-specific' (Ramalingam et al., 2008, p. 26).

Feedback

A fundamental idea of systems, taken from cybernetics, is that of circular causality (as opposed to linear) - more commonly known as feedback (Mingers, 2011). Feedback loops are important to recognise, as they can keep a system in a stable pattern or alternatively, change can be initiated by altering the feedback loops (Eppel et al., 2011). Feedback processes occur when individual agents initiate changes which then in turn have a dynamic influence on other agents in the system. Due to system connectivity, as discussed above, these changes mutually feedback to each other in a continually dynamic manner, causing further changes in the system. As economist Brian Arthur argues, 'in the real world, outcomes don't just happen. They build up gradually as incremental, small chance events become magnified by positive feedback' (cited in Waldrop, 1992, p. 45).

Requisite variety or diversity within systems

The concept of requisite variety suggests that, if a system is to survive, the system's internal variety (diversity) should be roughly matched by its external environmental conditions (Ashby, 1956). The performance and resilience of a system depends directly on the diversity of the components, their interactions and ethical values (Preiser & Cilliers, 2010, p. 285). Bokeno (2007, p. 20) suggests a systems environment is 'unimaginably rich with information' and diversity allows this information to be interpreted and exploited. Sufficient diversity allows a system to be optimally prepared for any foreseeable or unforeseeable contingency (Ashby & Goldstein, 2011). Diversity of knowledge or skill within a system can additionally provide a resource for learning and innovation, allowing the system to adapt. Heylighen et al. (2007, p. 124) argue that 'the greater the variety of perturbations the system has to cope with, the greater the variety of compensating actions it should be able to perform'. Without such variety, a system may be unable to adapt, meaning regulation will fail and the system is likely to be out of control.

These tools are particularly suited to health care and international development research as these involve complex human systems. The tools collectively offer different ways to reveal and elucidate the system under examination, to make known unknown aspects and glean insights into how strategies to improve maternal health interact with the existing systems. Kernick (2006, p. 387) explains, however, that in attempting to understand a system by reducing it to its parts, the analytical method risks destroying what it seeks to understand. The tools presented here highlight the variety of possible multifaceted lenses that can be drawn on to allow insight into aspects of human systems. Careful selection of the appropriate tools allows considerable flexibility and cognitive agility to aid in the 'sense-making' of the each unique system, revealing change from different angles and on a number of fronts (Kuhn, 2008).

Clarifying my theoretical position

The view of complexity thinking taken in this thesis concurs with Hannigan (2013, p. 217) who is 'in favour of using a broad-based complexity approach, in heuristic fashion, in the service of an empirical examination'. The selected complexity concepts are used to foster reflection and create 'a space for thinking otherwise' (Kuhn, 2008, p. 185) about the system implementing international strategies to improve maternal health in the selected case study province. I am broadly guided by Cilliers' (1998) basic assumptions and the empirical research introduced above, as well as by the complexity thinking derived concepts introduced in this chapter.

Specific complexity tools selected to explore the maternal health care system are: path dependence to reveal continuing aspects of historicity; connectivity and nonlinearity to examine the impact of the Ministerial Taskforce on Maternal Health (National Department of Health, 2009b); and self-organisation and emergence to better understand the impact of institutional structures, concurrent individual agent action, and systemic interpretations of midwifery. Each of these concepts is further discussed in the appropriate chapters that follow. The selected complexity thinking concepts are used as thought-provoking tools to examine and gain insight into the maternal health care system in East New Britain. This is an exploratory process (Preiser & Cilliers, 2010, p. 285) which offers the potential to identify alternative solutions and different ways of working with the web of interacting institutions and people concerned with protecting the health of women and babies during childbirth.

As discussed previously, it is important to explicitly frame the boundaries of the system under examination, with the proviso that this may introduce distortions. Boundaries are used to identify the focus of the research with the acknowledgment that 'each system takes all other systems as its environment' (Walby, 2003, p. 3) and does not imply any universal or absolute reality or truth. The provision of maternal health care, in any setting, has neither physical nor spatial boundaries. Moreover, maternity care is not recognised or defined as a system per se in Papua New Guinea. Indeed, in no context is health 'a stand-alone phenomenon with clear boundaries' (Pourbohloul & Kieny, 2011, p. 242). Rather, the boundaries within and across sub-systems are porous and negotiable, reflecting interdependence within and across the external environment (Hurst & Zimmerman, 1993).

In order to constrain and frame the investigation in this research, I have defined the 'maternal health care system'. This system includes skilled health workers delivering maternal health care services to women and their babies' during pregnancy, labour and birth, until six weeks postpartum. This includes routine health care and acute/emergency care related to the physiological process of pregnancy and childbirth. The system includes mangers at health facilities, health sector

administrators at local level government, district and provincial administrations, and national level advisors and planners. It encompasses educators and development workers, as well as the policies, structures and institutions that form the structural components of the system. This framing does not encompass all possible contributing factors impacting on maternal health outcomes. What it provides is a 'fit-for-purpose' definition (van Olmen, Criel, et al., 2012) to guide the exploration of this research. As this thesis investigates the implementation of skilled birth attendance (defined and discussed in chapter five) it does not include informal care given by family members, lay health workers and others, such as village health volunteers or village birth attendants. The focus in this research is on the formal health care system, related to the implementation of midwifery care or other skilled birth attendance.

This framing is congruent with framing proposed in the literature. Rowland, McLeod, and Froese-Burns (2012, p. 12), for example, define a maternity care system as 'the services, healthcare professionals, initiatives, policies and infrastructures designed to provide the care pregnant women need to safely give birth to healthy babies'. Likewise, the international maternal health discourse, as discussed later in chapter five, frames maternal health as a distinct component of the broader sexual and reproductive health and rights agenda (United Nations Population Fund, 2008), distinct from other health care services.

Chapter conclusion

This chapter has explored complexity thinking as the theoretical framing which guides the research. Adam and de Savigny (2012, p. iv1) explain that complexity thinking provides an approach that:

> appreciates the very nature of complex systems as dynamic, constantly changing, governed by history and by feedback, where the role and influence of stakeholders and context is [sic] critical, and where new policies and action (of different stakeholders) often generate counterintuitive and unpredictable effects, sometimes long after policies have been implemented.

I have introduced complexity thinking using selected complexity thinking tools and briefly defined the maternal health care system investigated in this thesis. In the following chapters I build on the system and the concepts used. The selected tools are used as a way to examine and explore 'the social systems within which interventions are implemented' (Walton, 2014, p. 119) to improve maternal and neonatal health outcomes. Considering interventions and strategies for improving maternal health from a critical complexity thinking perspective may enable the generation of new insight, including a better understanding of how specific strategies are interrelated as they form part of, and

are mutually influenced by, the larger whole. Insights into how the individuals in the system act, the decisions they are able to make, and what guides their behaviour and actions can reveal how the overall system adapts and evolves in response to its environment (Cilliers, 2001, p. 143). New insights generated by this examination, in turn, may reveal ways the system supports or inhibits provision of effective health care for women and their babies. The next chapter explores the methodological tools employed to undertake the research.

CHAPTER THREE: Methodological tools

> For what you see and hear depends a good deal on where you are standing: it also
> depends on what sort of person you are.
>
> C. S. Lewis (1955), *The Magician's Nephew*

Introduction

Undertaking research involves making decisions at every stage (Bryman & Bell, 2011). In this chapter I describe my decision making and how I grappled with inevitable tensions that arose during the process of conducting this research. The study draws on a range of disciplinary perspectives and it is important to explore the different perspectives as they impact on myriad decisions, such as the research strategy, design and methodology (Henn, Weinstein, & Foard, 2006, p. 19).

The chapter begins with a discussion of the discipline of development studies, the academic location of this work. It then revisits the ontology and epistemology. Next the research strategy, design and methods are discussed, including data collection tools and analysis, followed by consideration of ethical issues, research limitations, challenges and other issues. I conclude with some thoughts on positionality and reflexivity.

International development research

Deliberate processes to 'develop' the 'Third World' began following the second world war in the context of decolonisation, as former colonised countries sought independence and a new world order was emerging (Escobar, 1995, 2012; Rist, 1997). Although, these processes had roots in 'deeper historical processes of modernity and capitalism' (Escobar, 2007, p. 18), according to Rist (1997, p. 4) this was the commencement of the 'age of development'. It offered 'a new way of conceiving international relations' (Rist, 1997, p. 72) and was the genesis of international institutions and policies focused on alleviating poverty and improving living conditions for the world's poor. During this period, the discipline of 'development studies' as a discrete social science research area emerged, focused on the generation of development-related research (Scheyvens & McLennan, 2014).

Since the emergence of the development era, ideas about how to achieve development, who should be responsible for directing social change, and exactly what constitutes 'development' have been subjected to 'considerable confusion' and 'divergent conceptualisation' (Sumner & Tribe, 2008b, p. 10). Scholars such as Escobar (1995, 2012), Esteva (1992), Ferguson (1994), and Sachs (1992) have critiqued the way development has been conceptualised. Sumner and Tribe (2008b, p.12) argue it can

be conceptualised as 'a long-term process of structural societal transformation' (p.12); as 'a short- to medium-term outcome of desirable targets' (p.13); or as 'a dominant 'discourse' of Western modernity' (p.14). The study of development is often concentrated on developing countries, although there is poverty and wealth in every country and therefore development studies extends beyond developing countries to encompass a wide array of various aspects of change in all human societies (Sumner & Tribe, 2008b).

Development studies is a 'discourse characterised by a great diversity of perspectives and views, knowledge and research processes' (Sumner & Tribe, 2008a, p. 751), and is intimately connected with multifaceted elements of social change. It represents cross-disciplinary scholarship, and involves interdisciplinary and multidisciplinary approaches, which require the cooperation of specialists from different disciplines (Harriss, 2002; Hulme & Toye, 2006). While initially dominated by economists and economic thinking, development studies now crosses disciplinary boundaries (Qizilbash, 2006; Ramalingam, 2013; Sumner & Tribe, 2008b) and is inclusive of social sciences disciplines, such as sociology, anthropology, and political science, which all have an important role 'as equal partners in development studies and development policy' (Kanbur, 2002, p. 477). Development studies research encompasses researchers with specialised technical knowledge, who can offer in-depth understanding and contribute to more effective policy development. Of importance to the current research, Sumner and Tribe (2008b, p. 2) specifically suggest that areas such as health, agricultural and environmental research clearly involve the need for researchers with disciplinary specific technical knowledge.

Interdisciplinary work brings together researchers who contribute individual disciplinary knowledge to a collective research project or goal, with the aim of producing greater insight (Castan-Broto, Gislason, & Ehlers, 2009). The researchers bring 'norms, conventions and rules of their own discipline(s) to the interdisciplinary research' (Castan-Broto et al., 2009, p. 15) and work collaboratively to share norms and conventions with other disciplines; as well as engage with criticisms. This process, the authors warn, may not always be rewarding or effective. In my experience working cross-disciplinary has not been without challenge, but it has given substantial opportunities for learning and rewarding exchange.

While there are professional incentives to remain within comfortable disciplinary confines (Hulme & Toye, 2006), the result of interdisciplinary research can be a 'fruitful interaction between disciplines' (Castan-Broto et al., 2009, p. 15) and produce new insights. Henn et al. (2006, p. 3) argue that the primary motivating force driving people to undertake research 'is the pursuit of knowledge', although the process reflects a constant negotiation of strategy (Castan-Broto et al., 2009; Henn et al., 2006, p.

2). Importantly, the integrity of interdisciplinary research rests on the contributing disciplines retaining discipline specific integrity as a reference point, alongside openness to critique (Castan-Broto et al., 2009). Harriss (2002, p. 494) adds that 'the case for cross-disciplinary work in studies of international development is a strong one … because research priorities should be set by the practical problems that development involves, more than by the puzzles that are generated out of theoretical speculation'. In this work, I bring my discipline specific midwifery knowledge to the broader field of development studies, and the very real problem of poor maternal health in the developing world.

The focus of this research is on integrating the knowledge of how to improve women's health outcomes during pregnancy and childbirth with the broader aims of international development. The issue of poor maternal health in the developing world has been called 'the greatest unsolved public health issue of our time' (Foster-Rosales, 2010, p. 279) and acknowledged as 'an intractable problem that has defied every effort to solve it' (Grady, 2010). Although, as the discussion in chapter five detailing the global maternal health discourse argues, not nearly enough effort has been made to address the issue. To contribute to scholarship in this area, this research draws on the benefits of interdisciplinary work, encompassing knowledge derived from the positivist framework of medicine, the broader discipline of midwifery, as well as drawing on more interpretivist approaches arising from the social sciences. This aligns with both a development studies frame, and with the midwifery philosophy which I bring to this work as a registered midwife. My midwifery philosophy embraces and utilises knowledge drawn from both positivist and interpretivist approaches, and strives to enhance and protect the normal processes of pregnancy and childbirth, while keeping women at the centre of care. This philosophy is outlined by the New Zealand College of Midwives (2015, p. 3), which states:

> Midwifery is holistic by nature: combining an understanding of the social, emotional, cultural, spiritual, psychological and physical ramifications of women's reproductive health experience; actively promoting and protecting women's wellness; promoting health awareness in women's significant others; enhancing the health status of the baby when the pregnancy is on-going. Midwifery care is given in a manner that is flexible, creative, empowering and supportive.

The New Zealand philosophy is supported by the International Confederation of Midwives core documents (International Confederation of Midwives, 2014b, p. 2). The philosophy guiding my professional role aligns with my selection of development studies as the base of my academic pursuit to actively promote and protect women's wellness, and contribute to improving maternal health in the developing world. Furthermore, I concur with the increasing scholarship from midwifery, arguing for a shift in the delivery of maternal and newborn care away from pathology towards a women-

centred, whole-system teamwork approach (Renfrew et al., 2014; Soltani & Sandall, 2012). Walsh (2010, p. 7) argues strategies to address the problem of unacceptable rates of perinatal and maternal mortality and morbidity, 'have to be more than replicating high-tech western-style maternity hospitals'. Midwifery brings a unique perspective to this aim, recognising the centrality of women in maternity care, alongside the judicious use of biomedical tools when normal physiology deviates and intervention can preserve the lives of women and their babies.

In approaching this research, I sought to find a research frame that would allow me to investigate the devastating and intractable issue of maternal mortality in developing countries, such as Papua New Guinea, more broadly than through a narrow biomedical positivist frame or solely from a midwifery practice perspective. While I was mindful that the frame needed to encompass my midwifery perspective, I felt it was important to take a wider lens, as midwifery does not stand alone from society. Castan-Broto et al. (2009) suggest that the increase of interdisciplinary research can be attributed to a turn away from reductionist approaches such as biomedicine, as a response to the challenges of an increasingly complex world. Ramalingam (2013, p. 193) likewise offers that interdisciplinary approaches often extend beyond what a scientific approach permits. Furthermore, interdisciplinary research is a way to refine tools for practical results.

Taking development studies and midwifery into the research

With these considerations in mind, I selected the discipline of development studies as the academic home and complexity thinking as the theoretical framework to guide this research. Complexity thinking, as presented in chapter two, like midwifery and development studies, is broad and orientated towards interdisciplinarity, so much so that McKelvey (1997, p. 371) suggests complexity oriented work represents the 'ultimate interdisciplinary science'. A complexity epistemology seeks to understand complex phenomena 'as part of a fabric of relations' and 'supposes a fundamental non-simplicity of studied phenomena' (Alhadeff-Jones, 2008, p. 68). It sits across multiple disciplines, and is flexible, enabling researchers to draw on different paradigms (Anderson et al., 2005; Levy, 2000; Lewin, 2000; Wheatley, 2010).

As discussed in chapter two, the interpretation of complexity thinking taken in this work is one of critical realism. This position marries 'a realist ontology with a constructionist epistemology' (Walsh & Evans, 2014, p. e5), enabling the examination of phenomena from multiple perspectives, including an exploration of underlying influences that contribute to surface behaviours. A constructionist epistemology holds that there is no one truth or reality, rather meaning is socially constructed by individual people and groups (Gray, 2013). Taking this approach, as described by Etherington (2004, p. 21), enables a way to 'begin to deconstruct fixed beliefs about … power and invite other ways of

thinking', challenging dominant constructions. Using a social constructionist epistemology does not require privileging one type of knowledge over another; rather, it embraces and values multiple views, realities and discourses (Gergen, 2011).

This section has identified the early stages of the research journey. It notes the framework of interdisciplinarity with development studies as the academic home of the project, enmeshed with midwifery and complexity thinking as guiding frames. Acknowledgement of these factors is important as they contribute to the lens I bring as the researcher to myriad research decisions and the literatures utilised to explore and understand the maternal health care system in East New Britain, Papua New Guinea. As Dahl and Boss (2005, p. 65) contend, 'as researchers, we are not separate from the phenomena we study' and being up-front about these attributes contributes to the methodological rigour of this study. The next section examines the more specific details of the research.

Research Approach

Qualitative research

This study was undertaken using an interpretative, qualitative case study design. Qualitative research is a complex and evolving field with many definitions. It embraces a wide array of approaches, methods and techniques, based on an equally wide array of theoretical perspectives (Ormston, Spencer, Barnard, & Snape, 2013). Corti and Thompson (2006, p. 297) suggest the goal of qualitative research is 'to capture lived experiences of the social world and the meanings people give these experiences from their own perspectives'. Denzin and Lincoln (2011, p. 3) suggest qualitative research can be described as:

> a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings and memos to self.

Researchers then take these perspectives as a starting point to make sense of or interpret phenomena (Ormston et al., 2013). Liamputtong and Ezzy (2005, p. 2) further argue that qualitative research is dependent on the creativity and insights of the researcher(s) undertaking the project, who must 'find the best way of studying how meanings and interpretations are constructed in their particular substantive research area'.

Case Study

Case studies utilise multiple data sources and techniques for explanatory and/or descriptive examination (Crowe et al., 2011; Yin, 2014). Case study is a good fit with complexity inspired research as a way to identify links between case characteristics, provide a rich picture of a particular situation and contribute to empirical analysis and theory building (Anderson et al., 2005; D. Byrne, 2009; Trenholm & Ferlie, 2013). Case study methods are particularly important for interdisciplinary work (D. Byrne, 2009), such as those exemplified by health studies and development studies. Yin (2014) suggests case studies can help answer questions of how or why things work in real life contexts. They offer an opportunity to study specific phenomena and experiences in a particular context, to identify a holistic and real-world view of factors facilitating or impeding improvement, which in turn informs the development of robust theory (Baker, 2011; Yin, 2014).

A case study approach can employ a variety of data sources, such as documents, archival records, interviews, direct observation, participant-observation or physical artefacts (Yin, 2014). In this study, I elected to undertake in-depth interviews, direct observation, and document analysis of health policy and literature. I selected these tools to reveal the perspectives and understandings of the people working in the maternal health care system, and to reveal hidden aspects, such as decisions around resource allocation and change processes. Interviews were undertaken across the system capturing the perspectives of a wide array of system agents. Direct observations were carried out in health facilities and at health management meetings.

Undertaking the research

One of the first questions asked when I share that I am undertaking research is why I chose Papua New Guinea. Ideally I could share a history of personal connection; however, prior to this research I had little prior connection or history. What I did have were friendships with Papua New Guinean women who had undertaken post-graduate study in New Zealand, and professional midwife/woman relationships with women from other developing countries who shared their experiences of childbirth in those places, alongside a personal passion for social justice and women's right to access reproductive health care. Papua New Guinea was selected for these reasons, and because it reports the highest rates of maternal mortality in the Pacific and is a recipient country for New Zealand ODA[5].

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[5] New Zealand is noted as an important development partner by the Government of Papua New Guinea (2015). Between 2012 and 2015, Papua New Guinea received approximately 8% of New Zealand's bi-lateral aid (New Zealand Aid Programme, 2015).

To begin the research process, following an extensive review of the literature, in late 2012 I undertook a two-week research scoping trip to Port Moresby, Papua New Guinea. The aim of this trip was to ensure I was comfortable working in the context and that my research would be welcomed. I arranged informal meetings with a wide variety of people to narrow the research focus. During this trip I received reassurance and support to continue with the project. I also took the opportunity to learn the formal processes for undertaking research in Papua New Guinea, which included gaining ethical clearance from the Papua New Guinean Medical Research Advisory Committee (MRAC), securing a research visa, gaining provincial support, and gaining approval to access individual health facilities[6] (Government of Papua New Guinea, 2012).

Following this visit I was able to clarify my research question, complete the research proposal, apply for ethics approval from the University of Auckland Human Ethics Committee[7] and from MRAC[6] (a discussion of ethics follows). Importantly, in order to fulfil the MRAC requirements, I was required to nominate the selected province and gain provincial support. The selection of a province was an important process and as an outsider researcher somewhat challenging. As a starting point, I made links with other health professionals in New Zealand who were interested in Pacific reproductive health, by joining the Pacific Society for Reproductive Health (PSRH) and attending the PSRH biennial conference in Samoa, July 9-12, 2013.

The PSRH is an international non-government organisation (NGO) for medical practitioners, midwives and nurses, family planning workers and other health professionals, with a special interest in reproductive or neonatal health care working in Pacific Island countries. The inaugural meeting was held in Vanuatu in 1995 and the society aims to encourage and contribute to the professional development of health care workers and advocates for the improvement of women's health (Pacfic Society for Reproductive Health, 2015). I was able to join the PSRH and attend this conference as a health professional. However, first and foremost, I attended as a researcher and sought to establish relationships and identify a case study province. As a novice researcher, this was an important scoping exercise and learning process. At the conference I was delighted to meet and receive support from Papua New Guinean participants, including Mary Kililo from the National Department of Health, Maria Posanek a midwife and midwifery leader in East New Britain, and Professor Glen Mola, a long-time champion for reproductive health and an obstetrician from the University of Papua New Guinea. I was also supported and encouraged by Australian development workers working in Papua New

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[6] See letters of approval, Appendix One.

[7] Ethics Approval Ref. 8871, Appendix Three.

Guinea, including Professors Caroline Homer and Pat Brodie from the University of Technology, Sydney. It was reassuring and important to receive this support for my project.

As a result of this networking, and the guidance received from my research supervisors, East New Britain was selected as the case study province. The choice of East New Britain perhaps stems from what has been identified as a possible bias in development studies research - the selection of location based on the needs of the researcher (Sumner & Tribe, 2008b) or a spatial bias (Chambers, 2006)[8]. In the case of this research, selection was based on the invitation and welcome I received from Maria Posanek, a midwifery leader in the province. I was also reassured that it is a relatively safe province, allowing me ease of movement as a solo woman researcher. Following the conference, I sought the support of the East New Britain Provincial Health Advisor[9] and was able to secure MRAC approval, which I received in September 2013. Following a visit to the Embassy in Wellington, and with the assistance of a colleague based in Port Moresby to gain a further signature on a form to accompany my visa application, I was granted the necessary research visa.

With all required documentation and approvals in place I was able to commence fieldwork. Using complexity thinking, a system orientated approach meant it was important that I carried out fieldwork in both the case study province and, in order to explore national policy processes, in the National Capital, Waigani, Port Moresby. As it transpired, the extended process for gaining the necessary approvals necessitated splitting fieldwork into two trips as it brought my proposed research travel in line with the Christmas shut-down period. Fieldwork was therefore undertaken over two trips – in late 2013 to East New Britain Province, and in May 2014, split between East New Britain and Port Moresby. In retrospect, the necessity to undertake a second trip was fortuitous as it split the transcribing and enabled initial engagement with the data. The second trip also afforded an opportunity to interview two participants who were unavailable previously and to conduct repeat interviews with five participants. In total, fieldwork was carried out over 14 weeks - 12 weeks in East New Britain (10 weeks in 2013 and two weeks in 2014) and two weeks in Port Moresby (May 2014).

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[8] I return to this discussion in the limitations section below.

[9] I identified the Provincial health advisor with the assistance of Associate Professor Chris Bullen from Population Health, University of Auckland and approached him using an electronic communication platform (Linkedin).

Research methods and participants

Interviews and observations were undertaken across both government and church-based health care facilities. I interviewed health workers at 13 different locations in all four districts[10] of East New Britain. Facilities included the provincial hospital, four district/rural hospitals, five health centres, two urban clinics and one community health post. Health management participants came from management roles at health facilities, local level government, district administration and provincial government including the provincial health office and from the National Department of Health. I also interviewed participants from local and international research and development agencies and education institutions.

In total 68 people contributed to the research through participation in 74 formal one-to-one semi-structured interviews. Many others contributed to building my knowledge and understanding through informal conversations and countless hours of observation in health facilities. Participants came from across the maternal health care system and from different professional roles, including midwives, nurses, community health workers (CHWs), health extension officers (HEOs) and doctors (health workers, n = 38), health managers/planners (n = 22), educators (n = 7) and one health researcher. Five people did not respond to invitations to participate.

Participants were women (n = 50) and men (n = 18) who ranged from 24 to 60 years old, with an average age of 37 years. Some were parents and grandparents, others had not had children; some were married, some single or separated; several participants had travelled overseas, others had never had the opportunity. Some participants did not share their tribal or provincial affiliations or other personal details. Many participants (n = 24) identified as belonging to the dominant indigenous group in East New Britain, the Tolai. There were also participants from other East New Britain indigenous groups (including from the Mengen and Lotes groups in the Pomio district) and from other provinces throughout Papua New Guinea including West New Britain, New Ireland, Manus, East Sepik, Bougainville, Central, Madang, Morobe, Enga and other provinces of the highlands.

Several participants (n = 7) were development workers from Australia, New Zealand, England and India. These participants were health professionals and/or educators and/or health managers with a knowledgeable outsider perspective of the maternal health care system, several having worked in Papua New Guinea for many years. During the process of data analysis and writing I reflected on how to identify these participants in order to ensure confidentiality and that their perspectives were

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[10] Kokopo, Rabaul, Gazelle and Pomio.

recognised as non-indigenous. After reflection, I made decisions based on maintaining confidentiality, to the best of my ability, whilst ensuring the impact of the extracts were preserved. As much as possible, I have ensured findings come from indigenous voices. I have avoided favouring the non-indigenous view throughout analysis and writing, and have used these voices cautiously. However, I acknowledge the analysis is mine alone and that I bring my perspectives from the lens of development studies as a 49-year-old New Zealand woman of European descent, with midwifery clinical, professional and teaching experience. The research is framed by complexity thinking concepts which have enabled me to think deeply about the system and reveal connections among the information drawn from different sources.

I interviewed five people more than once in order to revisit ideas and seek clarification of their responses. Knox and Burkard (2009) suggest that multiple interviews may foster a stronger relationship between the researcher and the participant enabling the building of trust, resulting in increased disclosure. In my experience, revisiting participants did bring a sense of increased trust and collegial sharing. The repeat interviews were helpful for clarification and to deepen my understandings of participant perspectives.

The interview data includes a small number of impromptu group interviews that spontaneously emerged during the course of observations in health care settings. These informal group interviews were generally prompted by curiosity at my presence at the health facilities. In general people were warmly welcoming and curious as to why I was at their place of work, and once I had shared my participant information sheet and made introductions, they were keen to share their views and practice realities. I took these opportunities as they arose, while being mindful of ethical practice and sought permission to use the information shared during these 'coffee break' exchanges. The exchanges were important as they allowed me to observe the relationships between participants (Liamputtong & Ezzy, 2005).

Trustworthiness and dependability

Qualitative research has been criticised as being open to bias and subjectivity (Cohen, Manion, & Morrison, 2000), therefore it is important to address the trustworthiness and dependability of the research findings. Triangulation refers to the use of more than one approach to enhance 'greater confidence in findings' (Bryman & Bell, 2011, p. 397) and 'develop a complex picture of the phenomenon being studied' (Liamputtong & Ezzy, 2005, p. 41). Triangulation in this research comes from the use of different methods of data collection, including interviews, unstructured observations of day-to-day interactions between health workers and women at health centres and hospitals and analysis of published and grey literature including policy documents and other secondary sources.

Observations

Observations of clinical exchanges and care provision, and administrative processes, were carried out with consent, and participants knew that observations were being made and who was observing (de Laine, 1997, p. 144). Observations were unstructured (Bryman & Bell, 2011, p. 272), meaning I did not follow a particular schedule; they involved interacting with and observing participants who were undertaking routine day-to-day activities in health care facilities or at health sector meetings. Some observations were with health workers who did not participate in subsequent interviews. I handwrote field notes to record what I observed of the activity, interactions and relationships. At the health facility level, observations generally involved women attending antenatal clinics, emergency care during pregnancy, or during labour and birth. I observed many instances of shift hand-over between health workers - morning shift/afternoon shift, and between night shift/morning shifts. In one instance I was able to observe an afternoon/night shift handover and half of a night shift. Observing across all shifts is important in health care settings, as clinical care happens throughout the 24-hour period. Night shift can bring unique care challenges and is known as a confounding factor in emergency care management, due to health worker fatigue, and the admission of patients in a more critical condition due to transport challenges and less availability of medical staff (Muecke, 2005; Peberdy et al., 2008).

I was invited to observe a maternal and child health (MCH) village outreach patrol, where nurses and CHWs provide child health screening, immunisation and growth monitoring. I observed two general outpatient clinics, one offered at a remote health centre by a nurse/midwife and another run by CHWs, nurses and a HEO at a district hospital. At the health management level, I observed two meetings at health facilities and two national meetings.

Interviews

Semi-structured Interviews were the most important means of data collection. Interviews are a widely used data collection tool in qualitative and case study research. In qualitative research interviews can be approached in many different ways, from 'structured interviews characteristic of survey research methods at one end and completely unstructured, conversational interviews at the other' (Liamputtong & Ezzy, 2005, p. 56). Knox and Burkard (2009, p. 572) suggest that an 'interview is a planned conversation to collect data, intended to be carried out in a similar manner with all participants'. In this manner, I employed a semi-structured interview approach guided by an interview schedule to ensure I covered a similar range of ideas and questions with each participant. However, interviews were largely participant-led and I actively encouraged participants to talk from their perspective (Bryman & Bell, 2011; Liamputtong & Ezzy, 2005) about maternal health care, their role in

the maternal health care system, and their perspective of strategies employed to improve maternal health. Participants were encouraged to share what they saw as relevant and important, generating rich responses (Bryman & Bell, 2011). Interviews were a conversation, meaning they were flexible, participant-led and context dependent. Each interview was unique: some very brief, while others longer; some were more formal and others had less structure. Interviews were undertaken at the convenience of the participant and this often meant they took place at the participants' place of work, in a private setting away from clinical or other work, or some took place in offices. The interview guide evolved as the fieldwork progressed and my thinking evolved as I worked with the data. I aimed for a semi-structured approach, however I was mindful of gaining a genuine understanding of the maternal health care system, from the perspectives of the participants (Bryman & Bell, 2011).

Document analysis

During analysis I drew on reflexive field notes, policy documents and other documentation, comprising LLG development plans, annual reports, and daily newspapers[11]. Multiple forms of data were collected to ensure trustworthiness and dependability of the findings. Analysis and conclusions have been drawn from a variety of sources. Buijs et al. (2009, p. 54) warn that researchers using complexity concepts particularly seeking to studying the concept of co-evolution, 'cannot base their work exclusively on interviews'. They argue that in order to ensure data goes beyond the 'self-conscious meaning-making of actors', researchers must use multiple methods including observation, document analysis, time series analysis, and so on, to complement information gathered from respondents. Buijs et al. (2009) further suggest that as actors and systems are influenced unconsciously, it is important to pay attention to subtle influences to trace patterns evolving within systems. This was certainly drawn out in my observations, as on a number of occasions observations appeared to be inconsistent with what participants shared during interviews, confirming the importance of observing actual day-to-day activities and clinical exchanges.

Data management and analysis

All interviews were conducted in English and data was digitally recorded. Verbatim transcription of interviews was commenced during fieldwork and completed on my return from the field. I transcribed all interviews while concurrently commencing the process of analysis. During transcribing and writing, in order to make quotes easier to read, pauses and breaks were omitted, sentences combined, and

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[11] See Appendix Two for list of documents collected during fieldwork.

other minor changes made, such as removing repeated words or filler words (um, ah, 'you know', like) ensuring that the meaning of the narrative was preserved. Hand written observations and field notes were reviewed and reflections noted. All data were converted to text and uploaded to NVivo (QSR International Pty Ltd, 2014), a data management tool. I approached data analysis several times, reviewing the theoretical framework guiding analysis, and returned to the literature to seek guidance on the process.

Qualitative research is known to generate large amounts of rich textual material and there is a lack of agreed concise 'rules' for analysis (Bryman & Bell, 2011). At the completion of transcription, the data corpus was a little over 1000 pages of text, comprising interviews, observations, and field notes, plus policy documents, grey literature, and secondary sources. Having assembled the data corpus, I examined my process for interpreting and understanding this somewhat overwhelming volume of material.

Abductive reasoning

The research proposal outlined an inductive interpretative approach for data analysis. On completion of transcription, I reviewed my understanding of inductive and deductive research approaches and through this process I recognised that my interpretation of complexity was more in tune with an abductive reasoning approach. Both deduction and induction involve linear forms of reasoning, from the general to observation or from observation to general. By contrast, abduction reflects a more lateral process, based more on inference and seeking explanation from a number of sources, beyond the general and the observed. Kuczynski and Daly (2003, p. 386) suggest that 'abduction combines the creative interpretive process with critical reasoning' and further 'offers an even wider spectrum of ideas that may help researchers generate and evaluate explanations' (p.389). An abductive approach aligns with complexity thinking as it can enable new insight about existing phenomena, by examining these from a new perspective. Using an abductive approach, 'researchers start out with some pre-perceptions and theoretical knowledge' (Kovács & Spens, 2005, p. 139), with the primary aim to develop understanding of phenomena simultaneously with data collection and theory building.

I proceeded with analysis using an abductive iterative framework based on thematic analysis. Thematic analysis involves the identification of codes from the data (Liamputtong & Ezzy, 2005) and provides a flexible research tool, that Braun and Clarke (2006) suggest allows for a rich and detailed, yet complex account of data. Analysis was an ongoing dialogue between concepts from complexity thinking and the literature on midwifery and skilled birth attendance (discussed in chapter five). NVivo folders were created reflecting broad themes which included complexity concepts, capacity building/international aid projects, family planning, influence of culture and/or religion, evidence of

international strategies, the organisation of maternal health services, personal details of respondents, methodological reflections, and a final category of 'unsure but capture for later'. Within these broad themes were various sub-themes that evolved as I progressed through the coding process.

Having revisited the theoretical framing and my approach, I reviewed the entire data corpus (Braun & Clarke, 2006, p. 79). This was an important exercise, as analysis was commenced prior to the second fieldwork trip. I considered the complete corpus, which included data from both field trips and the literature, to ensure consistency as I unravelled and unpacked ideas, mindful of the research question. Outlying or salient data that did not immediately fit a code was captured for later examination. I identified patterns of meaning and issues of potential interest and relevance. The process was circular and involved moving between interviews, observation records and field notes, coding extracts of data and linking these to similar ideas. I made frequent notations and memos linking extracts to one another, and to the literature. This reflects what Saldaña (2013, p. 45) calls 'codeweaving', which he argues is a critical part of qualitative analysis, 'to interpret how the individual components of the study weave together'. Throughout the writing process I frequently returned to the raw data to gather salient extracts and confirm my analysis.

Analysis was not a linear process of simply moving from one interview to the next, or from one phase onto the next; rather it entailed constant movement back and forth, with the goal of discovery and a deepening of understanding and identifying of patterns/themes, sorting, clarifying, and selecting those of interest to further explore (Braun & Clarke, 2006; Guest & McLellan, 2003; Stewart-Withers, Banks, McGregor, & Litea, 2014). I generated the initial codes, and then revised, reviewed and sometimes renamed and/or combined with other codes, until all data had been thoroughly examined. Several readings were needed to see past my biases and frustrations (Etherington, 2004, p. 128), and to begin to understand and see the silences. As various links and ideas emerged I was able to move to a process of theorising and drafting the substantive chapters, with meaningful discussion (Bryman & Bell, 2011). From this analytical process, the complexity inspired themes to guide the analysis and discussion in the substantive chapters became: path dependence; connectivity and nonlinearity; and self-organisation and emergence.

Ethical considerations

Ethics approval

Ethical clearance was sought and received from the University of Auckland Human Ethics Committee[12] and from the Papua New Guinea Medical Research Advisory Committee (MRAC)[13]. In the field, I followed expectations and requirements at the different research sites, including seeking permission from the East New Britain Provincial Administration, the CEO of Nonga General Hospital, the Archdiocese of Rabaul at St. Mary's Vunapope Hospital, and from managers at the different health centres in order to carry out observations and interviews with health workers.

Recruitment of research participants

I distributed copies of the research information sheet[14] and at all stages emphasised the voluntary nature of participation. I ensured participants were aware they had no obligation to participate, and could withdraw at any time. While I was not directly interviewing women and other patients seeking healthcare, I asked the health workers to seek permission from women during observations. For any photographs, I sought explicit permission from the subject of the photo. I additionally drew on my midwifery skills of relationship building (Hunter, Berg, Lundgren, Ólafsdóttir, & Kirkham, 2008) as I observed clinical care, and supported women, particularly as they laboured and birthed.

Free and informed consent

To ensure free and informed consent, I spent time making connections, building relationships with participants and explaining my background, interests and purpose of the research (Banks & Scheyvens, 2014, p. 164). My sense is this process enabled the building of rapport and facilitated informal and formal consent. All participants were given written and verbal information and an opportunity to ask questions, verbal and written consent was then sought. Written information was offered in English (with a pidgin/*tok pisin* translation) and included permission to digitally record interviews. Five people declined to participate in interviews and two participants requested that I not repeat some of the information shared, which I have respected.

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[12] University of Auckland Human Participants Ethics Committee approval, 7/6/13, Reference No. 8871; see Appendix Three.

[13] See Appendix Three for ethics documentation from UoA and MRAC.

[14] See Appendix Four for information sheet.

Protection of research participants' privacy and confidentiality

Protecting the rights of the participants and ensuring confidentiality (Kaiser, 2009) are basic starting points for ethically sound research. To maintain confidentiality, I have used a coding system identifying participants using professional roles followed by a number to distinguish different participants. Categories are midwife (MW), health management (HM), doctor (DR), nurse (NO), community health worker (CHW), and Health Extension Officer (HEO)[15]. To give the reader more sense of the participant's role, the HM category is broken down in the narrative prior to the extract. For example, I identify if participants are speaking from a national, provincial, district, local government position or health facility management position.

Although participants are not identified in the thesis, the reality was that during fieldwork it was not always possible to ensure confidentiality (Jackson, 2010; Underhill-Sem, 2000, p. 70), and many health workers and others were aware of who was participating in this research in the field. When I arrived at several remote heath centres to distribute information sheets, the health workers were already aware of my presence in the province. At the administration levels, participants often asked who else I had spoken with and made suggestions for further interviews. I ensured, as much as possible, to divert queries related to other participants and to maintain confidentiality.

In some cases I sought and received permission from participants who I felt, due to their unique position in the maternal health care system, were unable to be protected by anonymity; leading to possible deductive disclosure (Kaiser, 2009). Although several participants gave consent to use their names, I have avoided naming participants and, as much as possible, have presented extracts in such a way that makes it difficult to identify individuals, while allowing some description of the position of the participant, to enhance credibility and give extracts more depth.

Social and cultural sensitivity

I make no claim to have undertaken this research using indigenous research frameworks. However I have ensured coherence to codes of respectful research practice, as identified by indigenous scholars (Nabobo-Baba, 2008; L. T. Smith, 2012). In this respect, I was guided by my midwifery relationship building skills (Hunter et al., 2008) and by my personal and professional commitment to building culturally safe relationships and practice (Midwifery Council of New Zealand, 2011). Cultural

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[15] HEOs are a unique cadre of health worker in Papua New Guinea who undertake a four-year degree focusing on provision of community health services, including clinical and administrative roles. HEOs work across the health system although their education programme prepares them to work in rural areas.

competence is more than an awareness of or sensitivity to other cultures. It encompasses recognition of the impact of culture and beliefs, and embraces building respectful relationship with all people. To ensure ethical and culturally competent research relationships, I engaged in many hours of observation, relationship building and *talanoa*, which has been defined as 'talking about nothing in particular' (Farrelly & Nabobo-Baba, 2014, p. 319). During visits to health facilities, discussions and observations with health workers and managers, I endeavoured to build respectful relationships (Ritchie, Zwi, Blignault, Bunde-Birouste, & Silove, 2009) by deeply listening and by openly engaging with queries about myself as a novice development studies researcher and as a midwife and midwifery educator.

Reciprocity was an important personal consideration (Banks & Scheyvens, 2014). Reciprocity takes on different meanings in different cultures, and prior to fieldwork I reflected on my intention to reciprocate in an appropriate way. My research practice was participant led and the majority of people I approached appeared very willing to participate in the research, which led me to believe that they received some benefit from talking and sharing their perspective. In addition to listening to people, I offered a small gift as a thank you. Gifts were simple tokens - New Zealand made chocolates and New Zealand inspired key-rings, which appeared to be received with good humour and appreciation. Reciprocity extends to how knowledge from research is shared (Stewart-Withers et al., 2014). While I was unable to share specifics during the process of fieldwork, it is my intention to share a summary of findings and to publish on completion of the thesis. I hope to present findings at Papua New Guinean nursing, midwifery and medical forums and at appropriate health and development conferences. In addition, it is my intention to fulfil the agreement I made as part of gaining ethics and the research visa, to collaborate with Papua New Guinean academics to write and publish papers arising from this research.

Throughout the process of fieldwork, I was overwhelmed by the generosity, openness and friendship offered to me. In any human exchange there is shared curiosity, and during research processes, it is difficult to refuse to answer questions or offer feedback as there can be 'no intimacy without reciprocity' (Oakley, 1981, p. 49). *Tenk yu tru* to all who agreed to participate in the research; you have all contributed to my understanding. While your words have been understood through the lens of my culture, academic interpretation and translated into analytical concepts based on my theoretical framework, they remain your words and your reality, which I hope I have accurately represented.

Researchers' obligations and personal ethics

In addition to the 'formal' ethical expectations, I frequently considered my personal ethics, particularly in a health care setting fraught with ethical decisions. At times I felt out of my depth as I endeavoured to make sense of the system under examination. This resulted in my questioning of what I was asking of people, their time and openness in sharing their perspectives. During the process of fieldwork, I struggled with the heat and with my unceasing thinking and reflection, both resulting in an inability to sleep and therefore I was often very tired. Yet, throughout my field research I needed to be consciously competent with the research process and my research practice. On several occasions I made very conscious research practice decisions. For example, on one occasion, while undertaking observations at a district hospital, two labouring women were transferred to Nonga General Hospital. I was given the opportunity to accompany them in the ambulance, to experience the transfer process; however, I was mindful to follow correct procedure and therefore declined, having not yet received official permission to access Nonga[16].

On other occasions, I observed harrowing clinic events which did challenge me. In practice settings, I frequently noted the absence of routine clinical observations which provide reassurance of the wellbeing of women and their babies. These observations include maternal pulse, temperature, and blood pressure, foetal heart tones, observation of progress of labour, and review of post-partum blood loss. While subject to the challenge of contributing to unnecessary medicalisation, the recordings provide a mechanism to detect deviations from normal and allow timely initiation of interventions that can save lives. My observation of the lack of observations or incorrect interpretations was especially difficult where I linked this practice to poor outcomes.

I also observed practices which, in other contexts, have significantly altered as a result of research-based evidence. However, without access to ongoing professional development and education to incorporate changes into practice, health professionals in many settings in East New Britain continue to practice what they have been taught. Some of these practices were difficult to observe, such as ineffective 'frog-breathing' from the 1950s as a method of resuscitation for babies needing help with breathing at birth; the routine removal of babies from their mothers at birth resulting in an absence of skin-to-skin contact and early breastfeeding, and babies being left unattended. I also witnessed several instances of unkind and disrespectful treatment of women. While I quickly realised that these practices largely reflect the absence of ongoing professional education and the overwhelming stress

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[16] See Appendix One, Nonga approval letter.

and workload of staff, it did require ongoing reflective practice and restraint to remain in my role as an observer and researcher, and not default to my more familiar role as midwifery educator. I was mindful that as a researcher it was not appropriate to address practice issues and that these were reflective of far larger phenomena. While this did not make bearing witness easier, it did allow me to continue to form effective research relationships and avoid imposition of my western-based practice perspective. I was also mindful that I did not have the necessary regulatory clearance to practice midwifery in Papua New Guinea.

While I was mostly successful in maintaining the role of observer, this was not always possible. On one occasion, while observing a birth conducted by two midwives using vacuum extraction equipment, my position as an observer was significantly challenged. The poor quality of the equipment meant they were unable to expedite the birth and given the significant delay, I was expecting to witness a stillbirth (as were the midwives they later confided). It was difficult to watch this traumatic birth and the baby showed few signs of life at birth. When it became obvious, from observation and a verbal request for help, that the attending staff did not have the necessary skills to provide effective neonatal resuscitation, I assisted by resuscitating the baby. Although the equipment for neonatal resuscitation was available, the health workers shared that they did not have the skills to use the equipment. They later explained that they were only authorised to perform 'frog-breathing' – an ineffective and out-dated method of resuscitation (Mercer & Skovgaard, 2002).While this experience resulted in a good outcome, it exemplifies one of the many difficulties encountered.

In another exchange, in a very remote setting with no means of emergency transport (due to the time of day) or facility to perform an assisted delivery, I observed an obstructed labour (the cause of around 10% of maternal deaths). Over the afternoon, a multiparous[17] woman experienced a prolonged second stage, with little progress despite maternal effort. This observation occurred in the afternoon and I left prior to the birth (before dark). I was distressed and convinced I would return the next day to a report of a poor neonatal outcome and possibly a maternal death from obstructed labour. Yet, there was nothing I could do to assist. Thankfully, when I returned the next day, both the woman and her baby appeared well, with the birth occurring 90 minutes after I left.

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[17] Multiparous/multipara, a woman pregnant with her second or subsequent baby. Primiparous/primipara – a woman pregnant for the first time.

Beneficence

Many health professionals shared poignant and distressing stories of their challenges, dedication and commitment to women and midwifery practice, and at times I have felt concerned about unrealistic participant expectations of my research. I feel a deep sense of responsibility yet am well aware that this is a small, stand-alone project. There was so much to learn and record before I even began the process of analysis and writing. A notation in my fieldwork journal says: 'There is too much to record here. I wish I could capture everything, but it simply isn't possible'. In the end, I reminded myself I was in the field as a researcher and took note of all that I could. I saw huge resilience of the people, much beauty and many challenges of service provision. On the whole, people were friendly, open, supportive and curious about my research and I have a commitment to write the best thesis I can, with the hope that in some way it contributes to improving the health of women and girls, and the realities for the health workers.

Limitations

In addition to the limitations touched on in the preceding discussion, issues of language and interpretation are limitations in this research. As discussed in chapter four, Papua New Guinea is culturally and ethnically diverse; however, English is widely spoken in business and health care, alongside the local vernacular pidgin (*tok pisin*) and individual tribal languages (*tok ples*). I attempted to learn *tok pisin*, however my language skills were inadequate for research or even for most day-to-day interactions. All interviews were conducted in English, although many turns of phrase or distinctive spoken expressions required unpicking to clarify participant meanings. I have sought to achieve a comprehensive understanding but it is inevitable that as an outsider I will have missed cultural expressions and meanings in interpretation and analysis (Ritchie et al., 2009; Sumner & Tribe, 2008b).

Another important language consideration arises from the use of language that some readers may consider 'medical'. I have grappled with using lay language or my more familiar clinical language (as an insider), when discussing events within the narrative of the thesis. I have taken guidance based on the argument that the integrity of interdisciplinary research rests on the contributing disciplines retaining discipline specific integrity as a reference point (Castan-Broto et al., 2009). However, as this thesis may be read by development studies academics and professionals, and others from midwifery and other health related disciplines, I have attempted to avoid both development studies and midwifery jargon and abbreviations, and have provided abbreviations and definitions in the glossary and footnotes throughout.

The research was principally carried out from New Zealand, and communication with different bodies in Papua New Guinea has been challenging due to distance and inconsistent email access. Two issues are important to note related to the distance. The process of securing the research visa would have been almost impossible without the support of a colleague, Annie Yates, who was working in Port Moresby and able to collect various signatures and forms, for which I am very grateful. Second, during the writing process I have sought clarification of interview material and attempted to remain concurrent with system changes, however this has not always been possible. Therefore, a limitation arises from the data I collected. As a continuously evolving system, I am aware that the maternal health care system in East New Britain has evolved and changed since I carried out fieldwork.

Chambers (2006, p. 28) identifies potential biases in development work, including spatial, project, person, seasonal, diplomatic and professional, and security biases. To avoid spatial bias, I visited health facilities in all four districts of East New Britain. While I was able to include several remote health care settings, other facilities proved too challenging to visit given limitations of finance and personal safety. The health facilities accessed were principally those accessible by road, with one requiring a robust off-road vehicle and three others only accessible by sea transport. As discussed previously, maternal health care occurs across the full 24-hour period but I was generally unable to carry out observations outside of daylight hours. Moreover, despite the distribution of information sheets, I was unable to facilitate participation from many high-level political decision-makers at provincial or national levels. Analysis and findings are therefore limited by access to publically available information and the interview data collected.

Finally, a limitation arises from the scope of this study. I have attempted to synthesise the maternal health care system, which encompasses a broad array of areas, as discussed in chapter five. Undertaking this work has been a process of constant negotiation to ensure that the lens was wide enough to consider important contributing issues, whilst maintaining a focus narrow enough to ensure maternal health care remained central and the project was manageable. Kannampallil, Schauer, Cohen, and Patel (2011) suggest that the challenge is to identify the right 'sizes' of components and the interrelationships that exist across these components. They stress the importance of finding the right level of description for the system under investigation.

Cairney and Geyer (2015, p. 2) explain that in examining complex systems it is important to shift the focus from individual components to the overall system, they use 'the metaphor of a microscope or telescope, in which we zoom in to analyse individual components or zoom out to see the system as a whole', which sums up the potential to shift the focus and approach. So, although I acknowledge that 'everything is always interacting and interfacing' with everything else in the environment (Cilliers,

2013, p. 27), undertaking an individual project as a PhD researcher has meant it has not been possible to give significant attention to many important aspects of the maternal health care system. Maternal health is one part of the wider reproductive health agenda, one part of women's lives, a small part of the broader health service delivery agenda, and an even smaller focus of many complex development issues. It is also where too many women continue to lose their lives, and I believe, for women and newborns experiencing complications, a better understanding of the system providing health and medical services is essential.

Reflexivity and positionality

Etherington (2004, pp. 30 - 31) highlights the importance of researchers taking a reflexive approach to research, particularly in the process of qualitative research. In this final section I consider reflexivity, which I define as the continuous process of reflection on the research and the inclusion of my personal story, based on the premise that 'knowledge cannot be separated from the knower' (Steedman, 1991, p. 53). The above discussion reveals my reflexive practice during the process of fieldwork and working with the data. Providing this reflexive account contributes to the trustworthiness and integrity of the research, and considers how my 'personal stories might impact on my opinions and analysis that are undoubtedly influenced by my history and culture' (Etherington, 2004, p. 84). This is one element of a critical analysis, as there are undoubtedly some voices and stories which, in my representation of the data, I have chosen to focus on and others to leave out. A second element is related to social constructionism, as discussed above. A social constructionist epistemology enables viewing dominant discourses as social constructions, which can be challenged through the use of a critical approach to research (Gergen, 2011).

Complexity thinking enables a critical approach as a way to think and see differently (Kuhn, 2009; Ramalingam, 2013). Reflexivity is integral to this approach, to enable an awareness of my context within which social constructions sit. The importance of reflexivity is highlighted by Fleetwood (2004, p. 28, italics in orginal) who suggests there is

> no theory neutral observation, description, interpretation, theorisation, explanation or whatever. There is *no unmediated* access to the world: access is always *mediated.* Whenever we reflect upon an entity, our sense data is always mediated by a pre-existing stock of conceptual (including discursive) resources, which we use to interpret, make sense of and understand what it is and take appropriate action.

The focus of the thesis stems from my positionality and subjective interpretations as a New Zealand woman of European descent, a midwife and educator from a developed country and a visitor to

Papua New Guinea. I bring my perspective to the discourse. Maxwell (2013, p. 125) argues that 'the goal of qualitative study is not to eliminate this influence, but to understand it and to use it productively'. Throughout this project I have engaged with a wide range of literature and ensured triangulation of findings as previously discussed. I acknowledge my positionality and subjectivity as the researcher and recognise that no research is free from bias and that 'eliminating the actual influence of the researcher is impossible' (Maxwell, 2013, p. 125). England (1994, p. 251) argues for the importance of locating ourselves in our work, reflecting on how our personal location 'influences the questions we ask, how we conduct our research, and how we write our research'. In this chapter, and throughout the process of conducting the research, I have identified my positionality and worked with it as a strength through the process of reflective practice and cultural competence (Liamputtong, 2008; Midwifery Council of New Zealand, 2011).

Chapter conclusion

This chapter has explored the process of carrying out the research. The process has been iterative, underpinned by conscious reflective practice and continuous learning. The research draws on a constructionist epistemology, framed by international development, midwifery, and selected tools from complexity thinking. I use an interpretative, qualitative case study design drawing on data from interviews, observation, and document analysis. Throughout the process, I have been deeply mindful of undertaking research in another culture and country and ensured, as much as possible, to adhere to respectful, culturally sensitive research practice. This included undertaking a research scoping trip to discuss how to approach the research and the building of research relationships prior to fieldwork at a professional forum. As much as possible, I have adhered to Papua New Guinean protocol and ethics processes for carrying out research. The chapter has also explored formal and informal ethics, participant selection, and data collection techniques and data management. This chapter contributes to the thesis by identifying sound research practice and methodological rigour.

In the next two chapters I present the context of the research. First I explore Papua New Guinea, the country where fieldwork was undertaken, and East New Britain the selected province. The second context chapter focuses on the global maternal health discourse, with a literature review in the final section bringing together maternal health in Papua New Guinea.

CHAPTER FOUR: Papua New Guinea and East New Britain

My country your beauty will forever remain in my heart, the land of many languages, different cultures and one people united under heaven.

<div align="right">

Poem by Noah Wakai (2012) (17 y/o, Kundiawa, Simbu Province)
My beautiful country Papua New Guinea

</div>

Introduction

Papua New Guinea has been described as the land of the unexpected; the land of a million different journeys (Papua New Guinea Tourism Promotions Authority, 2008); and as 'a mountain of gold, on a sea of oil, surrounded by gas' (Chandler, 2011 cited in Luker, 2013). Tourism promotions display magnificent natural scenery, brightly coloured wildlife, and diverse indigenous people sharing their proud cultural heritage. This chapter provides background information for the research undertaken in this unique country. The chapter commences with an overview of Papua New Guinea which includes the historical, political and administrative contexts, followed by a discussion on the people, and the economic and development contexts. Overseas development assistance (ODA) is then considered, followed by an introduction to the formal health system implemented during the colonial era, and contemporary health service delivery and health statistics. Thereafter, the chapter focuses on East New Britain.

Overview of Papua New Guinea

Papua New Guinea is located between Australia and Asia, in the south-west of the Pacific basin (see Figure 1, p.57). It is the largest and most populous country of the Pacific region and is considered one of the least explored and most culturally diverse countries in the world (Luker, 2013). The country consists of the eastern half of the world's second largest island, New Guinea (shared with the Indonesian provinces of Papua and West Papua, formerly Irian Jaya). The total land mass of 461,937 square kilometres (United Nations Development Programme, 2014a) has some of the world's most dramatic terrain (Connell, 2005), including extensive mountain ranges running through the middle of the mainland in the Highlands region, rainforests and river systems. In addition to the mainland, there are four other main islands (Manus, New Britain, New Ireland, and Bougainville) and over 600 smaller islands and coral atolls forming an extensive arc of over 100 populated volcanic islands (Connell, 1997; Moore, 2003).

Figure 1: Location of Papua New Guinea
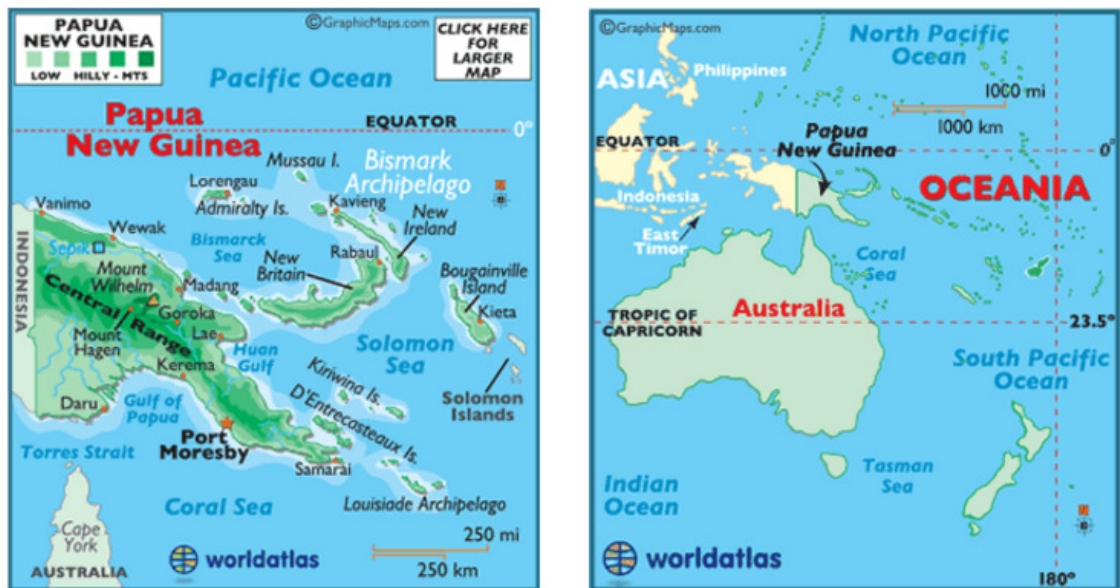
History

Papua New Guineans have begun writing their history from the perspective of the indigenous peoples, nevertheless indigenous knowledge largely remains oral (Simet, 2000). Published pre-colonial history is mainly recorded on the basis of archaeological work carried out by foreign scholars (Kirch, 2010). This evidence suggests New Guinea was one of the first landmasses after Africa and Eurasia to be populated, with two waves of migration. The first occurring around 60,000 years ago, when Australia and Papua New Guinea formed one continent called Sahul (Irwin, 1992, p. 116; Kirch, 2010; Leavesley et al., 2002; Moore, 2003). People settled in the highlands some 30,000 years later (Luker, 2008). Distinct language types are suggestive of a second migration, around 4000 years ago, when people settled on the coast and islands (Kirch, 2010). Centralised polities never developed (Luker, 2008, p. 251) but evidence suggests people formed well-developed networks between different geographic regions and established economies related to migration, trade and exchange (Campos-Outcalt, 1989; Moore, 2003; Reilly & Phillpot, 2002).

European explorers and traders arrived from the early 16th century, firstly in the accessible coastal areas and over time across the nation (Kirch, 2010). These traders began settling from the early 1870s (Bolger et al., 2005), bringing with them Christian missionaries (Nichol, 2011). Weeks and Guthrie

(1984) suggest the proselytising aims of the missionaries were in alignment with various settlers and colonial governments.

Since 1884, there have been three colonial governing powers of New Guinea. Initially Britain and Germany divided the country in the south-east (Papua), and north-east (New Guinea), and the Dutch governed in the west (Connell, 2005). In 1906 the British passed administrative powers to Australia and following the second world war, German New Guinea also came under the Australian administration while the west was passed into Indonesian control (Nelson, 2000). From 1920 the territory known as Papua and New Guinea was governed as an Australian colony. In 1972 the name Papua New Guinea was adopted and in 1973 the country became self-governing. It was one of the last places in the world to gain independence, which was declared on September 16th, 1975 (Connell, 2005; Denoon, 2005; Feeny, Leach, & Scambary, 2012; Golson & Gardner, 1990; May, 2003).

Independence was marked with 'both bold anticipation and uncomfortable ambivalence' (James et al., 2012, p. 2) as the newly formed nation state sought to unite many different communities into one country. Connell (2005, p. 4) argues that challenges to national unity arose from 'linguistic and cultural diversity, regional divisions, especially between the highlands and the Papuan coast, and the regency of colonisation and decolonisation'. A Constitutional Planning Committee made up of 15 Papua New Guinean 'respected parliamentarians' (Denoon, 2005, p. 113) drafted, debated and accepted the founding constitution on August 15, 1976. The Constitution reflected the hopes of an emerging postcolonial state. It proclaimed complex aspirations, including giving explicit priority to the importance of tribal and traditional ways of life (James et al., 2012). James et al. (2012, p. 5) argue that 40 years on, 'by any measure, the years from independence to the present have been hard'. The newly formed state has been dominated by the extractives sector (Burton, 2005; Gouy, Kapa, Mokae, & Levantis, 2010; United Nations Development Programme, 2014a) and receives considerable foreign aid (James et al., 2012; United Nations Development Programme, 2014a).

Political Context

Papua New Guinea is a member of the Commonwealth, with a governor general who represents the British monarch, Queen Elizabeth II (Regis, 2000; Waiko, 1993). It is a single-chamber parliamentary democracy based on the Westminster style of government (Gouy, 2009). The national government consists of 111 members who represent 89 single-member electorates (Districts) and 22 regional electorates (Provinces). Members of parliament come from all provinces including the Autonomous Region of Bougainville and the National Capital District. Since independence Papua New Guinea has 'maintained an unbroken record of democracy' with a continuous democratic government elected by universal adult suffrage every 5 years (Reilly & Phillpot, 2002, p. 907). Very few women have held

seats as members of parliament and Papua New Guinea has the lowest female political participation in the world (Chandler, 2013). Brouwer, Harris, Tanaka, and the World Bank (1998, p. 11) suggest that 'the very public and adversarial nature of formal political participation in an overwhelming male arena has been a major sociocultural factor, which makes it difficult for women to stand for national election … Men see politics as essentially a 'man's game'. There are currently three women in Parliament, holding 2.7% of total seats[18]. Brouwer et al. (1998, p. 12) argue that women's participation cannot only be gauged by participation at formal levels, as political involvement at the local and informal level make an important contribution.

Administratively, the country is divided into four regions: the Highlands (43% of the national population), Momase (25%), Southern (18%) and the Islands region (14%) (National Statistical Office of Papua New Guinea, 2012). The four regions are divided into 22 provinces and provincial administrations are further broken down to district level administrations which are divided into Local Level Governments (LLGs), comprised of several wards with one or more villages and hamlets, depending on population size (Mellam & Aloi, 2003). An elected provincial member of parliament assumes the office of governor of the province, and heads the provincial government (Reilly, Brown, & Flower, 2014). Other members of the provincial government include the presidents of the LLGs and other elected members of national parliament from the province. At the national level, administration is divided among 25 national departments. Based on the Organic Law, some functions and responsibilities are decentralised to provincial departments, delegated to district and sub-district administrations (Mellam & Aloi, 2003).

Decentralisation and the Organic Law

At independence, despite indigenous negotiations involved in drafting of the Constitution, the new state was largely based on the existing Australian colonial bureaucracy (Denoon, 2005). Basic services including health and education, transport infrastructure, and other civil services were highly centralised administrative agencies. The early years of independence saw strong pressure from the provinces for decentralisation (Campos-Outcalt, 1989) and formal responsibility for resource allocation changed significantly in 1977 with the passage of the Organic Law on Provincial Government (Bolger et al., 2005). The law created provincial assemblies aligned with districts holding administrative authority and coordination roles, and rural and urban LLGs, with political and

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[18] Since the first national election in 1977, only seven seats have been held by women (Dame Carol Kidu winning three times and Dame Josephine Abaijah twice). In the most recent elections in 2012, three women, Julie Soso Akeke, Delilah Gore, and Loujaya Toni won seats (Chandler, 2013).

administrative responsibilities (Commonwealth Local Government Project, n.d., p. 156; Hasnain, Keefer, & Menzies, 2014; National Statistical Office of Papua New Guinea, 2012). Subsequent phases of decentralisation have followed, and management and administration of basic services has now transferred from national to provincial and local level (Feeny, 2013).

The intent of the legislative framework is active provincial and district administrations responsive to the needs of the people at the lower tier of government, to enable more effective policy formulation and implementation. Starting at the bottom from the wards up, a detailed set of cascading plans and budgets are produced (Hasnain et al., 2014). However, there are no mechanisms within the structure to align and coordinate bottom up plans with national policy (Ketan, 2013). A large body of literature suggests that under the decentralised governance structure health care has declined, fewer children are attending school and infrastructure (roads, bridges, airstrips, wharfs, health facilities and classrooms) has deteriorated in many provinces (M. Allen & Hasnain, 2010; Hasnain et al., 2014; Ketan, 2013; Thomason, Newbrander, & Kolehmainen-Aitken, 1991; Wiltshire & Mako, 2014; Windybank & Manning, 2003). These authors argue that, as a result of the framework, little development has taken place due to minimal accountability mechanisms, and service delivery has deteriorated to varying extents across the country. Moreover subsequent legislative changes have failed to adequately improve implementation of national policy, and resources, authority and competency are poorly matched with the decentralised responsibilities under the framework (Asian Development Bank, 2014).

May (2009) suggests the legislation has resulted in considerable confusion in roles and responsibilities in the mix of national, provincial, and LLGs. Campos-Outcalt (1989, p. 162) explains,

> Provincial public servants are employed by the national public service, yet are supervised by provincial governments. Budgets are decided in National Parliament and provided to the provinces in the form of grants, and there is little locally derived income from royalties and taxes for provinces to use at their own discretion.

The national parliament and national authorities retain overall legislative oversight and vision to determine policy priorities, yet the impact of 'bottom-up' planning processes through local level, district and provincial governments can result in inconsistent priorities at the different levels of administration and inconsistent budgeting (Ketan, 2013). Pieper (2004, p. 4) suggests that all layers of government, public sector institutions and decision-making are 'disaggregated and unfocused', LLGs are not empowered and provincial governments cannot meet expectations (in part due to underfunding) which further hampers effective service delivery.

For some time, it has been known that the political and administrative arrangements have critical implications for governance and service delivery in all sectors (Axline, 1986), including health service delivery. Although few studies have directly investigated the link between the political arrangements and service delivery (Reilly et al., 2014), Burton (2005, p. 107) contends, 'politics, whether inside the men's house or out on the hustings, is culture'. Individual members of parliament have considerable power, through various mechanisms, including electoral development funds (EDFs), which are a form of 'slush fund' available to individual electorate parliamentarians 'under various district improvement programs' (Reilly et al., 2014, p. 11). However, Reilly et al. (2014, p. 11) suggest that investment is often in personal networks, not necessarily related to service delivery or district improvement, and that the 'status quo … has produced a decades-long slide in the quality of service provision' (Reilly et al., 2014, p. 8). Conversely, given the challenges of service delivery, supporters of the EDF argue that it is an effective mechanism for allocating development grants to remote communities (Reilly et al., 2014).

Devlin (2010, p. 12) contends that while decentralisation can be viewed as highly problematic, it validated Papua New Guinea as 'a nation of more than a thousand tribes', and kept Bougainville as part of a unified country. B. Scott (2005, p. viii) agrees, suggesting that 'decentralisation is unavoidable in such an ethnically and geographically fragmented country'. Moreover, Reilly and Phillpot (2002, p. 926) add that the multiplicity of ethno-linguistic groups have to some degree shaped cooperation, as there is no group that is large enough to act 'as a hegemon and dominate others, or to overthrow the incumbent regime'. The different groups have worked together, with some degree of cooperation and accommodation, fulfilling the national motto: 'unity in diversity' (Reilly & Phillpot, 2002, p. 927).

The people

The people of Papua New Guinea are linguistically and ethnically diverse with the population noted as one of the most heterogeneous in the world, representing more than 800 distinct communities (United Nations Development Programme, 2014a). The modern state continues to reflect many small, fragmented and self-sufficient communities, separated by distance, environment, and language (James et al., 2012; Waiko, 1993). The different cultural groups and clans are explicitly acknowledged in the constitution, which ensures the preservation of traditional villages and communities as the backbone of society (Independent State of Papua New Guinea, 1975). While many different languages are spoken, English, Neomelanesian Pidgin (*tok pisin*) and Hiri Motu are the official languages and form the main means of business and communication (World Health Organisation, 2014b).

The most recent census (2011) indicates a total population of 7,257,324 and an estimated growth rate between 2000 and 2011 of 2.9% (B. Allen, 2014; National Statistical Office of Papua New Guinea, 2014). Nearly half of the population are under 20 years of age, and the number of young people is expected to double over the next 20 years (National Strategic Plan Taskforce, 2009; World Bank, 2012). The total fertility rate is 3.39 children per woman based on 2012 estimates, and there are an estimated 220,000 births per year. The World Health Organisation (2015c) estimates that for women between the ages of 15 and 49, the probability of dying from maternal health causes is 10%, while overall life expectancy is estimated to be age 60 for men and 65 for women.

Estimates suggest the majority (87.5%) of the population lives in widely scattered, heterogeneous rural communities characterised by isolated mountainous regions and remote islands with limited roads and difficult access (World Health Organisation, 2011). Many people's lives revolve around the informal sector and subsistence agriculture (James et al., 2012) with limited access to basic services such as health, education, transport and other infrastructure such as markets and financial services (Feeny, 2003). Twelve percent of the population is estimated to live in urban areas. Approximately 318,128 people, (4.5% of the total population) are based in the capital, Port Moresby (National Statistical Office of Papua New Guinea, 2012).

Economic and development context

Since independence the Papua New Guinean economy has been dominated by two sectors. Namely, the agricultural, forestry and fishing sector, which supports more than 70% of the population and contributes to around a third of GDP; and the mineral and energy extraction sector, which accounts for the majority of export earnings (Avalos, Stuva, Heal, Lida, & Okazoe, 2015, p. 352; World Bank, 2016). However, the country experiences significant economic volatility as exports are almost totally comprised of commodities, with an estimated 70% of exports comprised of minerals, oil and gas (Avalos et al., 2015, p. 349). Recently, one of the most substantial developments has been the discovery of a large liquefied natural gas (LNG) reserve, and the expectation of significant economic returns, which was predicted to double GDP (Avalos et al., 2015; May, 2016). However, as the LNG project reached production in 2015, falling global oil and gas prices led to downward revisions of predictions. These falling prices, coupled with El Niño-related drought, frosts, and bushfires, and the government's struggles to control expenditures, have led to substantially larger budget deficits than forecast, and rising fiscal concern for the country (Asian Development Bank, 2015c; Flanagan, 2015; May, 2016).

Nevertheless, benefits from the LNG project would not have reached the majority of the people[19] and the gross national income per capita is estimated to be US$2,386 (United Nations Development Programme, 2013). Comparative levels of poverty are increasing and on the United Nations 2012 Human Development Index, Papua New Guinea is placed in the 'low human development category', at 157 out of 187 ranked countries (United Nations Development Programme, 2014b, p. 162). The latest Gini coefficient was measured at 0.48 in 2005 showing little change over the past decade (0.51 in 1996). This demonstrates high income inequality and that Papua New Guinea is considered poor by developing country standards (James et al., 2012; United Nations Development Programme, 2014a). The Gross National Income (GNI) per capita rank minus Human Development Index (HDI) rank of -15 also demonstrates inequality. Maisonneuve (2006, p. 11) explains economic indicators are reflective of income generated by mineral exports and aid received, rather than incomes of the majority of the population[20] who continue to live semi-traditional subsistence lifestyles.

Poverty

Using a basic needs measure of poverty (rather than the World Bank USD$1.25 a day poverty line measure), the Australian Agency for International Development (2009, p. 7) suggests 40% of the population experiences poverty. Poverty is often accompanied by a lack of access to basic services such as clean water, healthcare and education and a lack of opportunity for development. Despite limited employment opportunities and housing, some people choose to migrate to urban areas, which has resulted in the growth of urban settlements and a growing number of urban poor (Jones, 2012; Storey, 2010).

Communities

Traditional values and practices predominate in everyday life and most of the population continue to live in small villages dependent on subsistence agriculture (Izard & Dugue, 2003). Central to society is family and community, with strong obligations and responsibilities for extended family members (Izard & Dugue, 2003, p. 5). The foundations of these obligations are expressed in the '*wantok* system', literally meaning 'one talk' or people who share the same '*tok ples*' (talk place) language. The system is based on 'reciprocity, genealogy, or cultural affinity' (James et al., 2012, p. 58) and is an intricate web of strong mutual community obligations which provide a safety net for many people

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[19] Flanagan (2015) suggests that benefits from the LNG project will go to repay the loans that funded the majority of the project (70%) and the overseas project partners, mainly through dividend flows.

[20] This point is important in relation to the discussion below on models used to estimate maternal mortality, as statistical modelling techniques are based on per capita incomes, and rely on quality and a 'trickle-down' effect.

(Gustafsson, 2007, p. 12). However, some literature suggests the system can also lead to conflicts of interest and nepotism in the public service (Izard & Dugue, 2003; Renzio, 2000).

There are hundreds of different and separate communities in the modern state of Papua New Guinea and 'meaning can vary dramatically by place and time' (Jolly, 1994, p. 248). Connecting the different societies is 'intercultural trade and translocal movement' of people (James et al., 2012, p. 20) which has developed over many generations. In recent times 'more and different kinds of goods and ideas' (Underhill-Sem, 2001, p. 199) have joined the exchange and increased the connectivity between people. Furthermore, James et al. (2012, p. 80) suggest 'identity based on land, place and belonging' is coming into conflict with the emerging identities of migrant communities in the new cultural borderlands created by development. Moreover, there are a growing number of people based in urban settings with experiences of travelling and living overseas (Spark, 2014). Some literature suggests new identities are more likely to be tied to national pride and national objectives to modernise Papua New Guinea (James et al., 2012). The transition from pre-colonial to contemporary Papua New Guinea has brought 'new times, new ways of thinking and living, [and] new forms of social organisation and settlement' (Polier, 1999, p. 58).

Overseas Development Assistance (ODA)

Australia continues to be a major strategic partner and the most significant source of ODA to Papua New Guinea (Costa & Sharp, 2011). Australia is also the main export destination and import source for goods and services, and the main destination for emigration (Prizzon, 2014). At independence Australian ODA accounted for 60% of the government budget and 24% of GDP. Over the past 20 years this has declined by more than 30% and in 2015 represented '8.6% of total expenditure' (Government of Papua New Guinea, 2015, p. 53). However, Australia continues to be the largest bilateral donor, contributing 77% of ODA in 2015 (Government of Papua New Guinea, 2015, p. 53). The Asian Development Bank, New Zealand, Japan, the European Union and the United Nations are other sources of ODA, and since the mid-2000s, China has emerged as a major donor[21] (Feeny, 2003; Prizzon, 2014).

Aid programmes focus on human development, health and education, while development loans target the energy, transportation, and agriculture sectors (Feeny, 2003). Australia's health aid programme has largely focused on women and children in rural communities, aiming to improve low-

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[21] In 2011 Papua New Guinea received approximately US$600 million in ODA, $510 from Australia, $31 million from the World Bank, and $21 million from New Zealand (Prizzon, 2014).

cost primary and preventative health services and establish effective structures for delivering health services to rural areas (Feeny, 2003, p. 89). Since 2006 the Australian Aid Program has adopted a sector wide approach (SWAp) as a core platform for the delivery of health aid (Negin, 2010).

Sector Wide Approach (SWAp)

The SWAp is an aid management modality that emerged in the 1990s as a response to the limitations of other forms of ODA such as projects or general budget support (Cassels & Janovsky, 1998; Land & Hauck, 2003; Tolley, 2012). SWAps aim to support recipient government leadership (McNee, 2012b), taking a middle ground between the over-prescriptiveness of projects and undirected budget support (Cassels & Janovsky, 1998). The approach is intentionally grounded in promoting country-led sector policy and institutional development, with the expectation of outcomes demonstrating a higher degree of ownership and sustainability (McNee, 2012b). Alongside capacity building, SWAps are designed to contribute to strengthening government systems, including disbursement and accountability processes (Land & Hauck, 2003). The first Papua New Guinea health SWAp operated from 1999 - 2005, named the Health Sector Support Program. This was followed by the Health Sector Improvement Program (HSIP) (Emmott, Lee, Weelen, Kawe, & Leslie, 2009; Government of Australia and Government of Papua New Guinea, 2008). The HSIP operated alongside the broader Capacity Building Service Centre (CBSC) programme (2005 – 2012), with the goal of supporting the health sector.

The CBSC and the HSIP have recently been revised and extended in the Papua New Guinea – Australia Partnership for Development: Health and HIV schedule and Health Delivery Strategy 2011 – 2015 (known as the Partnership for Development). Goals of the Partnership for Development include improving maternal and child health and increasing services to the rural majority (PNG - Australia Ministerial Forum, 2012). The Partnership for Development aims to provide support for strengthening the health system across the country, as well as providing support in five provinces trialling a provincial health authority model (Milne Bay, Eastern Highlands, Western Highlands, Autonomous Region of Bougainville and Western Province). The agreement identifies key inputs for the health system, including financing, medical supplies, infrastructure and human resources for health (PNG - Australia Ministerial Forum, 2012). The Partnership for Development is supported by the Asian Development Bank, Country Partnership Strategy, 2016-2020 (Asian Development Bank, 2015b).

Asian Development Bank (ADB)

The second-largest development partner in Papua New Guinea is the Asian Development Bank (ADB) (Asian Development Bank, 2015a). The ADB partnership with Papua New Guinea focuses on building

more inclusive economic growth through investment in transport and energy, lowering business and trade costs, and increasing jobs and livelihood opportunities, particularly in agriculture. The ADB is supporting the Papua New Guinean Government, in alignment with the above Australian Development Strategy (Asian Development Bank, 2014, Annex 6), to improve access to water and sanitation services for the urban poor and to strengthen rural primary health delivery in the Rural Primary Health Services Delivery Project (Asian Development Bank, 2011). This ADB project aims to strengthen the rural health system in selected areas by increasing coverage and quality of primary health care. As a first stage in the government's Rural Health Service Transformation Project, the ADB project will cover two districts in each of eight provinces: Eastern Highlands, East Sepik, Enga, Milne Bay, Western Highlands, West New Britain, Morobe, and the Autonomous Region of Bougainville. The intention is to roll out the project to additional districts and provinces as funds become available (Asian Development Bank, 2014). The ADB project is implemented under the umbrella of the SWAp discussed above and aims to assist the National Department of Health in developing and implementing policies, standards and strategies for a new health facility, developed in 2009, called Community Health Posts, to replace aid posts as the most peripheral health facility (Asian Development Bank, 2014; National Department of Health, 2013e).

Development constraints

The Australia Agency for International Development (2012b) suggests Papua New Guinea faces critical development constraints, including weaknesses in governance and institutions, poor infrastructure and infrastructure services, shortages of skilled human capital, poor and unequal access to affordable and quality education, and a lack of affordable and quality health services. Major challenges to development effectiveness include the mountainous terrain and scattered small communities, with many areas only accessible by air or sea. Estimates suggest that only 7% of the population has access to electricity and reticulated water (United Nations Children's Fund, 2012).

Papua New Guinea was a signatory to the United Nations Millennium Development Declaration and the Millennium Development Goals (MDGs), however, it remains far from attaining these development goals (United Nations Development Programme, 2014a). The Department of National Planning and Monitoring (2010) identify nine crosscutting challenges, which they argue are 'fundamental weaknesses in PNG society which [have] caused the lack of progress' (p.20). The challenges are noted to include the generalised HIV/AIDS epidemic; development challenges related to population growth, resource distribution and environmental sustainability; a lack of good governance; deficiencies in service delivery; poverty of opportunity for the largely young population; gender culture and gender disparity which places women in a disadvantaged position; climate change, environmental degradation and unsustainable livelihoods; demographic and socio-economic

disparity between provinces; and low levels of formal education and literacy (Department of National Planning and Monitoring, 2010).

On the Gender Inequality Index, Papua New Guinea is placed in the 'low human development group', ranked at 157 out of 187 countries (United Nations Development Programme, 2014a). This index reflects gender-based inequalities in each country based on three dimensions – reproductive health, empowerment, and economic activity, and reflects the lost opportunities for development due to inequality between men and women. Women hold a 'central position in domestic life, as wives and mothers with responsibilities for households, extended families and raising the children' (V. Hauck, Mandie-Filer, & Bolger, 2005, p. 19) and are noted to be the 'backbone of PNG society' (Department for Community Development, 2011, p. 8). Nevertheless, there are deep-rooted social and cultural beliefs that women are subordinate to men. These beliefs are reflected in lower rates of literacy, low political participation, high rates of gender-based violence, and the normalisation of poor maternal health (Gibson & Rozelle, 2004; Kidu, 2009).

Health Sector

This section describes the national health care system, decentralisation of health services and health care delivery in general. A more in-depth discussion of maternal health and the maternal health care system is provided in the next chapter.

Early establishment

In most pre-colonial communities, 'medicine' was not a discrete body of theory or practice (Luker, 2008). Sickness or unexpected death, particularly among young adults, was generally attributed to transgression of custom, sorcery or punishment by spirits. Some societies developed specialists in bone-setting, trepanning, or in medicinal plants, while other responses to disease included ritual remedies, including abandoning the sick and sites of illness (Luker, 2008).

Colonial implementation of the health system was largely based on models from other countries, with little questioning of the appropriateness or adaptability to the local context, and little or no opportunity for 'indigenous negotiation, contestation, or engagement on the form … or the nature of care within the system' (McNee, 2012a, p. 1). There was little coordination between the colonial administrations and different missionary groups (Ascroft, Sweeney, Samei, Semos, & Morgan, 2011). V. Hauck et al. (2005, p. 6) explain that the different churches began arriving in Papua New Guinea from 1845, bringing health and education services alongside proselytising aims. The merging of these two aims had remarkable success in many settings, for example Merrett-Balkos (1998, p. 213)

describes the power and authority given to the Catholic Church mission sisters by Anganen women in the Southern Highlands Province.

The colonial health system largely neglected the majority rural population prioritising urban-based services, largely focused on curative care, rather than health promotion and preventative, public-health based models (Denoon, 1989). The cultural and geographic realities of the country called for services close to the people in villages and communities (MacPherson, 1980, p. 135); yet, priority was given to expensive, western-style urban-based hospital services (Denoon, 1989; MacPherson, 1980, p. 124). Luker (2008, p. 258) argues that the services were not established for the benefit of the indigenous population. Rather the needs of 'ordinary villagers were secondary to the needs of European settlers and 'native workers' engaged in the cash economy' (MacPherson, 1980, p. 114). Luker (2008, p. 258) adds that the 'ideas, methodologies and values of the state's health officials and those of the villagers mostly failed to synergise'. So much so that Aitken (1991, p. 28) argues that 'the initial reaction of villagers to the limited care made available … was one of passive avoidance'.

The focus of colonial administrations was largely directed by circulars from London and centred on the treatment of such problems as leprosy, cancer, hookworm, yaws, venereal disease, and by the 1920s, malnutrition (Denoon, 1989). Standish (2013) suggests that resources and staff for aid posts, the facilities closest to the people, were extremely limited and services largely excluded the most remote areas and services for women and children (Denoon, 1989, p. 85). Alternatively, from the outset church-based services catered more for rural populations and primarily focused on basic grassroots care, particularly for women and children (Merrett-Balkos, 1998).

During the 1950s and 1960s, a three-tiered network of health facilities was developed with village-level aid posts, district-level health centres and hospitals and provincial-level hospitals (Luker, 2008, p. 262). Health services were centrally administered by the Department of Public Health in Port Moresby, and managed through regional and provincial health offices. At this time, the colonial government and church-based health services were integrated into a single publicly funded system (Denoon, 1989, pp. 99 - 102), with the process of integration completed prior to independence.

Peabody, Edwards, Maerki, and Molyneaux (1995) suggest at independence 'Papua New Guinea could take pride in its effective and expanding public services' which were well conceived (World Bank, 1995, p. 1). Conversely, Luker (2008, p. 262) argues that at this time maternal mortality was high and largely unrecorded. In a report prepared for the first National Health Plan (NHP) Bell, Bignold, and Mercardo (1973, p. 467) note that it was 'not the policy of the department to encourage all women to be delivered in hospital' and few women received antenatal care or supervised births, modern family

planning was scant and sexually-transmitted infections generally uncontrolled (Bell et al., 1973; Luker, 2008).

Changes in governance

As part of decentralisation, between 1977 and 1983, responsibility for rural health services was progressively transferred from central administration to provincial governments (Izard & Dugue, 2003; Sweeney & Mulou, 2012). The transition initially resulted in parallel provincial and national administrative systems, confusion and unclear lines of responsibility and reporting, as well as serious implications for workforce development (Kolehmainen-Aitken, 1992). Changes to decentralisation followed in 1995 with the aim of improving service delivery, especially delivery of health services to the majority rural population (Thomason & Kase, 2009). In 2009 a third phase of decentralisation was undertaken with the objective of ensuring greater equity in funding. More funds were allocated to provinces with higher costs in service delivery (Feeny, 2013). Day (2009, p. 137) argues that while there was an awareness that there were insufficient skilled managers, the 2009 changes nonetheless devolved more responsibility to local governments.

James et al. (2012) argue that despite good intentions, progressive decentralisation has contributed to a deterioration of health services, particularly in rural areas. Other authors concur, arguing that health service delivery has been severely undermined and suffered from a lack of capacity in health management (Izard & Dugue, 2003; Kolehmainen-Aitken, 1992; Kwa, 1999). Provinces, districts and local governments have been given the responsibility to run rural health services, yet they have not received sufficient financial resources or support to improve managerial capacity (World Health Organisation, 2010b). The ongoing deterioration of health services was confirmed in a recent survey undertaken to track health and education outcomes over the past decade (Wiltshire & Mako, 2014). The survey suggests 'an underlying trend of deteriorating performance', and substantial deterioration of health services between 2002 and 2012; 'infrastructure and utilities are in poor condition', and primary health care clinics 'struggle to remain operational and deliver basic services' (Wiltshire & Mako, 2014, p. 84).

Conversely, Reilly et al. (2014, p. 8) argue that 'there is nothing in the structure of Papua New Guinea's institutions themselves that is preventing better service delivery'. Rather, they suggest the problem of service delivery stems from 'the way the institutions are used, and in some cases abused'. Moreover, as Day (2009) argues, the changes since independence have had little to do with improving service delivery. Rather, they have been fuelled by 'the primacy of politics', regional aims, and 'the political imperative of maintaining national unity' (Day, 2009, p. 136).

Health system structure

Under the current structure, the National Department of Health provides reporting functions to parliament and technical advice to provinces. The department, under the leadership of the Minister of Health, is responsible for developing national policies, legislation and health services standards; providing advice to provincial governments on implementation of health policy; managing specialist medical services at provincial public hospitals (including the national hospital in Port Moresby); procuring medical equipment and pharmaceutical supplies for all health facilities; maintaining a national health information system; and supporting nursing (includes midwifery) and community health worker education (Bauze et al., 2009; Kase, 2011). Provincial and local level governments are responsible for the rural health services which include implementation, planning, and financing of the nationally-agreed policies (Asante & Hall, 2011; Bolger et al., 2005).

Kase (2011, p. 2) states, 'by law development of health policy is the responsibility of the national government, while implementation of health policy is by provincial government'. However, a number of authors note a disconnect between policy and implementation (Asante & Hall, 2011; World Health Organisation and the National Department of Health, 2012). Moreover, Bolger et al. (2005, p. 54) contend there are no checks and balances in place to ensure that national policies are effectively implemented on the ground. Reilly et al. (2014, p. 67) concur, and argue problems stem from 'ineffective or inefficient mechanisms for developing policy, setting priorities, delivering funds and monitoring performance', rather than purely from a lack of funds. This has been a finding in similarly decentralised developing countries, such as South Africa, where local governments have little incentive to conform to policy advice from national directives (McIntyre & Klugman, 2003).

National Health Plan (NHP)

The National Health Plan 2011-2020 (Government of Papua New Guinea, 2010) broadly defines the overall policy directions and priority areas for the health sector. The plan, mandated by the Health Administration Act (1997), provides a resource document for planning, implementing and managing health services (Ambang, 2015). Its first objective is to increase universal health coverage and equity in access for the majority of people who are rural dwellers and for the urban disadvantaged. The plan calls for universal education, provision of safe water, and effective transport infrastructure. It prioritises a back-to-basics approach and highlights the importance of strengthening service delivery (Government of Papua New Guinea, 2010). However, many provinces and districts are unable to successfully implement the NHP in the context of the decentralised health system (Ambang, 2015).

Health statistics

Papua New Guinea has some of the worst health indicators in the Pacific, with the average life expectancy of 60 years for men and 65 years for women, which is noted to be poor by global standards (James et al., 2012). A heavy burden of communicable diseases is reported, with the leading causes of morbidity and mortality noted to be acute respiratory infections (pneumonia), malaria, tuberculosis, diarrhoeal diseases, and human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS) (Government of Papua New Guinea, 2010, p. 12; World Health Organisation, 2010b). The generalised HIV/AIDS epidemic[22] is driven predominantly by heterosexual transmission (World Health Organisation, 2010b, p. 2) and women are estimated to be 60% of new diagnoses (Government of Papua New Guinea, 2010, p. 12). Due to the deleterious consequences of the virus, women are more likely to experience poor maternal outcomes. For example, in research carried out in Zimbabwe and Malawi, Milliez (2009) found the rate of maternal death to be 22 times higher among HIV-positive women. The adoption of western lifestyles has also resulted in increasing rates of non-communicable diseases, such as diabetes, heart disease and cancers, particularly in urban areas (Government of Papua New Guinea, 2010, p. 12; World Health Organisation, 2010b).

The main health concerns identified are high rates of maternal mortality and the poor health of children (Government of Papua New Guinea, 2010). The under-five mortality rate, for example, is 75 deaths per 1,000 live births[23], which means that one in every 13 children born dies before reaching their fifth birthday (National Statistical Office of Papua New Guinea, 2009, p. 96). The latest Demographic Health Survey (DHS) estimates a maternal mortality ratio (MMR) of 733 deaths per 100,000 live births (National Statistical Office of Papua New Guinea, 2009). Kirby (2011, p. 57) points out that this means the 'lifetime risk of dying in pregnancy for a PNG mother is 1 in 120' (c.f. a risk of 1 in 190 in India, or one in 10,000 in Australia). Reflecting differing means of calculation, the United Nations inter-agency estimate suggests a lower ratio at 220/100,000 (World Health Organisation, 2014c), based on per capita income calculations.

Mola and Kirby (2013) discuss the discrepancies between international estimates and national maternal mortality data, and based on data collated from health facilities from all provinces, they

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[22] Estimated prevalence of 1% (United Nations Program on HIV/AIDS, 2012).

[23] The under-five mortality rate comprises the infant mortality rate of 57 deaths per 1,000 live births and the child mortality rate of 19 deaths per 1,000 live births (National Statistical Office of Papua New Guinea, 2009, p. 96).

suggest a ratio of 500/100,000 births. However, they stress that in the absence of mandatory vital registration and the high number of women who give birth in the villages, this is an estimate. Breaking down the figures, Mola and Kirby (2013) contend for the 15% of women in urban areas the MMR is approximately 100/100,000 live births; increasing to 400/100,000 for women who can access a basic health facility (55% of the population); and to around 900/100,000, for the 30% who live in remote rural areas and have no access to health services (Mola & Kirby, 2013, p. 197). A more extensive discussion on maternal health in Papua New Guinea follows in the final section of chapter five.

Health service delivery

Health services are provided by a mix of government and church providers (both financed from the public sector), with a small private sector and enterprise-based services such as logging and mining companies, and customary healers (James et al., 2012). The government is the largest overall provider of health services and church-based health services operate the majority of rural and remote health centres and outreach health services (Ascroft et al., 2011; Izard & Dugue, 2003). Overall services include: the national hospital in Port Moresby and provincial referral hospitals in most provinces, managed by the National Department of Health; rural health services managed by provincial health administrations and LLGs[24]; health centres and outreach patrols, managed by various churches and coordinated by the Churches Medical Council[25]; and an unknown number of private sector organisations including a small private sector and employment-related health care programmes, extraction industry health services, women and youth organisations, NGOs, and unregulated traditional healers (James et al., 2012; Nembou, 2013; World Health Organisation and the National Department of Health, 2012).

The health system continues to be based on the hierarchical primary care framework established during the colonial era. At the village level, aid posts and newly established community health posts (National Department of Health, 2013e) provide health promotion and primary health care. These community-based services feed into health centres where referrals for more complex care are made

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[24] Rural health services include aid posts and community health posts, health centres, district and rural hospitals.

[25] The CMC was established in 1972 and has 27 members. It coordinates the health work of the difference churches and negotiates with the Government on behalf of members. Church medical services receive state funding and each service manages their own health facilities (including human resources) in line with the national health framework (V. Hauck et al., 2005). In 2015, K22m (US$ 7.5m) was distributed via the Church State Partnership Program (Government of Papua New Guinea, 2015).

to district and provincial hospitals. Each level of the system offers increasing specialisation of staff, and all government funded medical personnel are based at urban provincial hospitals. There are a small number of (expatriate) volunteers at church-facilities. Outpatient services are additionally provided at urban clinics and from hospitals, including clinics run at the national hospital in Port Moresby (Government of Papua New Guinea, 2011, p. 7; World Health Organisation, 2010b).

Human resources for health

Health workers are an essential building block in health systems; however, strengthening of human resources for health has been neglected in Papua New Guinea (and in many other countries) (Bangdiwala, Fonn, Okoye, & Tollman, 2010; Henderson & Tulloch, 2008). Luker (2008, p. 266) sums up the state of human resources for health in Papua New Guinea by saying: 'the health workforce is ageing, human resources are short, and most doctors congregate in Port Moresby'.

A recent study of the health workforce was commissioned by the National Department of Health and undertaken by the World Bank (World Bank, Morris, & Somanathan, 2011). This report states that the health sector is facing major challenges, with little improvement over the past 35 years (World Bank et al., 2011). CHWs and nurses (including midwives) form the backbone of the health system, particularly in rural areas, with no increase of staffing in line with population growth (Razee, Whittaker, Jayasuriya, Yap, & Brentnall, 2012). Kase (2011) suggests this has severely limited the ability to deliver quality health care. Estimates suggest that for every 10,000 people in Papua New Guinea there are 0.5 physicians, 5.1 nursing and midwifery personnel and 6.2 CHWs (World Health Organisation, 2011, p. 120). This places Papua New Guinea among the countries with the least number of skilled health workers in the world, at lower than 22.8/10,000[26] (World Health Organisation, 2014a, p. 12). Moreover, the World Bank report highlights that the majority of health workers (87% of doctors, 55% of nurses) are based in urban centres (World Bank et al., 2011).

In response to the World Bank report noting weak national health workforce planning (World Bank et al., 2011; World Health Organisation and the National Department of Health, 2012), an Arrest Plan 2013 – 2016 (National Department of Health, 2013f), Health Sector Human Resource Policy (National Department of Health, 2013a), and Health Workforce Enhancement Plan, 2013-2016 (National Department of Health, 2013b, 2013g) have been developed for future health workforce planning. Yet, these have not yet been budgeted or fully resourced (Kase, 2011; World Health Organisation, 2010b).

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[26] Both New Zealand and Australia, like other developed countries, are in the highest performing group, with a density equal to or greater than 59.4 health workers per 10,000 population (World Health Organisation, 2014a, p. 12).

The National Department of Health remains responsible for managing education programmes for nurses, midwives, HEOs and CHWs (but not doctors) (Kase, 2011) and church-based providers operate six of nine nursing schools and all 14 CHW training schools. As discussed in the following chapter, Australian development assistance is supporting workforce development for maternal health.

The remainder of the chapter introduces the case study province of East New Britain.

East New Britain Province

East New Britain Province[27] is one of five provinces in the New Guinea Islands region[28]. It is situated on New Britain Island and shares land and sea borders with the provinces of West New Britain, New Ireland, and Bougainville, with extensive coastal waters and the Watom and the Duke of York Islands (National HIV/AIDS Support Project, 2005). Much of the province is rugged mountainous terrain covered in tropical rainforest, including the Baining and Nakanai Mountains, the Ania, Melki and Megigi valleys, and the Keravat and Warangoi rivers (National Research Institute, 2010, p. 161).

Figure 2: East New Britain Province, Papua New Guinea

East New Britain Province

Port Moresby, National Capital District

Source: Wikimedia Foundation Inc. (2015)
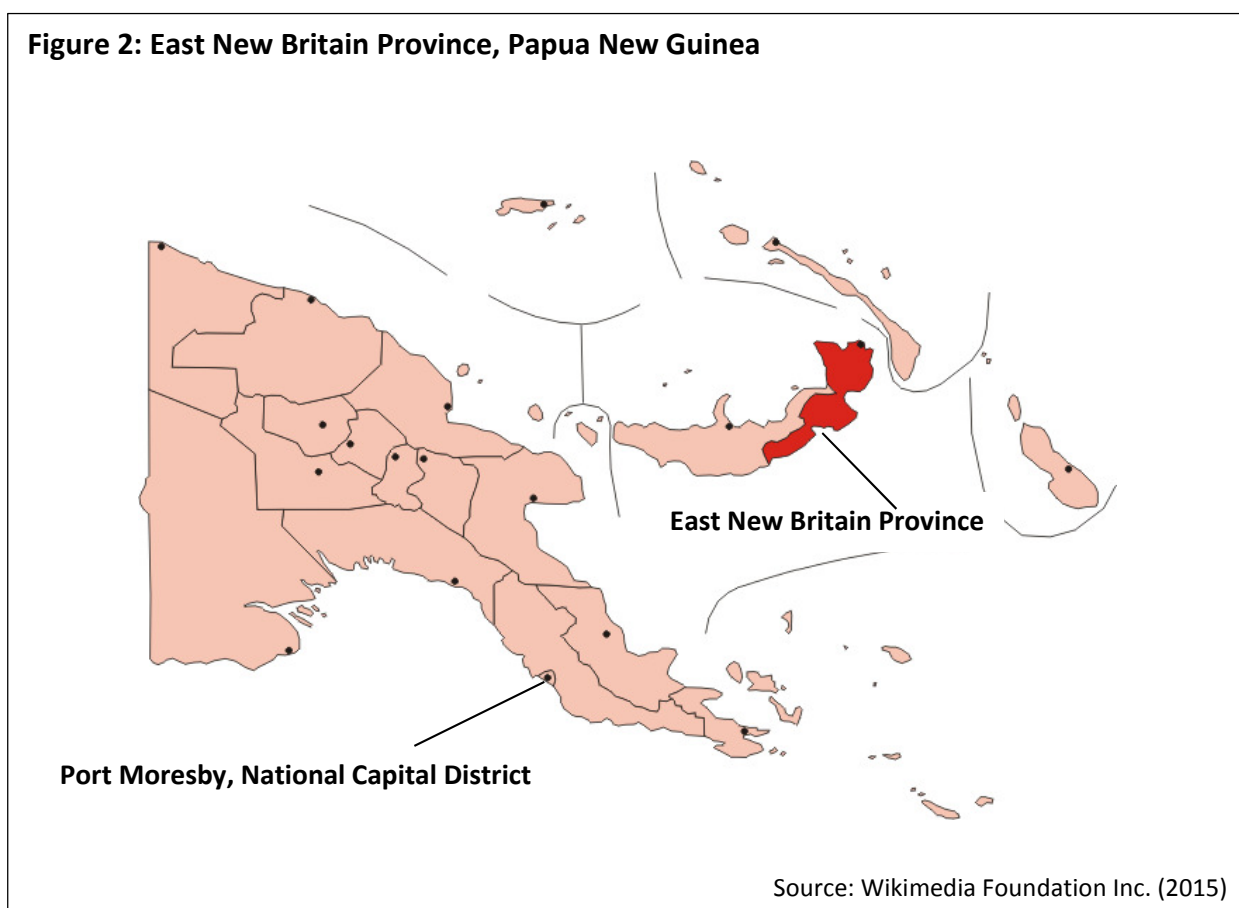
[27] East New Britain has a total land area of 15,274 square kilometres with 104,000 square kilometres of coastal waters.

[28] Islands Region includes: Autonomous Region of Bougainville, East New Britain Province, Manus Province, New Ireland Province and West New Britain Province.

Traders, settlers, and Christian missionaries arrived in East New Britain from the mid-1800s (V. Hauck et al., 2005; R. W. Johnson, 2011). Martin (2013, p. 12) identifies that German colonisers 'planted their first flag at Matupit in 1884' and in 1910 established the German New Guinea capital in Rabaul. Unlike other parts of Papua New Guinea, large areas of land were alienated from customary ownership[29] and established as copra, rubber, and cotton (later cocoa, vanilla and timber) plantations (40% of the Gazelle c.f. 3% across the country). The German administration built a network of roads, enabling movement around the area, particularly movement of cash crops for the export market (Martin, 2013; Scales, 2010). In 1920, after the First World War, the territory was passed to Australia which governed until independence in 1975 (excluding 1942-1945 during the Second World War Japanese occupation). The early and sustained contact with settlers and Christian missionaries, led to rapid change in East New Britain, particularly around the Gazelle Peninsula. The alienation of land for plantations has led to political unrest and intense land pressure due to population growth over the long-term (Martin, 2013; Tammisto, 2010; N. Thomas, 1995).

Districts

The most recent census suggests East New Britain Province has a total population of 271,252[30] [31] (3.8% of the total Papua New Guinea population) living in four districts: Kokopo, Rabaul, Gazelle and Pomio (National Research Institute, 2010). Kokopo District is a small semi-urban district on the northern coast. It includes the ten Duke of York islands and volcanic plains. Most of the district is under cultivation or used for cash crops such as copra, cocoa and subsistence farming (National HIV/AIDS Support Project, 2005; National Research Institute, 2010). In Kokopo District there is an estimated population of 73,896, with four LLGs and associated wards. Health services are provided from one rural hospital, three medical centres, four health centres, and eight aid posts (Kokopo District Administration, 2008). Kokopo is the provincial capital and the main business area with a large market.

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[29] Much of the land was 'purchased or acquired' by the Catholic church to set up plantations (V. Hauck et al., 2005).

[30] Interestingly, the figures demonstrate a sex ratio of 107 males per 100 females, this gender imbalance may point to the increased vulnerability of women and reveal something about gender relations (National HIV/AIDS Support Project, 2005).

[31] Population and census data is derived from the 2011 census and at the time of writing, although the final figures have been published (National Statistical Office of Papua New Guinea, 2014), I have been unable to access a copy, therefore I have elected to use the published preliminary figures (National Statistical Office of Papua New Guinea, 2012).

Rabaul District is a small semi-urban district on the northern end of the Gazelle Peninsula. It is dominated by the Rabaul caldera and three ancient volcano cones. In 1994 two active volcanoes erupted, almost destroying Rabaul town by covering it in volcanic ash. At this time the provincial headquarters, public services, and many people moved to Kokopo (National HIV/AIDS Support Project, 2005; National Research Institute, 2010). Rabaul district comprises four LLGs and has an estimated population of 32,078. There are many people living in resettlement areas following the 1994 eruptions and ongoing restoration efforts. Tavurvur remains an active volcano, with constant ash fall and periodic mudflows, despite this, people continue their day-to-day lives. There is a market and the only port in the province, which is an important shipping hub. Rabaul is also the site of the provincial hospital (Nonga General Hospital) which continues to operate, despite ash fall. Other health facilities include a day clinic in Rabaul town centre, one health centre, and seven aid posts (Rabaul District Administration, 2009).

Figure 3: Districts of East New Britain
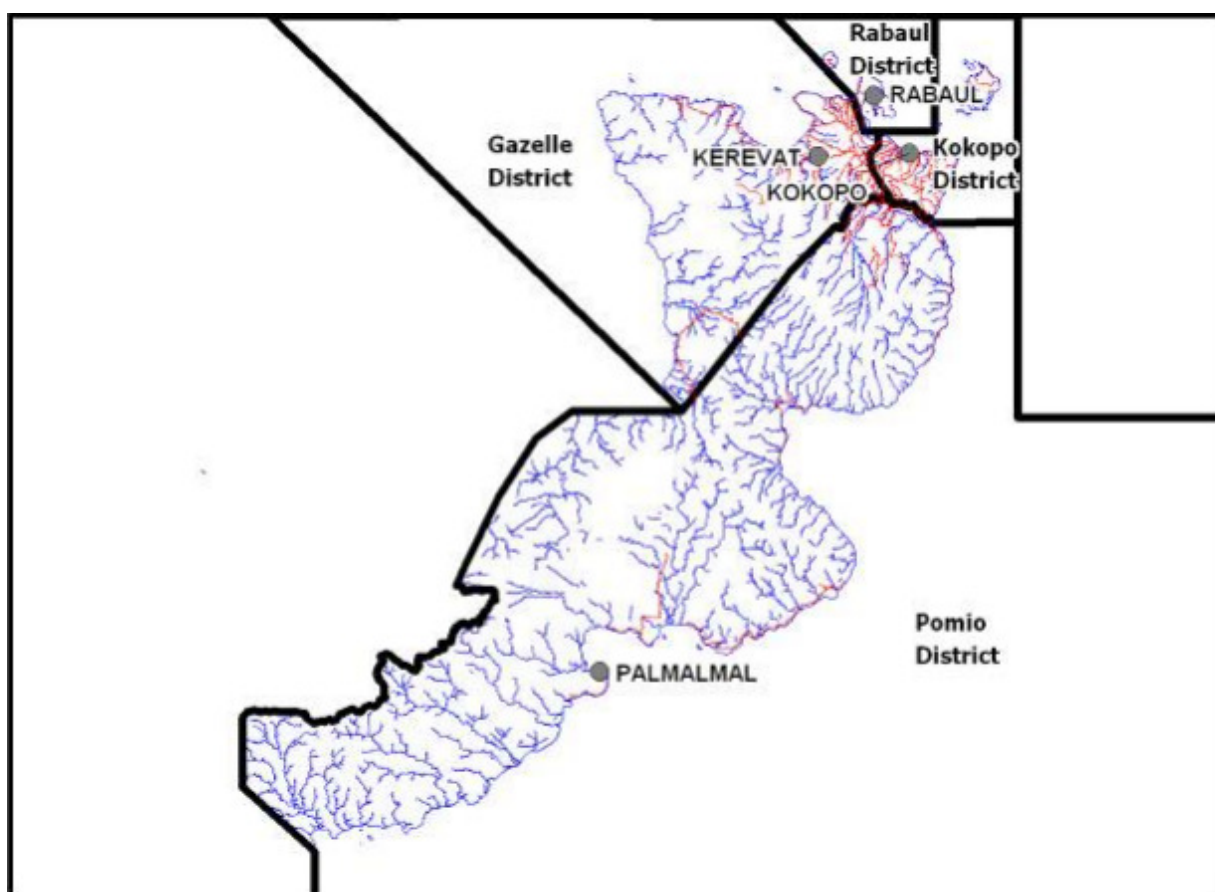
Source: National Research Institute (2010)

Gazelle District is the second largest geographical district, in the north-west of the province. It consists of lowlands, highlands, and rivers out to the sea (National HIV/AIDS Support Project, 2005). The district comprises five LLGs and around 120 wards with an estimated population of 107,217, the largest by population in the province. The district has 10 health facilities including one rural hospital in the main business area, Kerevat, several health centres, a day-clinic, and 35 aid posts (Gazelle District Administration, 2008).

Pomio District is the most remote and largest geographic district to the south-east of the province, stretching along the coastal plains. The district is mostly mountainous and has extensive areas of virgin forest, caves, waterfalls, and wildlife. There is limited infrastructure with few paved roads or wharves (National HIV/AIDS Support Project, 2005). The estimated population of 58,061 principally live in scattered small villages and hamlets. It is comprised of five LLGs with seven different cultural groups. Health services are provided at 29 aid posts, seven sub-health centres, five health centres, and one rural hospital in Palmalmal (Pomio District Administration, 2009).

Provincial Government

The East New Britain Provincial Assembly was established following the Organic Law reforms (1995, 1997) as a mechanism to implement government policies within the province. The provincial assembly is comprised of the elected members of parliament, presidents of the LLGs and appointed representatives from NGOs and women's organisations (Kokopo District Administration, 2008; Standish, 2013). The provincial government receives grants from the national government and is able to levy taxes. It is responsible for education, water supply industry and business development, and works with local governments to provide health services, environment protection, waste disposal, roads, and economic promotion (Standish, 2013). The Provincial Ten Year Strategic Development Plan, 2011-2021 proclaims the East New Britain provincial vision is: 'to have an educated, healthy and wealthy people living in a socially peaceful and wise community' (East New Britain Provincial Administration, 2011, p. v).

People and economic activity

The four districts (Rabaul, Kokopo, Gazelle and Pomio) encompass many villages and hamlets, some of which are amongst the poorest in the country, particularly in the Pomio district (Bauze et al., 2009, pp. 18 - 19). The major reported ethnic groups in the province include: the Tolai in the north-east Gazelle, the Mengen in central Pomio, the Kol in the hinterlands of Pomio, the Tomoips of East Pomio and part of Central Pomio, the Kairak and the Qaqet of the Bainings Mountains (East New Britain Provincial Administration, 2011). Other groups include the Sulkas of Pomio, Taulils, Makolkols,

Mamusi, Duke of York islanders, Watom, Lotes of Pomio, and mixed Nakanais (National HIV/AIDS Support Project, 2005). There are also migrants from Sepik, the highlands and many other parts of Papua New Guinea who have come to East New Britain seeking work on the plantations, logging sites or with construction companies (National HIV/AIDS Support Project, 2005).

There is frequent movement between districts and provinces as people travel to participate in higher education, and for work in government departments, logging companies, plantations or building projects (National Research Institute, 2010). There is currently a large and controversial Malaysian Special Agricultural and Business Lease (SABL) project underway in the Pomio District, which is bringing many changes including new migrants from around Papua New Guinea and from Malaysia (Filer, 2011). The majority of people continue to live traditional lives in villages, earning incomes from export cash crops of oil palm, cocoa farming and producing food for subsistence and for sale at local markets. The majority of economic activity is situated in Rabaul and Kokopo districts, with less economic activity in Pomio and Gazelle (Scales, 2010).

The key economic activities across the province are agriculture and livestock, small scale fishing projects, forestry and mining projects, small family or clan owned trading stores, and a small number of tourist guesthouses (National HIV/AIDS Support Project, 2005). Some people produce and sell copra, vanilla, and other small holdings such as poultry. Cocoa production, while previously a dominant economic activity, has declined following the 2006 widespread infestation of Cocoa Pod Borer (Curry, Koczberski, Lummani, Ryan, & Bue, 2012). Moderate to large markets for fresh produce are situated in Kokopo and Rabaul, and a smaller market in Kerevat. There are also many small, road side or road junction markets, operated by families or groups of neighbours (Curry et al., 2012; Scales, 2010).

Women in East New Britain

Many societies in East New Britain, particularly the dominant Tolai society, are regarded as strongly male-dominated (Bradley, 1985). A report by the United Nations Habitat Regional Technical Cooperation Division (2010) argues women's roles are dictated by traditional and cultural obligations, principally confined to child rearing and household management. This hinders the empowerment of women, including their ability to make decisions and choices about their lives. Bradley (1985) suggests that ideological factors maintain sexual inequality among the Tolai, and keep women in a subordinate position, particularly within marriage. In 2010 local government membership was documented to consist of 19 men and only one woman. Churches and other NGOs in the province support women's groups and are actively involved in addressing the empowerment of women; however, efforts to address gender disparity are greatly hindered by strong cultural and traditional

beliefs and values. Further, women are vulnerable to gender based violence and have limited opportunities to gain education, life skills, or employment (United Nations Habitat Regional Technical Cooperation Division, 2010, p. 20).

Infrastructure

Major infrastructure in the province consists of a provincial airport at Tokua, Kokopo and two wharves in Rabaul. There is a road network in the Gazelle Peninsula (Kokopo and Rabaul), covering an estimated 10% of the province, with very few roads in the south and inland areas of the Gazelle and Pomio Districts (National HIV/AIDS Support Project, 2005; National Research Institute, 2010; Scales, 2010). Scales (2010) suggests this is driving depopulation as people seek better opportunities elsewhere. In Pomio District there is a small wharf at Palmalmal and scattered airstrips. Tammisto (2010) highlights that in Pomio there are numerous short roads built by logging companies connecting logging sites with the coast and smaller villages with one another, however there is no road connection between Pomio and the provincial capitals of East or West New Britain and people travel by sea or walk many days on foot to reach services. The National Research Institute District and Provincial Profiles (2010) suggest over half (61.3%) of the population are within 5km of a road. While the National HIV/AIDS Support Project suggests 'people living in the interior of Pomio and Gazelle Districts do a lot of walking' (National HIV/AIDS Support Project, 2005, p. 13).

Health services

The health service delivery system in East New Britain reflects the national decentralised framework. Services are provided by a mix of government and church-based services from aid posts, community health posts, urban-based day clinics, four rural/district hospitals (Vunapope, Kerevat, Warangoi and Palmalmal) and one provincial hospital (Nonga General Hospital). An estimated 42% of health services are provided by church-based health services (National Department of Health, 2013g, p. 23). The majority of rural health funding is allocated to LLGs, who are responsible for funding health services, coordinated by a district health coordinator. A provincial health advisor provides advice to the provincial assembly on health policy.

A recent survey identifies East New Britain as a top performer in comparison to other provincial health and education systems. Howes et al. (2014) note the province has the most outreach health patrols, the highest maintenance levels of facilities, and the highest proportion of positions filled within health facilities. Conversely, the report notes workers had to travel substantially longer distances to access banking services and airports than in other provinces, and that they face similar challenges in service provision (Howes et al., 2014).

The East New Britain Provincial Administration (2011) strategic development plan, 2011-2021 suggests that while health is a priority social sector for the province, the service delivery system has been inadequately responsive to population growth. The plan notes a continuing decline in the effectiveness of the health services and many challenges at district and ward levels, such as increasingly non-functional aid posts, unreliable cold chain systems and inconsistent deliveries of medical supplies (p.25). Maternal mortality is noted to be high, especially in the remote areas where health facilities are inaccessible for the population. Other health issues are noted to be infant mortality, tuberculosis, malaria, and an increasing prevalence of non-communicable diseases (East New Britain Provincial Administration, 2011).

Chapter conclusion

This chapter provides background information to place the current research within a national and provincial context. It describes the historical and political context, as well as the people, and economic and development context of the country. Australia is the main donor of ODA to Papua New Guinea and several large health projects are in progress. The health system was established during the colonial era based on a primary health care approach although services were primarily urban based and subsequent decentralisation has failed to respond to poor health conditions.

East New Britain, the case study province for this research, was introduced. It is a province with a long history of contact with traders and missionaries and is noted as a top performing province in a recent report. The people of East New Britain identify with a range of ethnic groups, including the dominant group of the Tolai from the Gazelle Peninsula. There are many people from other parts of Papua New Guinea in the province, having settled following the establishment of plantations during the colonial era. For many women little has changed with modernisation, and roles are predominantly confined to child rearing and household management. Health services are provided by a mix of government and church-based providers based on the national decentralised framework and a primary health care approach. Like other parts of the country, health services have deteriorated over the past decade. The following chapter takes a more global perspective and explores maternal health discourse and then focuses on maternal health in Papua New Guinea.

CHAPTER FIVE: Maternal Health context

Women are not dying of diseases we can't treat... They are dying because societies have yet to make the decision that their lives are worth saving.

Mohmoud F. Fathalla (1997)

Introduction

In this second context chapter I trace global maternal health discourse by reviewing selected published and grey literature, and introduce maternal health in Papua New Guinea. The impact of poor maternal health cannot be understated for the woman herself, her baby, surviving children and other family members, her community and broader society (Filippi et al., 2006, p. 3). Maternal health is central to multiple aspects of women's lives, and is critically important for broader social and economic development of societies (Gill et al., 2007). Maternal health encompasses women's health during pregnancy and childbirth and until 6 weeks postpartum. For most women this is a normal physiological process, yet for some - an estimated 15%[32] - it can result in the tragedy of a maternal death (or ongoing morbidity, which, although is less easily defined, is more widespread). Maternal health encompasses health outcomes for women (and girls) and their newborns, whose outcomes are intrinsically linked.

The chapter commences in the 1930s and offers a chronology of the global maternal health discourse until the time of writing in 2015. Maternal health in Papua New Guinea is then examined through selected literature published in the 40 years since independence in 1975. This section presents reported rates of maternal mortality and reflects on the maternal health care system and strategies to improve maternal health, including the donor funded, multi-stakeholder Maternal and Child Health Initiative (MCHI).

Tracing the evolution of global maternal health

Any attempt to portray the evolving ideas regarding strategies to improve maternal health in the developing world over the past half-century risks oversimplification in the requirement for brevity,

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[32] Although childbirth is a normal physiological process, the literature suggests that around 40% of women will develop some form of complication (Gill et al., 2007). For an estimated 15%, without access to health care, complications potentially result in maternal mortality (Gill et al., 2007; Koblinsky, Timyan, & Gay, 1993; Lule et al., 2005).

and risks exclusion of the importance of contributing wider global movements and trends. Change is never a linear, contained or superficially neat process, and in many respects changes in health policy are driven by the changing international environment. International development co-operation is argued to have emerged in the shadow of the second world war and in the context of decolonisation and independence (Esteva, 1992). Broadly, the 1950s saw the emergence of the global mechanisms, the 1960s modernisation and population control and the 1970s the era of state intervention, the 1980s market liberalisation, and the 1990s saw the era of participation and empowerment. The new millennium saw the advent of the Millennium Development Goals (United Nations Millennium Declaration, 2000), and a greater focus on aid effectiveness, with efforts directed to modernising, deepening and broadening cooperation. Four high level forums have focused on aid effectiveness, namely Rome (2003), Paris (2005), Accra (2008) and Busan (2011) (Organisation for Economic Co-operation and Development, 2015). The most recent global mechanism for development cooperation are the SDGs agreed in September 2015, which will guide the agenda for the next 15 years until 2030 (United Nations, 2015c). It is within these broader global movements that health policy generally and specifically policy on maternal health has evolved. While being mindful of the complexity of the international discourse, the following discussion traces the evolution of maternal health policy, identifying dominant themes.

Maternal health 1930 -1948

The League of Nations Health Section first noted concerns about poor maternal health in the developing world in the 1930s (AbouZahr, 2003). However, at this time, global health efforts were principally focused around war and trade, or oriented towards the protection of the colonising populations and their workforce (Jolly, 1998; MacPherson, 1980, p. 114). In 1948, the World Health Organisation (WHO) was founded as the health agency of the United Nations. The WHO Constitution proclaimed the right of all to the highest attainable standard of health, including the promotion of maternal and child health and welfare (World Health Organisation, 1948, p. 3). The WHO identified maternal and child health as priorities, although erroneously included maternal health in a list of 'diseases' (O. Campbell, 2001), despite being a normal healthy part of life for the majority of women.

Early recommendations 1950 – 1960s

In the 1950s the WHO promoted key areas including provision of technical support to train health workers (including midwives) to raise the standard of care, particularly for home births; support for countries to create administrative divisions for maternal and child health within national health programmes; and, the integration of maternal and child health services with general health services (O. Campbell, 2001; World Health Organisation, 1952). However, at a wider level, maternal health

was not recognised as a key public-health concern (AbouZahr, 2003; Gruskin et al., 2008, p. 590; G. Sen, Govender, & Cottingham, 2007; World Health Organisation, 2005b) and little attention or funding was allocated to improving maternal health in global programmes[33] (O. Campbell, 2001). Lane (1994) suggests that in the late 1950s the international focus was on halting the rapidly increasing global population, and these population control efforts were based on political agendas.

The 1960s saw the emergence of the first global development goals in the context of the United Nations first 'development decade', 1961 – 1970. Health development goals focused on national health planning, communicable disease control, water systems, malnutrition, and staffing levels. In this context, international cooperation for maternal and child health began to appear, with donors and international agencies funding maternal and child health (MCH) programmes (O. Campbell, 2001, p. 419). However, reports and programmes seldom featured maternal health as a specific component. Alternatively, infant and child health interventions such as universal immunisation, nutritional supplementation, oral rehydration and growth monitoring where emphasised (Gruskin et al., 2008, p. 590) under the banner of maternal health. By the second WHO decade, Campbell (2001, p. 7) suggests any specific concern for maternal health further diminished. Maternal health was referred to in the context of population control, conceived either as an approach to empower women or as eugenic population control (Birn, 2009).

The importance of improving women's general health or their reproductive and maternal health for the benefit of women themselves, independent of the impact on children, appears to have been absent from the debate. Children and infants who had a greater risk of dying than their mothers garnered far greater policy attention (de Brouwere, Tonglet, & van Lerberghe, 1998). G. Sen et al. (2007, p. 34) emphatically argue that 'child health was the engine driving attention maternal health well into the 1970s and 1980s'.

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[33] There were some exceptions, such as English colonist wives in Fiji who supported maternity services for indigenous populations, and services provided by missionaries (O. Campbell, 2001, p. 418). In addition, several notable outsiders such as Sri Lanka, Malaysia, and Thailand focused on decreasing maternal mortality through the introduction of health care facilities, investigation of maternal deaths, creation of certified village midwives and other skilled birth attendants to replace traditional attendants, and strengthening and equipping district hospitals (Koblinsky & Campbell, 2003; van Lerberghe & de Brouwere, 2000; Pathmanathan & Liljestrand, 2003).

Primary health care era – 1970 – 1980s

The realisation in the 1970s that the transfer of medical care models[34] from developed to developing countries was not effectively improving people's health, shifted the paradigm away from hospital-based models to primary health care (PHC). PHC focuses on decentralised health services with extensive community involvement, prevention and provision of services close to communities. The 'Alma Ata Declaration on Health for All by the Year 2000' (1978) was developed at a WHO/UNICEF conference. It identified the importance of improving health lay beyond the health sector by addressing the underlying determinants of health in the social, economic, and political sectors, with an emphasis on prevention, use of appropriate technology and a multi-sectorial approach (Kloos, 1998; World Health Organisation and United Nations Children's Fund, 1978). It is important to note that an unintended consequence arising from the focus on PHC and improving social determinants of health has been a significant shift, in some settings, directing resources away from hospitals and medical care (van Lerberghe & de Brouwere, 2000), although these services continue to remain vital for complex medical conditions alongside community based interventions.

In 1974 the WHO adopted a family planning[35] strategy as the major focus of maternal health care programmes (World Health Organisation, 1974 cited in Campbell, 2001). Prevention of unplanned pregnancy reduces the risks associated with pregnancy, abortion and childbirth; however, a number of authors suggest that priority for family planning programmes came at the expense of other reproductive health services, including limiting the focus on maternal and neonatal health (G. Sen et al., 2007). In this context, vertical family planning programmes, supported by donors emerged, separate from other government programmes, while other aspects of women's reproductive and general health were neglected (AbouZahr, 2003).

The 1980s have been described as a 'stalling of global summitry and goal setting' (Hulme, 2009, p. 8), as dramatic changes arose from the global economic crisis and subsequent structural adjustment programmes imposed by the International Monetary Fund and the World Bank. These programmes imposed liberalisation, privatisation and reduced government spending. Imposed conditionality damaged health and education programmes and other essential services, leading to the 1980s being

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[34] Western medicine has been exported from developed to developing countries since the late 19th century by both colonists and missionaries (Gaines & Davis-Floyd, 2004).

[35] I have some discomfort with using the common term 'family planning' as it has a connotation of an expectation of women 'planning' a family. I prefer the term contraception, although I acknowledge this may have biomedical connotations for some readers (Etymology of contraception – contra – against, -ception - shortened form of conception).

called development's 'lost decade' (Cornia, Jolly, & Stewart, 1989). Consequently, primary health care 'fell victim to economics and was compromised by the adoption of selective interventions', such as vertical immunisation or growth monitoring programmes (AbouZahr, 2003, p. 15). Kickbusch (2000, p. 982) suggests that donors and agencies competed and many had a preference for 'vertical programs[36] and medical/technical solutions' rather than directing resources to infrastructure and human capital investments.

Within this context, strategies to reduce maternal mortality remained substantially unchanged from those of the early 1950s - encouraging attendance at antenatal clinics and educating mothers (de Brouwere et al., 1998; World Health Organisation, 1952). In the late 1960s access to contraception was added as mentioned previously, and in the 1970s the training and promotion of traditional birth attendants emerged as a major strategic axis in the action against maternal mortality (de Brouwere et al., 1998, p. 776). These public health programmes continued to rely largely on the transfer of knowledge and techniques from developed to developing countries, with little consideration given to political or social realities (AbouZahr, 2003), or to building the underlying determinants of health, existing community structures, or health systems in developing countries.

Awakening to the issue of maternal mortality

Women's movement

During the 1970s lobbying from the international women's movement, feminism, and human rights was growing, leading global campaigns for women's rights and expanding women's roles beyond those associated with childbearing and the domestic sphere (O. Campbell, 2001). The focus was on two key issues: equal pay for work of equal value and the rights of women to have control over their bodies and reproductive choices through access to contraception and abortion (Gruskin et al., 2008, p. 590). The United Nations Decade for Women, 1976-1985, focused attention on women's health and rights, stressing the importance of women's health in its own right. The 1979 Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) was adopted by the United Nations General Assembly. This was seen as a breakthrough as it 'explicitly addresses human rights regarding family planning services, care and nutrition during pregnancy' (Cook, Dickens, & Fathalla, 2003, p. 153). However, Davies (2010) argues reference to health was limited to one article, largely discussing women's health in the context of family planning. Moreover, while CEDAW requires the

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[36] Vertical programmes focus on selected health issues, targeting a specific disease or condition, rather than supporting general or horizontal health system strengthening (Elzinga, 2005).

establishment of capacity to deliver health services, it 'provided no political or funding incentives on how this might be achieved' (Davies, 2010, p. 394). The decade closed with the formulation of the 'Forward Looking Strategies', which included a call for the reduction in maternal mortality by half by the year 2000 (AbouZahr, 2001; Starrs, 2006).

In the context of these movements, two events in 1985 highlighted the severity of maternal mortality in the developing world and drew significant policy and development attention to the issue. Firstly, a seminal paper by Rosenfield and Maine (1985) was published in *The Lancet*, entitled 'Where is the 'M' in MCH (Maternal and Child Health)? This paper starkly presented the inherent neglect of women in maternal and child health programmes, which were revealed to be mostly driven by concerns about infant and child health. Secondly, the WHO[37], published the 'first 'guesstimates' (AbouZahr, 2003, p. 15) of global maternal mortality, which revealed the extent of the issue had previously been 'grossly underestimated' (van Lerberghe & de Brouwere, 2000, p. 23). The new estimates suggested around half a million women were dying of maternal health causes every year: 99% of whom were in developing countries.

Safe Motherhood Initiative – 1987 – 2005

In conjunction with lobbying from the women's movement, the first international conference devoted to maternal mortality (Nairobi, Kenya, 10-13 February 1987) was jointly sponsored by the WHO, UNFPA, and the World Bank (Starrs, World Bank, World Health Organisation, & United Nations Fund for Populations Activities, 1987). This conference was instrumental in the campaign to establish reproductive health as a human right (Davies, 2010, p. 394) and the Global Safe Motherhood Initiative (SMI) was launched. The conference called for a reduction in 'maternal mortality by 50% by the year 2000' (Starrs et al., 1987). Closing statements argued for the need to improve women's status, educate communities, and strengthen and expand core elements of maternal health care, in the community and at referral levels (Starrs, 2006). National and regional meetings following the conference raised awareness among policy makers, and received commitments to improve maternal health (Maine & Rosenfield, 1999). Nonetheless, many governments and public health agencies queried the need for a special focus on maternal health, arguing safe motherhood was already included within national health systems as a part of maternal and child health programmes (Starrs, 1997). Consequently, many accounts of the initiative highlight disappointing results (AbouZahr, 2001; Maine & Rosenfield, 1999; Shiffman & Smith, 2007; Weil & Fernandez, 1999).

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[37] The World Health Organisation in conjunction with the United Nations Population Fund.

Antenatal care

In retrospect, the reasons for the disappointing results can be found in the strategic focus taken. Starrs (2006, p. 1130) suggests:

> donors, UN agencies, and governments seized on two elements of the safe motherhood strategy discussed at the Nairobi conference – antenatal care, with a focus on screening women to identify those at risk of complications, and training of traditional birth attendants to improve delivery care at the community level – and poured their funding and support into these strategies.

The strategies were a good fit with the prevailing primary health care philosophy and were thought to be cost-effective measures to improve maternal health (Rosenfield & Min, 2009). Yet, a decade later, at a conference marking the 10th anniversary of the SMI, two of the key messages alerted to the failure of both these approaches (Starrs, 2006). It is now known that although antenatal care has positive benefits, such as increasing women's engagement with the health system and administration of prophylaxis treatments to improve neonatal outcomes, it has very low predictive value for maternal health, as many complications can be neither predicted nor prevented (de Brouwere et al., 1998; Carroli, Rooney, & Villar, 2001; Rosenfield & Min, 2009). Antenatal care in isolation does not prevent maternal mortality or morbidity, and, since 1999, skilled birth attendance within 'packages of care' have been recommended (Kerber et al., 2007). As Paxton, Maine, Freedman, Fry, and Lobis (2005) argue, the majority of maternal deaths are from direct obstetric complications that cannot be prevented by attending antenatal care, being well nourished, being educated, or being empowered. While attention to these factors can facilitate women's access to health care services, they do not protect women from experiencing maternal morbidity and mortality (Paxton et al., 2005).

Traditional Birth Attendants

The second strand widely supported by donors, agencies and governments from the 1986 conference was training of traditional birth attendants (TBAs). Pfeiffer (2003, p. 732) contends that, 'so many organisations wanted to support the TBA training that some TBAs received more support than their counterpart maternal-child health nurses in the health posts who suffered supply shortages'. Training of TBAs[38] was promoted as a major strategy to improve maternal and neonatal health (Sibley et al.,

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[38] Alternatively, in some contexts, where there were no traditional birth attendants, donors introduced programmes for village birth attendants for example, in Papua New Guinea see Schumacher (1987) and Albu and Alto (1989) for discussion of introduced programmes in line with international recommendations.

2007; 2012). This strategy was in alignment with primary health care and empowerment approaches. TBAs are argued to provide services where there are acute shortages of health infrastructure and health professionals. From 1972 to the mid-1990s Fleming (1994, p. 143) suggests that 85% of countries initiated some form of TBA training. However, despite thousands of TBAs receiving training in all developing countries[39], evaluations demonstrated little impact on maternal mortality (de Brouwere et al., 1998, p. 778; Sibley et al., 2007; 2012). A large body of literature[40] now suggests that 'for most complications of pregnancy and childbirth, there is little that TBAs [or VBAs] can do to save women's lives' (Rosenfield & Min, 2009, p. 11).

Further, short training courses are not sufficient to ensure TBAs (or VBAs) have the technical knowledge, skills, or critical thinking necessary to provide the care women and babies require for optimal outcomes (Bergström & Goodburn, 2001). The knowledge and skills drawn from medical science related to utilising obstetric techniques[41], while not usually necessary, can protect women's and newborn lives when needed.

Further explanation for the limited success of TBAs, may come from their social role, which is rooted in local culture, with sometimes immense cultural gaps between traditional and biomedical methods of care (Nyanzi, Manneh, & Walraven, 2007). De Brouwere et al. (1998, p. 778) go further and suggest that rather than encouraging women with complications to seek professional help, TBAs can delay health care seeking or even 'deliberately discourage women from going to hospital'. Davis-Floyd (2001, pp. 5 - 6) similarly asserts that TBAs are an antiquated leftover and their continuing existence is only due to the lack of skilled birth attendants. The vast majority of women, who experience normal pregnancy and childbirth processes, will experience culturally appropriate care with TBAs as they have since the beginning of time. And there is little doubt that TBAs can give women significant support, empathy and comfort (Bergström & Goodburn, 2001). However, for women who experience

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[39] Programmes were instituted throughout the developing world, e.g. in Bangladesh, Nessa (1995) argues that between 1978 and 1995 over 44 000 TBAs were prepared, with little demonstrable impact on maternal mortality. Nessa (1995) argues that 'regardless of the success of their training, it is not in the hands of the TBAs to prevent case fatality' (p.S138).

[40] For example, see (Bergström & Goodburn, 2001; Goodburn, Chowdhury, Gazi, Marshall, & Graham, 2000; Sibley & Sipe, 2004; Sibley, Sipe, & Koblinsky, 2004; J. B. Smith et al., 2000).

[41] The majority (75%) of maternal deaths arise from direct obstetric complications - such as haemorrhage (excessive bleeding antepartum or postpartum), sepsis, complications of abortion (spontaneous miscarriage or illegal/unsafe abortion), hypertensive disorders of pregnancy, prolonged or obstructed labour, ruptured uterus and ectopic pregnancy. These complications occur even in well nourished, well-educated women who have received antenatal care, and cannot be predicted (Paxton et al., 2005, p. 185), however optimal and timely health care interventions can decrease the incidence of mortality and morbidity.

complications, early recognition, first line treatment and referral for medical services, if necessary, is vital to achieve optimal outcomes. An important future role for TBAs/VBAs could involve community education, mobilisation efforts, facilitating women's access to information and health services, and linking women and their families to skilled birth attendants (Howard-Grabman, 2000; Perreira et al., 2002).

International Conference on Population and Development – Cairo 1994

While failing to make a significant impact on improving maternal health, the Nairobi conference (1987) was nevertheless the genesis for multiple publications[42], wide ranging advocacy materials, national and local research projects and conferences. Seven years later, the 1994 International Conference on Population and Development (ICPD) in Cairo saw the realisation of lobbying and advocacy and heralded a significant paradigm shift, 'away from demographically driven approaches towards policies grounded in concerns for human rights, social well-being and gender equity, with particular emphasis on reproductive health and rights' (Corrêa, 1999, p. 5). Contraception and safe motherhood were incorporated at this meeting under the concept of reproductive health. The ICPD and the development of the Program of Action is noted as a breakthrough, acknowledging the critical role of women, including their legal rights and social status as vital for sustainable development, at family, community, and national levels (Barot, 2009).

The ICPD was the first time women were explicitly recognised as having a right to experience pregnancy and childbirth safely (L. Johnson, 2010). The international community has repeatedly reaffirmed the Program of Action as part of the international development agenda and it continues to remain a cornerstone of global policy frameworks (T. Thomas et al., 2014). The forum was the first major international conference to formally articulate a human rights approach to the provision of reproductive health services. The Program of Action set global goals and targets for reducing maternal mortality, differentiated by development level, alongside 'sweeping changes in social structures and gender relations' (Yamin & Boulanger, 2014).

The same year, 1994, the WHO articulated new policies to improve maternal health, based on four pillars: antenatal care, clean safe delivery, emergency obstetric care, and family planning (World Health Organisation, 1996). These changes were based on the increasing realisation, as discussed,

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[42] For example see: United Nations General Assembly (1999b); United Nations (2014), and United Nations General Assembly (1999a)

that strategies reliant on antenatal care and training traditional birth attendants were ineffective, and maternal mortality rates remained unacceptably high. Nevertheless, many programmes continued to focus on the provision of contraception and treatment of sexually transmitted infections (STIs), with additional attention in some settings on safe abortion services, post-abortion care, and other reproductive health issues such as female circumcision and gender-based violence (Rosenfield & Min, 2009).

The Fourth World Conference for Women was held in Beijing the following year, in 1995. Again substantial attention was given to maternal mortality as a 'visible and reprehensible sign of the historical neglect of women's health and women's needs' (Starrs, 1997, p. 2). History shows that calls from both forums were unheeded and within developing countries maternal health continued to receive little focused attention.

Second decade of the SMI

Despite the increasing recognition of maternal health as an important health and development issue and pledges of support at the global level, maternal death rates were largely unchanged (Starrs, 1997). Hill (2005) suggests that from 1990 - 2005 there was an overall decrease in maternal mortality of 2.5% per year, yet where the highest number of deaths occurred, there was little, if any improvement.

In 1997, a technical consultation was held in Colombo, Sri Lanka, to review key lessons from the first decade of the SMI. The consultation brought together decision-makers from national and international agencies, programme planners and specialists, and helped forge greater consensus on strategies to improve maternal health (AbouZahr, 2001). At this meeting, maternal mortality was framed as a social injustice, highlighting the importance of a human rights approach that obligates governments to use political and legal means to provide appropriate health services. Rosenfield and Min (2009) argue that the meeting prioritised perspectives from socio-economic development, and failed to clearly define strategic priorities. Consequently, the 1997 meeting represents a broadening of the agenda, to include improving women's general health and nutrition, social status and empowering women, and the education of girls. Some decried this move as 'too broad' (Berer & Sundari Ravindran, 2000), and argue the lack of consensus and clear focus resulted in a belief, by many developing countries, that protecting maternal health was already a part of their programmes or alternatively, that interventions were too costly, technical and complex to implement (Berer & Sundari Ravindran, 2000, p. 11).

Importantly, within the 10 key messages arising from the Sri Lankan meeting was the recognition that 'every pregnancy faces risks, and therefore programs should stop using risk screening tools [antenatal care] as a means to reduce maternal mortality' (Rosenfield & Min, 2009, p. 11). The meeting saw an emerging consensus that 'the single most critical intervention for safe motherhood is to ensure that a health worker with midwifery skills is present at every birth, and transport is available in case of an emergency' (Starrs, 1997, p. 29). While some progress had been made, in developing countries as a whole, almost half of births still occurred without a skilled attendant, and in some countries the rates of skilled attendance were noted to be below 20%. These two realisations were the most fundamental messages to emerge from a decade of the SMI, leading to growing consensus of the importance of skilled birth attendance (AbouZahr, 2001, 2003; Rosenfield & Min, 2009; Starrs, 1997).

A skilled birth attendant was first defined by the World Health Organisation (1999, p. 31) in conjunction with the United Nations Population Fund, the United Nations Children's Fund, and the World Bank to exclusively refer to people with midwifery skills trained to proficiency to manage normal births and diagnose and refer complications. The definition has been refined in the joint World Health Organisation, International Confederation of Midwives, International Federation of Gynaecology and Obstetrics statement as: 'an accredited health professional, such as a midwife, doctor or nurse, who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and their babies (World Health Organisation, 2004b). The skills and competencies expected of a skilled birth attendant can be provided by various health workers, working to different country-specific titles, not restricted to those noted in the official definition. The key priority is the level of midwifery skills held by the health worker (World Health Organisation, 2004b).

Skilled birth attendance is the process whereby a pregnant woman and her baby/ies are provided with adequate care during pregnancy, labour, birth, and the postpartum and immediate newborn periods, regardless of place of birth - home, health centre, or hospital. For this process to take place, the attendant must have the necessary midwifery skills and be supported by an enabling environment at various levels of the health system. An enabling environment includes a supportive policy and regulatory framework; adequate supplies, equipment, and infrastructure; and an efficient and effective system of communication and referral and transport when needed (Bhutta, Lassi, & Mansoor, 2010; Graham, Bell, & Bullough, 2001). The environment could be expanded to include political will, policy context, socio-cultural factors, health worker education, supervision and deployment, and health system financing (Graham et al., 2001).

The emphasis on skilled attendance at birth has not been adopted without debate. Prata et al. (2011) argue that many women continue to birth without skilled attendants. Omitting training traditional birth attendants and other lay providers does not address the immediate needs of 45 million women who are more likely to be based rurally and isolated from facilities. They argue that a complementary strategy, with community based attendants will increase the benefits for women in the lowest economic quintiles (Prata et al., 2011). Further debate questions the weak negative relationship shown between the maternal mortality ratios and the percentage of births with skilled attendance and the problematic definition of a 'skilled attendant' (Harvey et al., 2007; Stanton, Blanc, Croft, & Choi, 2007). Nevertheless, given the heavy reliance on the indicator for skilled attendance, Stanton et al. (2007) suggest that its advantages are viewed as outweighing its disadvantages.

Millennium Development Goals – MDG5 2000 - 2015

AbouZahr (2003, p. 20) suggests that consensus forged during the 1990s was the foundation for the inclusion of maternal health in the Millennium Declaration (United Nations Millennium Declaration, 2000) and as one of eight Millennium Development Goals (MDGs), agreed in 2000 by Heads of States and Governments (United Nations General Assembly, 2000). The MDGs framed the development agenda for the 15-year period, 2000 – 2015, and reaffirmed previous commitments to maternal health and universal access to reproductive health as global priorities. MDG5 aimed to 'improve maternal health', with the associated targets to reduce by three quarters, between 1990 and 2015, the maternal mortality ratio, and achieve universal access to reproductive health care (United Nations, 2015a). AbouZahr (2003, p. 21) suggests that 'the unambiguous focus on maternal mortality reduction target and the inclusion of a skilled attendant at delivery as an indicator of progress provides an unparalleled opportunity to re-energise safe motherhood efforts'. In contrast, Yamin and Boulanger (2014) argue that the selection of maternal mortality as the only goal for sexual and reproductive health and rights suggests reductionism, and has resulted in deleterious consequences for wider policy priorities. Yamin and Boulanger (2014, p. 219) further suggest:

> the selection of a limited set of indicators and the acute focus on one – the MMR – effectively neglected the complexities inherent in the realisation of comprehensive SRHR[43] by ignoring complex power relations, human rights principles, and established international legal frameworks, and by selectively excluding certain SRHR issues. Efforts to address the root

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[43] SRHR – Sexual and Reproductive Health and Rights

causes of maternal mortality, let alone broader aspects of SRHR and gender inequality, were lost.

These debates highlight the longstanding divergence of views within the discourse. While fundamentally the maternal health community has united with a 'shared belief that maternal mortality is a neglected tragedy that demands redress' (Shiffman & Smith, 2007, p. 1375), there have been many stumbling blocks, detours and shortcuts (Maine, 2007) that have mired the agenda. Of note, the name of the movement, 'Safe Motherhood' has been a point of contention. Storeng and Béhague (2014, p. 262) suggest the term was coined to draw attention to how unsafe the process of becoming a mother could be for some women, and was selected as an 'uncontroversial term, dissociated from ongoing debates in fertility control and abortion'. Moreover, Shiffman and Smith (2007) identify that the name was conceived as a way to circumvent the conservatism regarding reproductive issues from the U.S. Bush administration[44] and attract U.S. funding.

Some groups have been reluctant to support the movement, because of its framing around motherhood. For example, it failed to resonate with the demands of the feminist movement because of the focus on women's childbearing role (Shiffman & Smith, 2007; Starrs, 2006). Likewise, from a human rights perspective, maternal health is recognised as only one aspect of the broader sexual and reproductive health and rights agenda. Considering maternal health in isolation, Yamin and Boulanger (2014) argue, risks ignoring the root causes of maternal mortality and the broader aspects of the agenda such as gender inequality and the complexities inherent in power relations.

Among anti-abortionists, the SMI was seen as the 'Trojan horse for the introduction of legal abortion' (AbouZahr, 2003, p. 18). As a result, there was some hesitance to support the movement. Unsafe abortion remains a significant contributing factor to poor maternal health, accounting for an estimated 14% of maternal deaths globally (Barot, 2013; World Health Organisation, 2012) and countless morbidity. Among supporters of women's access to safe, legal abortion, the SMI failed to accommodate women's right to choose not to become mothers, again limiting support for the movement. In practice, most programmes give little attention to abortion or the management of

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[44] The United States account for 50% of all population health funding (Senanayake & Hamm, 2004) so it was vital that the movement elicited their support. Nevertheless, when accounting for inflation, U.S. funding levels for family planning dropped by 40% between 1995 and 2008. The Obama administration has overturned previous restrictive policies including the Mexico City policy (known as the global gag rule) and has taken steps to repair, rethink and realign U.S. foreign policy on sexual and reproductive health (although the 1973 Helms Amendment banning U.S. funding for abortion services remains) (Barot, 2009, 2013).

complications from unsafe abortion because of the political sensitivities surrounding the issue (Rosenfield & Min, 2009).

Further contention arose from some groups arguing that the root of maternal mortality lies in the broader determinants of health, social vulnerabilities and inequality. This view is supported by Kerr and Weeks (2015) who argue that the historic reductions in maternal deaths in the U.K. were multifactorial, resulting from improved standards of living and nutrition, and reduced dietary anaemia, better roads and motor transport. Nevertheless, they contend the biggest improvements came from the introduction of antibiotics leading to dramatic falls in sepsis deaths between 1930 and 1950. Kerr and Weeks (2015, p. 667) argue their study 'demonstrates the benefit of multifaceted interventions, including infection control, free health services, high-quality emergency care and blood transfusion services, as well as the use of oxytocics'[45]. Likewise, Starrs (2006, p. 1131) argues maternal deaths are:

> not just the result of poor or inaccessible medical care, but indicate a long chain of problems: lack of education for girls; early marriage; lack of access to contraception; poor nutrition; and women's low social, economic, and legal status. These factors, individual and collectively, contributed to women's poor health before and during pregnancy, increasing their vulnerability to life-threatening complications and limiting their ability to seek and receive good quality care.

Because of the multifaceted factors involved in improving maternal and neonatal health, large scale national action plans are complicated and expensive, involving a range of ministries including health, education, infrastructure, women's affairs and other civil society groups. In many settings, 'rivalries over funding, visibility and control mitigated against the development and implementation of clear, focused, realistic strategies for reducing maternal mortality' (Starrs, 2006, p. 1131). Shiffman and Smith (2007, p. 1375) suggest that advocates have made concerted efforts to frame the issue, emphasised the severity of maternal mortality and morbidity, formed rights based arguments, noted the effect on children and developed economic and development benefits for improving maternal outcomes, yet 'few leaders have prioritised maternal mortality' (AbouZahr, 2001, p. 406). Safe motherhood 'efforts have lacked conviction' with meetings unable to attract the most senior decision-makers (AbouZahr, 2001, p. 20). The lack of attention to maternal health efforts has resulted

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[45] Pharmaceutical drugs to control haemorrhage – the major cause of maternal mortality.

in 'cautious, sporadic rather than sustained' political commitment, and maternal health has not generated wide political attention nationally or internationally (AbouZahr, 2001, p. 20).

Although the inclusion of maternal mortality as a key MDG was widely criticised for espousing a vertical or silo approach rather than supporting system strengthening (Yamin & Boulanger, 2014), it led to unprecedented support for maternal health and post-2000 has seen a marked increase in maternal health activity (T. Thomas et al., 2014). Reports indicate that several countries have experienced remarkable success, as highlighted in the Countdown to 2015 report (World Health Organisation and United Nations Children's Fund, 2013). Overall, global maternal mortality is estimated to have declined by nearly half since 1990 (Souza et al., 2014). Yet, of the eight MDGs, the maternal health goal lags the furthest behind, with only 18 countries (of 189 signatories) on track to meet the target of maternal mortality reduction and 15 countries on target to reach the related infant mortality goal by 2015[46] (World Bank, 2015).

The Partnership on Maternal, Newborn and Child Health

Over time, the SMI has diversified and expanded and between 2002 and 2005 the SMI merged with other initiatives to form the 'Partnership for Maternal, Newborn and Child Health' (the Partnership) linking reproductive, maternal, newborn, and child health (Storeng & Béhague, 2014, pp. 262 - 263). The partnership's focus is to harmonise and accelerate efforts towards achieving maternal and child health goals (MDG4 & 5) by adopting an integrated or continuum of care approach (World Health Organisation, 2005a). The group has grown to an alliance of over 680 member organisations including academic, research and teaching institutions, donors and foundations, health care professional associations, partner countries, and the private sector. Shiffman and Smith (2007) suggest that initially it was an uneasy alliance, with multiple areas of politically contentious debate and discussion, however the interdependencies of the related challenges served to merge the differing voices. There is now wide acknowledgement of the benefits of integrating health service delivery for women and children across the continuum of care to improve access to essential healthcare and improve outcomes for all. Kerber et al. (2007, p. 1359) agree and propose a definition for the continuum of care, building on the previous work:

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[46]Neonatal mortality (deaths in the first 28 days) accounts for 41% of child mortality. Neonatal resuscitation and newborn care is an integral part of midwifery practice. Midwifery care, in addition to protecting women, leads to reductions in stillbirths and newborn deaths (Renfrew et al., 2014).

The continuum of care for maternal, neonatal, and child health requires access to care provided by families and communities, by outpatient and outreach services, and by clinical services throughout the lifecycle, including adolescence, pregnancy, childbirth, the postnatal period, and childhood. Saving lives depends on high coverage and quality of integrated service-delivery packages throughout the continuum, with functional linkages between levels of care in the health system and between service-delivery packages, so that the care provided at each time and place contributes to the effectiveness of all the linked packages.

This definition acknowledges the importance of the social determinants of health and the care provided by families in communities, as well as the importance of linkages between adolescent, maternal, newborn and child health within the wider health system. It additionally supports improving maternal health within the context of strengthening health systems, or sector wide approaches (SWAps). As Kerber et al. (2007, p. 1368) argue, the main barrier to increasing people's access to quality health care is no longer insufficient knowledge. The challenges lie in inadequate implementation and operational management, especially at the local level. Maternal and child health programmes, like other health programmes, can no longer be framed within 'vertical special interest programmes' (World Health Organisation, 2005b, p. 129). It is now recognised that maternal health outcomes are intricately linked with poverty and wider issues of socioeconomic development, as well as the functioning and use of health services, including midwives or another skilled birth attendants; therefore systemic efforts are needed to address constraints, within the context of district and national development (Freedman et al., 2007; Kerber et al., 2007; World Health Organisation, 2005b).

Proliferation of actors

As global interest in maternal health has increased, so too has commitment by differing United Nations agencies, multilateral organisations, health professionals, universities, and NGOs. For example, the International Confederation of Midwives (ICM) (an International NGO - INGO) has organised workshops and programmes since 1987 focused on different aspects of maternal and neonatal health care, and supported midwifery education, regulation, and association. The International Federation of Gynaecologists and Obstetricians (FIGO) established a task force in 1982 to draw attention to poor maternal health at global and regional levels. However, until 1997, AbouZahr (2003, p. 20) suggests, 'fine sentiments voiced at meetings were rarely followed by practical action'; moreover, some advocacy groups have been mistrustful of medical involvement due to 'a tendency for doctors to over-medicalise a natural process' (p.20).

Other organisations have established research and advocacy groups in developed countries to instigate programmes, keep maternal health on the agenda and contribute to international efforts. In

1999 the Averting Maternal Death and Disability Program (AMDD) was launched as part of the Department of Population and Family Health at Columbia University in New York City. AMDD is a global programme of research and policy analysis, advocacy and technical support, working with more than 50 countries in Africa, Asia, and Latin America to meet the challenges of improving maternal and neonatal health (Averting Maternal Death and Disability, 2015). In 1999 the INGO White Ribbon Alliance was founded and in 2002 the Initiative for Maternal Mortality Programme Assessment (IMMPACT), was established at the University of Aberdeen. Moreover, several notable private and bilateral donors are supporting efforts to improve maternal health[47]. Private donors, with few accountability mechanisms, have had a significant influence on global health programmes, which Birn (2009) suggests have heavily focused on narrow interventions rather than integrated approaches.

Funding and political support

Shiffman and Smith (2007) discuss the many challenges of attracting substantial political and financial support. Despite the aforementioned donors, the literature suggests that in many settings political commitment and financial investment to improve maternal health have not been forthcoming (Cleland et al., 2006, p. 1811; Mahmoud F. Fathalla, Sinding, Rosenfield, & Fathalla, 2006, p. 2095; Filippi et al., 2006, p. 4). One study, tracking donor assistance for maternal, neonatal, and child health, summarised that 'the current level of ODA to maternal, neonatal, and child health is inadequate to provide more than a small portion of the total resources needed' (Powell-Jackson, Borghi, Mueller, Patouillard, & Mills, 2006, p. 1077).

Investment in maternal, neonatal, and child health is estimated to yield up to nine times its value in economic and social benefits (Presern, Bustreo, Evans, & Ghaffar, 2014, p. 467), yet Filippi et al. (2006) suggest that maternal health continues to receive only an estimated 1% of the total aid budget. Within health programmes, maternal and neonatal health programmes compete with other health priorities such as tuberculosis (2.4 million annual deaths), HIV/AIDS (3 million deaths) and malaria (1 million deaths), and competition for funding is fierce (Nugent & Feigl, 2010). A further persisting dilemma for maternal and neonatal health is the priority given to HIV/AIDS in the reproductive health field, via vertical funding mechanisms, with no mechanism or incentives for

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[47] Bill and Melinda Gates Foundation and the John D. and Catherine T. MacArthur Foundation, the United Kingdom's Department for International Development, the Norwegian Agency for Development Cooperation, the Swedish International Development Agency and the Canadian International Development Agency (T. Thomas et al., 2014).

ensuring equitable allocation of resources to other areas of reproductive health (McDonagh & Goodburn, 2001).

In many settings the priority for maternal health, and particularly for midwives or skilled birth attendance, continues to be overlooked, as demonstrated by Deleye and Lang (2014). Their study of funding priorities for maternal health programmes analysed 263 projects and found notable differences between donor groups. Bilateral donors focused on family planning, vertical disease programmes and capacity building; corporations focused on vertical programmes and capacity building; and foundations focused on family planning programmes (Deleye & Lang, 2014). Few organisations have prioritised funding specifically for midwives or skilled birth attendance as a priority area to improve maternal health.

In 2010, in an effort to galvanise funding and support for issues related to women and children's health, the UN Secretary-General Ban Ki-moon launched the 'Every Woman Every Child' campaign at the United Nations MDG Summit. The launch followed wide consultation and development[48] and aims to raise funds to support the United Nations Global Strategy for Women's and Children's Health (Ki-moon, 2010). This new strategy sets out key areas where action is needed to 'enhance financing, strengthen policy and improve service delivery' (Ki-moon, 2010, p. 3). However, Requejo et al. (2015, p. 474) suggest there are crucial gaps in tracking of health spending at country level, and few countries (four out of 75 Countdown countries identified as priority countries) have the mechanisms to report on reproductive, maternal, neonatal, child health expenditures, by domestic or external funding.

As discussed in the previous chapter, since the late 1990s, ODA has been increasingly dispersed using sector wide approaches (SWAps). Goodburn and Campbell (2001) argue that the emergence of SWAps offer both opportunity and risk for the promotion of maternal and neonatal health. As a funding mechanism they emphasise the development of comprehensive, integrated policy frameworks across the health sector, with an overall focus on the operation particularly at the governance level. The SWAp changes how governments and donors interact at financing, policy and

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[48] The 'Every Woman Every Child campaign' was developed with the support and facilitation of The Partnership for Maternal, Newborn and Child Health. It was discussed at the World Health Assembly, the UN General Assembly, the Economic and Social Council High-level Segment, the G8 and G20 Summits, the Women Deliver conference, the Pacific Health Summit, the UN Global Compact Meeting and the African Union Summit, the Jakarta Special Ministerial Meeting on Millennium Development Goals Asia and the Pacific, as well as within countries and International organisations. Many governments, international organisations, academic institutions, foundations and health professional organisations, and NGOs contributed with submissions (Ki-moon, 2010, p. 20).

implementation levels, resulting in bilateral agencies being limited by domestic legislation and administrative regulations to the extent to which they are able to effect change within the system. This represents an altered level of focus between the agencies involved in negotiating the SWAp and the health workers and managers on the ground in maternal and neonatal health care strategies. Standing (2002) points out a resulting gap between a system-level focus, and service delivery issues that are critical to maternal and neonatal health programmes. Hill (2005, p. 14) highlights the importance of maternal and neonatal health advocates to be 'actively engaged in SWAp governance, on both donor and government sides of the table', to ensure an ongoing focus on implementation of evidence based programmes.

The importance of engagement from donors and governments extends to political commitment for maternal and neonatal health programmes. In many settings practical action and political commitment remain absent. Davies (2010, p. 396) argues that there is a 'wide gap between global aspirations and the political and cultural interests of many states and their societies'. Common challenges identified in a recent accountability report include a lack of in-country awareness of the Global Strategy for Women's and Children's Health; little data transparency; weak national accountability mechanisms; and inadequate human resources to achieve ambitious international goals (Independent Expert Review Group, 2014). Moreover, many states are reluctant to tackle political, religious, and cultural obstacles related to implementation of reproductive health and rights for women. As a consequence, despite safe and effective interventions for all major causes of maternal mortality (Adam et al., 2005; Paxton et al., 2005; Renfrew et al., 2014), 'few leaders have prioritised maternal mortality, especially compared with the many national leaders that have prioritised issues such as child survival and HIV/AIDS' (Shiffman & Smith, 2007, p. 1375).

Likewise, Freedman et al. (2007, p. 1384) suggest that 'implementation of maternal health services on the ground has been woefully neglected'. As a result, women's access to midwifery care or other skilled birth attendance, 'remains highly inequitable between regions, countries and between women in the lowest and highest wealth quintiles within the same country' (Snow, Laski, & Mutumba, 2014, p. 152). The most vulnerable women are those who are young, poor, rural, migrant or displaced, and they remain the most affected by maternal mortality and morbidity, and demonstrate the least progress (Baraté & Temmerman, 2009). Implementation and widespread scale-up of effective maternal and neonatal health care remain a critical development challenge (T. Thomas et al., 2014).

Measurement and tracking progress - MMR

Measuring maternal mortality and morbidity and tracking progress has always been problematic, and remains notoriously difficult in many contexts given the lack of reliable and complete statistics

(Graham, Ahmed, Stanton, AbouZahr, & Campbell, 2008). Shiffman and Smith (2007, p. 1376) explain that the 'framing of the issue' has posed difficulties in creating sustained support and question:

> … whether maternal mortality or maternal health more broadly is the focal concern; how progress should be measured; whether the continuum of care idea is embraced as the core positioning of the issue; the precise strategies to address the problem; and the relation of the initiative to other health concerns, including family planning, the broader reproductive health agenda, and health system development.

The maternal mortality ratio (MMR – number of maternal deaths per 100,000 live births) is generally used as a tool to measure the risk of maternal death and to report progress (United Nations Children's Fund, World Health Organisation, & United Nations Population Fund, 1997). However, due to the lack of availability and the poor quality of general population data, MMR estimations use different statistical modelling techniques which result in imprecise estimates, requiring complicated interpretation (Yamin & Boulanger, 2014). As an indicator, the MMR can be 'technically complex and intuitively hard to grasp' (AbouZahr, 2001). Moreover, as a macro-perspective, the MMR, can be confusing and hold little relevance for local planners as it provides a national figure. A national MMR can additionally mask marked regional disparities and growing differences between and within countries. Ascertainment of pregnancy status, especially in its early stages contributes to the unreliability of statistics, as does the reality that in developing countries many women die at home or on the way to services – meaning many women's deaths are never formally registered (Graham et al., 2008).

Underreporting and misclassification are common, especially in remote and rural areas. Furthermore, a focus on the national MMR can distract attention from strengthening local information sources most relevant to preventing further deaths (Byass & Graham, 2011). These numerous issues have led some authors to argue that the MMR is not a suitable tool for assessing progress on the effectiveness of interventions and strategies (Yamin & Boulanger, 2014), however in the absence of a more effective measure, it continues to be used as a universal tool to measure effectiveness of strategies.

Sustainable Development Goals

In September, 2015, the United Nations General Assembly agreed to the new development framework; the Sustainable Development Goals (SDGs). Ending preventable maternal mortality continues to be noted to be a 'pillar of sustainable development, considering the critical role of women in families, economics, societies, and in the development of future generations and communities' (World Health Organisation, 2015d, p. 8).El-Noush et al. (2015) suggest almost all of the

proposed SDGs have some relevance to the determinants of reproductive, maternal, neonatal, child, and adolescent health. However, two specific goals are noted to be directly applicable for maternal health. Goal Three aims to 'Ensure healthy lives and promote well-being for all at all ages' (United Nations, 2015c, Goal 3), with a new target for maternal health that aims to 'reduce the global maternal mortality ratio to less than 70 per 100,000 live births United Nations (2015c, Goal 3)[49]. The second goal that is applicable to improving maternal health is Goal Five which aims to 'Achieve gender equality and empower all women and girls' (United Nations, 2015c, Goal 5)[50].

Eliminating preventable maternal mortality and morbidity remain complex health challenges. There is now strong and compelling evidence that attendance at every birth by a midwife (or another skilled birth attendant) is central to improving maternal health. Midwives provide skilled, supportive and preventative care for all women and babies, regardless of women's education, income or health status. They have specialist skills in providing care for normal birth; protecting the normal physiological process and mitigating the tendency for doctors to overmedicalise (Byrom & Downe, 2015; Downe, 2008; ten Hoope-Bender et al., 2014). Midwives can provide first line management of complications and emergency care when needed, and most importantly, they work to strengthen women's capabilities, tailoring care to the needs of individual women and their babies (Renfrew et al., 2014). While maternal health outcomes are broadly determined by social, political, and intersectoral determinants of health (P. S. Hill, Buse, Brolan, & Ooms, 2014), improving outcomes are concurrently reliant on the provision of quality health care services within strong health systems. At the global level, improving maternal health is now firmly established within the continuum of care approach, which calls for the integration of services to best use resources and maximise the 'impact, quality and efficiency of care provided' (Requejo & Bhutta, 2015, p. s80).

Interventions to improve maternal health are complex and the same strategy cannot be applied to all situations. Strategies must be able to respond to evolving environments (Baraté & Temmerman, 2009). There is no 'one-size fits-all core strategy and … policies need to be context-specific' (Costello,

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[49] Related targets are: 3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes; 3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing State (United Nations, 2015c, Goal 3).

[50] With associated targets being: 5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life; 5.6 Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences (United Nations, 2015c, Goal 5).

Azad, & Barnett, 2006, p. 1477), and driven by locally owned information and tailored interventions (Say et al., 2014). Importantly, solutions rely on robust health systems and access to midwifery care or other skilled birth attendants, as well as access to contraception and other reproductive health services. The evidence for skilled attendance for all women during pregnancy, labour and birth, and referral to higher level care when needed is indisputable (Freedman & Kruk, 2014); however, technically competent, respectful services remain an unmet priority in many settings (Freedman & Kruk, 2014). Implementation research for health system strengthening to deliver evidence-based interventions is noted by Kendall (2015) as a critical and neglected area for research, as well as the importance of a paradigm shift away from causal linearity towards a systems thinking approach.

This section has provided a chronology of the global maternal health discourse. It highlights the competing priorities, commitments and the inclusion of maternal health as one component of the partnership for maternal, newborn, and child health 'at the heart of the post-2015 sustainable development framework' (The Partnership for Maternal Newborn & Child Health, 2014). Midwives have been identified as primary providers of care for childbearing women and their babies, and a vital and key part of strategies for improving maternal and neonatal health (Sandall, Soltani, Gates, Shennan, & Devane, 2015). The next section focuses on maternal health in Papua New Guinea to provide the historical context for the current research.

Maternal health in Papua New Guinea

As mentioned in the previous chapter, at the end of the colonial period, maternal mortality in Papua New Guinea was recognised to be high, although it was largely unrecorded; few women received antenatal care or supervised births, use of contraception was scant, and sexually transmitted infections largely uncontrolled (Luker, 2008, p. 262). The literature about childbirth during pre-colonial and colonial times comes largely from accounts of foreign anthropological scholars working in different communities. Periodisation is problematic as it is not possible to clearly separate pre-colonial, colonial and post-colonial village birthing practices. Much of the literature conflates the time periods and meanings and change is uneven over both time and place. Merrett-Balkos (1998, p. 215) explains, the women in her study spoke 'of "before" and "now", meaning the entire period since the coming of whites – as distinct periods, pointing out the difference in values and practice … they also recognise similarities between these two phases'.

The history of Papua New Guinea is complex, revealing multiple and different communities, cultures and peoples (James et al., 2012), who have experienced significant social change at different rates in different ways in different places (Fiti-Sinclair, 2002). Moreover, the significance of custom and cultural practices continues to change (Jolly, 1994). This complexity precludes universalising claims

about birthing practices. Nonetheless, the literature does identify some shared roots resulting in similarities in practices and aspects of childbirth common to many places (Macfarlane, 2009). In this section I consider published accounts of cultural beliefs and practices around childbirth. While the literature does not clearly distinguish time periods, the discussion nevertheless gives a glimpse of some customary practices, among some of the many communities in Papua New Guinea. A chronology of maternal health drawn from public health and demographic literature follows.

Townsend (1995, p. 21) carried out a study with anthropologists who had undertaken fieldwork in 66 different rural communities covering nearly all provinces from 1953 – 1983. Her findings suggest that women in most parts of the country had 'significant social support during delivery' attended by one or more close female relatives. In some groups birth is essentially a private affair; while in others it seems to be 'almost a public event' (Townsend, 1995, p. 21). In some settings, the literature suggests family or clan birth attendants are customary (i.e. Schumacher, 1987, Morobe Province). While in other settings, 'unattended delivery is common', as 'women are often extremely shy about this especially private matter' (Schumacher, 1987, p. 214). Albu and Alto (1989, p. 90) working in the Southern Highlands comment that 'many cultural groups have no traditional midwife and the women labour and birth unattended, or supported by female relatives. This was also a finding by Boyd and Ito (1988), working in Eastern Highlands Province.

Sepoe (2000) argues that in many pre-colonial societies, gender roles were clearly defined, separate and complementary, serving the interest of the community as a whole. Although, the majority of societies have been identified as being patriarchal (McPherson, 2012), men are generally considered to be the decisions makers, protectors, hunters, builders and warriors (Maisonneuve, 2006, p. 13). Women are frequently responsible for tending the gardens and pigs, food harvesting and processing, and family care (Maisonneuve, 2006). Undertaking research in northwest New Britain McPherson (1994, p. 40) argues that 'a fundamental criterion in the cultural definition of womanhood is the achievement of motherhood'. According to some accounts, following conception men were seldom involved in pregnancy and birth (Boyd & Ito, 1988, p. 59; Holmes et al., 2011) and Townsend (1995, p. 21) suggest, 'in almost no cases are men allowed to be present during birth'. This was also a finding by Pöschl and Pöschl (1985) in the context of Trobriand Islanders, and Boyd and Ito (1988) working in

Eastern Highlands Province. McPherson (1994, p. 40) likewise suggests that the 'corpus of knowledge and techniques that comprise the reproductive subculture is an exclusively female domain'[51].

Townsend (1995, p. 25) notes a variety of settings for childbirth; some women birthed in their sleeping house, some in a specially constructed birthing hut and others in a menstrual hut, outdoors or in another private place. In Morobe, Tinning (2014, p. 53) suggests women laboured and birthed in a private and sacred house known as the *hauskarim*, built away from the village. In West New Britain, many women laboured and birthed in the open, as they rarely announced they were ready to give birth due to intense shyness, meaning there was little time to prepare a birthing hut (Scaletta, 1986).

Although considered a natural, common and normal event in many societies, birth was also 'shrouded in fear and corresponding taboos' (Schumacher, 1987, p. 213). McDowell (1988) and Pöschl and Pöschl (1985) likewise note sexual relations, menarche and menstruation, and childbirth were considered natural, common and normal events in women's lives, that were intensely private matters that should be hidden from others and not openly discussed. Scaletta (1986, p. 37) suggests, 'all things to do with sexuality are private', and women are expected to endure the process of birth quietly and competently. Many women recognise that being pregnant and giving birth involves pain and risk, and thus many desire fewer children than men (Boyd & Ito, 1988; Townsend, 1995, p. 57).

Sharp (1982, p. 109) undertaking research in Enga Province explains that 'most serious illness is regarded as having a spiritual cause as a divine punishment for some moral transgression or social offence. Few people are regarded as having died of natural causes', particularly for unexpected deaths, such as those during childbirth. This was also a finding by Townsend (1995), where her sources attributed difficult birth to a wide range of social and spiritual factors, including adultery, snake spirits or other spirits, not adhering to food taboos, or sorcery.

In terms of help available during difficult births, Townsend (1995) identified a regional pattern. In coastal and lowland regions traditional healers may be called for counteracting or diagnosing sorcery, while in the highlands there were limited specialists for magic spells, and most respondents suggested they had no knowledge of assistance being called (Townsend, 1995, p. 39). However, Fiti-Sinclair (2002, p. 58) comments that even when magical specialists were called, they had limited skills in physically helping the woman or baby, rather they called appropriate spirits, to ease the fears of women in childbirth, and calm them physically and emotionally. Townsend notes that although

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[51] Until the 17th century in most parts of the world, childbirth was exclusively in the domestic female domain and hospital birth was uncommon before the 20th century, when maternal mortality in the West substantially decreased (Johanson, Newburn, & Macfarlane, 2002).

accurate statistics are unknown, in the 30 year time period of her study, maternal mortality was noted to be high.

In Milne Bay, Pöschl and Pöschl (1985) found that only in exceptional circumstances will a traditional healer be called. However, they remain outside the birthing house and protect the woman with magic. They suggest that only after the failure of traditional therapy may a woman be transported to the health centre, based on the entire family's decision. However, 'by the time of the patient's arrival at the health centre, adequate therapy is often too late and can seldom prevent maternal and foetal death. With this outcome, the village people's confidence in the health centre and its personnel will steadily decline, resulting in further reluctance to consult them earlier or even in the first place' (Pöschl & Pöschl, 1985, p. 141). In a project to introduce village birth attendants in Madang Province, Wells (1985) suggests that pregnancy related-illnesses were thought to be a result of 'too heavy work' or 'kros' – unresolved conflict. She quotes participants, saying, 'If a woman is close to dying we will try to take her to hospital … but she will probably die' (Wells, 1985, p. 150). In the Southern Highlands, Albu and Alto (1989, p. 90) found that many women laboured alone, and birth was a feared event. Obstructed labour is believed to be due to sexual intercourse during pregnancy, they comment that:

> If the labouring parturient does not reappear after a day, her mother may call out to her from outside the delivery hut but entry is forbidden. If there is a reply, pigs are killed to appease any evil spirits that may be delaying the birthing process. If there is no answer, it is assumed that she is dead.

Townsend (1995, p. 41) notes widespread acceptance of supervised birth at western-based health services. She comments that the acceptance was rapid where services were provided close to the people and in places where women were not given support from traditional cultural systems. However, barriers to supervised birth may arise from how births are managed at health facilities, including imposed practices and birthing positions, loss of privacy and failure to fulfil women's expectations (Townsend, 1995). McPherson (1994), undertaking research in northwest New Britain, argues that pregnancy and childbirth are intimately interrelated with cultural constructs of femininity and womanhood. She argues that while senior women construct western based childbirth in terms of a 'loss of knowledge, autonomy, authority, power, control, responsibility and dignity; young women experience it … as liberating them from the tyranny of tradition' (p.67).

Merrett-Balkos (1998) from her work in the Southern Highlands notes rapid acceptance of facility birth, although women did stage a protest and engaged in negotiations to retain a portion of the placenta/cord, which is considered pivotal to cultural practices. In more recent research, investigating the impact of mining in Lihir islands, Macintyre (2004) argues that traditional ideas about health often

intersect with western medical understandings and influence the use of introduced medical services. Moreover, women's decisions to birth in health facilities demonstrate their engagement with modernity and their claim over some of the benefits from mining resources in the area.

Between 1970 and 1980, Townsend (1995, p. 40) suggests the women attending facilities for birth had grown from around 21% to 34%, with the majority of births attended by nurses. Despite this increase in facility birth, numerous papers have highlighted the persistence of high maternal mortality. During the 10 year period 1964-1973 G. Campbell (1974) notes maternal mortality was 2160/100,000 at Goroka Hospital. Three years later, Vacca and Bird (1977) highlight the high rate of maternal death reported to the national maternal death register, and argue that 80% of deaths were considered preventable, if women had better access to maternal health services. Shann (1979, p. 171) identifies however that the 'health system suits the small minority who live in urban areas', with a focus on 'urban, curative' services, neglecting the majority of the population (85%) in rural settings.

Mola and Aitken (1984, p. 70) suggest that while 'the prevention of maternal and perinatal death is the main aim of maternal health services', there had been little or no improvement in maternal mortality rates over the previous 13 years. Conversely, they argue, the only change appears to be poorer reporting of deaths. They call for health planners to become more aware of the magnitude of the problem and develop maternity waiting houses, arguing that 'the single most important factor which could have prevented death was the mother's attendance at a health centre or hospital for delivery' (Mola & Aitken, 1984, p. 70).

Reflecting international recommendations[52], several authors consider the implementation of village birth attendants (VBAs) in the Papua New Guinean context. Projects to introduce VBAs, or other village health volunteers (VHVs) to support maternal and neonatal health, are discussed by Albu and Alto (1989) and Alto, Albu, and Irabo (1991) working in Southern Highlands; Barss and Blackford (1985) and Pöschl and Pöschl (1985) in Milne Bay; Wells (1985) working in Madang; and Schumacher (1987) in Morobe Province. Moreover, there have been a number of national workshops held to

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[52] As discussed earlier in the chapter, recommendations from WHO and public health literature: 1950s: technical support to trained midwives/health workers to raise standard of care and integration of maternal and child health with general health services. 1960s: seldom feature maternal health. 1970 – 1980s: primary health care focus, underlying determinants of health, substantial focus on family planning – training and promotion of traditional birth attendants emerged. 1980s – 1997 focus on antenatal care and training traditional/village birth attendants. Mid-1990s onwards: maternal health increasingly incorporated with wider concept of reproductive health, ongoing debate and genesis of recommendations for skilled birth attendance for all. 1999 – clear definition of a skilled birth attendant as a midwife or other skilled health worker with midwifery skills working within a supported environment (World Health Organisation, 2004b).

investigate the work of VBAs, with the first in 1991 as part of the Child Survival Support Project (Karel, 1999). Subsequently provincial guidelines for VBA programmes were developed (Edwards, 1992), and a pilot in Morobe Province trained 42 health workers as trainers. Karel (1999) notes that the programme was not without problems but argues it could be a useful tool to improve the needs of rural women. A further forum and technical workshop for community health volunteers was held as part of the Women's and Children's health project, in 1999. This workshop was attended by more than 20 participants from 12 provinces (Papua New Guinea Department of Health, 1999).

Mola and Aitken (1984); Barss and Blackford (1985) and Edwards (1992) in separate projects reviewed maternal deaths in different areas and all identified that village births posed a far greater risk for women, than births in health centres or hospitals. These authors all called for encouraging more women to birth in health centres and hospitals. Biddulph (1993b) likewise notes the continuing tragedy of maternal mortality and highlights the static MMR at around 700/100,000. Biddulph called for increased political will and policy commitment to improve the status of women; increased coverage and quality of antenatal care; upgrading of facilities and quality of care at health centres; and more accessibility to contraception. In a prescient warning, Biddulph (1993b), identified that unless these innovations became a reality, Papua New Guinea's high maternal mortality rate would continue unchanged for decades to come.

From 1989 to 1997, the United States Agency for International Development (USAID) (1989) led a multi-donor[53] Child Survival Support Project in Papua New Guinea. The project was coordinated by the National Department of Health and aimed to improve service delivery for maternal and child health care in rural areas. The initial project information identified the training of health workers and supervised birth as an important part of the project (p. 3). However, reflecting prevailing international recommendations, a 'training course for village birth attendants' (USAID, 1989, p.20) was planned among other project activities. A mid-term review carried out in 1993 notes the 'extremely high level of decentralisation in management'; the challenges associated with the financial crisis; and the development of 'an impressive array of technical documents, curricula and audio-visual material, all centred appropriately on child survival technologies and messages' (Beracochea, Gillespie, & Heywood, 1994, p. 2). The review did not comment on activities associated with maternal survival or supervised birth. Recommendations arising from the review included a revised focus from all provinces to only four selected provinces (Beracochea et al., 1994). In a second project evaluation,

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[53] The project drew on funds and support from USAID, UNICEF, UNFPA, WHO, Asian Development Bank, Australian International Development Assistance Bureau, Japan aid, U.S Peace Corps, and the Government of Papua New Guinea.

Leiter (1995, p. 7), reviewed the implementation and field testing of project activities, which were confined to only two provinces (Gulf and New Ireland). In this evaluation, Leiter (1995) notes the project activities had been revised to education for health workers on the use of a 10-step check list and flipchart, poster and pamphlets to identify sick children. There was no further mention of activities related to maternal health, and the project was terminated two years ahead of the scheduled completion date (Leiter, 1995).

The USAID project was followed by an Australian funded project: the Women's and Children's Health Project (1998 – 2004), which aimed to 'foster community involvement in, and support for, the health of women and children' (Ashwell & Barclay, 2009, p. 143). It was implemented in all 20 provinces between July 1998 and December 2004. The project worked at national, provincial and district levels and strategies included in-service courses for health workers, training village health volunteers (VHV), producing culturally appropriate education materials, and undertaking health development activities through local organisations to empower local people. These strategies were congruent with principles of primary health care focusing on the underlying determinants of health. However, in a retrospective analysis of the project, Ashwell and Barclay (2009) note significant implementation difficulties, and limited national counterpart cooperation which both inhibited capacity building and local ownership for the project.

At the conclusion of the project, 'maternal and child health statistical indicators and incidence of illness failed to confirm significant change' (Ashwell & Barclay, 2009, p. 146), although the project 'interventions improved the interaction between the community and health system, and improved use of maternal and child health services' (Ashwell & Barclay, 2009, p. 148). This project was additionally evaluated by Heather (2010) who concluded that VHVs were neither successful nor effective in meeting key health indicators in relation to 'escalating maternal death rates' (Heather, 2010, p. 2), and called for urgent research to identify a sustainable and effective model of rural health care. While the project initially identified in-service education for health workers, it omitted to focus on ensuring women had access to midwives. Moreover, no provision was made for developing maternity birthing homes or for ensuring transport was available in the event of maternal health emergencies (Heather, 2010).

In 2000 an Asian Development Bank (ADB) report, 'A review of Safe Motherhood policies and strategies and their impact on Women in PNG' was completed albeit with 'technical difficulties' (de Wit, 2003, p. 2). De Wit notes that Papua New Guinea, like other countries in the Asia-Pacific region, had pockets of inaccessible populations with high maternal mortality and high fertility, social and financial constraints to accessing services, public sector governance problems, and lack of funding of

essential safe motherhood services' (de Wit, 2003, p. 2). Following this report, the ADB provided technical assistance to identify priorities and strategies for safe motherhood, in line with advice from the Technical Consultation meeting held in Sir Lanka in 1997, to other countries included in the region wide review (Cambodia, Indonesia, Laos People's Democratic Republic, Nepal, and Pakistan). However, de Wit (2003) notes that 'PNG did not complete the strategic planning work' with no explanation given, aside from a comment that 'PNG [is] not ready as yet'. Unsurprisingly, the ADB report suggests that the activities arising from the 1997 Safe Motherhood meeting in Sri Lanka 'need substantial funding to maintain support for some time to allow capacity building and mobilisation of a broader circle of stakeholders … [with] more focus on poverty, governance and financing problems' (de Wit, 2003, p. 2). No activities appear to have resulted from this review in Papua New Guinea.

The need for substantial support in Papua New Guinea was also noted as a constraining factor in the 2006 Global Health Workforce Alliance project carried out by the World Health Organisation. This project aims to be a platform to support countries to address the chronic shortages of health workers, who are recognised as 'the heart and soul of health systems' (Global Health Workforce Alliance, 2013). Yet, the website notes that although the process of supporting and strengthening the workforce has commenced, 'due to the reforms and other administrative issues within the MOH, the … process is still awaited to be launched' (Global Health Workforce Alliance, 2013).

In other recent work, public health researchers Yaipupu and Eves (2002) undertook a formative research study, on behalf of the National Department of Health, to ascertain the understandings and perceptions of the community concerning pregnancy and childbirth, and make recommendations to support the National Health Plan 2001-2010. Focus groups and interviews were carried out in urban and rural settings in five provinces, namely New Ireland, Sandaun, Western Highlands, Western and Central. The report notes that although the Department of Health program goals 'aim to prevent illness, suffering and deaths through access to gynaecological, pre-and post-natal care and supervised delivery', to date, health promotion efforts focus solely on family planning. No health promotion materials have been developed to support antenatal care or advocate for supervised birth. Moreover, Yaipupu and Eves (2002) suggest that care during pregnancy and childbirth is influenced by sociocultural, economic, and behavioural factors. They recommended promoting the need for better management of pregnancy and childbirth; service improvements; improved access to services; and education and promotion to minimise women's exposure to risk.

In 2006 the maternal mortality ratio was estimated to be 733 deaths per 100,000 live births (National Statistical Office of Papua New Guinea, 2009) (c.f. the WHO estimate of 220/100,000 (World Health

Organisation, 2014c)[54]. This estimate equates to four women dying every day in circumstances associated with maternal health causes. This represents a stark and ongoing tragedy that Joseph (2013) argues is still largely unrecognised. Mola (1989) explains in the average Papua New Guinean village, maternal death is uncommon; 'for a village population group of 400 people, a birth rate of 40/1000 and a maternal mortality rate of 1000/100,000, there will only be a death every 6-7 years; a time interval just long enough for the last death to be forgotten and for local woman to feel, "It couldn't happen to me". Joseph (2013, p. 271) concurs, suggesting that among most people 'the plight of women dying in childbirth is "off the radar screen" and there is little awareness of the high rates of maternal mortality' (Joseph, 2013, p. 271).

The 2006 Demographic and Health Survey (National Statistical Office of Papua New Guinea, 2009) estimated around half (52%) of the population labour and birth in health facilities[55], attended by skilled health professionals (9% doctors, 40% nurses, and 4% midwives) with wide regional and urban/rural variations. This is not very different to the situation at independence (Bell et al., 1973), with women living in urban settings (90%) are more likely to use formal health services than rural women (10%), and around half of the population (46%) continuing to birth with no skilled assistance (National Statistical Office of Papua New Guinea, 2009). The 2006 report estimates that 7% of women birth alone. The low reported rate of attendance by midwives (4%) is interesting and possibly due to the lack of distinction between the nursing and midwifery professions, as well as acute shortages of midwives in clinical practice (Kruske, 2006).

In other recent literature, Mapira and Morgan (2010) examine the contribution of church health services to maternal health care and found that churches are providing 58% of care outside of provincial capitals. However, their findings suggest that church facilities were likely to provide only basic care with limited options for referral to higher levels of care. Moreover, there was marked variation across provinces with clear indications that health system strengthening is required to improve maternal health, including improvements in monitoring of complicated childbirth and the inclusion of community based care.

In a recent PhD project, Buasi (2011) explored the challenges of introducing social support for women during labour and birth at Port Moresby General Hospital, where over 15,000 women birth every year. She found that women appreciated having support during labour and birth. However, a policy of

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[54] See Appendix Five for summary of historical estimates of MMR in Papua New Guinea.

[55] 37% of births are in government health facilities and 15% in church or private health facilities.

support people accompanying women in labour was difficult to implement as half of the midwives did not support the implementation, although she notes 'the reluctance was often hidden' (Buasi, 2011, p. xviii). Further findings argue that the design of the labour ward is problematic as it does not accommodate a support person and maintain privacy for other women, and some midwives experienced a sense of intimidation in the presence of a support person, particularly in the environment of severe understaffing (Buasi, 2011).

Melua (2011), in her Masters project, explores the validity of maternity waiting homes in Central Province. She argues that poverty, scarcity of transport, negative cultural practices, lack of awareness of risk factors, and geographical isolation all contribute to preventing women accessing maternal health services. These factors are exacerbated by problems such as shortages of health workers, deteriorating infrastructure and limited outreach programmes, which are disincentives for women. The study supports calls for facility births and the establishment of maternity waiting homes. In the context of a functioning health system that provides quality health care for women experiencing complications, this is a useful call. However, Melua (2011) contends that health system problems undermine the value of developing maternity waiting houses and that strengthening the health system is a priority for reducing maternal deaths.

Byrne and Morgan (2011, p. 3), on behalf of World Vision,[56] argue that 'in a country like Papua New Guinea, with limited resources and significant geographic obstacles, it is critically important to make maximum use of local resources'. They call for community development approaches, including more training of lay health workers (village health volunteers) to provide family and community health care. Conversely, in alignment with international recommendations for skilled birth attendance, McNee (2011) challenges the Byrne and Morgan (2011) report, suggesting that there is limited evidence of improved maternal health and that numerous programmes in Papua New Guinea have failed in the past using community development approaches.

In a retrospective study undertaken in East Sepik Province Maraga et al. (2011) argue that intrapartum services are not well accessed. They found that despite uptake of antenatal care, two thirds of the women in their sample gave birth at home. Barriers identified for accessing supervised birth were distance to health facilities, and the women's feelings of shame presenting to facilities to give birth.

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[56] Paper published by World Vision Australia, the Macfarlane Burnet Institute for Medical Research and Public Health and Compass: the Women's and Children's Health Knowledge Hub (which is a strategic partnerships initiative funded by the Australian Agency for International Development).

Using participatory action research in her recent PhD project, Joseph (2013) worked collaboratively with women in a remote setting in New Ireland Province to establish action and strategies to improve maternal health. Although her literature review notes the importance of having a skilled birth attendant present at every birth (alongside contraception, abortion services and improving social determinants of health), she calls for the building of a community health post within the village and training of 10 local women as village birth attendants. This argument is based on reports from women in her study who felt they were 'subjected to negligence and abuse from staff' (Joseph, 2013, p. 267). Given the overwhelming evidence that midwives or other skilled birth attendants are vital to improve maternal and neonatal health, it is unlikely that, if instituted, the strategy of VBAs would have a significant impact on improving maternal health.

In another study undertaken in Madang Province King, Passey, and Dickson (2013) note the stagnant maternal mortality rates and the lack of improvement in maternal health services since the 1980s. They investigated women's attitudes and utilisation of maternal health services and found that despite high rates of complications, most women were not enabled to access supervised birth. The most common reason given was the lack of access to services. The women cited lack of comfort at the health centre and the attitude of staff as inhibiting factors; and the availability of medical help and physical comfort as enabling factors.

As part of a larger project, Vallely et al. (2013) undertook qualitative research with 100 women in Eastern Highlands Province, to explore their perception and experiences of maternal health care. They argue that while the majority of women saw benefit in antenatal care and recognised the importance of supervised birth, they experienced geographical, financial, language, and cultural barriers, which inhibited accessing services. Vallely et al. (2013) conclude that distance, terrain and transport, as well as the ability of women to make decisions impinge on access to facility birth. They call on strategies to provide information to women, men and other key family and community members within communities on the importance of safe birth.

Bolnga, Hamura, Umbers, Rogerson, and Unger (2014) examined maternal deaths at the provincial hospital in Madang Province. They argue that maternal deaths are underreported and that most women died of direct obstetric causes. Women experienced delays in receiving care, which contributed to the poor outcomes. Bolnga et al. (2014) call for strategies to reduce maternal mortality and improve reporting of deaths.

More recently in a Masters project in Morobe Province, Tinning (2014) employed an indigenous feminist approach working with women in a small village to explore their perceptions of family planning and reproductive health services. Her findings suggest that women's attitudes and actions

were largely informed by their local and practical knowledge, shared in communities for many generations. However, she argues that the introduction of contraception has weakened and challenged traditional cultural practices and norms related to childbirth culture. She shares that the community ceased supporting and 'building *hauskarim* (birthing house) for women and waited for the government to build a modern childbirth facility' (p.74). Tinning (2014) calls on increased government support, utilising indigenous structures, the promotion of holistic health approaches and collective community learning to improve sexual and reproductive health outcomes.

The most recent health system project in progress is the Asian Development Bank, Rural Primary Health Services Delivery Project (Asian Development Bank, 2014). This project aims to strengthen the rural health system in two selected districts across eight provinces (Eastern Highlands, East Sepik, Enga, Milne Bay, Western Highlands, West New Britain, Morobe, and the Autonomous Region of Bougainville). The project will be rolled out to additional districts and provinces as funding becomes available. Interestingly, project activities include provision of 'technical advice to the training institutions on the training of CHWs in maternal health, in alignment with the Australian funded project discussed shortly (Asian Development Bank, 2014, Terms of reference, p. 2).

The above discussion reveals a long history of research and repeated calls for improvements in maternal health care services. While there is ongoing research and project activity, some work continues to reflect dated recommendations, with little consideration for educating midwives or strengthening the health system; two strategies vital for improving maternal and neonatal outcomes. Moreover, as the World Bank report notes, more attention is needed to build human resources for health (World Bank et al., 2011).

The health care system in Papua New Guinea provides maternal and neonatal healthcare through government and church-based health services, although it is noted very few facilities meet the minimum requirements to support the provision of quality intrapartum maternal health services (National Department of Health, 2009b, p. viii). There are no significant differences in outcome measures between government and church-based health providers (Mola & Kirby, 2013) or in how services are provided. Maternal health care consists of antenatal clinics, pre-and postnatal emergency care, labour and birth services in hospitals and some health centres, and routine maternal and child health clinics offered at fixed, and mobile outreach clinics (Bauze et al., 2009). Maternal health care is provided by all cadres of health worker including CHWs, nurses, midwives, HEOs (Dawson, Howes, Gray, & Kennedy, 2011) and by doctors based in urban hospital settings.

General nursing programmes include theory and skills related to normal pregnancy care and normal birth, although it is noted that nursing students receive minimal education on managing

complications (Kruske, 2006). Like many developing countries, Papua New Guinea has insufficient midwives or other skilled health workers to assist an estimated 1.8 million reproductive aged women, who give birth to approximately 220,000 babies every year. Of these estimated births, an estimated 87,000 occur in health facilities (Mola & Kirby, 2013, p. 194). The numbers of registered midwives is unknown but estimates range from 150-570[57].

Moreover, the general health system continues to focus on curative healthcare services, with few resources allocated for preventative or health promotion activities (Ashwell & Barclay, 2009; Denoon, 1989; Joseph, 2013; Shann, 1979; Yaipupu & Eves, 2002). Curative services focus on diagnoses and treatment of disease, with priority given to institutional facilities such as urban hospitals and medical care (Ashwell & Barclay, 2009; Biddulph, 1993a; Shann, 1979). However, as discussed above, the most important priority for improving maternal health is the provision of midwifery care for all women and babies, close to the communities where women live (Homer et al., 2014; van Lerberghe et al., 2014).

Human Resources for Health/Midwifery

Nursing and midwifery were initially taught in Papua New Guinea through apprentice-style training based in hospitals and from 1969 nursing programmes were established and run by the National Department of Health (Kruske, 2006). During the 1980s and 1990s there was no formal maternal and child health education provided outside of the University of Papua New Guinea, Port Moresby (Duke, 2004). In line with international trends, following a review in the late 1990s midwifery education was transferred to the tertiary sector and offered as an advanced diploma of nursing, becoming a bachelor degree in 2002 (Kruske, 2006). At this time, the Government pledged to have 'a midwife in every health facility by 2010' (Government of Papua New Guinea, 2010). However, only 20 midwives graduated per annum from the University of Papua New Guinea (Nursing Council of Papua New Guinea, 2003) and despite some programmes being designed to increase human resources, this goal was not achieved. Instead, care for women during pregnancy and normal birth was included in general nursing education and many nurses provide intrapartum care as part of their roles in health centres. Midwifery is generally considered as an extension of the role of the nurse (Kruske, 2006; Nursing Council of Papua New Guinea, 2003). CHWs, who undertake a two year programme, also provide antenatal and intrapartum care. There is an expectation that CHWs will refer to a midwife for intrapartum care, however, severe shortages of midwives mean that the majority of women giving

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[57] Australian Agency for International Development (2012a) suggests Papua New Guinea has 152 practicing midwives; United Nations Population Fund estimates 277 (UNFPA, 2011, p. 165); and, the Burnet Institute estimate there are 567 practicing midwives (Dawson et al., 2011, p. 11).

birth in rural health centres are attended by CHWs and nurses who have minimal education or skills for managing emergencies (Kruske, 2006).

In recognition of the poor status of maternal health, the National Department of Health, supported by the World Health Organisation, undertook a review of midwifery education in 2006 (Kruske, 2006). The review led to the development of a new 52 week midwifery curriculum for nurses, which leads to registration as a midwife. The delivery of the new curriculum has been supported by the WHO collaborating centre for nursing, midwifery and health development at the University of Sydney, funded by Australian ODA in the Maternal and Child Health Initiative (MCHI).

Maternal Child Health Initiative (MCHI)

The MCHI forms part of the Papua New Guinea-Australia Partnership for Development: Health and HIV schedule and the Health Delivery Strategy 2011-2015 SWAp, with the long term aim of improving the health of Papua New Guineans (Emmott et al., 2009; PNG - Australia Ministerial Forum, 2012). It is aligned with the UN Secretary-General's Global Strategy for women's and children's health discussed previously, and commits around A$1.6 billion over five years to 2015 (United Nations, n.d.). It is a multi-stakeholder initiative, funded by the Australian government, working in partnership with the Papua New Guinea National Department of Health, the World Health Organisation and the Faculty of Health, University of Technology, Sydney (University of Technology, 2014). The initiative commenced mid-2011 to contribute to improving maternal and neonatal health in 'a sustainable manner through improved quality of essential maternal and newborn health care' (University of Technology, 2014, p. 6). Specific objectives of the MCHI were to improve the standard of midwifery clinical teaching and practice in four existing teaching sites and support the development of a fifth midwifery school, and to improve the quality of obstetric care in two regions through the provision of clinical mentoring, supervision, and teaching (University of Technology, 2014, p. 6). Unlike previous projects identified above, this initiative specifically focused on improving human resources for health, particularly midwives. The Australian government supported nurses to undertake midwifery education through scholarships, and eight international midwifery educators and two obstetricians were contracted to work alongside Papua New Guinean academic and clinical personnel to improve the standard of midwifery education and practice (JTA International, 2012; PNG - Australia Ministerial Forum, 2012; University of Technology, 2013). Additional funding supported infrastructure development, teaching capacity and medical supplies for hospitals, health centres and aid posts.

The MCHI has been in progress over the same time frame as this thesis, 2011 – 2015, and has markedly increased the numbers of midwives. Homer (2015) suggests nearly 450 midwives have completed the programme: 49 in 2011, 73 in 2012, 106 in 2013, 88 in 2014, and 132 in 2015. The

project initially supported four existing midwifery programmes and, in July 2015, a fifth school commenced at St Marys, Vunapope in East New Britain (Homer, 2015). The initiative has also supported a pilot programme to increase the skills of CHWs (University of Technology, 2014) and provided capacity building at Port Moresby General Hospital for midwives and other health workers. For the first time in over a decade, the Nursing Council has been supported to recommence midwifery registration, with over 300 midwives recently admitted to the register, doubling the previous number of midwives (Homer, 2015).

Chapter conclusion

This chapter reviewed selected literature on the evolution of global maternal health policy and the status of maternal health in Papua New Guinea. Global maternal health policy and practice recommendations have been subject to changing ideology and paradigms. Initially population control was the driver of global policy, followed by access to contraception from the 1950s to the late 1980s. Both of these drivers were based on macro-economic agendas and economic concerns over population growth. Primary health care emerged in the late-1960s with a focus on broad theories of development, and saw health embedded as part of a broader political and economic development agenda; meaning maternal health received no focused attention. Beginning in the 1970s, gender equality and women's rights took centre stage, with suggestions that meaningful improvements in maternal health could be achieved only by improving women's status. The global economic downturn from the 1970s and into the 1980s ignited a cost effectiveness agenda, limiting programmes in developing countries, and focusing international efforts on packages of care that were considered cheap, cost-effective and available to all. In maternal health care, these packages focused on antenatal care and training traditional birth attendants. However, these strategies proved ineffective, with disappointing results and stagnant rates of maternal mortality. Recommendations for all women to have access to midwifery care or skilled birth attendance accelerated during the 1990s and into the new millennium, with the women's human right to access appropriate maternal health care becoming more established. Over time the discourse has shifted from a fragmented approach to a whole-system approach that argues for skilled care for all women, in the context of a continuum of care approach, and strong effective health systems.

The chapter then reviewed Papua New Guinean literature and revealed a long history of research and repeated calls for investment and improvements in maternal health care services. The literature and many donor projects have identified the poor rates of maternal health yet many projects appear to have focused primarily on child health activities. The importance of health system strengthening, monitoring of complicated births, improved reporting of deaths, and the inclusion of community

based care were dominant themes (Bolnga et al., 2014; Mapira & Morgan, 2010; Melua, 2011; Tinning, 2014; Yaipupu & Eves, 2002). The MCHI 2011 – 2015 has markedly increased the numbers of midwives and built capacity in midwifery education, and the current ADB project is working to strengthen health systems in eight provinces.

Since the 1980s, when maternal mortality was recognised as an important health and development issue, there have been many studies from different contexts, perspectives and academic disciplines; there is no one complete literature. I have not aimed to perform a comprehensive review of the voluminous literatures; rather, the chapter has focused on maternal health in Papua New Guinea, the issue of improving maternal health in developing countries and the provision of midwifery care or skilled birth attendance, which is the focus of this thesis. This chapter shows that 'the need for improved health systems that provide all persons with comprehensive and integrated SRH [sexual and reproductive health] prevention and care is no less urgent today than in 1994, and remains pivotal to fulfilling commitments of the ICPD' (Snow et al., 2014, p. 166). There is now strong and compelling evidence that midwives and midwifery care (or another skilled birth attendant) are central (Renfrew et al., 2014).

CHAPTER SIX: Path Dependence

> The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise – with the occasion. As our case is new, so we must think anew, and act anew. We must disenthrall ourselves.
>
> Abraham Lincoln, *Second Annual Message, December 1862*

Introduction

Complexity thinking is concerned with understanding resilience and change in social systems (Ramalingam, 2013). Path dependence is a complexity thinking tool adopted from economics, political science and sociology (Arthur, 1989; Mahoney, 2000; Pierson, 2000) used to understand and explain 'order creation' in complex systems (McKelvey, 2003). It explores how the past can cast a long shadow on the present and future, and 'to a greater or lesser degree' (D. Byrne, 2005, p. 105) continue to influence and shape complex social systems (Begun et al., 2003; Rhodes & MacKechnie, 2003).

This chapter, the first of three presenting the empirical findings, uses the concept of path dependence as a tool to explore the maternal health care system. I define and discuss path dependence and two key elements - sensitivity to initial conditions and lock-in mechanisms. Drawing on literature and the empirical data, I use these concepts to examine the ways in which the system in Papua New Guinea, has not yet established effective strategies to prioritise maternal health, despite longstanding reports of poor maternal health as a key health and development issue. This finding reveals a significant locked-in phenomenon in the maternal health care system in East New Britain.

Path dependence

Complexity thinking seeks to understand 'the levers of history' (Mason, 2008, p. 38) and uses the concept of path dependence to explore potential reasons 'why things have emerged in the way that that have' (Kuhn, 2009, p. 58). The emphasis is on generating theoretical propositions, essentially as an interpretive exercise (Kang, 2014). Cilliers (1998, p. 4) argues that history is an important element in any system and suggests 'any analysis of a complex system that ignores the dimension of time is incomplete'. Path dependence is the process by which interactions and events in systems accumulate over time, with irreversible consequences, constraining possible future directions and the available options within the system (Agyepong et al., 2012, p. iv21; Crichlow, 2013, p. 563). Mason (2008, p. 40) describes path dependence suggesting,

that the inertial momentum of a particular phenomenon will sustain its direction and speed along a particular path, that a phenomenon is describable in terms of the direction of its path, and that it will continue in that path unless and until sufficient inertial momentum of a competing phenomenon results in a redirection of that path.

Although path dependence implies that systems have evolved from their historical contexts, this does not infer determinism; rather Cilliers (1998) cautions that nonlinear interactions and feedback loops of multiple system agents create difficulties in distinguishing cause from effect. While 'history is highly relevant, [it is] not necessarily deterministic' (Begun et al., 2003, p. 264), and past circumstances do not determine future realities (Lanham et al., 2013). The two key elements of path dependence, sensitivity to initial conditions and lock-ins, are introduced in the next section.

Sensitivity to initial conditions

Kuhn (2009, p. 58) suggests that using the concept (or metaphor) 'of sensitive dependence on initial conditions' poses the question, 'what constitutes the *initial conditions?'* (italics in original). She proposes that researchers be 'thoughtfully discerning', given that systems, like life, are made up of a series of what she calls 'instances', building on one another. While there are no definitive answers as to when to commence analysis, Sydow, Windeler, Müller-Seitz, and Lange (2012) argue analysis must follow from a reconstruction of path processes on different levels of the system over an extended period of time.

Cilliers (1998, p. 122) likewise suggests that as systems evolve, traces of the past become distributed over the lifetime of the system. In an iterative fashion, traces or influences from the initial conditions of a system continue to shape how individuals understand and construct ideas, which 'in turn constrain what is seen and not seen' in social systems (Zimmerman & Dooley, 2001, p. 70). Kuhn (2009, p. 22) explains, systems and processes are 'inherently relational', influenced by many things such as other people, processes, contexts and so on, 'forever influencing and being influenced'. Walby (2003, p. 13) adds that 'key to this is the role of social and political institutions that lock-in certain paths of development, through their shaping of power, opportunity and knowledge'. Path dependency is a tool to reveal modern expressions of older logic.

Lock-ins

The phenomenon known as 'lock-in' is an important component of path dependence, arising from the self-reinforcing processes of historical paths. Sydow et al. (2012, p. 161) provide a definition of lock-in as 'a situation or outcome whereby the trajectory of a path becomes confined to one single solution that, even in the face of more efficient alternatives, agents have to follow by and large'. Lock-ins can

be cognitive, normative or resource-based, and the more a path becomes the norm, or entrenched, the less likely or easily it can be changed (Ebbinghaus, 2005; Sydow et al., 2012). Put another way, the individual sense-making and actions of people within a system create certain 'ways of being' or understandings which gain an upper hand, meaning that once established, institutions or system elements become 'locked in', and difficult to shift, even though they may no longer be the best-adapted structure as the system evolves[58] (Curtis & Riva, 2010, p. 216; Klijn, 2008; Ramalingam, 2013, p. 222). In complexity terms, this is theorised as the tendency of systems to maintain the status-quo through feedback mechanisms.

Locked-in patterns and behaviours continue until such time as a 'critical juncture' (Kang, 2014, p. 230; Thelen, 2004) or a 'phase transition' (Ramalingam, 2013) occurs that is sufficient to disrupt the status quo, and trigger the occurrence of a 'path-shifting change' (Kang, 2014). When a context is particularly powerful, minimal significant change is possible because an organisation or system ends up trying to do new things in old ways (G. Morgan, 2006, p. 40 cited in Ramalingam, et al., 2008), or new things based on existing paradigms, norms and assumptions (Ramalingam et al., 2008). Mahoney (2000, p. 513) emphasises the connection between critical junctures and path dependent processes, explaining that 'once a particular option is selected [in a social system], it becomes progressively more difficult to return to the initial point where multiple alternatives were still available'.

The history of Papua New Guinea, as discussed in chapter four, reveals multiple communities, cultures and peoples (James et al., 2012), complex relationships between tradition and modernity (Feeny et al., 2012) and historical and ongoing exchanges of goods and ideas (James et al., 2012, p. 20; Underhill-Sem, 2001, p. 199). While the many different communities make it nonsensical to suggest universal practices or universal beliefs and understandings around childbirth, the literature reviewed in chapter five demonstrates some similarities from which practices originate (Macfarlane, 2009) and aspects of childbirth common to many places (Townsend, 1995). From a complexity thinking perspective, it is the actions and behaviours of multiple system agents that collectively form the system, therefore the many different practices and communities collectively contribute to the national maternal health care system, where policy decisions are taken.

The concepts of path dependence, initial conditions and lock-ins are important for understanding both continuance and change in social systems. Moreover, social and historical factors strongly

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[58] A typical example of an entrenched lock-in is the QWERTY layout on typewriters and subsequently on keyboards, despite better alternatives being proposed, such as the Dvorak layout (David, 1985), or the preference given to VHS over beta in video technology.

influence every aspect of the health system that was established in the colonial era, through beliefs and societal attitudes (Glassman & Chalkidou, 2012, p. 6; Grundy, Hoban, Allender, & Annear, 2014). Using the concept of path dependence, the contemporary maternal health care system can be traced to reflect the interplay between the historical and contemporary system. While it is impossible to predict when sufficient momentum will trigger a phase transition (Ramalingam, 2013), retrospective analysis can reveal the presence of path dependence and locked-in patterns that may no longer serve. The following discussion identifies evidence of path dependence and lock-ins in the maternal health care system in East New Britain and more broadly in nationally developed policy.

Reconstructing the path

The strong attachment held by women and families to cultural practices has been suggested as a contributing factor for low use of skilled birth attendance in other developing countries (Bohren et al., 2014; Makowiecka, Achadi, Izati, & Ronsmans, 2008; Tabatabaie, Zahra, & AbouAli, 2012). These studies note that poor childbirth outcomes in many settings are viewed as spiritual rather than physical. This contributes to women and their families failing to seek formal health care (Bohren et al., 2014). Several participants[59] in the current research highlight the ongoing significance of cultural practices in East New Britain. As shared by a nurse participant:

> Most of the time, our cultural background and beliefs can stop mothers coming in for safe delivery to the health centres. In most of the villages, they have customs and beliefs when the man is there with the wife during labour, like they treat the blood as, like not good for men … It is against all their cultural beliefs, taboos… (NO1)

This view supports the literature arguing that for some woman cultural prohibitions continue to 'cause men to keep a distance from women during the late stages of pregnancy and the postnatal period' (Yaipupu & Eves, 2002, p. 12); one result is that women may not receive assistance and support in the event of an emergency. This view was shared by other participants, for example, a participant from a provincial health leadership role comments:

> The men's behaviour in Papua New Guinea is important; you hardly see them, the men they just don't come. I think this is also a contributing factor to the many deaths in Papua New Guinea. Our men are not always supportive. (HM17)

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[59] HM1, HM2, HM3, HM13, HM17, MW5, NO1, HM6, HM21, MW8, CHW1.

A nurse participant likewise notes:

> The man is always away somewhere… they are good at coming and giving babies and then going, leaving the problem to the mother. It's like most of them they have this cultural belief and custom that prevents them coming to deliveries and helping their wives. (NO1)

A number of participants[60] mentioned a new government policy encouraging men's participation in childbirth. However, they note that childbirth continues to be considered a private women's matter and that few men are involved. In another setting, Joseph (2013) suggests that all issues of sexual and reproductive matters are considered cultural taboos, which people are 'forbidden to speak about' (p. 101). At one health facility in the current research, a facility administrator, discussing new health infrastructure designed to house sexual health facilities[61], was very clear that this facility was for women and that men would not come for screening[62, 63]. A midwife at this facility also comments that the men 'give excuses that they are busy and so they will not turn up' (MW11). Untreated sexually transmitted infections are a significant factor in maternal health as they can cause infertility or sepsis for women and neonates. This finding aligns with a study undertaken by Kura, Vince, and Crouch-Chivers (2013) in the Southern Highlands Province, who found cultural factors strongly influence men's sexual and reproductive health behaviour and attitude, and these matters were considered part of women's social roles.

Yaipupu and Eves (2002) argue that although people have some knowledge of the biomedical causes of complicated pregnancy and labour, 'their belief in traditional cultural explanations is very strongly embedded' (p.13). Participants in the current study confirm this argument, with one midwife participant suggesting:

> There are still a lot of mothers die in the villages and no one knows. When there is a flooding river in the big bush, you don't know there is a pregnant mother, and she dies from sorcery or something else. Many mothers die in the village from birth complications. (MW19)

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[60] NO1, HM2, HM6, HM13, HM21, MW8.

[61] Part of an Australian supported program – the PNG Australia Sexual Health Improvement Program supports the scale-up of STI services in high risk areas, including the construction of STI clinics in eight provinces (Moraitis, 2007) and a research program at the Papua New Guinea Institute of Medical Research.

[62] Hammar (2008, p. 62) suggests that in Tok Pisin sexually transmitted infections are known as 'women's sickness' (*ol sik bilong meri).*

[63] Butcher and Martin (2011, p. 2) identify that in Papua New Guinea many more women than men seek sexual health services.

Participants[64] also highlight the continuance of the cultural practice of women avoiding men during labour and birth. What this means is, that if health workers are male, women may avoid health facilities. A national policy manager shares:

> We have this culture as well, if a male is trained in that area, the village women would not want to go to a man, it's a taboo, it's culture. We are used to a woman assisting another woman, not a man. So sometimes when they come to the hospital and they see there is a male O&G there, they won't stay… cultural sensitivity. These are some of the issues and challenges we have to address when we are talking about addressing maternal health. (HM2)

The literature supports this finding. For example, Walker (2008) quotes a Papua New Guinean midwife saying:

> A woman can bleed to death in front of a male midwife, because she doesn't want to be seen by a man. Women do not come to antenatal clinic, because they don't want to be seen by a male officer. When there are male officers they don't come for delivery.

Joseph (2013) likewise argues that due to the sensitive nature of pregnancy, pregnancy related complications are normally kept hidden. This hinders the development of mechanisms to support women and reflects a view that labour and birth are private affairs more suited to village birthing huts, as a participant explains - '*samting bilong meri*'[65] (HM17).

Several participants comment that women were more likely to attend health services for antenatal screening than for labour and birth, typical comments were:

> According to our records … 70% of our mothers reach antenatal, but less than 50%, come for delivery. …antenatal covers a better percentage than supervised delivery, because they come. (HM13)

The disparity between antenatal attendance and facility birth is confirmed by the official records (National Department of Health, 2009b). The literature from other developing countries, such as Tanzania, identifies a similar disconnect between antenatal care attendance and facility birth, citing physical, cultural, or familial barriers (Choe et al., 2015). Conversely, other literature suggests a positive correlation between antenatal attendance and facility birth (Guliani, Sepehri, & Serieux,

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[64] HM13, HM2, HM21.

[65] Women's business, or something belonging to women.

2012). Guliani et al. (2012) importantly note that policies aimed at increasing the use of supervised birth should be linked with other social development programs such as poverty reduction, enhancing the status of women, and increasing primary and secondary school enrolment rates among girls, as well as improving quality of care and access to transportation. Similarly in East New Britain, the participant goes on to say:

> Maybe because of the road infrastructure and accessibility to health facilities, but when it comes to delivery … some [have to] travel an hour, some travel more than 6 hours. Once labour started they don't want to walk so they just stay in their village, it's too far to walk; anything can happen on the road. (HM13)

Transport was mentioned as a significant barrier to attendance at health facilities for labour and birth by several participants[66]. A national policy advisor comments:

> We would like to put transport in the policy, but it is an expensive exercise, so we are just saying effective transportation. But how will the provinces generate it? Like in the rural area, they can find the best way. For provinces like, in the coastal they will be looking at sea ambulance or something like that, but whether it is operational throughout, is you know... [pause]. So those are the real challenges we have. They have to walk. (HM2)

Likewise a nurse participant comments:

> I see a lot of people that … need health services …they are just there in the village and they don't have access to transport… It's very hard for them especially where the health centre was located it is a bit far from most of the villages, especially these very remote people. Around the coastal area it is a bit okay for them, but for the very remote or very inland people, sometimes they can walk for two to three days to reach the health centre. (NO1)

Another midwife supports this view:

> At least 1 out of 10 would deliver in the village because of transport problem. They might be feeling labour pains in the night and there is no transport to take them to the hospital. (MW8)

The preceding discussion identifies evidence of path dependence from some cultural practices related to pregnancy and childbirth and a contemporary continuation. The extracts also highlight the

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[66] HM2, HM5, NO1, HM10, MW1, NO2, MW7, MW8, HEO4, MW10, MW11, MW13, MW14, NO7, MW18, MW19.

importance of other issues, such as access and transport. In the following section, I trace a further aspect of path dependency arising from the colonial establishment of the health system. I argue the contemporary system continues to reflect the disjointed colonial systems where antenatal care is considered part of maternal and child health (preventative care), and labour and birth care part of acute/inpatient care (curative care). While it is difficult to distinguish the most important determining factor, the discussion argues that, together, the disjointed structure of the maternal health care system alongside cultural practices and beliefs, have resulted in a lock-in where women are not enabled to access assistance from an appropriately skilled health worker. Collective interpretations have created a corresponding political lock-in or status quo of an absence of priority for improving maternal health, including inadequate resourcing, and non-establishment of an effective maternal health care system. The next section explores path dependence arising from the colonial health system.

Maternal health care system

Conflation of maternal health with child health

As discussed in chapter four, the western-based health system was introduced in Papua New Guinea by the colonial administration. Initially it was primarily to support the health of plantation workers and European settlers (Luker, 2008, p. 258). Although some church-based health services provided maternal and child health services from the outset (Denoon, 1989, p. 86), initially little priority was given to the health of the villagers, or to women and children's health in particular by the colonial administrators. Government maternal and child health (MCH) services were established in 1953 with the provision of mobile and fixed clinics offering immunisation and health screening for children and antenatal care for women (Aitken, 1991). However, while the 'infant work' was gradually accepted by the people, 'maternal work lagged behind'. Denoon (1989, p. 88) notes the reluctance of indigenous health workers to become involved in the maternal work and what was established was a service 'ostensibly for women and children, but actually focused on children'. By the end of the colonial period D. J. Johnson (1973, p. 486) identifies that in many places there was 'very little 'M' in MCH[67], and the prioritisation of child health services has since been well documented (Denoon, 1989; D. J. Johnson, 1973; Reid, 1983).

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[67] This finding represents connectivity with other settings as discussed in chapter five, and highlighted in the seminal publication by Rosenfield and Maine (1985).

This is an example of path dependence. Participants in the current research continue to associate maternal health with MCH and many participants'[68] in response to my questions on maternal health, responded with information about child health and MCH clinics. For example a manager in a district coordination role, comments:

> Maternal health is safe motherhood, which is family health; it comes under outreach patrols, which is MCH, maternal and child health clinics and programmes. (HM5)

Interestingly, however, it became clear later in the interview that the overriding focus of the clinic was on children, as he says:

> With MCH we have decided to concentrate on immunisation of children and child health education messages and the home visits ... they revisit the children, especially the sick children. (HM5)

An absence of 'M' in MCH remains; women and specifically pregnant women are not acknowledged as important recipients of health care and appear to be overlooked. The following comment, from a maternal and child health nurse highlights the general attitude, she says:

> We do MCH – maternal and child health, but when we go out we just check babies, not much to do with mothers. (MCH5)

I attended a MCH rural outreach patrol (November 11, 2013), and observed a focus on child health, with no provision made to offer women contraception or pregnancy care, despite several pregnant women attending with their other children. In this case, the focus of the health workers (nurses and CHWs) was exclusively on immunisation, child health screening and care provision. When I queried this omission, the nurses advised that rather than offering antenatal care, the health workers encourage pregnant women to attend the weekly antenatal clinic held in the urban centre. This could be some distance away, yet no provision is made for transport or any follow up made to ensure that women are able to attend the urban clinics. This suggests that neither reproductive health care services nor antenatal care are prioritised during outreach rural services[69].

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[68] NO3, MW3, MW6, MW7, HEO3, MW8, HF17, MW17, MCH5, MW4, HM5, HEO1.

[69] It was noted that in the village setting is it difficult to maintain privacy and carry out abdominal palpation (examination) in the absence of a private venue (HEO3, NO4).

The lack of focus on women and maternal health during MCH clinics was acknowledged by some participants, such as this HEO who comments:

> We are supposed to go out, the maternal nurses, they are supposed to go out to check mothers outside [in the community], but we don't do that. We just stay in our health facility; we are fine in our health facility just waiting for them to come, so when they come they come with complications. (HEO1)

At the district and provincial administration levels, however, there appeared to be little recognition or acknowledgement that in reality MCH clinics pay little attention to women or maternal health. A provincial administration participant discussing maternal health services notes:

> There is a national standard on those key critical areas … that is family planning, antenatal care, MCH, TB, and leprosy. (HM20)

The expectation is that MCH services are inclusive of antenatal care, which is one component of maternal health care. The WHO recommend a minimum of four antenatal visits (Villar et al., 2001), aimed to support women during pregnancy and identify their health needs. Antenatal care can prevent, detect and treat problems arising during pregnancy (Kerber et al., 2007), and encourage women to attend facilities for supervised labour and birth[70]. However, as discussed in chapter four, antenatal care in isolation has minimal impact on preventing poor maternal health. The most important time for saving maternal and neonatal lives is during labour and birth, and in the first 24 hours following birth (Bhutta et al., 2014; Requejo & Bhutta, 2015, p. s78).

Contraception and STI screening and treatment were other health related areas frequently mentioned in response to my queries about maternal health[71]. I asked a senior provincial health administrator if he was able to 'talk more about strategies for improving maternal health': he responds:

> Family planning is a big one of those and safe motherhood. Safe motherhood is a programme that actually targets health facilities, for syndromic management of STIs [treating on symptoms and not lab results]. It's not that we've neglected that area; it's just that the

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[70] While beyond the scope of this research, recent literature suggests that to the contrary, improving access to antenatal care may not be enough to motivate facility-based delivery, especially in rural areas (Choe et al., 2015).

[71] DR1, DR2, HM6, HM7, HM9.

coordination point for those, those things are being done at the facility level. Immunisation for children, monthly programme, those are the ones to talk about. Measles outbreak, I mean there is an outbreak in East New Britain now… (HM16)

Access to contraception can prevent a significant portion of maternal deaths[72] by preventing unplanned pregnancies (and therefore decreasing maternal risk) (Homer et al., 2014). However, it does not prevent mortality or morbidity for women with continuing pregnancies.

The above comment highlights that intrapartum care appears to be ignored in the context of MCH services, with little understanding demonstrated on what 'safe motherhood' entails. In this interview, the participant talked in detail about immunisation programmes and the current measles epidemic in East New Britain, but not directly about maternal health. Questions on women and maternal health were inevitably answered with comments related to family planning, MCH, child health screening, sexual health services, HIV or other health programmes such as malaria and TB. Participants would typically 'talk around' maternal health, but never identify deliberate steps that are being taken to improve maternal health care services. The importance of acute antepartum or intrapartum care was very rarely mentioned outside interviews with midwives and other health workers who were directly providing services for women.

Shani and Mohrman (2012) argue that health care systems are inextricably intertwined with the societal context, which includes communities, all levels of government, churches and international development partners. At all levels of the system, better recognition that the issue of poor maternal health is a collective problem is vital, so that collective strategies can be developed. Eyben (2012, p. 17) asks, 'when something is never named or discussed, how do you know it is being ignored? She argues that resistance to ideas may be passive to achieve the effect of continuing to ignore issues. The absence of policy or discussion about an issue is itself a statement about the 'right ordering of the world'. An issue only becomes visible when people are talking about it and construct it through social interaction, and then, potentially, action can be taken (Eyben, 2012). The extract reveals that there are complex interactions of networks, relationships and processes at play within the system (Cilliers, 1998) where many agents continue to remain silent about addressing maternal health care services.

Participants at the provincial and district management levels did not appear to link improving maternal health with midwives, the providers of skilled care. At the national level of the system, when

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[72] Homer et al. (2014, p. 5) suggest that 'family planning as an integral part of midwifery as a package of care because family planning utilisation reduces fertility, which reduces the number of women at risk of maternal death and stillbirth or neonatal death'. They argue family planning can reduce maternal mortality by 44.7 – 80.6% (p.6).

I asked about maternal health, again responses were more likely to focus on related issues and not those directly aimed at improving maternal health services for women and babies, with particular gaps noted around intrapartum care. This conflation is clearly illustrated in an interview with a national technical advisor. I directly asked 'Is there a focus on maternal health?' The participant responds:

> Definitely, most of these [new policies] are addressing issues that concern women and maternal issues. For example, the SRH policy – that is talking about women. Family planning that is talking about women. The Youth and Adolescent health policy focuses mainly on young girls, in school and out of school, and even the gender, so most of these are addressing maternal health. (HM6)

These comments illustrate that while maternal health has received an increase in focus at the national level, there appears to be a continued silence around the importance of acute care and particularly the intrapartum period and access to midwives. The silence can be traced from cultural practices and the disjointed colonial health system to the contemporary health system. I could find no evidence to suggest that a distinct maternal health care system or even a distinct care provider has emerged. Non-recognition of the importance of midwives was noted by a midwifery educator, who says:

> I think people pretty much don't have it in their heads, that to solve a maternal health crisis you need midwives. (ED1)

Many participants[73] mention that all health workers are expected to attend women during labour and birth, regardless of their education, knowledge or skills. The comments of these midwives typify many respondents' attitudes:

> Even if you are a midwife you are a nurse the same as the others. That's the one problem. A CHW is a nurse, like the others. You are all nurses. Anyone can deliver a baby. (MW19)

> It's everybody that attends to mothers, whenever they are on duty and the mothers are in there they attend to them. (MW11)

There is little recognition of the specialist skills of midwives. I asked a doctor participant if 'the unique skills of midwives were recognised?' and he responds, 'No, I don't think so. They go and come back,

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[73] DR1, DR4, CHW1, ED5, HM9, NO3, HEO1, HEO3, HEO4, MW1, MW4, MW9, MW12, MW14, MW17, NO5, NO6.

we forget they have been' (DR1). The participant is discussing the nurses undertaking midwifery education, yet on their return, the newly acquired knowledge and skills in managing maternity related complications are not recognised or acknowledged. As a recently educated midwife notes:

> They think everybody can deal with the mothers during delivery, but they don't know the complications mothers will have at delivery or afterwards, they don't know how to prevent and manage complications, so some mothers die. (MW11)

Without the establishment of a unique maternal health care system or recognition of midwives as key providers of specialist care for women, there is little advocacy or lobbying for adequately resourcing the maternal health care system. Denoon (1989, p. 121) referring to the health system in the 1980s, says, 'the essential first step [to improving services for those at risk] would be the realisation that each woman's problem is not unique, but part of a national issue'. However, to date, the issue of maternal mortality remains unrecognised (Joseph, 2013, p. 271) and constructed as an individual, rather than a collective system problem and an important health service issue. As a result, little collective responsibility is acknowledged, and no collective endogenous strategies have developed to enable women to access midwives and skilled birth attendance.

Complexity thinking contends it is the action of all individual agents within systems that collectively form the whole. National, provincial, district and local leaders, policy makers and decision makers are part of communities. They bring their personal, familial and cultural beliefs, which inform professional ideas and practice. Unless all members of the community recognise their collective responsibility for improving maternal health, women will continue to pay the cost with their health, and some with their lives. Shani and Mohrman (2012) argue health care systems are inextricably intertwined with the societal context, which includes communities, all levels of government, churches and international development partners. At all levels of the system, better recognition that the issue of poor maternal health is a collective problem is vital, so that collective strategies can be developed.

Minimum Priority Activities

The Minimum Priority Activities (MPAs) for rural health provide further evidence of path dependency and the locked-in continuation of the status quo with an apparent absence of policy or discussion about intrapartum care. These health system mechanisms do not have any focus on ensuring women have access to skilled care for acute antepartum or postpartum events, or intrapartum care. The MPAs arose from the 2009 reform of intergovernmental financing arrangements. They direct funding priorities for rural health services by providing the operational funding for rural facilities, rural

outreach patrols, and the distribution of drugs and medical supplies (World Bank, 2013, p. 7). The MPAs were discussed by several health management participants[74], with one respondent saying:

> For the health sector we have three minimum priority activities … [and] funds are allocated for those three activities… One is medical supplies and distribution … two is integrated patrols that includes MCH, supervisory visits, medical officer visits, all the outreach patrols. And thirdly is operation of health facilities. Those are day to day operation of each facility and that includes supplies, infrastructure. So currently the government is funding only these three MPAs, Minimum Priority Activities under the health sector. (HM5)

Another participant highlights:

> MPA two is for outreach funds, which is directly responsible for improved ANC, improved maternal health outcomes and so forth. (HM11)

As discussed above, maternal health is viewed under the umbrella of MCH. MCH clinics provide antenatal screening with no role in care for women during acute antepartum or postpartum events or intrapartum. Maternal health is highlighted in the NHP as a key objective and priority area (Government of Papua New Guinea, 2010, p. 26), yet no specific funding targeting acute or intrapartum care has been allocated to achieve this goal and no substantive changes have been made to establish a dedicated maternal health care system.

While an exploration of health funding is beyond the scope of this thesis, it is noted that the low level of health spending is a significant, ongoing issue. Bolger et al. (2005, p. 17) show that provincial governments on average allocate only 3.3% of their internal revenue to health spending. Izard and Dugue (2003, p. 10) and World Bank (2014, p. 5) both report that, in comparison with other Pacific Island countries, Papua New Guinea spends the lowest proportion of gross national product (GNP) on health and has the lowest level of health spending per capita. Several recent reports have addressed health financing, such as the World Bank (2013, 2014) and the PEPE project (Howes et al., 2014). Findings from these reports suggest that despite some increase in government funding to the health sector since 2009, there has been minimal impact on service delivery (Howes et al., 2014; Wiltshire & Mako, 2014) and evidence that health sector spending is a 'leaky bucket' (World Bank, 2014, p. vii). The low level of spending allocated to health suggests that health is not a priority area for the provincial or national governments.

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[74] HM5, HM11, HM15, HM1, HM16.

In this section I have argued that the contemporary maternal health care system reflects path dependency arising from the system established in the colonial era. The system status quo is evident, with few changes in the system since its establishment. The system separates antenatal care from intrapartum care, and influenced by cultural beliefs, intrapartum care is largely ignored and almost invisible within the system. No distinct maternal health care system has been established and no key health worker identified. In the next section, I build on this argument and argue that there are important broader implications for these omissions.

Political priority for maternal health

In this section I argue that reports and literature highlighting the poor state of maternal health in Papua New Guinea have failed to sufficiently disrupt the status quo and generate sufficient momentum to trigger a phase transition (Ramalingam, 2013). Rather, the system reveals a locked-in absence of political priority to address the issue of poor maternal health. Sydow et al. (2012) suggest that lock-ins can be cognitive, normative or resource-based in nature; i.e. due to constrained cognitive perceptions, an unwillingness to change or due to a lack of resources (Sydow, Schreyögg, & Koch, 2009). Kauffman (1993) argues lock-ins originate when systems choose a path (or bifurcation) which results in the system taking a particular direction. The new direction becomes dominant, based on the complex interactions of relationships and processes within the system, and the actions of multiple system agents (Cilliers, 1998). Lock-in emerges due to increasing inflexibility and the system becoming more constricted (Sydow et al., 2009). While lock-ins are never 'final', given that systems are always in motion, systems tend to maintain the status quo (or remain locked-in) until there is sufficient momentum to trigger a phase transition (Ramalingam, 2013).

Glassman and Chalkidou (2012, p. 1) argue that global health 'advocates, researchers, and policy makers have labelled almost every disease, condition, medication, or intervention a health priority'. As every society has limited resources, spending decisions must be priority based. From a complexity thinking perspective, it is the collective actions and beliefs of individual agents that form systems, and their shared normative and cognitive assumptions, which collectively contribution to decision-making regarding resource distribution. Whitfield and Buur (2014) argue that for many ruling elites in developing countries the main motivation driving decisions is political survival. As a result, political survival can underline the policies they choose to implement, the alliances they choose to enter into, and the sectors and industries they choose to support.

In this section, I argue that a locked-in pathway has emerged into the contemporary era, from a combination of the colonial health care system and the cultural beliefs and practices arising from within some communities. The belief that childbirth is women's business (separate from the business

of men), alongside the separation of antenatal care from intrapartum care, has resulted in a locked-in status quo and a continuing blind spot for intrapartum care. Consequently, insufficient resources or political priority has been allocated to improving maternal health. Maternal health continues to be constructed as *'samting bilong meri[75]' (*HM17); overlooked by agents throughout the system - in communities, and in the political arena by local level, provincial and national governments. The absence of specific policy attention to improving maternal health reflects the ideas of system agents about the 'right ordering of the world' (Eyben, 2012, p. 18).

Health policy

Since independence there have been seven national health plans. The first plan, 1974 - 1978, formalised the structure and function of the integration of church and government health services (Denoon, 1989, p. 102) and emphasised national ownership, decentralisation and self-reliance (Aitken, 1991, p. 30). In principle the plan aimed to provide health care as close to people's homes as possible; however, the 'involvement of communities in health care delivery and its quality-control was not achieved'(Aitken, 1991, p. 32). The 1986 - 1990 plan revised the provision of care close to people approach and confined doctors' clinical activity to hospitals in urban settings (Government of Papua New Guinea, 1986; Kolehmainen-Aitken, 1991). This health plan restricted each province to only one provincial hospital. However, some provinces created 'district' hospitals and paid staff from provincial funds or recruited expatriate volunteers (Kolehmainen-Aitken, 1991, p. 107).

Subsequent health plans (1991 - 1995 and 1996 - 2000) both identify maternal mortality as a key health concern. Peabody et al. (1995) argue that although childbirth was the commonest cause of admission to health facilities, supervised birth numbers were estimated to represent only 30-40% of total births. Notwithstanding the low numbers of women attending health facilities for birth, maternity related causes were noted as the leading cause of death, outranking all other causes, estimated to be 800/100,000 (Peabody et al., 1995). Strategies identified in the 1996 - 2000 plan emphasised the need to improve education and skills for health workers in reproductive health (Government of Papua New Guinea, 1999a).

With goals of the 1996 - 2000 plan not achieved, the 2001 - 2010 plan notes 'a collapse of the health system' and continuing unacceptably high maternal and infant mortality (Government of Papua New Guinea, 2000). This health plan called for priority to be given to safe motherhood and the restoration of rural health services, including human resource development, aiming to have a midwife in every

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[75] Women's business or something belonging to women.

health centre by 2010. Again, this aim was not achieved and the current NHP, 2010 – 2020, once again notes a high MMR 733/100,000 (Government of Papua New Guinea, 2010, p. 11). The plan makes a repeated call to 'increase in the capacity of the health sector to provide supervised deliveries' by increasing the number of health workers skilled in obstetric care (p.26).

In addition to the health plans, other government policies, such as the National Population Policy for Progress and Development (1991); the second National Population Policy (2000-2010); the National Family Planning Policy (2007); and the Report of the Ministerial Taskforce on Maternal Health in Papua New Guinea (2009) have all identified poor maternal health as a key health and development issue. The literature review presented in chapter five details many other published accounts of poor maternal health and repeated calls for changes to the maternal health care system. However, as Shann (1979, p. 171) identifies, the 'health system suits the small minority who live in urban areas', with a focus on 'urban, curative' services, and neglects the majority of the population in rural settings.

With few changes evident in the structure of the system or how services are delivered, the neglect of services for the majority of the population has continued. There has been an absence of action to ensure all women have access to a midwife or other skilled birth attendant, resulting in continued poor maternal health outcomes. As identified earlier, despite the many calls and reports, no specific maternal health care system has developed to focus on reproductive health or specifically on maternal health, and no identifiable specific health care worker has emerged. A human resources for health policy has been developed in response to the World Bank et al. (2011) report highlighting the health workforce crisis. The recent policies include the 'Arrest Plan' (National Department of Health, 2013f), the Health Sector Human Resource Policy (National Department of Health, 2013a) and the Health Workforce 'Enhancement Plan' 2013 – 2016, Volume 1 & 2 (National Department of Health, 2013b, 2013g). Together these four documents detail the proposed Department of Health action to 'arrest the current workforce crisis' and 'guide decision-making processes to resuscitate the health workforce development for the future good health of the people of Papua New Guinea' (National Department of Health, 2013g, p. 4).

Yet, midwives do not feature as a key health workforce to support maternal health in these important planning documents. As an education participant notes:

> I was at an HR meeting process to do some workforce planning and … some guys from planning … presented figures and they didn't even mention that midwife word. This is the workforce, the health workforce that we need for Papua New Guinea for the next 5 to 10 years, and the word midwife wasn't even in there. … I looked at the strategic plan for the next 5 years and it didn't have midwifery in there at all. It has community health workers, it

has nurses, but it doesn't have midwives. They don't understand what a midwife does and that to solve a maternal health crisis you need midwives. (ED1).

Surprisingly, despite international and national evidence for their limited effectiveness, the documents continue to budget for training of village birth attendants (National Department of Health, 2013g, p. 43). And, for example, the Pomio District Health Office continues to support training of village health volunteers in attending births[76]. Ensuring women have access to midwives or other skilled birth attendance continues to be overlooked. As a participant in a recent report suggests, the *'issue of maternal mortality and morbidity and the factors affecting it, was neglected'* (University of Technology, 2014, p. 28, italics in original).

Compared to other health issues, little targeted action focused on reproductive and maternal health[77] has followed the launch of national health plans. This is in contrast to other areas of health, where there have been focused workshops, literature and policy releases. For example, the PNG National Child Health Policy 2011-2015 (National Department of Health, 2009a) and the National Malaria Control Strategic Plan 2014-2018 (National Department of Health, 2014a), the National Strategic Plan on HIV/AIDS (National AIDS Council, 2006) or the National Tuberculosis Management Protocol (National Department of Health, 2011b).

While significant problems undermine the entire health system and health care service[78], the analysis in this chapter suggests that the government has failed to take deliberate steps to address the significant issues that contribute to poor maternal health and produce targeted policy. At the 19th Waigani Seminar, almost 25 years ago Biddulph (1993b) suggested that a reduction in maternal mortality to a more acceptable level below an MMR of 500/100,000, would require: considerable resources dedicated to primary care and upgrading of facilities and quality of care at first level health centres; concurrent improvement of support and supervision at provincial hospital level; education and promotion on the importance of family planning; and community education to improve health literacy. These recommendations were echoed more recently by Yaipupu and Eves (2002), who

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[76] HM12, HM13, HM17, NO2, HEO3, Pomio District annual activity plan.

[77] For example, from other developing country settings - the 'Road Map for accelerating the reduction of Maternal and Neonatal Mortality and Morbidity in Malawi' (Republic of Malawi, 2005); the Skilled Care Initiative, in Burkina Faso, Kenya and Tanzania (Family Care International, 2015); and the policies from Sri Lanka, Malaysia and Thailand (Koblinsky & Campbell, 2003).

[78] For example: insufficient financial resources, inadequate infrastructure, equipment and supplies, and low capacities of health workers with limited education, supervision and support (James et al., 2012, p. 282).

recommended health promotion related to pregnancy care, improvements in health care services including health workers relations with clients, facilitating women's access to service and the development of maternity waiting homes. Importantly their report identifies the importance of improving health care services, as women are disinclined to use health services if they receive poor care.

Despite their worth, the recommendations made in these and other reports and literature have not been implemented. Interestingly, demonstrating poor connectivity with the global discourse, neither of these calls specifically identifies the importance of midwives. Packages of care to improve maternal, neonatal and child health and a continuum of care approach, have been advocated in the global literature for over a decade (O. Campbell & Graham, 2006, p. 1285; Kerber et al., 2007). Moreover, there is now 'indisputable evidence of the birth day as the riskiest day for both mother and newborn' (Bhutta et al., 2014; Requejo & Bhutta, 2015, p. s78), and that midwifery care is the most cost effective solution to decreasing maternal and neonatal mortality (Homer et al., 2014; Renfrew et al., 2014). Yet, to date, in Papua New Guinea, targeted strategies reflecting global recommendations appear to be limited to the recent MCHI, focused on building midwifery capacity.

A fundamental precondition to the implementation of effective health strategies is political will and policy commitment, as recognised by Biddulph (1993b, p. 168) nearly 25 years ago, and argued in more recent global literature by van Lerberghe et al. (2014); Shiffman and Smith (2007); and S. Smith (2014). Political will arises from within the endogenous system, however, 'the political leaders are themselves subject to complex social processes that influence the values and parameters of their behaviour' (de Coning, 2012, p. 139). 'Lack of commitment' and/or 'lack of political will' can suggest deeper political, cultural, psychological and social factors that underpin what is seen at the surface level (Baser & Morgan, 2008; Eyben, 2012).

Findings from the current study demonstrate what appears to be a locked-in absence of political will and priority to ensure women have access to maternal health care. Various feedback mechanisms within systems created a 'locked-in situation', where the system continues to revert to the status quo (Klijn, 2008). This can be demonstrated by tracing action arising from reports and from empirical data. Several recent national reports have been commissioned which all highlight the crisis in maternal health: formative research undertaken to ascertain perceptions from the community concerning pregnancy and childbirth (Yaipupu & Eves, 2002), a review of midwifery education (Kruske, 2006), the 2006 Demographic Health Survey (National Statistical Office of Papua New Guinea, 2009), the Ministerial Taskforce on Maternal Health (National Department of Health, 2009b), and documentation of the crisis of health worker shortages (World Bank et al., 2011). The establishment

of the multi-stakeholder MCHI in 2011 has markedly increased midwifery education; yet specific attention directed towards modernising the system within which midwives practice has received little meaningful attention or coordination at provincial, district or local levels in East New Britain. No significant changes have emerged at health facilities or within communities. Midwives are critical health workers for improving maternal health outcomes (Homer et al., 2014) yet they are constrained by the model and system within which they practice, as highlighted in chapter eight.

Collection and reporting of information alone is insufficient to compel substantive change. To be effective, the information must be considered across the system, in a form compelling enough for the information to be seen and recognised as important for action (Carey & Crammond, 2015; Meadows, 1999). This has not been the case in the East New Britain or Papua New Guinea maternal health care system. As an educator participant notes, to date efforts to improve maternal health are largely driven by exogenous development partners:

> AusAid is really doing everything. The government really needs to do more. I don't know, maybe they have something at the policy level, but in terms of training and education, no government support. … I still need to see some tangible contribution or development by the government. (ED5)

This perspective was echoed by a senior development practitioner who comments that Australia appears to be 'doing everything':

> Everything that came out of the recommendations from the ministerial taskforce has been funded by Australia. We are funding the MCHI, the reproductive health training unit, the CHW up-skilling and Marie Stopes for family planning. (HM10)

At the community level, no strategies have emerged, such as health promotion recommended by Yaipupu and Eves (2002) to encourage women to engage with the health system or establishment of maternity waiting houses as recommended by Melua (2011), support with transport or other financial barriers. Alternatively, one policy maker notes: 'we would like to put transport in the policy, but it is an expensive exercise, so we are just saying effective transportation. … They have to walk.' (HM20).

At the health facility level, a district hospital health worker participant confirms these national views, she says:

> We are trying to help the mothers as much as we can, but from the top down there hasn't been any in-service or meeting what-so-ever addressing maternal child health issues, nothing… no visits from national department nor from the provincial. No focus on maternal

child health. They are depending on us, to do what we can do. Likewise all the other facilities, it is just the same. … just trying to do what we can to address issues. We have been operating in line with the national health plan, but any advice from the top down, nothing. Nor has there been any refresher course or anything on any new changes in maternal child health in the standard treatment manual we have received. No advice from national or provincial level on maternal health, they have been focusing on malaria and other health issues. (HEO6)

A doctor participant, working in a provincial hospital, likewise comments that maternal health has not been prioritised. He says:

Maternal health has not had priority, there are other issues in the health sector that are taking more priority, for example HIV/AIDS and TB; they seem to have an edge. (DR1)

A senior provincial administrator in East New Britain explains how decisions are made at the provincial level:

We advocate for new positions. I advocate at the provincial level, with the provincial administration and administrator. Saying, this is what we need, the number of staff. Of course, those at the district level are also fighting for the same kind of positions they want to have for facilities. But … health is not the only sector; you have education, division of commerce, agriculture, DPI, and so all this. … we have a restructure that we are working on that may be ready this year, it may be ready next year. For the [health] division, we've included two additional positions … so, hopefully we'll get a provincial TB officer. (HM16)

The participant demonstrates little conviction that new health positions will be funded, as he says - 'hopefully'. This explanation also reveals that at the implementation level in the province neither reproductive health nor specifically maternal health has been prioritised. And within health, although the national health plan identifies a priority for maternal health, within the province, TB appears to be regarded a more important health priority area.

From a development economist perspective, Lopes (2002, p. 132) argues that in developing countries 'governments are not the sole actors in building and reforming institutions' such as health systems. He argues that change is rooted within the system, which includes 'individuals, communities, multi-national companies and other civil society actors' (Lopes, 2002). Lopes' argument aligns with a complexity thinking argument, which suggests all individuals comprise a system, including informal and formal structures. Individual and community actions and constraints shape how formal institutions act in practice (Piotti et al., 2006). It is vital therefore that solutions, ownership and

change emerge across all levels of the system, driven by endogenous motivations, which in the East New Britain and wider Papua New Guinea system appear to be absent.

Lopes (2002, p. 134) further suggests 'values are culturally determined' and while the state is a key agent in establishing a value system this must be reflective of actual societal behaviour. Lyon (2009, p. 1) notes that insufficient attention has been given by donors to the wider constraints within and beyond the health sector in Papua New Guinea, such as culture, norms and values, which are known to shape attitudes, behaviours and incentives. If government or other formal structures act in 'total disregard of society' (p.133) and fail to take into account the interests and values of its people, the deviation between formal institutions and actual practice 'will create a limbo', resulting in 'fake formal … systems that have little to do with the informal exchanges' (p.133). Dia (1996) likewise suggests that if formal institutions are not rooted within local culture they will generally 'fail to command society's loyalty or trigger local ownership, both of which are important catalysts for sustainability'. If formal institutions are at odds with societal behaviour, expectations and incentive systems, they will face a crisis of legitimacy. Conversely, 'indigenous institutions anchored in local culture and values can count on the sound pillars of legitimacy, accountability and self-enforcement' (Dia, 1996, p. 1).

Systems are comprised of all agents, who collectively contribute to, and build the system including formal institutions, 'in partnership with each other' (Lopes, 2002, p. 132). In the process, the system maintains the status quo, produces continuous iterative change, or, with sufficient momentum, rapid change. A system is a delicate balance between people and the formal state power; 'between business and social interests' (Lopes, 2002, p. 132). In the case of maternal health in Papua New Guinea, using the complexity concept of path dependence has highlighted the ongoing influence of cultural beliefs associated with childbirth and the continuation of the colonial health system. This status-quo can be seen in the inadequate policy response, inattention and insufficient resource allocation dedicated to improving maternal health care services and ensuring women's access to skilled birth attendance.

Emerging changes?

The 2006 Demographic health survey (DHS) (National Statistical Office of Papua New Guinea, 2009) highlighted the poor state of maternal health and this led to the Ministerial Taskforce on Maternal Health (National Department of Health, 2009b). Since then, increased policy activity has followed at the national level. In June 2014 the Sexual and Reproductive Health policy was launched (National

Department of Health, 2014b), along with several other related policies which were discussed by participants[79]. These new policies include family planning, neonatal health care, youth and adolescent health, gender and integrated management of childhood infections (IMCI) (HM6). Prior to the launch of these policies, despite the longstanding reports of poor maternal health as discussed above, there was no policy guidance on reproductive health or specifically maternal health (HM2). A national technical advisory participant explains:

> We have developed the sexual reproductive health policy; we have developed the youth and adolescent health policy. It is all focusing on targeting the maternal health issues that we have. We have also developed the gender, the health gender policy. … we are working on the nutrition policy, nutrition covering maternal health as well as the others, a holistic approach. (HM2)

The participant reveals that while activity in the space has increased, the importance of intrapartum care continues to be overlooked. Another participant acknowledges this, saying:

> To answer your question, the answer is no, obviously. We are not getting the intrapartum care done properly, no not at all. Because even the women we are training as midwives, with the diplomas, they usually end up working in administrative positions, not in clinical care. … the problems are the lack of accessibility and how the government system runs in this country. (HM6)

Other participants commented on the policy work underway, one saying:

> The DPs [development partners] have taken a big hand in it and the government has been led by that… They have responded to the DHS … with the maternal task force, they have responded with an emergency response action. (HM11)

Another national level participant comments:

> We have a sexual and reproductive health policy that is being approved by the SEM [Senior Executive Management] but it is yet to be endorsed by NEC [National Executive Committee/cabinet], it has taken some years. All the policies are still waiting to be endorsed. (HM7)

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[79] HM2, HM6, HM7, HM9, HM11.

Although the policies were launched in June 2014, a year later (July 2015) the department was still awaiting funding (HM7) to enable printing and distribution. While it is too early to comment on the impact of the newly released Sexual and Reproductive Health policy, it is interesting to note that, as in other countries, maternal health is integrated into the wider sexual and reproductive health agenda. This aligns with calls from the International Conference on Population and Development, 1994. As such, the policy represents an 'umbrella' policy, aiming 'to create an enabling environment for appropriate actions aimed at providing the necessary impetus and guidance to national and local interventions and initiatives in all areas of sexual and reproductive health' (National Department of Health, 2014b, p. 1). Maternal health is recognised as an integral component of the broader sexual and reproductive health agenda, yet in isolation the policy provides little meaningful guidance to actually improve maternal health and intrapartum services where the most significant improvements can be made. I argue, therefore, in addition to an umbrella policy, specific and focused maternal health policy and practice guidance is vital to actually make a difference for women and their babies.

Discussion

Many significant issues appear to remain unaddressed and there is an absence of specific guidance for provincial and LLGs related to strategies for improving maternal health. Moreover, as explained by a development participant in the following extract, there appears to be little support to increase a focus on maternal health. The participant says:

> We were invited a good 2 years ago, from national planning … to put in a Public Investment Proposal, a PIP, which is government funding for a key initiative. … A PIP is not funded by global funds, not funded by any DPs. It is a GoPNG development project that could be looking specifically at reproductive health.

> So, the Department of National Planning said you need to put a PIP in for maternal health, [and] they would fund extra funding… that would be a GoPNG development project, looking at reproductive health, but a PIP requires … a lot of work [and] …there was nobody prepared to do that, no-one who wanted to do the work. There is no leadership within the NDoH as the work is for the provinces and it's a difficult one to sell to somebody to pull their staff off to do this for maternal health. … There seems to be no energy for programmatic activity, and a PIP could be whatever initiatives were seen as part of a maternal health improvement plan. (HM11)

Evidence for limited support can be found in the actions and spending priorities at all levels of the system. Decision-making and priority setting take place in a profoundly political environment, with

many different political interest groups and political constraints arising from the system (K. Hauck & Smith, 2015). Despite consistent reports of poor maternal health in published and grey literature, and recommended solutions in both government and development partner documents, no evidence-based, effective strategies have been implemented and there have been no alterations in the structure of the maternal health care system in East New Britain or nationally. The goals and motivations of a system can be deduced by how the system acts (Carey & Crammond, 2015). In this case, a possible explanation could be that, despite high-level agreement to international mechanisms, agents within the system have yet to take ownership of the problem and thus creative, endogenous strategies and solutions to protect maternal and neonatal lives have not yet emerged.

This finding represents a defining feature of the East New Britain and Papua New Guinea national maternal health care system as a 'locked-in position' (Ramalingam, 2013; Snowden, 2009), where ongoing (in)action leads to little change. Snowden (2009) explains that 'sense making' within complex systems comes from deciphering these 'locked in' pathways that have emerged from tracing path dependent mechanisms. Complexity thinking argues that behaviours and relationships within systems are shaped by the environments within which they are embedded, and change is based on the actions and behaviours of agents (Kuhn, 2009; Richardson & Cilliers, 2001). The actions of individuals represent the strongest form of system resilience and, until the underlying system paradigms change, there will be little change or evolution of the system structures and consequently little change in system outcomes (Carey & Crammond, 2015). Exogenous policies or 'institutional transplantation' (Kang, 2014, p. 221) imposed on developing countries, 'may be grudgingly accepted on a superficial basis, but will rarely be implemented as intended' (Lopes, 2003, p. 44), until individuals take ownership and embrace change. Tsoukas (1998, p. 303) points out that systems reflect 'dominant societal, historically formed self-understandings', meaning that systems 'reproduce the beliefs and institutional practices of the society in which they are embedded'.

From a complexity thinking perspective, Mitleton-Kelly (2003a, p. 7) argues that within social systems 'new ideas can only be 'seen' and developed if both the constitution and the history of the system allow them to be 'seen' and developed'. Similarly, Goodin (1998) argues the deeply nested norms or rules, which are often not codified or written, although they are understood and accepted, permeate formal systems or institutions. Complexity thinking argues that systems develop incrementally from their history and responses to contingent conditions. Resilience is created by multiple feedback mechanisms that support systems to maintain or return to their status quo (Cilliers, 2005). It follows, then, that systems are not easily changeable; rather, in the interest of stability, systems tend to resist change to sustain the status quo (Stacey, 1996, p. 484).

Jervis likewise argues that 'until a critical mass is assembled' from agents within systems very little impact is felt from introduced or imposed changes (Jervis, 1997, p. 52). This chapter, utilising the complexity thinking concept of path dependence, demonstrates that to date, insufficient momentum to improve maternal health in Papua New Guinea has emerged or evolved from within the indigenous system. There has been no phase transition (Ramalingam, 2013) to push or tip the system onto a new path. Rather, any change, has been driven by exogenous priorities; endogenous organic change has not yet become a reality. The system continues to sustain the status quo, which is to confer minimal policy or practice attention towards improving maternal health at the LLG, district and provincial levels where important decisions are made concerning implementation and the distribution of resources.

The data highlights an increased high level focus on maternal health[80] and reveals that some policy work is in progress related to maternal health issues. Yet, for effective results, in addition to the high level work, strategies must build community engagement, strengthen community ownership, and build creative implementation strategies. These deliberate steps, specifically targeted at improving women's access to maternal health care services, are critical at the local, district and provincial levels. This point was clarified by a participant at the national policy level:

> Here we are responsible for policy formulation, it is down at the province they are responsible for implementation, so they plan for the implementation and operationalisation is done at the province. (HM2)

The participant was realistic of the work ahead suggesting that:

> A lot of work has been done; but it still requires a lot of commitment. … The provinces have to take on ownership themselves and the people too. [There are] different channels of funding, the churches are being funded through the government grants and the development partners are also coming in … also the extractive industries … so there is a lot of support going into that area [maternal health]. It may not be enough, and it needs to be well coordinated so we can see some good outcomes. (HM2)

This comment aligns with tenets from complexity thinking; systems are intimately interconnected and actions of individuals are intricately intertwined and influence each other. Mitleton-Kelly (2003b, p. 7)

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[80] The increased focus on maternal health is evident in increased research media highlighting the issue, for example the current Prime Minister in a recent news report , publicly acknowledging the issue (Staff Reporter, 2015), suggesting evidence of change.

explains change emerges in the context of other elements and dimensions of a system. The relationships and interactions between the different elements are more important than the individual elements themselves in determining overall system behaviour (Mingers & White, 2010; Preiser & Cilliers, 2010). Complexity arises from the interdependencies among different parts of the system and varies dependent on those linkages.

At provincial, district, and local levels of the system there appears to be substantially less focus on maternal health in comparison to the national level. Many participants continue to conflate maternal health with MCH, family planning or other aspects of health, while concurrently failing to recognise the importance of maternal health care, intrapartum care and women's access to emergency care when required. Many clinical stories were shared by health workers at the facility level, which highlighted their dependence on the actions of managers and the structures of the wider system. Overall these stories identified a lack of priority given to women experiencing maternal health emergencies. Likewise, at the provincial level of the system there appeared to be minimal focus on maternal health issues, as a health administrator identifies:

> No, there is not really anyone focused on maternal health. There is no one for family health
> or for maternal health. I think when we fill that position [family health coordinator] again we
> could have maybe satisfactorily having that on the radar. But, at the moment, it is swept
> along with everything else. (HM16)

In East New Britain, the post for Family Health Coordinator; 'a very strategic post' (HM2) according to a national policy maker, was allowed to remain vacant for over two years, from December 2012 (HM16) until mid-2015.

At the local government level a participant acknowledged that since 2009 changes have occurred and the 'local level governments have a bigger role, … as implementers' (HM8); however, no local and district level participants in this research, were able to share knowledge of health policy or specific programmes related to maternal health during interviews[81]. None seemed aware of the importance of prioritising midwives to provide maternal health care or attend women during acute antepartum, postpartum or intrapartum events.

Lipsky (2010) suggests it is these 'street level bureaucrats' who hold the discretionary power in how and when they act, and make decisions regarding implementation of national policy objectives at the

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[81] HM1, HM3, HM5, HM8, HM13, HM18, HM20, HM23, HM25.

local level (Lipsky, 2010, p. xii; Rice, 2013), thereby supporting or undermining policy intentions. When policy and programmes 'fit the dominant paradigm', programmes will appear natural and familiar and, as a result, are more likely to appeal to implementers. However, when a policy is at odds with accepted local interpretations, it is unlikely to be implemented as intended (J. L. Campbell, 2001, pp. 170 - 171). Similarly, Butler and Allen (2008) suggest that, from a complexity perspective, policy implementation processes are best understood as self-organising systems within which adaptive capabilities are extremely important. They argue, 'policy implementation is self-organising because national policy is reinterpreted at the local level, with each local organisation uniquely mixing elements of national policy with their own requirements' (Butler & Allen, 2008, p. 422).

In some settings policy makers and implementers may be unwilling or unable to give an issue significant attention, due to wider system priorities or competing problems. As Cairney (2012, p. 350) explains, a 'policy is less likely to change when the issue receives minimal attention', and the 'selective attention' of decision makers or institutions can explain why issues can be 'relatively high on certain agendas, but not acted upon' (p.351); furthermore, a 'focus on one issue means ignoring 99 others' (p.351).

The above discussion uses the complexity thinking concept of path dependence to demonstrate modern expressions of an older logic at the national policy level and at the provincial and local level in East New Britain. It also reveals a contemporary lock-in related to the maternal health care system. Despite longstanding reports of poor maternal health, self-organising mechanisms within the system continue to sustain the status quo. No distinct maternal health care system has emerged and the continuation of the status quo has impeded system change in line with the international recommendations, outlined in chapter five. Importantly, the data reveal an absence of significant country ownership or engagement in developing specific policies focused on improving maternal health at district and provincial levels. This could significantly undermine the Australian funded maternal and child health initiative at the local level. In the absence of concurrent support to transform the locked-in status quo, international development technical support to increase human resources for health, may be insufficient.

These analyses demonstrate that there has been a longstanding non-reaction to reports and recommendations to improve maternal health care. Lopes (2003, p. 48) suggests that 'at the heart of development is a change in ways of thinking, and individuals cannot be forced to change how they think'. 'Effective change cannot be imposed from outside. Indeed, the attempt to impose change from the outside is as likely to engender resistance and give rise to barriers to change, as it is to facilitate change' (Lopes, 2003, p. 48). Changing behaviour and action begins with evolving beliefs,

which from a complexity thinking perspective arise organically from individuals within a system. In order to create change in the maternal health system, I argue it is vital that development strategies consider this complex blend of historical and contemporary conditions and beliefs and take deliberate steps to initiate change. No intervention is introduced onto a clean slate, rather, in complex systems 'interactions are iterative, in the sense that the outcomes of one period become the starting point of the next, giving rise to path dependency' (Levy, 2000, p. 74).

While there is no evidence that reports of poor maternal health were formally rejected[82], there appears to have been minimal system uptake and engagement, outside of midwifery education institutions and the MCHI activity. There has been no discernible political or health system response or establishment of a distinct maternal health care system to protect women and babies. The 2006 DHS (National Statistical Office of Papua New Guinea, 2009) prompted the establishment of the Ministerial Taskforce on Maternal Health (National Department of Health, 2009b) and the subsequent donor funded maternal and child health initiative (MCHI). Yet these appear to have led to a non-linear response, with no discernible uptake or change at health facility, local government, district, and provincial levels. The donor funded MCHI has increased the number of midwives and built the capacity of midwifery education programmes (University of Technology, 2014). It will take time to reveal if these strategies are sufficient to trigger a phase transition to create significant long term systemic change.

Notwithstanding the important work of the MCHI and its significant impact on educating midwives or the current Asian Development Bank Rural Primary Health Services Delivery Project that aims to support the development of Community Health Posts (Asian Development Bank, 2014), a key finding of this research is that there has been little contemporary change in the structure of the disjointed system established in the colonial era. Evidence indicates that the system has yet to engender local ownership or political support to develop endogenous solutions to improve poor maternal health outcomes. Alternatively, the maternal health care system could be described as a 'transplanted institution' (Kang, 2014). As a senior policy maker comments, 'There is still a lot to be done' (HM9).

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[82] To the contrary there has been marked concern expressed in formal public settings, such as a speech by Mr P. Kase, Health Secretary (2011), at a National Development Forum, National Parliament, Waigani, which identified maternal health as a key concern and recent reports of high level acknowledgement of the importance of reproductive health (Staff Reporter, 2015).

Chapter conclusion

Using concepts from complexity thinking, this chapter argues that longstanding reports of poor maternal health can be traced to the disjointed health care system, influenced by cultural beliefs about maternal health. The literature review in chapter four and the above discussion demonstrates that since independence poor maternal health has been reported as a key health and development issue in literature, reports and national health plans. Yet, aside from exogenous driven strategies, such as the Safe Motherhood Alliance PNG (Safe Motherhood Alliance, 2014), the Oil Search Health Foundation (Reproductive Health Training Unit, 2013) and the MCHI building capacity in midwifery education (University of Technology, 2014), maternal health appears to have received minimal endogenous policy attention and few significant system changes to ensure all women have access to skilled health care.

Systems reflect a complex interaction between the historical and contemporary context and the structural environment (Cilliers, 1998, p. 89). In the maternal health care system, analysis reveals that few changes have emerged since the establishment of the colonial health system, and there have been few changes in the numbers of women dying during pregnancy and childbirth. The colonial health system constructed maternal health services alongside child health, thus creating a blind spot for the importance of intrapartum care, in alignment with the historical cultural context. Reported poor maternal health outcomes have failed to create sufficient momentum to disrupt the locked-in status quo and trigger a 'phase transition' (Ramalingam, 2013). No specific system focused on the provision of maternity care has been established. Acknowledging the importance of initial conditions, path dependence and lock-ins suggests that to understand complex systems 'phenomena have to be studied over time' (Haggis, 2010, p. 1476). In the following chapter I continue to explore empirical data using the complexity thinking tool of nonlinearity to examine the Ministerial Taskforce on Maternal Health in Papua New Guinea (National Department of Health, 2009b).

CHAPTER SEVEN: Connectivity and Nonlinearity

'Whose faces are behind the numbers?
What were their stories? What were their dreams?
They left behind children and families.
They also left behind clues as to why their lives ended early.'

World Health Organisation (2004a)

Introduction

The previous chapter used the complexity thinking concept of path dependence to elucidate the continuing implications arising from the health system structure established during the colonial era and post-colonial practices. In this second substantive chapter, I use the complexity thinking concepts of connectivity and nonlinearity to examine the *Ministerial Taskforce on Maternal Health in Papua New Guinea* (National Department of Health, 2009b), focusing on a key recommendation: the establishment of national, provincial and district maternal health review committees. In this chapter I briefly introduce the taskforce report and then define and discuss the complexity thinking tools of connectivity and nonlinearity. These tools are used to explore empirical data concerning implementation of taskforce recommendations and how they contribute to implementing international strategies to improve maternal health in East New Britain and Papua New Guinea.

Ministerial Taskforce on Maternal Health

As previously discussed, the 2006 Demographic Health Survey (DHS) (National Statistical Office of Papua New Guinea, 2009) reported a maternal mortality ratio of 733 maternal deaths per 100,000 live births. In response, the government launched the *Ministerial Taskforce on Maternal Health* (National Department of Health, 2009b) (the taskforce). Zibe, the then Minister of Health and HIV/AIDS introducing the taskforce (2009b, p. ii) report said:

> I established the Ministerial Taskforce on Maternal Health to report on the current situation in Papua New Guinea so that we could all know what impact maternal death is having on our country. I also asked the Taskforce to report on ways that the National Department of Health and the Government of Papua New Guinea can respond to the needs of mothers and reduce the maternal death rate.

The objectives of the taskforce were to develop a national framework of action, as a whole of government response to the high maternal mortality and to develop a health sector response through short, medium and long term strategies (National Department of Health, 2009b, p. 58). A wide range of people contributed to the taskforce including representatives from medicine, NGOs, church agencies, international development agencies, and members of the public. The final report, launched in 2009, declares that 'Papua New Guinea is currently failing its mothers and that there is a crisis in maternal health' (p. ii). Key issues and challenges identified include a lack of confidence in the health system which was noted to have 'improved very little in the last 30 years' (p. vii).

In alignment with international recommendations, the taskforce made recommendations to improve broad social determinants of health and specific health system recommendations. These were: to build leadership by creating advisory and coordination bodies at the national, provincial, and local levels to oversee implementation of report recommendations (taskforce committees); to build strength in the health system to respond to women's maternal health needs; to improve the provision of comprehensive family planning services; workforce development to ensure every woman has access to a trained health provider by 2030; development of standards for care from the aid post level upwards; and, improvement of access to emergency care and development of referral, communication and transport systems.

This chapter focuses on the first recommendation: the establishment of leadership to oversee recommendations of the report. The establishment of 'maternal health coordination reference groups' at each level of the governance system, national, provincial, and district, is designed to guide the development and implementation of the broad taskforce recommendations (National Department of Health, 2009b, p. 53). The recommendation aligns with National Department of Health policy and regulations, established in 1991 (National Department of Health, 2013c, p. 12). This policy requires every maternal death be notified and reviewed at district and provincial level. The aim of the review is to learn from maternal deaths and near misses to develop local solutions to prevent future deaths. Knowledge drawn from the district and provincial committees is then anticipated to feed into a national system to support national policy making, strengthening of the maternal health care system, and review of intersecting broader strategies.

Complexity concepts

Interconnectivity

Klijn (2008) argues that from a complexity perspective systems are hard to influence and govern. Although formal systems and patterns of organisation exist in societies and states, these structures,

such as leadership, hierarchy and institutions, while part of social systems, do not create social order in and of itself. Instead, complexity thinking argues that social order is shaped by the self-organisation of interconnected agents who relate, respond and communicate, based on the history of the system (see chapter six), motivating factors or attractors that function as organising forces (see chapter eight) (Kuhn, 2009), and other internal and external drivers of change.

Complex social systems are comprised of diverse and interconnected agents and in a fully connected system every agent is connected to every other agent; however, systems vary, and can be 'sparsely connected, richly connected or fully connected' (Cilliers, 1998, p. 27). How agents connect and relate impacts on how the overall system functions. Connectivity is critical to the survival of a system as it is from connections that the behaviour of the whole system emerges (Kuhn, 2009). Change within systems is also dependent on the strength of connections, based on multiple minute relationships and interactions. The quality of interconnections is critical, 'because everything, whether tightly or loosely coupled, is understood as being related to everything else' (Kuhn, 2009, p. 52).

Ramalingam et al. (2008) suggest that degrees of connectedness, either tightly coupled or loosely coupled, can have implications for the ability of systems to absorb change. For example, in tightly coupled systems, changes can spread rapidly and unpredictably throughout the system and have dramatic effects. Conversely, in loosely coupled systems, individual elements influence over longer timeframes and in more diffuse and subtle ways, or have minimal impact. What this means is that change in systems is dependent upon how people connect with one another, as well as the sense-making of individual agents as discussed in the previous chapter. Moreover, the relationships between agents are generally more important than the agents themselves. System agents are only able to operate on the information that is available to them locally, as Cilliers (1998, p. 121) argues, 'they have to, since in the complex system there is no meta-level controlling the flow of information'.

Nonlinearity

Change is frequently nonlinear, disproportionate and unpredictable (Miller et al., 1998), leading Cilliers (1998, p. 4) to suggests that nonlinearity is a precondition for complexity. Nonlinearity occurs due to the many interconnected and interrelated parts of a complex system, which are subject to feedback, the actions of individuals and the arising unpredictable emergent properties. This means that while it is impossible to make direct cause and effect links, nonlinearity can be used as a tool to better understand complex systems. It describes situations where small inputs or events lead to significant outcomes, or conversely, large events or inputs result in a disproportionately small impact (Anderson et al., 2005, p. 43). Importantly, Ramalingam (2013, p. 343, italics in original) notes while 'non-linear dynamics cannot be predicted: they can be analysed *ex post*'.

Connectivity and the taskforce

Demonstrating sparse connectively within the maternal health care system in East New Britain, the majority of participants were unaware of the taskforce and its recommendations. A typical response at the health facility level is demonstrated by an HEO[83] holding a rural hospital clinical position who says:

> No, no I don't know this report... I have not sighted it. Normally when it comes to such review, it is the people in the provincial health office that are sent down to Moresby to sit in for the review and launching of such reports, not so much of us at the peripherals. The implementation level no, we are not involved. (HEO6)

The only health workers who had an awareness of the taskforce report were those who had been involved in continuing professional education[84], although these participants were not always clear about the report detail or recommended strategies. Several participants shared that although they knew about the report, they had not read it. One health facility manager says:

> I heard about the taskforce. But I didn't have any document on that one, a document that was put forward on that one.
>
> *So do you know the recommendations?* No, I haven't seen it in black and white, but I heard about it. (HM21)

This comment is particularly interesting, as several health workers[85] suggest this manager had actually put a soft copy of the report onto their laptops. Among the local government, district, and provincial health managers who participated in this research, again, demonstrating sparse connectivity, few were aware of the taskforce or its recommendations. This was a surprising finding given the importance of their role in building strength in the health sector. This was also interesting given the assertion from an advisor from the National Department of Health that the district health coordinators had been involved in meetings promoting the establishment of review committees.

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[83] Health Extension Officer

[84] One initiative arising from the taskforce has been the establishment of continuing professional development education for health workers, conducted by the Reproductive Health Training Unit. This is a public-private partnership between the National Department of Health and the Oil Search Health Foundation (Reproductive Health Training Unit, 2013).

[85] MW1, MW10, MW13, MW18.

However, the district managers in this study appeared to be unaware of the importance of district review committees. For example, one manager comments:

> You'll find all our policies at the provincial health office … So if you want to know about any activities, maybe malaria, or whatever you can talk with him and he will provide you the policy. Actually they should give us copies so we also know, but they have not been doing that so I can't help you with information on policy documents. (HM5)

At the provincial administration level sparse connectivity was also observed. Participants[86] were unaware of the taskforce report, or if they knew about it[87], they had not read the document, as this participant shares:

> No, I haven't actually read the document; I was not here when they launched it. But I should read it and come up with a matrix out of those, to come up with what we should do for East New Britain. (HM16)

When I enquired with national level advisors about the apparent absence of knowledge at the provincial level there was a resounding lack of surprise. One national policy advisor comments:

> ... many of them wouldn't have any clue … there was no coordination from this [national] level, down to the ground. And yes, the document looks nice, but ... nothing happened after the launch. (HM6)

Remarkably, given the importance of a whole-of-government response and the scale of the problem, even at the national level of the maternal health care system, there was sparse connectivity noted and mixed awareness of the taskforce report. For example, one participant, in a national health policy role, appeared to have only a peripheral awareness of the taskforce report, saying:

> I'm not too familiar with the maternal health. Or do you mean the project? There is a project that is running, the maternal health command post project. (HM2)

This comment is interesting, as the command post had ceased in 2011, some two years earlier. The comment further identifies limited connectivity between the work of the technical advisors and policy makers, who are all situated at the National Department of Health headquarters in Port Moresby.

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[86] HM3, HM20, HM17, HM25, HM8, HM5, HM13.

[87] HM16, HM21.

Other national level participants demonstrate a more comprehensive engagement with the taskforce report and its recommendations, even so, as one technical advisor (HM6) comments 'very little happened following the launch of that document', which he suggests was due to the personnel in the department at that time, saying:

> Most of the recommendations, if you read them, are technical in nature and so, as I was saying, the people that were here then, could not grasp the ideas and connect them with the clinicians on the ground … the report was only circulated to the specialists in the hospitals …and that was it. But it was at the provincial and district level that document needed to be implemented. (HM6)

The participant goes on to say that because of the fragmented governance systems in place, there was little connectivity between the national department, provincial hospitals with standalone boards and the rural health services managed by the provincial health department. The participant suggests that cooperation (or connectivity in complexity terms) was difficult because of system constraints, as he explains:

> …cooperation with the provincial health advisor was needed. But, because there are two systems it was difficult. …doctors are tied down to only working in the major provincial hospital, the rest was not my job description. In order for the obstetrician to go out, we needed money that was going to be coming from …the provincial health advisor, who would then liaise with our CEO, the hospitals boss to allow, …for the doctor to go and do a rural patrol. And that took a lot of paper work and time, and frustration. The money was provided by HSIP[88], but it was often used on other things, so our response was if that's not going to be organised properly by people who are supposed to organise it, I'm not going to waste my time. My primary responsibility was to the patients that came to the hospital. (HM6)

Other participants were more positive, highlighting the success of the donor funded maternal and child health initiative, which has arisen from the taskforce findings. One suggests, 'human resource was one of the main results …With support from AusAid, we have improved the training schools, especially the midwifery training schools' (HM9). How this has translated into wider system changes is examined in the next chapter. The next section focuses on the establishment of a provincial maternal health review committee in East New Britain.

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[88] HSIP – Health Sector Improvement Project, a donor funded sector wide approach (SWAp), which is the main mechanism for distribution of donor funds via the Papua New Guinea – Australia Partnership for Development: Health and HIV schedule and the Health Delivery Strategy 2011 – 2015 (see discussion in chapter four).

Maternal Health Review Committee

A key recommendation from the taskforce, as noted above, is the recommendation for development of advisory and coordination bodies at district, provincial and national levels, to oversee changes recommended by the taskforce. Interestingly, the broad reference groups have been narrowed to the establishment of 'provincial maternal health review committees' (HM9), which have a narrower focus that aligns with the regulations established in 1991. These regulations require that every maternal death is recorded on a maternal mortality reporting form (Appendix Six), as well as on a death certificate (National Department of Health, 2013c, p. 12). In the period from 1991 to 2012, only 10 completed forms were received by the national register from East New Britain (National Department of Health, 2013c, p. 14).

Since the launch of the taskforce report, there have been national directives[89] (Kase, 2012), as well provincial visits from an advisor from the World Health Organisation[90] and several visits from the National Department of Health advisor, plus a capacity building development worker, with the MCHI, who have all advocated for implementation of the recommendation to establish a maternal health review committee in East New Britain. A national advisor from the National Department of Health explains:

> …we wanted to improve the death reporting, and so with support of WHO we went to all the, nearly all, the provinces … to visit them and talk about maternal deaths that occur there, and encourage them to establish some form of committee. … We said, 'This is the policy and this is how we want to do it'. This is what we did with maternal death review. We met with the district health managers and the hospital guys and the provincial guys. (HM9)

The participant confirmed that he had visited East New Britain Province and met with a number of people including the provincial obstetrician and members of the provincial administration, however to date these visits have not resulted in improved reporting of maternal deaths or the establishment of a provincial committee in East New Britain.

At the provincial administration level, a senior manager participant comments:

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[89] A letter was sent from the national health secretary, dated February 2012 noting that in 2011 only 8 maternal deaths were notified to the national health information service and reminding provinces of the importance of ensuring forms are completed and sent to the national office (Kase, 2012).

[90] Field notes, Oct 10th.

When we talk about the recommendation of the maternal review, taskforce, most of those activities are already being done by the facilities. But in management and coordination … the maternal provincial maternal health review committee, that's the one we haven't established. (HM16)

In East New Britain, a capacity building development worker with the donor funded MCHI comments that over two years working in the province, he has had no success with establishing a committee. He says:

One of our other targets was to establish a maternal health taskforce committee in the province. The committee reviews maternal deaths … so that these cases are discussed and to evaluate what happened. Where did the system go wrong? Where do we need more training? To see if there was any mistake from the staff, whether more training has to be done with the staff specifically in those areas, or whether there was delay in transport, whether any communication gap to be filled with help from the government. So that was the aim of starting a maternal health committee. But, I have been trying for two years to achieve this. We had almost finalised the meetings once or twice, but it didn't go ahead yet. (DR4)

The participant explains that although he has lobbied for the establishment of the committee to date he has not been successful. This is despite arranging multiple meetings with members of the provincial government, the provincial health department and with the senior provincial gynaecologist. Under the governance structures, implementation and responsibility for establishing the committee lies with the provincial government and there are no mechanisms to compel the provincial governments to comply with national directives, regulations or recommendations. As a national advisor explains:

Of course, here in the health department we are policy and guidelines. Implementation is the provincial responsibility. So I can't be doing the provincial work. I provide them with guidelines and they do the work. (HM9)

Reflecting sparse connectivity within the system, no managers who participated in this research from local and district level administrations were aware of the recommendation for district and local review of poor maternal health outcomes, so, unsurprisingly, no review committees have been established at these levels of the system.

The recommendation for maternal health review committees aligns with international recommendations (World Health Organisation, 2004a) and is repeated in other Papua New Guinea reports (National Department of Health, 2013c) and policies (National Department of Health, 2014b,

p. 12). The World Health Organisation (2013a, p. 2) define a maternal death review as a 'qualitative, in-depth investigation of the causes of, and circumstance surrounding, maternal deaths, that occur in both health-care facilities and communities'. Findings are presented at a multidisciplinary committee to establish the cause of death, contributing factors, and avoidable issues. The guidelines suggest that health care workers can learn from facility based verbal case reviews and outcomes can be improved with resulting adoption of practice changes (World Health Organisation, 2004a). A secondary important sequel is that health workers become advocates for change as a result of their involvement and learning from the process. Different processes are appropriate at different parts of the pathway, including community level verbal autopsy, facility level local clinical audit and case review of near misses and deaths, and national level audit of practice and confidential enquiry into maternal deaths and near-misses (World Health Organisation, 2004a).

De Brouwere, Zinnen, and Delvaux (2013, p. 15) argue that the process of review must be based on the following principles: the search for improvement, adherence to the evidence base to recognise good practice, a 'no blame' process which is not punitive, a 'no name' process in which confidentiality is respected. Transparent monitoring and accountability processes, disaggregated by age, geographical location and other socioeconomic characteristics, are vital to generate data. The expectation is that the data collected at meetings will guide the implementation of strategies to improve maternal and neonatal health, and is used to improve clinical quality and service efficiency (Health and Social Care Information Centre, 2015; Health Quality & Safety Commission New Zealand, 2014; Khan, 2009).

Reviewing what actually happened in the case of every poor outcome is crucial to better understand the root causes as a basis for development of strategies to address identified weaknesses or failures within the system and to propose changes to prevent future deaths (Say, Souza, & Pattinson, 2009). However, in East New Britain as a midwife participant is acutely aware, 'it has never been established', she says:

> …it is a directive from the National Department of Health …to all provinces to start up a taskforce in each province, but we haven't started the committee here … in the province … it has never been established. (MW13)

The directives and recommendations come from the national department, yet they are not necessarily supported by concurrent structural processes to enable them to happen, as one participant shares:

> There is a policy that was done recently, but my issue with this is that I have empty offices.

The offices that are supposed to be running with this are not here, so there is a policy for provinces to establish a provincial maternal health review committee, but we haven't started this here in East New Britain. (HM14)

This comment highlights that while the taskforce report recommends the establishment of provincial committees, it does not appear that sufficient attention has been given to the practical details and processes of establishment. The expectation is that committees are established within the mechanisms and structures of the provincial government; however, as the participant mentions, the workable structures are not necessarily in place to enable this, he says:

We talk about this partnership thing, but you know, the church they still want to be the church, Nonga, they just still want to be Nonga and rural health are often isolated out there. So in terms of networking … we are still separated, there is no partnership and nothing is actually done. There are too many layers and accessing funding is so difficult. (HM16)

These structural and institutional constraints add problematic layers to implementing international and national recommendations. As noted in chapter two, the boundaries of the maternal health system are fluid, merging with the broader governance systems, highlighting the importance of wider governance mechanisms. The participant notes:

For us, we, we came up with members for taskforce, but we never actually put it through the clearing houses, the institutions, the PCT [Provincial Corporate Team] or the PEC [Provincial Executive Council] – so that we could send our officers for provincial maternal taskforce meetings. So it's actually never … it never happened. (HM16)

Interestingly however (and reflecting the historical traces as discussed in the previous chapter), the participant questions the importance of a committee specifically addressing maternal health, he comments:

I mean we look at the committees we have established in the sector, and there are various committees but you find the same faces in those committees, so one wonders if we should set up another committee, or just make those objectives part of one of the other committees. There is a diseases control committee and basically their job is reviewing some of these diseases, so we could probably use that committee. (HM16)

This comment suggests a lack of recognition and acknowledgement of the importance of reviewing every maternal death, and perhaps a minimising of the urgency, resulting in a lack of priority being given to addressing myriad challenges that contribute to maternal deaths. It additionally identifies, as

least for this manager, an alignment of maternal health, a normal life process for the majority of women, with a disease focus rather than with a wellness model.

In alignment with the international recommendations, from a national perspective, Mola and Kirby (2013, p. 198) suggest that 'when there is a focus on collecting information about maternal deaths, many more deaths are identified'. However, a finding from this research is that awareness of magnitude of deaths largely remains unseen, confirming findings from Joseph (2013) in her recent doctoral thesis. Many people remain unaware of the collective significance of women dying in childbirth and the importance of tracking each death. The number of deaths reported to the national register via the national maternal mortality reporting forms is very low in comparison to the estimated number of maternal deaths. For example in 2009, the year the taskforce report was published, the estimated number of maternal deaths was 2000 women (National Department of Health, 2009b), yet in that year only 34 maternal deaths were actually reported. The year following the launch of the report, more deaths were reported however this number was still only a fraction of the total with only 71 reporting forms received. In 2011, 56 forms were received and 38 forms in 2012 (National Department of Health, 2013c, p. 15). As discussed shortly, findings from the current study show continued falls in reporting in 2013 and 2014, with national meetings unable to be held due to the lack of information received, despite a national advisor visiting all provinces.

Effective management and use of health information can identify vulnerable groups, serve as a foundation for identification of problems, identification of what works and as a guide for local decision making (Gill et al., 2007, p. 1351). Where maternal deaths are counted, it is more likely that the information is used to plan and deliver high quality, equitable services. Findings from reviews should lead to immediate actions to prevent similar deaths, and reveal patterns to enable the establishment of longer term responses tailored to address the problems identified in the community, at health-care facilities, and more broadly. Action taken is dependent on an analysis of the findings and the actions of various stakeholders involved (World Health Organisation, 2013a).

The process

As noted in the previous chapter, Carey and Crammond (2015) argue that the goals and motivations of a system can be deduced by what the system actually does. The national process for reviewing maternal health outcomes in Papua New Guinea is as follows. For every 'maternal death, whether they occur in a health facility or in the community/home, must be reported by any health worker whenever they hear about the event' (National Health Information System, n.d.). Health workers and provincial health information staff are encouraged to ask about maternal deaths when visiting aid posts and other health facilities, or when carrying out maternal and child health patrols and clinics or

visits to collect health information. Information is to be recorded, by doctors, midwives, nurses, CHWs or HEOs, on a standardised national Maternal Mortality form (Appendix Six), which asks for as much detail as available. Completed forms are then expected to be sent to the provincial health office and the national health information office, with a copy sent to Port Moresby General Hospital. The information is then used to carry out case reviews of health system factors and broader community contributory factors.

As the form instructs, 'every maternal death is a sad story but it needs to be told so that others might not die' (National Health Information System, n.d., p. 1). In a cascading manner, the information is anticipated to be used as a learning process at the community and health system level when completing the forms and then when the information is collated and reviewed at the district and provincial committees. The data then feeds into the broader national review committee process, to inform the development of national recommendations. In this way every individual in the system has an important role to contribute to ensuring the overall process runs effectively.

However, a system is a delicate balance between people and the formal institutions or systems that build the collective society (Lopes, 2002, p.132). Dia (1996) suggests if formal institutions are not rooted in local culture they will generally 'fail to command society's loyalty or trigger local ownership, both of which are important catalysts for sustainability'. In one district, the district health coordinator demonstrates little knowledge or engagement with the process outlined above, he suggests:

> This is done by the Nonga team and our provincial headquarters team... but the person they appointed to be the team leader resigned, so the group dissolved. But we normally had the team which mainly looked at maternal deaths only... maternal deaths coordinated from provincial. (HM5)

This interview was conducted in November 2013, and although the health manager shared during the interview that he was aware of at least three maternal deaths in his area, no review forms had been completed or reviews conducted to learn from these deaths. The manager was not familiar with the taskforce report or the recommendation for establishing a district based committee to coordinate a local response. He did not appear to be aware of the importance of his role in facilitation of the process.

This quote additionally points to further procedural difficulties associated with the process, the absence of a 'team member' which is discussed shortly. The manager appears to have an awareness of the importance of recording and reporting maternal deaths, and he shares that during his visits to the health facilities he stresses the importance of completing the maternal mortality register and

form. However, this awareness does not appear to have been followed through with action and completion of the reporting forms or meetings to review possible local changes.

In another exchange, I was shown at least three completed reporting forms at the provincial health office in November 2013. Yet, by May 2014, these had not successfully arrived at the national office in Port Moresby. Several national participants[91], who are members of the national maternal review committee, suggested that no forms were received by the national health information office, meaning that it had not been possible to hold a national maternal death review committee meeting. A participant explains: 'We planned to sit this year, but we don't receive the reports, so we are waiting' (HM9)[92]. Another participant explains:

> I'm a member of the [national] maternal death review committee… but we don't have this meeting until we get all the death information coming from the provinces. At the moment it is not coming. It's not coming because people are not doing what they are supposed to do. … Our last meeting was last year, we met three times, but the last time nobody turned up. (ED5)

The lack of national meetings severely undermines the process of making recommendations and developing strategies to improve maternal health. This finding additionally demonstrates substantial nonlinearity as the process has not been successfully implemented over the past four years, despite the lobbying, reminders and efforts made for establishment.

Midwives (and other health workers) and maternal death review

At the health facility practice level, several midwifery participants note that they thought some kind of review should occur following a poor outcome, yet they did not appear to recognise their role in initiating this process or that they were required to complete the national reporting form (National Department of Health, 2013c, p. 12). Rather, the midwives appeared to be looking for external leadership, for someone else to lead the process, although it was not always clear who 'they' were. One midwife comments:

> I think [a process] is in place, but they never come… if there is a death, they never come to the centre and ask what happened. It is just some kind of cut off. Like when we refer a

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[91] HM7, HM9, ED5, DR3.

[92] In the period 1991 – 2012 a total of 379 forms were collected throughout the country, with some provinces regularly reporting deaths and others hardly reporting them at all (National Department of Health, 2013c). During this 10 year period, East New Britain supplied 10 completed forms.

mother to the hospital and she is dead, they never come back to us and say your mother is this and that, and that. They never come back to ask us. (MW10)

Another midwife comments:

…one big part of it is they don't report, obstetric death or maternal or neonatal death or stillbirth or all this. These are the things they don't report them. (MW1)

Here, the midwife is expressing her surprise that a maternal or neonatal death does not appear to trigger a process of review, although again, it is unclear who the midwife is referring to as 'they', who she expects is responsible for reviewing poor outcomes. She did not appear to recognise her key role in completion of a maternal mortality reporting form to contribute to the process of review. Nationally, around 60% of forms are completed by nurses, CHWs or midwives (National Department of Health, 2013c, p. 19), however this did not appear to be the practice in East New Britain. Likewise, another midwife, who had attended an education update course, comments:

Maternal death review was one of those things discussed when we were in Moresby, but it never happens in the province, never. Because the province, they want reports only, they only want statistics, but to really come and help us, they never came down to really understand. (MW2)

At another facility, health workers did not mention a process in place for reviewing and learning from poor outcomes, one comments:

…when we have a problem like a neonatal death we don't sit down to talk about it. No, we just carry on. We don't talk about it to find resolutions or case review. We don't do that. People just carry on … we do have maternal deaths… but we don't have reviews. To tell you the truth, we don't sit or meet. We do have meetings and talk about other things, but some of the very important things that we should be talking about, we are not. (MCH2)

When I asked the health worker why she thought these issues were not talked about, she appeared to be uncomfortable with my questions and was not able to elaborate, repeating several times, 'No, we don't talk about it, we just carry on. … We are busy with the mothers.' (MCH2).

Another participant at the same facility made a similar comment, saying:

We should know why a mother has died, but it is not really a practice here. I have not seen this happen, we should be doing this, but we just come and do our work and we go home. (MW19)

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When I questioned further, the participant offered a possible explanation, suggesting that even in the event of a case review:

> …people are not changing their minds. …change is very hard. When you come and you fall into the trap, just come deliver babies and go home. Many of these new midwives they come with very good knowledge but they fall into the same trap and then they just forget about the very good things they know as midwives. They just come deliver the baby and go with the knowledge inside of the old midwives and not utilise the new skills … people don't tend to listen to each other. (MW19)

In complexity thinking terms, this comment aligns with the concept of individual agent sense-making and maintaining the status quo in systems. The participant talks further about the difficulties, expressing curiosity about how hard it is to make changes, saying:

> I think this is more or less typical Papua New Guinean way. People, they are really challenged by the new… They will base their mentality on 'we are very experienced', even though we are not that knowledgeable, but we have experience. So you don't tell us to do this. (MW19)

However, in another setting, a large district hospital, that has received support and capacity building via the donor funded MCHI project, I did observe an emerging commitment to carry out facility case reviews. One of the midwives from this facility reflects on the support she has received:

> We don't have very active leaders. We are lacking leadership and all those skills. I lack all those skills. … I was attached with these CMFs[93] for this workshops and all this, and went to Australia for attachment. This was when I came to build my confidence… I gained confidence and I think, I've been learning skills and leadership to be a leader. … If only I would have all those skills and leadership qualities. I think I could have started something earlier on. Until I went to Australia and they said, now you are a midwifery leader, then I started. (MW12)

With this comment, the midwife is reflecting on her contribution to the case review process. Although it is too early to retrospectively assess if the process will continue, there are indications that this may be the beginning of a phase transition, and that the process may continue at this facility; perhaps triggering the establishment of provincial wide reviews. The midwife explains:

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[93] Clinical Midwifery Facilitator – capacity building development worker with the MCHI.

Yes, actually, if we have a poor maternal outcome, we go through the charts and see if we have overlooked anything. [To see] what we could have done and how we could have prevented that. …with maternal death we do a case review. And if it was something that was from the antenatal section, we discuss it openly with our colleagues from antenatal… we started off when we had [MCHI obstetrician] here and now we continue… So we see how the case was managed and how we can make improvements, so we have started off. (MW12)

With sustained support change is possible at the important local level. When I returned for the second fieldwork trip, May 2014, review meetings were continuing (with continued support from international development partners); however there had been no progress with the establishment of the broader provincial review committee process or appointment of a new Family Health Coordinator at the provincial health office. At the time of writing (August 2015), this role has been temporarily filled, although the new position holder has been given a joint role as the curative health coordinator as well as taking responsibility for family health services (DR4), a large role for one person.

Discussion

Agyepong et al. (2012, p. iv21) suggest a common precursor to unintended consequences and unsuccessful implementation relates to inadequate attention being given to individual actors and stakeholders in a system, and to their power in shaping and responding to change. In human systems formal and informal interactions and feedback mechanisms influence change. Systems tend to develop nonlinearly as a result of the various feedback mechanisms that work to maintain the status quo (Klijn, 2008).

Gerrits, Marks, and van Buuren (2009, p. 135) suggest that 'elements change because they have an incentive to do so, when they are under certain pressures'. In the East New Britain context, there appears to be little incentive or commitment from the provincial government or governance mechanisms to address poor maternal health, and poor connectivity between different parts of the system. As one participant notes, the church-based health services, the stand-alone provincial hospital and the rural health services operate independently from one another, with little connectivity or commitment to work together. While some agents in the system were aware of the national recommendations, no participants had comprehensive knowledge and the majority had no knowledge at all of the taskforce or its recommendations.

Complexity thinking contends that systems experience iterative and continuous change and 'episodic, catastrophic change' (Eoyang, 2011, p. 327). As examined in more detail in the following chapter, systems change when individuals are motivated to change, based on both internal and external

motivations, and when system contextual factors and structures provide available pathways. Change within systems results from individual people within systems changing as 'evolution is the change of elements – species, systems, actors, technologies – across a certain time span' (Gerrits et al., 2009). In order for maternal health review committees to be established, individual agents need to firstly recognise maternal health as a priority and then be motivated to action change in the system. These changes happen in conjunction with other system agents, within the broader environment. Changes arise and are sustained by the endogenous system, by the interactions and actions of multiple system agents (Trenholm, 2012, p. 55). While change can be triggered from the exogenous environment, by disrupting the status quo, it can only be sustained by the endogenous system. Systems interact with their environment in many intricate ways and therefore it is not possible to clearly demark the limits of the system (Cilliers, 1998) or where barriers may arise. Complex systems are not easily externally regulated or controlled, rather the self-regulatory control systems work to maintain the status-quo (Haynes, 2008).

I asked the MCHI capacity building obstetrician if he thought a committee would be established in East New Britain and he responds:

> I don't think so, because it needs a strong will from the government, from the provincial government and that is not possible. I have … failed for two years. I've been trying, I've been visiting so many people and still it hasn't happened. (DR4)

There are few direct incentives or tangible benefits for provincial governments to commit scarce time, personnel or resources to establish and continue to support maternal health review committees. There are few direct consequences when, for example, a village woman dies from a PPH due to her inability to secure transport deep in the night, or when a Catholic woman denied contraception from the edict of the church, struggling with poverty and suffering from TB finds herself pregnant, again, and does not have the means to attend for antenatal care and treatment during her pregnancy, and consequently arrives at the facility in well-established labour moribund. The stories and reasons why women die are unique. But the many stories, if shared and collectively owned by the system, could be used as important learning tools, and potentially a trigger for change. Emergence of new system properties can only arise in the system, from the agents within the system – from the people in communities, the health workers, and the LLGs, district and provincial decision makers. These are the agents that collectively have to power to develop robust systems and approaches grounded in local solutions, but only if the stories are heard, collected, reviewed and multifaceted changes made within the system.

Rihani (2002, p. 93) argues that in complex systems, 'command-and-control methods' may be

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effective temporarily when applied with sufficient force, however in the long term they are useless. Complex problems require multifaceted solutions, and Rihani (2002) argues that a light-touch style of management based on constant monitoring of small-scale incremental adjustments may be more sustainable and successful for long term change. Small incremental changes are more likely to result in significant long term changes, rather than imposed unrealistic expectations perishing in unrealisable ambitions (Klijn, 2008, p. 305).

As discussed above, reviewing maternal deaths has two purposes: at the facility level learning lessons from the deaths in order to review practice and processes and, at the national level to contribute to a national database compilation in order to inform policy makers (de Brouwere, Zinnen, Delvaux, & Leke, 2014). At the provincial or meso-level of the system, learning from deaths can inform strategies based on the local realities. In complexity thinking terms, Ramalingam (2013, p. 362) suggests that local solutions can tap into 'the dynamic potential inherent within communities, of asking the right questions rather than providing the right solution'. For effective change, community-based strategies must be grounded in the communities, with support from provincial governments and other intersecting systems, as many strategies are beyond the scope of individual health workers and health facilities. Sakeah, Doctor, et al. (2014, p. 237) suggest that mechanisms for reporting and reviewing 'maternal deaths is a barometer of commitment to and responsibility for action in terms of the health of women', with a fundamental precondition noted to be sustained commitment arising from the community, and from institutional structures, such as political, managerial and financial (Gill et al., 2007).

Examining the reasons why women die and the stories behind their deaths is vital to contribute to the development of strategies to address specific problems (G. Lewis, 2003). An essential first step is the examination of every death, which leads to knowledge and enables development of locally based and broader strategies (Bustreo et al., 2013; World Health Organisation, 2004a). However, recommendations to establish provincial maternal health review committees do little to address the challenges of implementation and practice (Thorsen, Sundby, & Meguid, 2014). Creative strategies to support system ownership and implementation are needed as without these practices in place, there is potentially limited focus or commitment to develop strategies.

Chapter conclusion

The Ministerial Taskforce on Maternal Health was launched in 2009 following reports of poor maternal health outcomes from the 2006 Demographic Health Survey (National Statistical Office of Papua New Guinea, 2009). Yet, in East New Britain sparse system connectivity means few people are aware of the taskforce or its recommendations. Unsurprisingly, it is difficult to discern any changes

arising from the taskforce report. The finding that no maternal health review committee has been established demonstrates nonlinearity following the recommendation, support and lobbying to establish a committee. There are many possible reasons for the lack of implementation of the taskforce recommendations, including the lack of connectivity between national recommendations and local managers and health workers, limited interconnectivity between the different parts of the system in East New Britain, the self-organising actions of system agents, and a lack of incentives for agents to translate policies into system changes. The following and final substantive chapter uses the complexity thinking concepts of self-organisation and emergence to further examine the maternal health care system.

CHAPTER EIGHT: Self-Organisation and Emergence

> Of course that is not the whole story, but that is the way with stories; we make them what we
> will. It's a way of explaining the universe while leaving the universe unexplained, it's a way of
> keeping it all alive, not boxing it into time. Everyone who tells a story tells it differently, just to
> remind us that everybody sees it differently.

> Jeanette Winterson (1985)
>
> *Oranges Are Not the Only Fruit*

Introduction

In the previous two chapters I utilised the complexity thinking concepts of path dependence, connectivity and nonlinearity to explore aspects of the maternal health care system in East New Britain. In this chapter I use the complexity thinking concepts of self-organisation and emergence to argue that particular contextual attributes and characteristics have emerged related to the role of midwives in the system. These emergent properties have arisen from historical and contextual attractors, and have led to ongoing negotiations around the most appropriate birth attendant and system of birth attendance in Papua New Guinea. While it is impossible to have considered every possible influencing factor within the system, as systems interact with their environment in intricate ways, the analysis provides a systematic interpretation of some tensions within the maternal health care system in East New Britain. The analysis reveals possible junctures where the decisions of individuals, motivated by system attractors, may work against achieving the goal of the system, which is to improve maternal health.

I initially define the complexity thinking concepts of self-organisation, emergence, and attractors. Empirical data, literature, and policy documents are then used to explore identified attractors and lead into a discussion on the emergent role of midwives within Papua New Guinea and East New Britain. The remainder of the chapter considers the emerging role of CHWs as birth attendants in the Papua New Guinean context. The chapter finally argues that as emergent solutions are more likely to exhibit creative solutions for each unique system (Goldstein, 2011), development strategies are likely to have more effective results if they arise from, and work with the endogenous system.

Complexity thinking concepts

Complexity thinking argues that systems are always in motion. System motion or change is shaped by history, self-organising agents, contextual factors, and attractors that function as organising forces,

that guide individual behaviour (Kuhn, 2009). In this way, individuals function within systems and play an important role in shaping and reshaping systems. The emergence of new properties arising from self-organisation is unpredictable and in turn influences many aspects of the system (Eoyang, 2011; Trenholm & Ferlie, 2013). Changes cannot be predicted by simply analysing the individual components (Cilliers, 2000, p. 42), rather analysis must consider the whole.

Self-organisation

Self-organisation forms a key concept in complexity thinking. It can be understood as the daily micro level processes of making and remaking the world, involving the sense-making and learning of all those involved within a system (Callaghan, 2008; Kuhn, 2009). Micro-level bottom-up processes maintain existing structures, patterns, or properties, which can also lead to the creation or emergence of new structures (Cilliers, 1998). Self-organisation is 'driven by complex patterns of interactions among individuals', which arise 'in response to exogenous or endogenous changes' (Ramalingam, 2013, pp. 187 - 188). Endogenous changes are those that arise from within the system itself, while exogenous change comes from introduced or outside sources. It is important to note that while self-organisation is often portrayed as a positive phenomenon, self-organising behaviours are not necessarily beneficial for the overall system goals. Boons, van Buuren, Gerrits, and Teisman (2009, p. 234) suggest that 'self-organisation is also the ability of actors and organisations … to maintain or change their structure and strategy by themselves, without external control, to resist externally induced change'. Moreover, individuals have the capacity to perpetuate the status quo when change is needed because of self-interest above organisation effectiveness (Boons et al., 2009), meaning that some self-organising behaviours can be maladaptive (McKelvey, 2003). Understanding the role of emergence, arising from individual sense-making, is intrinsic to understanding how systems behave and change over time (Ramalingam, 2013, p. 151).

Emergence

Emergence can be defined as 'the process of transition from micro-agent interaction to macro-structures' (Mitleton-Kelly, 2015, p. 114). The outcome of emergence is a system level change; however, emergence is not an end point or a final destination, rather it is part of ongoing system evolution (Lichtenstein & McKelvey, 2011). Emergent system properties arise as individual actors make individual choices while 'competing and cooperating to survive' (Kauffman, 1995, p. 15). The emergence of new system properties creates irreversible structures or ideas, which in turn become part of the history of individual agents and of the overall system (Mitleton-Kelly, 2006, p. 228).

Emergence cannot be easily seen as it arises from an intricate pattern of interaction that lies at the heart of a system (P. Morgan, 2005, p. 11). Further complicating analysis are time lags between actions and consequences, limits to human cognitive and information processing and that the rules governing behaviour are dynamic, diverse and dense (Atun, 2012; M. Byrne, 2011; Ramalingam, 2013, p. 147).

Emergent properties can arise from unplanned bottom-up slow incremental change or from turbulent environments generating dramatic shifts that push the system in a new direction (Eoyang, 2011; Kuhn, 2009; P. Morgan, 2005). Understanding emergence is key to understanding systems, as emergent properties can reveal what 'lies beneath the surface of many mysteries' (Ramalingam, 2013, p. 147) and reflect the 'role of humans in co-constructing the phenomena of which they are part' (Kuhn, 2009, p. 31). Emergent properties in human systems arise from the interplay between individual conscious choices constrained or enabled by the environment, which in turn is created, among other things, by other individuals. New behaviours and characteristics emerge as a result of system interactions and interplay (Mason, 2008, p. 36). It is 'not "planned", "controlled", or "created" through overall 'human design"' (Chiles et al., 2004, p. 501).

Attractors

Making sense of attractors is a way to reveal emergent properties in systems, as a way to understand complex unpredictable behaviour or reveal clues of why the system tends to behave as it does (Geyer & Rihani, 2010, p. 38). Kuhn (2009, p. 61) explains people may move from being organised around one attractor to being organised around another in an often unconscious process, based on system changes or individual motivators. Mingers and White (2010, p. 1148) suggest 'people will act in accordance with differing purposes or rationalities'. Further, as attractors change, individual behaviour changes, which in turn leads to collective shifts and resulting emergent phenomena (Room, 2011; Walton, 2014). In addition, emerging outcomes which are unpredictable and reliant on individual choices can be a result of numerous interacting agents, components, and attractors (Prashanth, Marchal, Devadasan, Kegels, & Criel, 2014).

The resulting co-evolution, from rational individual choices (guided by attractors) can lead to the emergence of new non-reversible overall system properties. However, because the actions of individuals are based on individual motivators, the arising systemic properties may not necessarily reflect the overall policy or system objectives. Individual actions while rational, may not necessarily align with the system goals, and can collectively lead to system 'failure' (Goldin & Mariathasan, 2014, p. 2). Teisman and Klijn (2008, p. 289) suggest that 'social systems are characterised by self-reflecting agents who try to understand the social systems they themselves are in'. Groups of people and

individuals are unpredictable and compete for resources based on their personal motivations. Movement from one attractor to another is often an unconscious process, as individuals act on the information available. Individuals concurrently reflect and amend the system as they negotiate their own definition of the situation (Nugus et al., 2010). Understanding attractors and the emergence of new system phenomena is critical to understanding overall system functioning (D. Byrne & Callaghan, 2014; Kuhn, 2009). However, Goldin and Mariathasan (2014, p. 2) further argue, it is:

> impossible to account for all the consequences of any individual's choices. … this shortcoming pervades the global system for the exchange of goods and services, skills, information, and people. Because the ramifications of individual choice or collective decisions are increasingly unclear, defining responsibility, rewards, and punishments is more challenging.

The accumulation of individual choices can collectively lead the system to 'drifting into sub-optimal solutions' (Ramalingam, 2013, p. 183) as individual choice can result in 'public good or public bad' (Ramalingam, 2013, p. 188). Self-organisation, co-evolution, and emergent properties may additionally lead to conflict between individuals within systems (Goldstein, 2011, p. 69; Xiao et al., 2013). Ball (2004, p. 182) suggests that 'changes in group behaviour do not necessarily require concerted changes in everyone's intentions. These switches of collective motion can instead emerge spontaneously even as individual predispositions are altered only incrementally'. This is consistent with Kuhn's (2009, p. 31) argument that individual 'micro-phenomena give rise to macro-phenomena, with characteristics observed in the macro-phenomena not being reducible to the micro-phenomena'.

Attractors within the maternal health care system

A number of attractors can be identified in the maternal health care system in East New Britain, which has led to the emergence of new characteristics being attributed to midwives. It would be impossible to identity and analyse all historical and contemporary attractors (Cilliers, 2000); nevertheless, the attractors that I identify and describe here offer a plausible way to explain and therefore better understand the system. This in turn may contribute to the development of more pragmatic and effective strategies for ensuring women are enabled to access skilled birth attendance. The discussion identifies the attractors, considers system effects in terms of how individuals self-organise, and then offers the chance to identify emerging properties within the system.

Attractors identified from data analysis include: the general shortage of health workers; the movement of midwifery education from hospitals to the tertiary sector, inadequate government funding for post-graduate education; restriction of midwifery positions to urban-based national

hospitals, little priority to locate midwives in aid posts; and the requirement of a midwifery qualification to hold a managerial post in rural health services. Each of these attractors will now be examined drawing on empirical data and policy documents.

Shortage of health workers

As discussed in chapter four, there has been a longstanding shortage of skilled health workers in Papua New Guinea. Thomason (1993), discussing the 1991-1995 national health plan, notes that the lack of human resources hampered successful implementation of the health plan in the early 1990s and that there was an inequitable distribution of staff noted between provinces. Recent literature suggests little change in the intervening two decades, and numerous reports note acute shortages of all cadres of health workers and an ageing health workforce (World Bank et al., 2011). The World Health Organisation estimate for every 10,000 people in Papua New Guinea there are 0.5 doctors, 5.1 nursing and midwifery personnel and 6.2 CHWs (World Health Organisation, 2011, p. 120)[94].

What these estimates suggest is a total of 11.8 health workers per 10,000 people in Papua New Guinea. The minimum threshold of health workers recommended to achieve universal health coverage and skilled birth attendance have been posited by the World Health Organisation as being 22.8 skilled health professionals per 10,000 population (World Health Organisation, 2006). The International Labour Organisation suggest 34.5 skilled health workers per 10,000 population as a minimum requirement to realise social protection (International Labour Organisation, 2008); and a final threshold of 59.4 skilled health professionals (midwives, nurses and doctors) per 10,000 population has been proposed as a requirement for reducing the maternal mortality ratio to 50 deaths per 100,000 live births (World Health Organisation, 2014d). Clearly, Papua New Guinea, like many other developing countries, is well short of reaching these thresholds for achieving universal health coverage.

The critical health workforce shortages and system structures in Papua New Guinea contribute to the maternal health care system in East New Britain. Although the numbers of health workers in East New Britain are unknown, findings from the current study[95] confirm the national literature detailing acute health worker shortages in all settings (Dawson et al., 2011, p. 11; Jayasuriya, Whittaker, Halim, &

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[94] The data is not disaggregated to identify midwives and the overall numbers of midwives in Papua New Guinea and East New Britain are unknown.

[95] DR1, DR4, ED3, ED4, ED5, ED6, HM5, HM6, HM7, HM8, HM13, HM14, HM23, HEO1, HEO3, HEO4, HEO5, MCH2, MCH3, MW1, MW2, MW12, MW17, NO1, NO3, NO5, NO6.

Matineau, 2012; Razee et al., 2012; World Health Organisation, 2011, p. 120). Staff shortages impact on midwives' ability to provide women with care, for example, a nursing manager says:

> We need more midwives … That is my biggest challenge. One midwife is not enough for 200 mothers at antenatal clinic every Tuesday. (NO4)

A midwife participant shares a similar observation:

> Most of the time, we just rush through because we see a lot of mothers hanging around. We just want to get rid of the number of mothers… Some of the problems we can overlook when there are too many mothers and just a few of us. (MW18)

Likewise, another midwife says:

> My biggest challenge is overwork. Not enough staff, with midwives here, there are not enough for the number of women and sometimes we work a double shift … It's a big problem. (MW19)

Health management participants[96] similarly comment on the difficulties of attracting new staff. One says:

> We have a lot of staff going finish, retiring and currently there is no replacement… the population is increasing and I have to expand the facilities … to meet the needs of the people. Now I'm finding it hard because, as I'm expanding the facilities I need more staff. The problem is, there is no staff so that is the biggest problem that I'm having currently with all my facilities. (HM5)

However, the critical staff shortages are not as simple as noting workforce deficits or the absence of staff applying for vacant positions. The system designates the number of positions available and the data reveals that within church-managed health services, there has been a longstanding freeze on employing staff, as a health management participant from this sector comments:

> It's a frozen ceiling since 1995; they have not adjusted it to the workload, the Churches Medical Council in Moresby policy. (HM1)

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[96] HM8, HM1, HM5, HM3, HM8, HM13, HM20, HM23, HM25, HM16.

This finding is confirmed in the St Mary's Hospital Vunapope Strategic Plan 2012 - 2016 which states: 'The point to note is the hospital human resource structure, established by Churches Medical Council in 1995, has remained stagnant for the last decade despite the emerging workload experienced by the hospital staff today' (Saint Mary's Hospital, 2011, p. 14).

Likewise in the government-managed rural health services, a senior provincial government manager explains:

> Most of the facilities they don't have even the minimum number of health workers …there is no positions. We haven't created more positions to uptake newly created health care workers [midwives] … there is a problem with these people who graduate from nursing colleges, they end up on the street, they end up in the private sector because there is no positions. That is the other challenge, creating positions, because we also have this limitation of finance, the financial ceiling. The number of positions… is based on the financial ceiling … not based on the population. … It is a disproportionate ratio. (HM16)

Confirming this comment, in the recent PEPE project, Howes et al. (2014) found that in the past decade there have been no increases in funding for human resources for health, despite population increases and the need for more health workers. An Asian Development Bank (2010, p. 2) report likewise notes the recruitment ceiling and the absence of pre-service or in-service training plans for health workers.

Interestingly, one participant comments that, although she acknowledges the importance of the donor funded MCHI in increasing the skills of the health workers, this programme fails to increase the overall number of health workers available:

> It's just the same nurses we are developing, it's not new nurses. So, the number of health workers is the same… we are not graduating enough nurses. We are not producing enough new nurses every year, so they can't retrench these old nurses. Even when they are bent and old, they keep working. We have midwives now that are too old to run for emergencies. (MW13)

Midwifery education

Global pathways to midwifery are very diverse and there is little consensus on the optimal model of education. Some programmes integrate midwifery with nursing, while others require completion of a nursing programme prior to midwifery studies. In other settings midwifery is acknowledged as a distinct profession from nursing and offered as a stand-alone programme (Fullerton, Johnson,

Thompson, & Vivio, 2011). The International Confederation of Midwives (2013) provides a set of core competencies for all midwives, regardless of education pathway, which encompasses basic knowledge, technical and cognitive skills and behaviours which should be included in any curriculum of midwifery. This basic guideline is then adapted to reflect the country's needs (Fullerton et al., 2011). Currently, midwifery education is offered in Papua New Guinea as a 12 month, post-nursing degree programme (Kruske, 2006, p. 15).

Initially, in Papua New Guinea, midwives were educated by way of apprentice-style training in hospitals (Dawson et al., 2011; Francis, 1999). In the 1990s, to bring nursing education 'in line with Papua New Guinea's … needs and to advance nursing to keep in line with world trends' (Voigt, 2001, p. 143), midwifery programmes were transferred to the tertiary sector (Dawson et al., 2011; Francis, 1999). Midwifery became a degree programme in 2002 (Kruske, 2006, p. 15). However, no midwifery education programmes were offered outside of the University of Papua New Guinea in Port Moresby (Duke, 2004), and very few midwives were educated in the 1980s or 1990s (Duke, 2004). These changes in midwifery education demonstrates connectivity with the international movement of nursing and midwifery education into the tertiary sector, yet there was no concurrent government funding for tertiary institutions to support educators or for course development (Kruske, 2006).

A senior development practitioner explains, the education model has contributed to workforce shortages:

> The model they have for training midwives is a significant factor to why there is so few midwives. …previously it [midwifery education] was hospital based, and staff received in-service [training]... they were part of the work-force. Once it went to the tertiary sector there was no thought given to what was the implications for the change, to suddenly stop funding… there is no government funding for post-graduate education. …that is a significant factor to why there is so few midwives. (HM10)

Kruske (2006) suggests the lack of funding for post-graduate education greatly reduced the number of students entering midwifery. The government is largely absent from higher education and institutional capacity for nursing and other health workers education has substantially decreased (National Department of Health, 2009b, p. 29). The majority of nursing, midwifery and community health worker education programmes (six of nine nursing schools and all 14 CHW schools) are run by church-managed institutions (V. Hauck et al., 2005; World Health Organisation and the National Department of Health, 2012).

Several participants note funding challenges for nursing schools, as a national health policy advisor participant comments:

> We used to have the schools of nursing throughout the provinces and because of some issues regarding funding, they were all closed and only three of eight were operating. So we have to reopen and increase. So that is the strategy that's being done now with the AusAid support coming in to assist with the increase … but the issue comes with the [teaching] staffing and the infrastructure capacity. (HM19)

Another educator participant comments on the changes to government support and funding for midwifery education. She suggests:

> ...the Department of Health used to do everything. They would send the students out for clinical, they would pay the fares, they would pay the tutors to go out and come back. [Now] … when the students come in for their course, they allow the students to come … paid on their base salary, plus the little fortnightly allowance that they get from Ausaid. So in that way, maybe the government helps with the students, but only in that way. The government really … needs to do more. (ED5)

Both participants are highlighting the impact of inadequate funding for tertiary education for educating midwives. As a senior health advisor comments: 'The intake to the schools has improved because AusAid is funding, sponsoring students, whereas in the past students had to pay their own way there and sometimes it was very difficult for them' (HM9). The literature suggests longstanding neglect and chronic underfunding for higher education in Papua New Guinea (Papoutsaki & Rooney, 2006). More recently, despite the Papua New Guinean government acknowledging the crisis in the health workforce (HM10) documented by the World Bank et al. (2011), no further funding or investment has been budgeted for educating health workers. Conversely, a participant (DR3) highlights, and an Australian Government Papua New Guinea development report confirms, the 2013 budget for health worker training institutions, 'was further cut from an already inadequate base' (Australian Government, 2013, p. 16) and health workforce spending remains underfunded (p.15). According to the World Bank (2014, p. 16) there have been no increases in human resource development over the past decade.

Within these debates about health worker education, it is well documented that maternal health has been neglected and very few nurses were enrolled in midwifery courses prior to the MCHI commencing in 2011 (National Department of Health, 2009b; University of Technology, 2014, p. 40). In 2000 when the government pledged to have a midwife in every health centre by 2010, only 20

midwives were graduating every year, with the majority of these midwives choosing not to practice, but to move directly into administration and management roles (HM10, ED1). Despite the 2000 proclamation of a midwife in every health centre, the number of nurses entering midwifery only increased to 74 by 2006 (Kruske, 2006); which is clearly insufficient for a population approaching 7 million people and an estimated 220 000 births per annum.

Midwifery deployment

A recent report on the MCHI suggests that students in 2013 came from both senior and junior health positions before the course, and that most of these students were motivated to become midwives in order to contribute to improving maternal health (University of Technology, 2014, p. 20). Many students indicated they intend to return to work in rural areas following their programme, however, as the discussion below reveals these motivated health workers may be unable to secure midwifery positions. The following discussion identifies attractors within the maternal health care system. The midwives concurrently reflect and amend the system as they negotiate their own sense making, and take the opportunities that are available (Nugus et al., 2010).

Midwives as senior health workers

The scarcity of opportunities for nurses to undertake higher qualifications has resulted in the delineation of midwives as senior health workers (Sa'avu, Duke, & Matai, 2014). Following midwifery education, they are sought after to fill senior positions in the rural health services such as Officer-in-Charge (OIC) or Sister-in-Charge (SIC) of health facilities. In these roles they are responsible for coordination of health facilities, staff supervision and management, management of resourcing, supplies and logistics. Midwives are supervising staff, but do not necessarily provide direct clinical care. As a new-graduate midwifery participant explains:

> I'm … happy going for study and coming back here, to be recognised… my big bosses, with the study I went for, to be seen as someone that knew the job around here, so now I've been appointed SIC of the clinic and it's something to me. (MW3)

As the sister-in-charge, this midwife holds a managerial role, not focused on directly providing women and babies with clinical care. While these roles are important for the general health system, they do not directly contribute to ensuring women have access to a midwifery care at the critical times during labour and birth (Homer et al., 2014; van Lerberghe et al., 2014). These management roles are often office-based and during normal work hours. At one district hospital, I asked the facility manager if they had positions allocated for midwives, and he replied:

No we don't, but the SIC here, one of the criteria... is they have to have a background of midwifery. (HEO2)

This was an observation at many of the health facilities I visited: if there was a midwife at the facility she was more likely to hold a managerial role. Another participant, a doctor working with the MCHI, likewise comments on the placement of graduates:

And the other problem with … the midwifery program [is] many of them have gone into management positions… our purpose was to train the midwives for clinical work… so even after training so many graduates, the workforce is still not strong enough to sustain the growth in population. (DR4)

At the national level several participants highlight that midwives were not remaining in clinical practice, as a senior policy advisor explains:

Unfortunately what is happening is that people come and get trained and then they go back and they get called to another place. The nurse came, trained to be a midwife and went back and became an OIC, or director of nursing. … We trained you to go and deliver babies, and now you are working in the office? (HM9)

Another national policy advisor shares a similar comment:

We are not getting the intrapartum care done properly, no not at all. Because even the women we are training as midwives, with the diplomas, they usually end up working in administrative positions, not in clinical care. (HM6)

Several participants note that midwives, as senior health workers, are sought after to fulfil a variety of other roles within the health sector and this is confirmed in the literature. For example, Sa'avu et al. (2014) argue that although more paediatric nurses are needed in practice in Papua New Guinea, many have moved from clinical care to administrative roles.

The National Health Plan, 2011 - 2020 (Government of Papua New Guinea, 2010, p. 15) notes that 'over 30% cent of skilled health professionals occupy administrative and management jobs'. The attractor of a more senior role, with better conditions, hours, salary, and benefits creates a strong individual motivator for midwives to seek these roles within the system. Here, I am not arguing that senior health positions are not important for the functioning of the overall health system or that midwives are not entitled to individual agency. However, having a midwife, with specialist clinical skills in these positions, using her time to manage staff rosters and carrying out six monthly staff

appraisals or other managerial and administrative roles, does little to protect maternal and newborn health. If the system fails to offer midwives appropriate roles as midwives, yet enables them the opportunity of improved salaries and conditions in administrative roles, then midwives will take the best individual choices available. The properties of the system emerge as a result of multiple interactions by individual agents and complexity arises as a result of these interactions (Cilliers, 1998).

STI/HIV and mining companies

The *Ministerial Taskforce on Maternal Health*, explored in the previous chapter, identified that 'significant numbers of health professionals are being attracted to both private enterprise and to programs under the auspice of Development Partners' (National Department of Health, 2009b, p. 30). This was also a finding from the current research, with participants noting colleagues who had moved into HIV/AIDS and other STI screening programmes[97] and taking positions in mining company health services[98]. An educator participant comments:

> When the midwives get more education, they take the opportunities presented by other employers. People are moving out of the government and church services to the NGOs, and mining companies. In those positions, they are not providing services to the most needy people in the bush, in the communities and in the rural areas, and they are not providing birthing services at all. (ED6)

Several participants noted a midwife in the province, who had taken a provincial government role, with one saying, 'she trained to be a midwife, and now she is a trainer in the provincial AIDS office' (MW2). While there are links between poor maternal health and HIV, it is not necessary to be a midwife to carry out screening during pregnancy and no intrapartum care is offered at HIV/STI clinics or during antenatal screening. Midwives are most effective at improving maternal health when they are able to work across the midwifery scope of practice, particularly providing care during labour and birth (Homer et al., 2014; van Lerberghe et al., 2014); yet, this is not widely recognised in the Papua New Guinean context. Health services are generally noted to be fragmented, with many donor vertical programmes focused on HIV and STIs, while maternal health is largely neglected at the service level (Asian Development Bank, 2014).

Likewise, while mining company health programmes and other company-based initiatives are

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[97] MW2, MW4, MW12, MW14.

[98] ED3, ED5, ED6, HEO5, HEO2, HM3, HM15.

beneficial for the surrounding communities and the individual health workers who take up the employment opportunities, these programmes are poorly integrated into overall health planning. There is 'no repository that systematically tracks volumes disbursed, numbers of projects or sector of activities involved' (Prizzon, 2014, p. 19). The employment of midwives at the few mandated sites where companies are undertaking projects contributes to their inequitable distribution throughout the country. The attractor of better conditions and remuneration encourages midwives to take these positions; however, whilst beneficial for individuals this may be detrimental to the overall maternal health care system, and further research is needed to better understand this issue, including the numbers of midwives who are concentrated in company health services.

Institutional structure/decentralisation

Deployment of staff and creation of health positions is complex, and further complicated in the Papua New Guinean context by issues related to decentralisation (Kolehmainen-Aitken, 1991). Staff deployment relies on the creation of positions via the Department of Personnel Management[99] for government managed facilities and on funding and priority setting by the combined Churches Medical Council for church-managed health services[100]. Further complicating health staff deployment is that despite their role in setting health priority, the National Department of Health has no role in how resources are allocated. Deployment of staff has been devolved to provincial governments[101] (Kolehmainen-Aitken, 1991).

The current national health plan (Government of Papua New Guinea, 2010) identifies maternal health as a key priority. Yet, no specific maternal health care system has been established, no specific funding has been allocated to ensure additional midwifery positions are created or focused attention is given to maternal health strategies within the wider health system. There has been no attention given to bringing health services closer to where people live, for the rural majority. Analysis from this research suggests that the importance of midwives providing intrapartum care is not recognised within the maternal health care system, or within the wider intersecting systems. As an educator clarifies:

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[99] HM3, HM13, HM8, HM15, HM20.

[100] HM1, HM18, HM21.

[101] HM9, HM3.

The government doesn't recognise midwifery as a specialty and has not created positions for the graduates to take up.… Graduates are disappointed and texting back and saying they are not happy to work where they are because they are not utilising the skills they have gained in their midwifery education. (ED6)

A graduate midwife confirms this comment, explaining that in her current role she is unable to use her midwifery knowledge and skills:

I think I should be in a health centre so I can practice all I learned. It would be better for me … in an outstation [rural health setting] …I am still waiting for the provincial positions to come out and then I will apply out to the health centres. I'm not using all my skills here: if I stay in a health centre I will utilise all my skills. (MW6)

Another newly educated midwife explains:

I won this position for communicable diseases, so that's my responsibility. … not as a midwife…. I went for that midwifery course, but then when I came back they didn't create a new position for me. So I went and told him [District Health Coordinator] and he said, 'no, you have to go work under your position' … but at the same time I'm performing midwifery skills too. (MW11)

When I asked the midwife what she spent most of her time doing, she replied, 'Midwifery, unless I've got [TB] patients' (MW11). Despite the challenges inherent in the maternal health system, this extract demonstrates individual self-organisation, with this midwife practising midwifery most of the time, although she is not employed nor remunerated to do so; unfortunately, the freedom this midwife experiences is unique in comparison to other health facilities.

Urban-based clinics

In the majority of settings it is not possible for midwives to work outside of their mandated roles, and midwives are not enabled to practise across the midwifery scope. This is largely due to a lack of a defined maternal health care system or recognition of the importance of their role. The midwives are expected to fulfil other responsibilities in the general health system as part of their duties as general health workers. These system factors are important considerations in the ability of individuals to self-organise as a midwife explains:

The staff here is on rotation … so for this month I'll be with family planning and antenatal, and next month I'll be with outpatients…

Do you do labour and birth care? No with the setting here, no, just a day clinic. (MW3)

An administration participant likewise comments:

> In the day clinics, the midwives only have one day a week for antenatal, that's all, then they do
> other public health activities on the other days, child health activities, immunisation, growth
> monitoring and treating the sick children, going out for health awareness [education]. They only
> do antenatal, no labour care. (HM7)

Several participants[102] commented on the role of midwives working in urban based day clinics,
providing only antenatal care with no opportunity to practise across the full midwifery scope as there
were no intrapartum care facilities available. In East New Britain, this applied to two of the six new
graduates in the province and two other experienced midwives. One of the educator participants
notes her frustration:

> We train the midwives, but when they go back to their work places they don't use the skills.
> Of course they use their skills in enrolments, palpations, antenatal check-ups, but they don't
> supervise deliveries. … If they come from town clinics they go back to town clinic after they
> finish, and there are no delivery services there. … it is such a waste. (ED5)

A new graduate midwife notes that a year after completing her course, she has not yet managed a
single birth:

> I'm the family planning officer here and … it's just a day clinic, just antenatal we've been
> practising … no labour facilities, no attending to labouring mothers, …so after I came back
> from the midwifery course, I haven't even done one delivery. (MW3)

The midwife has continued to be employed in her family planning role, where there are no facilities
for her to provide acute pregnancy care or intrapartum midwifery services, which is where she can be
most effective at improving maternal health (Homer et al., 2014; van Lerberghe et al., 2014). She
shares her frustrations of having to continue to meet her family planning role, saying, 'we are under
management, it is just a bit difficult'.

Due to these institutional structures, midwives experience limited ability to self-organise, to work
across the full scope of practice and enable provision of intrapartum care. Although this midwife

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[102] HM3. HM7, MW3, MW8, DR4, ED1, ED5, ED6, MCH5.

would like to be able to offer intrapartum care at her location, thereby easing the pressure on the referral hospital, she is unable to do so until the services are recognised as important, and infrastructure built to facilitate labour and birth services at this location. The midwife can only put this information in her annual reports to the local government, who receive and distribute funds. Another participant from a similar urban-based day clinic comments:

> …we are a community health service … we include antenatal, MCH and also some medical. … I am a midwife but I'm not doing much… It's just family planning and antenatal. …it is quite a challenge for me because I feel that I'm not being utilised more fully. I would like to be working in the labour ward. (MCH5)

The MCHI anticipates that 'most of the students will be returning to rural areas and will be posted in local health centres or aid posts' (University of Technology, 2014, p. 18). Similarly, the World Bank survey estimates 60% of midwives work in rural settings (World Bank et al., 2011). Yet, findings from the current study demonstrate that in East New Britain, only one graduate has elected to return to a rural setting while another five graduates are employed in urban-based roles - two in an outpatient day clinic and three in an urban-based national hospital. Although these midwives are using some of the skills gained during their midwifery education, they are not able to practise across the full midwifery scope and are unable to provide intrapartum care. In 2015 a further 13 graduates returned from midwifery education programmes and, as many of these health workers were selected from rural settings they are expected to return to those settings[103]; however, it is too early to know where they will elect to work in the long term.

Limited midwifery positions

As the discussion previously explores, there is no distinct maternal health care system and no opportunity for midwives to practise across the full scope – antenatal, intrapartum, and postpartum to six weeks. In the current study 16 midwives participated in 19 interviews. From this group only three midwives identified their main role to be providing women with midwifery care; five midwives are employed in senior roles, managing the day-to-day activities as the sister-in-charge of rural health facilities; four are employed in outpatient day clinics providing antenatal care one to two days each week; and four midwives are employed in general nursing roles using their midwifery knowledge and skills alongside general nursing duties. Midwives are part of the general nursing workforce, and not recognised as holding a specialist skill set, as a midwife explains:

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[103] MW12, ED1, HM10.

> …we have to rotate all around and look after everything. I'm one of the senior nurses, so I have to cover every section. …today they roster me for outpatients, tomorrow I'll be put in … looking after the patients in the general ward as well as the maternity section for deliveries of the babies. TB clinic is every Tuesday …and the next day STI clinic, we do STI and HIV voluntary counselling. (MW17)

This was a finding across all health facilities where interviews and observations were undertaken[104]. At no level of the system was there an awareness of the importance of midwives working as midwives and providing women with midwifery care during labour and birth; rather all health staff, regardless of knowledge and education, were expected to provide midwifery care. Health managers, given resource restrictions, managed as best they could to ensure health services continued to function, for all patients.

Observations at health facilities revealed that the acute needs of a steady stream of outpatients and others attending for emergency services often took precedence and required the full attention of the staff on duty, with labouring women often left unattended, meaning that minimal care was provided. In one facility the health workers reported that women often birthed unattended (MW1, HEO4), the midwife explains:

> We only have one staff to look after maternity, general and paediatric. It's too much. No quality care is given … sometimes mothers deliver by themselves or with their guardians. (MW1)

The HEO from the same facility confirms this comment and adds:

> Yes, it influences the care, that's true because we go to the other wards and work, work, work. One in 10 I should say, deliver by themselves or with their guardians. (HEO4)

As a result, at this facility (and others where observations were undertaken) women with obstructed labours, those experiencing miscarriages or heavy bleeding postpartum, for example, were attended

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[104] Prior to fieldwork I expected to see variety reflecting the environment, however, I noted no such variety at the different facilities across the maternal health care system in East New Britain (church or government run). 'Requisite variety' is a complexity thinking tool which argues that variety protects systems by maximising system diversity, which enables the system to be prepared for any contingencies (Jessop, 2003). Ashby (1956) 'Law of Requisite Variety' proposes that for system survival, a system's internal variety or diversity, matches the external environmental constraints (or complexities). Such diversity enhances the ability of the system to manage day-to-day realities and challenges and contributes to a system's robustness, by providing a range of options (Goldstein, Hazy, & Lichtenstein, 2010, p. 179). To be healthy systems require diversity or variety (Leifer, 1989), which provides capacity to manage permutations and more diversity.

by health workers with insufficient knowledge or skills to manage these complex clinical events, at times resulting in adverse maternal health outcomes and sadly, maternal deaths.

The above discussion identifies limited opportunities within the general health system for midwives to secure midwifery roles, with roles more likely to be focused on health management or general nursing responsibilities, or provision of antenatal care one to two days each week. The next section addresses the attractor of remuneration and employment conditions.

Remuneration and conditions

This section considers the attractor of remuneration and its significance on midwives' motivation and employment choices. Adequate and equitable remuneration, salary and benefits, and working conditions are important for productivity, performance and motivation of staff (Kolehmainen-Aitken, 2004). Several participants[105] discussed a common career pathway, of nurses and midwives commencing careers in the church-based health services and then moving to Government hospitals seeking improved conditions and remuneration. As a church health services manager shares:

> The nurses they drop out from here [church-managed service], highly qualified … and go to Nonga [national hospital], enjoying the allowances, which the church services doesn't pay. … You can really say [there is a] 30 – 40% difference. You can offset it in a way with housing, but they see the pay slip and they compare and all that matters is the gross figure the allowances and the net figure. (HM1)

Health workers were aware of wide disparities in remuneration between different health settings such as the national hospital, rural health services, and church health services. The finding aligns with a recent study by Jayasuriya et al. (2012), who note that salary discrepancies were a demotivating factor for health workers. Howes et al. (2014, p. xiii) note 'almost half of health workers feel that they are not receiving pay consistent with their position'. Several participants in the current study comment on their conditions, as one midwife says:

> Many of these nurses going for [midwifery] training, they are not going to the rural bases. They want to be in the hospital with access to higher pay. (MW10)

Another participant notes the importance of conditions and access to schooling for children as contributing factors:

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[105] CHW1, HM1, MW19, MW1, MCH3, MCH4, NO1, MW10, , MW13, MW12, ED6, HM9.

There are very big contributing factors. …accommodation, salary, my children have to go to school and there is no school out there. All these things, and it is their right, we cannot say no. So there are lots of things that are stopping improving the maternal rates. (ED3)

It has long been argued in Papua New Guinea that 'rejection of the rural areas and a desire for the perceived attractions of the town is a powerful and disturbing force among those who have been through the formal school system' (MacPherson, 1980, p. 441). Self-organisation, individual motivation and choice are important attractors for midwives' decision-making; however, given sufficient structural motivators and attractors, more midwives may choose to work in rural settings, if the system made these positions available and provided incentives. Alternatively, a coordinated maternal health care system could provide short-term incentives for midwives and other health workers to provide important services for rural populations and explore alternative community-driven solutions.

Currently, government employed nurses (which includes the midwives) are bound by the Public Service Awards and the grading system effectively 'caps the earning capacity of specialist medical officers … and nurses… [meaning that] to advance beyond this level of earning individuals are compelled to move into management', private practice or other activities or seek higher remuneration in other roles (National Department of Health, 2011a, p. 14). The public service awards are undoubtedly an attractor motivating midwives to seek work in urban-based national hospitals, management, or seek alternative employment in NGOs or mining companies.

Midwifery positions

As well as the reported differences in remuneration, several participants[106] note the absence of designated midwifery positions in church-managed health centres and in government rural health services. The only designated positions are for nurses, CHWs or HEOs. Although the previous national health plan, 2000 – 2010, called for a midwife in every health centre by 2010, this call was not accompanied by changes to governance structures to fund or support midwives and no midwifery positions were created. One participant comments:

I'm here in curative health [urban hospital] and getting bored … I always enquire with the public health [rural health] … to see if they want me back, but the problem is the positions. … I tried to recommend they upgrade the positions. Put the positions so we can apply back,

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[106] ED6, MCH4, MW10, MW13, MW9, MW12, HM3, HEO2, HEO3, HM16, MW10.

because we are trained MCH nurses and we want to provide rural services there but the positions are not there. (MCH4)

Nor has the church-managed system allocated specific midwifery positions. Although, as a church-based health management participant explains:

It is our intention to ensure that every health facility has a midwife. We are aiming at that... so far 4 out of 9 have a midwife stationed. (HM21)

Nevertheless, as a church-facility based midwife comments:

I don't have a midwife position here; I'm paid a nursing officer position... that is a reality. I am in a nursing officer position. (MW13)

This comment alludes to how demotivating this is for the midwives. Another midwife similarly notes:

...we want the church run service, the employer, to create a position for a midwife. So that a midwife can apply to the health centre, at the moment there are no midwife positions... (MW10)

The absence of midwifery specific positions was confirmed across all settings, by health management and administration participants, as well as by the midwives holding nursing positions. A senior provincial government participant notes:

[Maternal health] is noted as an issue, but in terms of specific positions for midwives, we don't create midwife positions. (HM16)

This chapter has highlighted several attractors which in combination encourage the midwives to self-organise and take the few roles available to them in urban-based hospitals. These include the reported differences in remuneration, the lack of midwifery positions within the rural health service, and the limited number of health positions overall. In these urban based roles the midwives are acknowledged as holding specialist skills where they can practice midwifery and receive improved remuneration. Alternatively the midwives take roles in urban-based day clinics, providing antenatal care alongside MCH and other general health services. The impact is that these specialist health workers are inaccessible to the bulk of the population in rural settings. Ramalingam (2013, p. 188) suggests that both public good and public bad can arise from self-organisation and emergence. The above description represents an example of public bad, where the combination of the constraints of the system restrict the self-organising activity of individual agents in a manner that does not support the overall goal of the system, which is to improve women's maternal health outcomes.

So far, this chapter has identified a number of system attractors. These include the overall shortage of health workers within the health system, the scarcity of sought after places for midwifery education, the limited opportunities for employment offered to these senior health workers to practise across the midwifery scope, and the draw of better remuneration and conditions in mining companies, NGOs or urban based settings. The only roles available for midwives to work as midwives are those offered in the urban-based national hospitals. Yet other attractors encourage midwives, as senior health workers, into roles with NGOs, principally in STI and HIV screening programmes or extractive industry companies.

These system constraints do not prioritise midwives to practise midwifery, to enable them to provide care for women and their babies across the full continuum of pregnancy, labour, birth, and postpartum. Alternatively, the attractors encourage midwives to be removed from the bulk of the population, and to work in other health system roles. In the next section I continue to use complexity thinking concepts of self-organisation and emergence to explore skilled birth attendance within the maternal health care system in East New Britain.

Self-organisation and emergence

The discussion now uses complexity thinking concepts of self-organisation and emergence to explore the endogenous interpretation of skilled birth attendance, with a focus on maternal and child health (MCH) nurses and CHWs. The issue of health worker education is not new and has been under discussion for many years. In this section, I consider the MCH nurse programme and the more recent CHW up-skilling programme introduced as part of the MCHI (University of Technology, 2014). As the preceding discussion demonstrates, through a process of emergence, the title of 'midwife' in the Papua New Guinean context has come to relate to a senior health worker with midwifery education filling many essential health system roles. The International Confederation of Midwives (ICM) (2011) define a 'midwife' as:

> …a person who has successfully completed a midwifery education programme that is recognised in the country where it is located, based on ICM Essential Competencies for Basic Midwifery Practice… The midwife is recognised as a responsible and accountable professional who works in partnership with women to give the necessary support, care and advice during pregnancy, labour and the postpartum period, to conduct births on the midwife's own responsibility and to provide care for the newborn and the infant.

This definition highlights the importance of midwives being educated to global standards and that the midwifery role is to work with women to give support, care and advice, during pregnancy, labour and

birth and postpartum. The ICM definition identifies that midwives can work in any setting, including home, community, hospitals, clinics, or health units. However, a key human rights guiding principle is the AAAQ framework– meaning that health care must be available, acceptable, accessible and of good quality – so that women are able to access midwifery care (Hunt & De Mesquita, 2007, p. 6). Accessibility includes access to health workers, transport and travel costs, referral mechanisms and the direct and indirect costs of access to health services (World Health Organisation, 2014d). Given that the majority of the population is based rurally and the majority of midwives are urban based, this does not make the health service widely accessible.

Cilliers (1998, p. 106) notes that systems changes result from the dynamic nature of self-organisation, where:

> the structure of the system is continuously transformed through the interaction of contingent, external factors and historical, internal factors, [and] cannot be explained by resorting to a single origin or to an immutable principle ... self-organisation provides the mechanism whereby complex structure can evolve without having to postulate first beginnings.

The findings demonstrate that in East New Britain, as a result of system institutional constraints, few midwives are able to secure roles focused on midwifery care for women in their communities. Alternatively, midwives are in roles as senior health workers in the rural health services, at national hospitals or working at urban-based day clinics providing only antenatal care. Therefore, findings from this research suggest that midwives are largely focused on the minority of women who are urban-based or able to travel to urban centres.

Over the past 25 years Papua New Guinean literature, reports and policy have all highlighted the importance of skilled health workers available to provide maternal health care, to achieve 'safe motherhood' (see chapter five). The severe shortage of skilled health workers has been well documented and this possibility makes the greatest impact on maternal health. However, there are ongoing discussions regarding who are to be educated as birth attendants in Papua New Guinea. There have been multiple programmes supporting short training programmes for village birth attendants, which have demonstrated minimal success and little improvement in maternal health outcomes, in alignment with findings from other settings (see discussion in chapter five).

At the Wagaini seminar in 1991, Dickson (1993, p. 111) highlighted the ongoing 'lack of training of health workers to deal with women's health problems' and Biddulph (1993b, p. 166) called for educated midwives, supported by their communities to be widely deployed to improve maternal

health. These calls have been repeated frequently during the past 25 years, and again in the most recent national health plan (Government of Papua New Guinea, 2010). Yet, reports continue to highlight the inadequate resources given to educating health workers, and estimates continue to suggest that approximately 1500 - 2000 women continue to die every year in Papua New Guinea. What this means is that nearly 50,000 women in Papua New Guinea have died while these recommendations have remained unheeded. The next section considers the Papua New Guinean explorations of the cadre of health workers attending births.

Maternal and Child Health (MCH) nurse education

Between 2005 and 2009, three of the four post-graduate nursing programmes in Papua New Guinea offered a double major programme, combining midwifery and child health nursing (Lipu, 2013; World Health Organisation, 2013b). These nurses are known as MCH nurses. A health management participant (HM19) suggests that the recommendation for the MCH double major programme came from an external development consultant leading to the creation of the double major course; although I have been unable to corroborate this suggestion from official documentation. The issue of the MCH nurses was frequently discussed during fieldwork[107], as the education programme has affected an estimated 100 nurses (HM19) across Papua New Guinea, who completed the double major MCH programme.

In a review of midwifery education, Kruske (2006, p. 57) argues that the combined 'maternal and child health' format did not allow sufficient time for competence in either discipline and, as many of the nurses returned to paediatric services, the programme did little to address the midwifery shortage or improve maternal health[108]. Further, since the advent of the double major MCH course, no midwives have been registered with the Nursing council as they have not fulfilled the requirements to enter the register as midwives (Kruske, 2006; World Bank et al., 2011).

Five MCH nurses in East New Britain, who participated in this research, all expressed frustration and disappointment at their inability to practise as midwives. However, as one MCH nurse recognises, the education she received did not sufficiently prepare her for managing emergencies, she says:

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[107] HM7, HM19, HM23, MCH1, MCH2, MCH3, MCH4, MCH5, MW6, MW12, MW19, NO1, NO6.

[108] This aligns with the argument in chapter six, confirming path dependency with services focused on child health, and little attention given to maternal health.

I only did a little bit of deliveries [during training], from what I learnt up there and when I came here, I do go into the labour ward and do deliveries, … but I'm still not confident when there are complications … I'm not confident. (MCH1)

Another MCH nurse likewise reveals that she does not feel confident in her midwifery knowledge and skills, stating:

We did a double … child health and midwifery at the same time, but only a one year period, so it was a very short time. We didn't have enough time to cover everything in detail … and I don't think that one year for me was enough. (MCH2)

Another participant, a midwife working alongside MCH nurses, similarly recognises the limited skills of MCH nurses, noting:

…you can see there is a difference. Like in handling complications … with the mother and child, they need to do more learning; they need to do a lot more skills in midwifery. Because some of them, they are not really practising well, this is what I see. (MW19)

My observations confirm these participant comments. The MCH nurses, as well as other nurses who have not undertaken midwifery education, did not always appear to have sufficient knowledge or skills, potentially causing detrimental outcomes for women. While general nursing programmes in Papua New Guinea include the care of women during pregnancy and birth, the literature suggests nurses receive insufficient experience and education related to management of complications (Dawson & Gray, 2010; Kruske, 2006).

The one year double major programme was stopped in 2010, following the review of midwifery education by the National Department of Health and the World Health Organisation (Kruske, 2006) and there is currently a national project underway to identify the nurses who have completed this course (HM19). The project aims to support these nurses to choose either child health or midwifery, and they will then undertake skills assessment with a preceptor/supervisor and resolve knowledge gaps. Following this education they will be able to register as midwives (or paediatric nurses). To date the list of names has been compiled and the project is seeking funding to progress, as a participant shares:

We've already completed a whole document, but now we are planning. We need funding to implement, to hold a workshop for the preceptors, the supervisors just to get them through how to implement. It is in progress. (HM19)

For the past decade, the introduction of the MCH nurse course has impacted on the quality of the health workforce. Once the above project is completed, this will potentially increase the number of midwives to provide women with skilled birth attendance.

Community Health Worker (CHW) community midwives

During field work, the advent of 'Community Health Worker (CHW) community midwives' (National Department of Health, 2009b, p. 29) and the CHW up-skilling programme underway as part of the donor funded MCHI were frequently discussed[109]. This is possibly because this is a new programme, representing the emergence of the new cadre of health worker - CHW midwives. Diverse ideas and opinions were expressed about the suitability of CHWs to deliver midwifery competencies. At one health facility, a health management participant questioned the programme, saying:

> We have qualified midwives and in the near future, we have clinical midwives coming up with a degree in this area. So where do our CHWs come in? What is their role, can they do the same? … it doesn't make sense. So my question is, CHWs, they are rural based, running an aid post, they are the workforce bulk, assisting, working in a health centre, rural health centre. A hospital midwife has many more tools, and knowledge. If you train CHWs here, they expect the same things. There is a contradiction...I have many questions. (HM1)

As this participant indicates, CHWs and nurses are recognised as the backbone of the health service (World Bank et al., 2011). The cadre of CHW was introduced in 1989 to replace the cadres of nurse aide and aide post orderly (World Health Organisation, 2013b). They are now well established as the key health work force in Papua New Guinea, making up 35% of the total (Dawson et al., 2011). CHWs are the key health care providers at the most peripheral level of the health system, providing care for remote communities (Campos-Outcalt, Kewa, & Thomason, 1995; Davy, 2007; Izard & Dugue, 2003). CHWs undertake a two year education program focusing on public health, health promotion, basic health care services, and disease prevention (Dawson et al., 2011; Kruske, 2006). It is anticipated that three CHWs, one with 'training in maternal health' will staff the newly developed community health posts planned to replace the current aid posts (Asian Development Bank, 2014; National Department of Health, 2013e).

Although it is anticipated that the new community health posts will provide labour and birth care, findings from the current research suggests that within the maternal health care system there is no

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[109] CHW1, CHW2, CHW3, CHW4, NO1, MW1, MW12, MW13, DR3, DR4, ED5, HM1, HM5, HM7, HM9, HM10, HM13, HM16, HM19, HM21, ED7, NO4.

clear recognition regarding who is the most appropriate birth attendant. A midwife participant explains that all health workers are expected to have the skills and knowledge to support women during labour and birth:

> It's everybody that attends to mothers, whenever they are on duty and the mothers are in there they attend to them...It is the nursing officers and the CHWs that deal with the mothers all the time. ...they think everybody can deal with the mothers during delivery, but the CHWs don't know what complications mothers will have, at delivery or afterwards, to prevent complications. (MW11)

Under the current education programme, CHWs receive basic education related to the normal process of pregnancy and birth, and have minimal skills to manage birth complications or provide emergency obstetric care (World Bank et al., 2011, p. 140). Nevertheless, I observed CHWs providing antenatal care and looking after women during labour and birth. While the expectation is that CHWs will be under the supervision of a midwife, several participants acknowledge that current staff shortages mean supervision is often not possible[110]. I observed CHWs providing care at every level of the health system and my field notes record:

> The CHW and I chat about her background. She initially did a nine month training course in 1996 and has since been on the labour ward for many years, and says she has 'learnt on the job'. Although the CHW has never had the opportunity for any specific education in maternal health care, she tells me she does everything - deliveries, suturing, IV's; 'just like a midwife'. (FN 28/10)

This CHW comments that she was disappointed that she had not had the opportunity to do the up-skilling course offered as part of the MCHI (discussed shortly) and shared that she wanted to do this course (CHW4). Another participant, a senior international development practitioner, explains:

> CHWs are supposed to be able to do normal birth, but they are supposed to do it under supervision, so they argue they do have a second level person that focuses on birth, the problem is we don't have the first level person to supervise. (HM10)

Another participant shares that in Papua New Guinea, CHW are expected to manage normal births. I asked this doctor if CHWs provided skilled birth attendance, and he emphatically responded: 'Yes,

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[110] HM9, HM17, MW12, CHW1, CHW2, CHW4.

yes, they do'. However, when I sought more information regarding their knowledge and skills, he replied:

> Probably not, not quite, but that's our basic level cadre so we have to classify it as a skilled birth attendant in our setting. Ideally they are meant to have registered nurse backup. They are not meant to be the sole provider of maternity care, they are meant to be part of a team. At the aid post level, very few babies are born. They don't have skilled birth attendants. There are a few community health posts; they might have a nurse and two CHWs. But they won't have midwives in my grandchildren's lifetime. They might have nurses if we can get nursing training up and running again in the next generation, but at the moment, the aid posts and the community health posts have one or two community health workers and very few of them have any capacity to supervise birth. (DR3)

The participant is acknowledging the reality of the Papua New Guinean context. However, before an attendant can be considered 'skilled' there is a set of core and essential skills that the person must achieve. Moreover, 'faced with immense HR problems it is understandable that there is a tendency … to classify health personnel as 'Skilled Birth Attendants' even though curricula may not fully meet the set of criteria for this' (Adegoke & van den Broek, 2009, p. 38).

My observations confirm that CHWs in East New Britain do not have the necessary education or skills to be classed as skilled birth attendants. A provincial health administration participant also explains, CHWs are currently not registered or appropriately educated to manage normal childbirth let alone manage complications should they arise:

> …some of the CHWs in the aid posts, they actually deliver [babies] … and according to the standards they are not supposed to. So our industrial relations officer actually went … to one of the health facilities and we were having an argument … because according to the standards the aid posts should not do deliveries. … [There is] no running water in an aid post, and CHWs are not supposed to do deliveries. (HM3)

As this participant clarifies, CHWs are working outside their recognised scope of practice, which leaves both the women and the CHWs vulnerable on many levels, including working outside of regulatory structures and not having the necessary skills and knowledge to provide emergency care. The National Department of Health (2013d) Health Service Standards Tool Kit identifies expected standards in rural health services. The tool confirms the above extract that currently births are not expected to occur at aid posts, which are staffed by a single CHW. At the next level of the health system facilities are the newly created community health posts. At this level, the tool kit identifies the

minimum staffing level to be '3 CHWs (1 with post certificate midwifery training)' (p.16). The accompanying matrix of role delineation in the national health services details the mix of staff, with midwives appearing only from level three of the health service – which accounts for urban health services, health centres, district hospitals and provincial, regional, and national hospitals. The minimum staffing levels in these settings identify that the Officer in Charge will have 'obstetric experience' from level four of the health system (District Hospital) and only from level five (provincial and regional hospitals) is there an expectation of staff being midwives (See Appendix Seven for role delineation chart (National Department of Health, 2013d)).

Nevertheless, several participants were frank about the realities and the importance of CHWs providing labour and birth care in the context of health worker shortages. A senior policy advisor shares his experience while visiting a provincial hospital:

> I go there in the labour ward and three health workers are in there with two women, one primip[111] and one multiple pregnancy[112]. Three health workers, all community health workers, no midwives, not even a general nurse. And of course many things were not there and many things that were supposed to be done are not done. I tell them, you are supposed to do this, this and this. They tell me, doctor, we are just working; we are doing our best… That's not on their duty statement and it is not on their normal training. (HM9)

Another participant, a senior midwife, expresses her concerns:

> CHWs, they can, they can recognise complications, but the really good practical part of it is to save that mother or the child, they panic and so sometimes we lost them. Like with regard to a simple cord around the neck and the baby is born flat and no good resuscitation. I had one case like that, the cord was … around the neck and the poor CHW didn't know how to do resuscitation. She went looking for suction tubes and suction machine which was not really necessary, so the baby died, just like that. These are simple things that need to be saved. But anyway, I came the next day to come to work and I saw the baby, a perfect baby, fresh death, sleeping there. (MW1)

A HEO participant also recognises problems with poor staff training, she comments:

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[111] Primiparous/primipara - a woman in her first pregnancy. Multiparous/multipara – a woman in her second or subsequent pregnancy.

[112] A woman pregnant with twins or triplets.

> We had a mother she was in here, she had the baby but she was bleeding, it stopped, they resuscitated her and the BP came up, but not really come to normal. They left her there resting. So when I came the mother was restless, gasping and it was too late, she died. (HEO1)

With this comment, the participant is acknowledging that the serious nature of this woman's bleeding and subsequent hypovolemia that was not recognised by the nurses and CHWs providing her care, so although she had her baby in a district hospital, and received care from nurses and CHWs she was not assured skilled birth attendance. Without education in essential competencies for midwifery practice, health professionals within the system do not have the specialist midwifery knowledge and skills needed to provide women with skilled birth attendance.

CHW up-skilling programme

The six month CHW up-skilling programme emerged from the taskforce (National Department of Health, 2009b) and is being conducted as part of the MCHI initiative. In many ways it is a pragmatic response to the dire health workforce shortages and poor maternal health in Papua New Guinea, as a National policy advisor explains:

> They [CHWs] come for 6 months, they work there and see how things are done and then they go back. So we want all provinces to do that while we are training midwives. … So we upskill some of the people who are already available, who are working there to do certain things, not everything, certain lifesaving skills; removal of placenta or maybe do a vacuum extraction. Baby's there, a prolonged second stage, the head is just there, but she is exhausted, she can't do anything but the baby needs to come out, so we just put a vacuum and pull the baby out. So upskilling CHWs is another programme that running, unfortunately these things, you know, we need to do it, like this is for us here, it's like an emergency response to be implemented quickly. (HM9)

Several other participants echo this view, supporting short-course trainings for CHWs. However, as other participants explain, while the CHW programme came from the taskforce, there is recognition that it is not an ideal solution. The maternal health care system has been grappling with birth attendants for many years and the advent of CHW midwives has been presented as an 'interim urgent measure for those people currently delivering services' (HM10). The introduction of CHW midwives therefore represents a process of emergence, a response arising from within the system, reflecting current staff shortages as well as the multitude of other system contingences. As a National advisor participant explains:

The workforce is still really our major hindrance to what we are trying to do, because training of midwives is one thing, but the up-skilling of the other category, the CHWs… is I think where we should be focusing. Because they are the ones in the facilities all the time, our standards require that in our facilities there will be more CHWs than nursing officers. So we need to up-skill them to be specialist midwife CHWs. (HM6)

This participant demonstrates the emergency response, echoed by other participants, such as a senior midwife who likewise comments:

The CHWs they are the very people in the community … the nurses don't really know the problems in the community. We have all these community health workers who are all alone, who are faced up with all these problems. They are the ones that really need this training. (MW13)

However, strong expressions of doubt were voiced from other participants regarding the current CHW programme. Several participants suggest the current six month course is not long enough for CHWs to reach the required standard to provided skilled birth attendance. A participant shares:

… It is a very pragmatic programme, it is only small amounts of theory and a lot of it is skills, skills, skills. You know, how to manage things, what to do, how to recognise, when do we intervene, and how to get women out; when you see these signs - get them out. It is very focused on trying to improve their skills for managing birth. Not an ideal situation.

Do you think the CHWs meet the definition of being a skilled birth attendant? No, no they don't. (HM10)

At the national level, another participant explains:

CHWs are a crisis intervention; it is not about a proactive solution. … My original approach was to teach them about the normal maternal health, not about complications. But in the process, it got diverted.

Who diverted it? You know there are some people, everybody. There are a lot of people involved, I am only one person. They were thinking about the maternal mortality rate and thinking the emergency sort of treatment management would elevate those problems, but they are missing the point. The point is … those are midwifery skills. Specialised skills, and at the level of the CHW, why are we giving them something they are not legally supposed to be doing? So those are the things, the implications.

Where did the push come from? A lot more from outsiders. (HM19)

This sentiment is supported by a World Bank et al. (2011, p. 75) report which says there has been 'a lot of ad hoc in-service training in Papua New Guinea, financed by development partners, related to a desire to implement different health programmes'. The influence of 'outsiders', as explained by this participant reflects connectivity with the international discourse. As Fauveau et al. (2008, p. 4) state, 'for too long it has been accepted that as long as the health worker received some (often too little) training in midwifery, this was sufficient'. Moreover, developing countries have been 'at the mercy of misguided, albeit well intentioned, advice from external donors recommending policy changes to create a multipurpose worker' (p.4). As history reveals, when viewing the now discontinued MCH nurse programme, some external consultants and donors may not have sufficient knowledge of maternal health strategies to provide best practice advice.

Other midwifery participants shared their concerns regarding the CHW up-skilling, as one midwife comments:

> We can allow them for normal deliveries, because this is what they can do. But, for breech, twins, manual removal – that is too risky. We don't want to cause problems … It shouldn't be done by these CHW up-skilling. (MW12)

The concerns expressed by this participant were confirmed by observations and other discussions during fieldwork. In one case I learned the outcome of a birth, managed by a graduate of the six month CHW programme. The woman arrived at a health centre with a breech presentation, and due to a lack of understanding and poor management by the CHW midwife, the baby was severely oxygen deprived and ultimately died. Sadly, although there was an experienced midwife available at this health centre to assist, she was not called to attend as the CHW midwife failed to recognise her inexperience.

The idea of emergence is intrinsic to how complex systems behave and change over time, although in human systems it can 'be the hardest model to analyse, precisely because the rules that govern our behaviour are so dynamic, diverse, and dense' (Ramalingam, 2013, p. 147). The emergence of new roles for midwives discussed earlier in the chapter and the currently emerging new cadre of CHW midwives are grounded in individual motivations, contextual factors, history, and attractors within the maternal health care system, in unpredictable and inexplicable ways.

Changes within the system have arisen from multiple sources - from bottom-up actions of the midwives (endogenous changes), from introduced top-down policy changes, exogenous factors from external actors' such as funding from donors or in the words of a participant, 'diverted from outside

influences' (HM19). The training of CHWs is intended to be a short term goal to help increase coverage of supervised births. It is vital that the issue of who the best birth attendant is for Papua New Guinean women receives thorough debate, country engagement, and ownership. Widespread support and agreement also needs to be cognisant of the history of the maternal health care system and the importance of women receiving skilled birth attendance.

Skilled birth attendant

To fulfil the international definition of a skilled birth attendant, it is necessary to have a sound theoretical underpinning and critical thinking skills, with sufficient problem-solving competencies to recognise and manage the often complex decision-making processes when there are life-threatening deviations from the normal process (Fauveau et al., 2008). Undeniably, the single most critical intervention for ensuring safe motherhood, after family planning, is skilled attendance at all births. This hastens the provision of emergency maternal and newborn care when required (Brodie, 2013; World Health Organisation, 1999). While most births are normal, skilled care is essential at every birth to effectively manage potentially life-threatening complications as they arise (ten Hoope-Bender, Liljestrand, & MacDonagh, 2006).

The international evidence suggests that short training programmes are not adequate to teach the necessary critical thinking and decision making skills to enable attendants to be considered sufficiently skilled (World Health Organisation, 2008a). Similarly Ronsmans et al. (2001, p. 809) argue that 'a short in-service training programme cannot substitute for a three year midwifery programme' and van Lonkhuijzen, Dijkman, van Roosmalen, Zeeman, and Scherpbier (2010) argue that while short training programmes may improve quality of care, strong evidence for this is still lacking.

Skilled birth attendance is essential to save maternal and neonatal lives, as outlined in chapter five. I argue that the development of a new 'community midwife' cadre with only six months training, means these CHWs are unlikely to have sufficient knowledge, skills or critical thinking to effectively save maternal and neonatal lives. Knowledge and critical thinking skills are essential to enable identification of risk factors, to detect early deviations from normal physiological progress in sufficient time to arrange transport to higher level care and to institute prophylactic measures for optimal outcomes.

A CHW participant astutely comments:

> ...we are not the nursing officer that knows everything already, we are just the CHW. We don't learn big, you know, most of the anatomy part of it, we don't learn it. Like, if they want us to come for the training, we must start from the beginning… To me … six months is not

enough. If it's one year, I think it will be okay, one year or one year six months or two years again. Because we are the CHW and some of us, some of the CHW they are not grade 12 … they are grade 10 and it's like way back, some years back. … all the terms of midwifery it is a bit hard for us, a big step. It's a big step. It will take time. (CHW2)

This CHW is well aware of her learning needs, and the time needed to develop skills, and she acknowledges the big step that is necessary for her to become a skilled birth attendant; as she says, 'it will take time'.

This argument has also been made in the literature. In a review undertaken to address the issues of poor competency, the ICM have produced Global Standards for Midwifery Education (Thompson, Fullerton, & Sawyer, 2011). These detail the minimum education requirements for midwives. While there is considerable global diversity in the cadres of health workers providing sexual, reproductive, maternal, and neonatal health services, Thompson et al. (2011) argue a minimum of 18 months is necessary to achieve proficiency in midwifery competencies post-nursing or another health professional programme. Findings from the current study confirm that within the maternal health system in Papua New Guinea, there is agreement with this minimum standard; an educator comments:

> I think, for me, I'm very much in the middle, because we lack people out there in the rural areas. If we want to train the community health workers, then we have to change their model of training. …something similar to nursing, if you want to let them do deliveries, and you want them to contribute to decreasing maternal mortality, change their model of training. (ED5)

The option of preparing CHWs to be CHW midwives, as a cadre of skilled birth attendant, appears to be arising as an endogenous solution in the maternal health care system in Papua New Guinea. Midwives, as senior health workers, are more likely to work in urban settings rather than rural areas, however, as a participant explains:

> The CHWs are from rural health and they will go back to rural health. We are training nurses from urban areas, people have access to computers and all that, people don't want to go to the places where there is no power. They want access to all this. Nurses and midwives want to own all this. They want good housing and salaries and all that, but the CHWs will accept village life. (MW12)

However, for this to be an optimal solution, for the cadre of a skilled birth attendant, then it is vital that they are truly skilled, with appropriate education, supervision, and ongoing professional

development (ten Hoope-Bender et al., 2006). If the system in Papua New Guinea comes to a consensus that CHWs are to be designated as skilled birth attendants for rural women, then appropriate education programmes can be designed and delivered to ensure that they have the appropriate knowledge and skills to enable them to save women's lives; that they are truly 'skilled'. For example, in Ghana, Sakeah, McCloskey, et al. (2014) found that with an extra two years education, financial and non-financial incentives, and integration and collaboration with wider systems, Community Health Officers were able to effectively provide skilled birth attendance. In Papua New Guinea, the current six month programme is unlikely to afford CHWs sufficient knowledge and skills for them to provide women skilled birth attendance, thereby failing to improve the maternal mortality indicators and continuing to deny women in Papua New Guinea their right to health.

Adding on a few weeks or even months of in-service midwifery training for CHWs may seem to be a useful shortcut to producing skilled attendants. However, as ten Hoope-Bender et al. (2006, p. 230) argue 'most primary health care frontline workers are not sufficiently skilled to deliver a minimum maternal neonatal health service package' therefore, the current ad-hoc six month programme is unlikely to be a successful strategy. Furthermore, this finding concurs with the Papua New Guinea decision to discontinue the combined 12 month MCH nursing post-graduate education which did not sufficiently prepare nurses to be registered as midwives; and with a recent report (University of Technology, 2014, p. 22) evaluating Phase I of the MCHI, which argued that 'a 12 month course was insufficient time' for registered nurses to gain adequate midwifery skills. It is vital that the health professionals charged with protecting and supporting women during pregnancy and childbirth are adequately educated in order for them to be able to provide skilled birth attendance and contribute to improving maternal health. A short 'training' for CHWs, nurses, or village women is not sufficient for the provision of skilled care.

Discussion

This chapter has used the complexity concepts self-organisation and emergence to explore data related to the role of midwives within the maternal health care system. There are acute shortages of all human resources for health within the Papua New Guinea health system meaning midwives are a sought after to fill senior health roles. Due to a number of system factors, there are limited opportunities for nurses to undertake post-graduate education, including midwifery. For those nurses who have an opportunity to become midwives, the increased education affords them opportunities to seek improved remuneration and employment conditions, including options to take roles in administration, health management, NGO programmes, or in mining companies. The midwives who

choose to remain in clinical care are limited to positions that require them to take responsibilities as senior health workers, such as managers in rural health services. Alternatively, midwives take roles removed from the majority of the population in urban-based day clinics or national hospitals. The only choices presented by the system to be employed as a midwife and provide intrapartum care are those in urban-based national hospitals (although even here midwives are not employed as midwives, rather they are employed in 'specialist nursing' roles). The discussion can be summed up by an extract from a health facility manager, when he says:

> The problem with training midwives is that every time you train a midwife, with their qualification they can get a job anywhere else. (HM1)

The Australia Awards education programme has become an important part of the Papua New Guinea maternal health care system via the MCHI, and aim to 'specifically respond to severe rural health workforce gaps' (Australian Government, 2014, p. 8). The expectation from the MCHI is that 'most of the students will be returning to rural areas and will be posted in local health centres or aid posts' (University of Technology, 2014, p. 18), with many students indicating that after they graduate 'they intend to work in rural areas, with many coming from rural areas' (p.20). Moreover, it is a requirement of the Australian Awards (2015) scholarship that graduates are expected to return to their employment organisation or sector for a minimum of two years on completion of their programme. After this time they are able to seek career advancement. Findings from the current research suggest that attractors within the system work against educated midwives remaining in rural areas. Many of the graduates are using some of their midwifery skills, however only one of six graduates that participated in this study is practising in a rural setting, across the full midwifery scope of practice, although she is employed as a communicable diseases/TB specialist nurse. Two graduates are working in an urban day clinic and three in an urban hospital.

Nurses in Papua New Guinea are very aware of reported poor maternal health outcomes. Undertaking midwifery education and gaining essential skills is perceived as a way to contribute to lowering maternal mortality (University of Technology, 2014, p. 20). A finding from this research is that while participants shared their commitment to this goal, attractors within the maternal health care system are more likely to encourage midwives to take management roles in rural practice or work in urban centres removed from the majority of the population. Specific midwifery positions are not created in the rural health service for midwives to focus on practising midwifery, although management positions require post holders to hold midwifery qualifications. Managerial positions, such as sister-in-charge or officer-in-charge are generally held for many years, with Howes et al.

(2014) suggesting the mean number of years to be nine years. Midwives self-organise and take these roles, although as participants shared, roles rarely become available.

The literature suggests that community-based primary healthcare, closest to the people, is the most important part of the health system (Bailie, Matthews, Brands, & Schierhout, 2013; Macinko, Starfield, & Shi, 2003; Starfield, Shi, & Macinko, 2005). Many women continue to labour and birth at home in villages in Papua New Guinea. However, the maternal health care system does not make positions available for midwives in this setting. Community health post and aid post positions are designated for CHWs (Howes et al., 2014, p. 22; National Department of Health, 2011a, 2013d). CHWs are not currently educated or regulated to provide care for women experiencing complex labour and births, or even for normal births which are not expected to occur in aid posts. Several participants comment on the role of CHWs in aid posts, with one human resources manager explaining: 'all the aid posts, according to the standards, there should only be one CHW' (HM3). Another midwife participant confirms this, saying: 'In the villages we have aid posts, but none of the nursing officers [includes midwives] are eligible to work in those places. They are health facilities categorised only for CHWs' (MW12).

Given the paucity of midwifery positions available rurally, midwives in this study demonstrated self-organisation by taking roles in national hospitals and remaining in these roles despite some wanting to return to rural services. Here I am not suggesting the work that these midwives are doing is not important for the system, as many women birth in urban settings. However, as Goldstein (2011, p. 69) notes, the 'emerging order may not be beneficial' for the overall system and for protecting women's and babies' lives at birth. Perhaps if there was an effective system that provided women with midwifery care in the community, then the majority of women, who birth with no complications, could safely stay in their communities, rather than overwhelming urban based services[113].

The emergent role of midwives, primarily based in urban settings or in management positions, creates a twofold problem. First, healthy women having normal, straightforward labour and birth processes are unnecessarily using scarce resources at the complex care level, as no services are provided close to where they live. Second, underfunded and poor quality services, closest to where people live, are bypassed (World Bank, 2014), as there are insufficient staff to provide services. It is estimated that around half of the population of women labour and birth outside of the formal health

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[113] For example: Over the past decade birth numbers at Port Moresby General Hospital have increased by 50% with 15,008 births recorded in 2014 cf. 10,124 births in 2005. This massive increase is overwhelming the capacity of the staff and the infrastructure (Yates, 2015).

system (National Statistical Office of Papua New Guinea, 2009), resulting in high rates of maternal mortality and morbidity as maternal health problems are not detected early and managed effectively before they become life threatening. Early detection and management of potential problems is vital in maternal health care. As several participants note, many of the women who have poor outcomes arrive at health facilities moribund, unable to be saved, and many more die at home or on the way to services.

Midwives as managers are playing vital roles within the wider health system; however, these roles are not focused on maternal health care, specifically intrapartum care where midwives can be most beneficial for improving maternal and neonatal health outcomes. Midwives as antenatal care providers are contributing to maternal and neonatal health outcomes but in these roles, they are not providing intrapartum care, despite some being motivated to do so. In addition, at the antenatal clinics I visited, midwives were only providing midwifery care for a restricted portion of their time, one to two days a week and only during working hours from 8am – 4pm. As one midwife explains, this is a challenge:

> It's upsetting when everyone kept on asking why we are in a clinic setting instead of a labour ward, but it's the system that's keeping me there because I am in a family planning position. And now I'm regretting the fact that I had to go and take up the course because now everyone don't just appreciate me implementing antenatal … instead of the labour ward. (MW3)

Midwives as workers in NGOs and other health related programmes, such a HIV/STI awareness and screening and those working for mining companies, may or may not be providing maternal health care and more research is needed in this area to fully understand their roles.

Some midwives in the current study shared their disappointment that they were unable to be employed in midwifery roles. Midwives can be most effective at improving maternal health when they are enabled to work as midwives, working across the full midwifery scope of practice (International Confederation of Midwives, 2014a). As this new graduate explains:

> Midwifery is all about looking after mothers … I went to school and we learnt about everything. It's not just dealing with mothers during deliveries, but during antenatal, deliveries, after birth and continue until the baby is 1 month and 2 weeks postnatal, and family planning. … I've learnt a lot, so whenever we have problems I'm able to deal with it, manage it - normal and complications. (MW11)

The midwife recognises that she can be most effective working across the full midwifery scope of practice (International Confederation of Midwives, 2014a). However, in her current role, she is employed to provide only antenatal care and only during working hours. There is no avenue available for her to provide labour and birth care, and only limited opportunities for postnatal care for women and their babies. Echoing the above discussion on the changing role of midwives in the Papua New Guinea maternal health system, a capacity building participant adds:

> They have simply forgotten what a midwife is here… I think people pretty much don't have it in their heads, that to solve a maternal health issue you need midwives. (ED1)

The United Nations Population Fund 'S*tate of the World's Midwifery'* (United Nations Population Fund, 2014, p. 3) report emphasises that 'midwifery involves far more than the care of the mother during childbirth: it promotes woman-centred care and the well-being of women more generally through a supportive and preventive model of care', and encompasses the care of the neonate.

Ten-Hoope-Bender et al. (2006) argue that to reduce maternal and neonatal mortality in low- and middle-income countries, 'skilled attendants must be available where women are giving birth – in rural areas and urban slums as well as the more attractive middle class suburbs'. If midwives are not enabled and supported to work across the fully midwifery scope of practice and importantly provide intrapartum care, then their effectiveness at improving maternal health outcomes will be limited. As well as having more midwives in the maternal health system, it is important to ensure that 'midwives can focus on midwifery practice' (United Nations Population Fund, 2014).

This chapter contributes to my overall argument that when working with a complex system, it is important to have a clear analysis of the current system, and insight into its history, to enable better identification of where specific intervention may be introduced to facilitate change. As the endogenous system has not sufficiently catered for supporting women experiencing complications during childbirth, it presents an opportunity for international development assistance to intervene to alter the momentum of the system. A national level technical advisor comments:

> We are trying to identify people we can train to identify the risks, for that 15% of women that will develop problems, and that's where we are having difficulty. … The government has information officers located in the LLGs, so should we use those ones? Train them a little bit in recognising these problems. But then the training itself is actually, they might give us some false alarms, so that is still being discussed. They have created a village health volunteer officer; they get 6 months training. And we can see, are they able to really do anything for the women and our pregnant mothers, and that's debatable. In some areas they won't, like

anything to do with women, they are 'oh, no, no, no, because of our culture and ethical issues'. (HM6)

As this extract reveals, the important role of midwives or skilled birth attendants in supporting pregnancy, screening, referring and providing essential care during pregnancy and birth is not recognised, although this participant is a doctor who works in maternal health care (in addition to his role in health management).

In answer to this issue of 'trying to identify people we can train to identify the risks' (HM6) and work with the local government and communities, it seems evident, that developing a new cadre of CHW midwives is indicated. This chapter has however highlighted that any education programme or upskilling needs to be extended beyond what has been done in the past. The development of a suitable midwifery education programme for existing CHWs would require at least an 18 month programme in alignment with international recommendations. In addition, the new midwives would need governance mechanisms to provide professional and institutional support. Importantly, this solution would combine the best of the endogenous system response and exogenous best practice.

Chapter conclusion

Using the complexity thinking concepts of self-organisation and emergence, this chapter reveals the emergence of new characteristics being ascribed to midwives, and ongoing adaptation within the maternal health system regarding the most appropriate birth attendants. Cooke-Davies, Cicmil, Crawford, and Richardson (2007, p. 52) suggest that 'when dealing with complex dynamic systems, there is an element of unpredictability about the future', and it is the spontaneous behaviour of individuals that give rise to new patterns and characteristics within systems. The emergent properties of living systems allow novelty and innovation to arise guided by system attractors. However, as the discussion highlights, the current interpretation of midwifery, within the resource restricted environment is not necessarily focused on the system goal of improving maternal and neonatal health and ensuring women's access to midwifery care during the critical intrapartum period. This limits the positive impact midwives are able to make on maternal health outcomes. M. Byrne (2011) suggests that often new properties within systems can only be seen by retrospective analysis as people do not easily see emergence or the significance of arising new properties within systems. In Papua New Guinea, the effects and impacts of midwives not being enabled to provide intrapartum care, alongside a multitude of other factors, are increasingly obvious in the reported rates of maternal mortality.

A complexity thinking framework reveals a number of barriers within the maternal health care system in East New Britain. The World Health Organisation argues that skilled birth attendants must have the

appropriate skills and they also need to be located in the right place at the right time (World Health Organisation, 2004b). In the current context, self-organisation and attractors within the system have led to the majority of midwives being located in urban settings. The majority of midwives in East New Britain have taken positions at the urban-based national hospital, or in management and administration. There are no midwifery roles available in rural health services, based in communities, close to the bulk of the population. In this environment, women are attended by unskilled family members or VBAs, or CHWs without appropriate education. CHW midwives, having undertaken a short course, are beginning to emerge as birth attendants; however I question if their education programme will provide sufficient preparation to enable provision of skilled birth attendance. In the following and final chapter, I revisit the research question, discuss the overall thesis findings, review research gaps and reflect on the doctoral journey.

CHAPTER NINE: Discussion and Conclusion

I don't understand it any more than you do, but one thing I've learned is that you don't have to understand things for them to be.

Madeleine L'Engle (1963), *A Wrinkle In Time*

Introduction

This study contributes to moving away from maternal mortality being approached as a 'vertical special interest program' (World Health Organisation, 2005b, p. 129). It argues that it is crucial to take a systems-oriented approach, in the development of solutions. This final chapter draws together the thesis findings and identifies the contributions made to the literature. I initially present a summary of the research findings, and then discuss these alongside emerging implications for international development agencies working to improve maternal health in developing countries. Areas for future research are identified and I conclude with some final reflections.

Summary of research

This research has been framed by concepts from complexity thinking, informed by literature drawn from development studies and midwifery. The literatures reviewed in chapter five reflect interdisciplinarity by drawing on material to trace the dominant maternal health discourses from social science, medicine, midwifery and health, human rights and government documents. The review commences in the 1950s when the World Health Organisation was established, and identifies that prior to the 1980s maternal health received little policy or practice attention; rather the discourse focused on population control, or infant and child health (O. Campbell, 2001).

During the 1960s and 1970s the rising influence of the women's movement converged with health concerns with campaigns calling for women to have control over their bodies and reproductive choices (Gruskin et al., 2008, p. 590). From 1974 contraception became a primary strategy recommended by the World Health Organisation to improve maternal health. The 1980s saw the first realisation of the magnitude of poor maternal health in the developing world, with the first published global estimates (van Lerberghe & de Brouwere, 2000, p. 23). Enmeshed within wider global agendas, initial strategies to improve outcomes were drawn from a primary care health approach and largely relied on the transfer of knowledge and techniques from developed to developing countries. Little

consideration was given to political or social realities, or to the voices of women, health workers, local health managers, and policy makers (AbouZahr, 2003). At this time, health system strategies focused on the provision of antenatal care and training of village or traditional birth attendants.

Over the 1990s the discourse converged and aligned with the movement calling for women's human rights, social well-being and gender equity (Corrêa, 1999, p. 5). Early strategies promoted to improve maternal health, namely antenatal care and training traditional birth attendants, were shown to be ineffective, resulting in stagnant rates of maternal mortality (Rosenfield & Min, 2009). In 1999 the World Health Organisation (1999), in a joint statement with UNFPA, UNICEF, and the World Bank called for all births to be attended by a person with midwifery skills, who had the skills to manage complications and, if needed, facilitate referral to obstetric services. Evidence emerging at this time suggested that around 40% of women develop some form of complication (Gill et al., 2007). For one in four women, in the developing world these complications are known to result in acute or chronic pregnancy related symptoms, which can lead to a range of long term disabilities (Gill et al., 2007). For an estimated 15% of women serious complications potentially result in death (Gill et al., 2007; Koblinsky et al., 1993; Lule et al., 2005). This includes women experiencing spontaneous miscarriage, induced abortion, and other pregnancy-related complications, meaning that maternal health cannot be disentangled from the wider agenda of reproductive health (Lule et al., 2005; Yamin, 2008).

Since the launch of the 1999 recommendations for universal skilled birth attendance, the consensus has grown and strengthened. There is now wide agreement of the importance of the continuum of care approach, encompassing reproductive, maternal, neonatal, and child health. Increasingly, the literature points to the crucial gaps in priority given to ensuring women receive skilled assistance around the time of birth, when the risk of mortality is highest for women and their babies (Requejo et al., 2015). Key factors known to improve maternal and reproductive health include: mobilising political commitment and fostering an enabling policy environment; investing in social and economic development such as female education, poverty reduction and improving women's status; providing contraception services; ensuring quality antenatal care; ensuring all women have access to skilled attendance during labour and birth, with emergency obstetric services available for complications; and strengthening community involvement and health systems (Lule et al., 2005).

A focus on health systems and skilled assistance

One key health system priority for improving maternal and neonatal health is access to skilled and supported midwives or another health worker with midwifery skills (Homer et al., 2014; van Lerberghe et al., 2014). Appropriately prepared and supported midwives can provide supportive, protective care for the majority of women who will experience a normal childbirth process, and

lifesaving care for the estimated 15% who will need access to more technical knowledge and interventions, which include management of the known causes of maternal death. Multiple human rights instruments additionally draw attention to women's human right to access care that is 'effective, safe, respectful, and compassionate' (van Lerberghe et al., 2014, p. 1222). Global recommendations call for a whole-system approach in the context of the continuum of care encompassing reproductive, maternal, neonatal, child and adolescent health, within strong effective health systems (The Partnership for Maternal Newborn & Child Health, 2014).

The literature highlights the importance of midwives and other skilled attendants accessing appropriate pre-service education, practising in an enabling environment which includes referral pathways, infrastructure, equipment and supplies, and receiving supportive supervision and ongoing professional development. Moreover, skilled attendants must be accessible to women and communities (van Lerberghe et al., 2014, p. 1216) and have a role in facilitating women's access to medical care in referral facilities for more complex complications (Shah & Say, 2007).

In Papua New Guinea, at the end of the colonial period, few women accessed formal health services and maternal mortality was noted to be high, although largely unrecorded (Luker, 2008, p. 262). The literature review in chapter five, traces repeated calls for increased attention to be given to the issue of poor maternal health. The discussion highlights few changes and little improvement in the reporting of maternal deaths (Mola & Aitken, 1984, p. 70). Although there have been international development projects that identify a focus on improving maternal health, in practice they prioritised child health (Ashwell & Barclay, 2009, p. 143; United States Agency for International Development, 1989) or training of unskilled attendants (VBAs)[114]. The most recently reported maternal mortality ratio, of 733 deaths per 100,000 live births (National Statistical Office of Papua New Guinea, 2009) is among the highest in the world (Requejo et al., 2014) and records show that only around half of Papua New Guinean women access formal health services for maternity care, with many women, an estimated 46%, continuing to birth with no skilled assistance (National Statistical Office of Papua New Guinea, 2009). Very few health facilities meet the minimum requirements to support the provision of quality intrapartum maternal health services (National Department of Health, 2009b, p. viii).

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[114] For example, the 1989-1997 USAID Child Survival Project, and the 1998-2004 Australian Women's & Children's Project.

Complexity thinking

The analysis in this thesis has been guided by complexity thinking, specifically using the concepts of path dependence, connectivity and nonlinearity, and self-organisation and emergence from the frame of critical realism. Together, these tools have offered a robust and revealing analysis enabling significant explanatory power to explore and elucidate aspects of the system previously unknown. Maguire et al. (2011, p. 8) suggest that 'there is no single best way of approaching complexity which, by its very nature, is constituted by competing descriptions from multiple perspectives'. While initially complexity thinking provided little clear direction or rules to adhere to, the iterative process and flexible approach employed, guided by the abductive reasoning, have offered a rich and valuable way to understand the maternal health care system investigated in this thesis.

Overall analysis of the empirical data revealed very little engagement with global recommendations for improving maternal health, and limited activity arising from international and local partners. The only notable exception being the 2011 – 2015 multi-stakeholder donor funded Maternal and Child Health Initiative (MCHI) (see p.116). Prior to field work I was fully expecting to see evidence of international recommendations and development strategies, but this did not arise from the data. Only one participant (HM17), at the provincial level, noted tools that informed her work which were introduced by a development project, undertaken between 1989 and 1997 – more than a decade ago. This participant showed me the tools she uses in her teaching workshops with health workers – guidance for health workers attending births and a 10-step check list and flip chart to identify sick children. Very few Papua New Guinean participants appeared to be aware of the global recommendations discussed at high level forums and conferences, or the many different models and frameworks present in the literature. There appeared to be very little engagement between maternal health care in practice and the global strategies. The next section presents a summary of the analysis arising from the Papua New Guinean system, guided by the selected complexity thinking concepts.

Path Dependence

Chapter six uses the complexity thinking concept of path dependence. This concept suggests that while the history of what has gone before in a system does not determine the future, it can continue to shape the present. Mason (2008) argues that the initial momentum of a system will continue to sustain the system until 'sufficient inertial momentum of a competing phenomenon results in a redirection of that path' (Mason, 2008, p. 40). The analysis in chapter six provides evidence that to date the status quo has prevailed and there has been insufficient momentum to engender a path altering shift to prioritise maternal and neonatal health and ensure women have access to skilled birth attendance.

Analysis reveals that in Papua New Guinea, despite many calls for action to improve maternal health, it has been largely neglected as a specific health and development concern requiring deliberate policy and practice attention. The analysis presented in this chapter reveals the conflation of maternal health with child health and an ensuing neglect of maternal health. Analysis identifies that this combination has resulted in a collective system 'lock-in' or status quo, where reports are launched decrying the poor state of maternal health and recommendations made with no subsequent system changes eventuating.

Findings from the 2006 DHS, which reported an MMR 733/100,000, appear to have resulted in an increased focus on maternal health strategies at the national level, yet the importance of women receiving skilled assistance during labour and birth does not appear to be acknowledged or recognised as critical to improve maternal health. This omission suggests path dependence arising from the structure of the health system and cultural practices. During the colonial era, health policy was dominated by predominantly urban, technical medical services (Denoon, 1989) and this focus appears to have continued since independence (Kolehmainen-Aitken, 1991, p. 101), and into the contemporary system.

A key finding of this research is that no distinct maternal health care system or health worker has emerged to provide reproductive or maternal health care services. The collective political and community status quo is an absence of priority and inadequate resourcing for improving maternal health. The analysis presented in chapter six argues that leadership and community members alike have not yet taken collective ownership and responsibility to ensure women have access to skilled assistance during labour and birth. There appears to be little impetus from within the endogenous system to generate change. Through a complexity thinking lens, change arises in systems in many time scales. While systems may appear to be stagnant, they do change, albeit over varying time frames. Change is driven by the small, iterative actions and interactions of system agents, which collectively 'tip' the system into a new trajectory. Alternatively, change can be triggered by intentional interventions; however, there will be unintended consequences (Ramalingam, 2013).

It is important to note that change arises from within systems, collectively formed by actions and behaviours of all the agents (Kuhn, 2009; Richardson & Cilliers, 2001). The actions of individuals represent the strongest form of system resilience and until the underlying system paradigms change, there will be little change or evolution of the system structures and consequently system outcomes (Carey & Crammond, 2015). While hierarchies and leadership structures exist, leadership is drawn from communities, therefore members of national, provincial, district and local governments

represent their communities. These representatives bring their personal, familial, and cultural beliefs, which inform their professional ideas and practice.

Therefore, because poor maternal health is a reflection of the collective system, until all members of the collective community take collective responsibility for poor maternal health outcomes, women, their children and families, will continue to pay the cost with their health, and some with their lives. The solutions are also part of the collective system as health care systems are inextricably intertwined with the societal context (Shani & Mohrman, 2012). Better understanding of the existing realities of systems, such as the maternal health care system in East New Britain, could facilitate better ways of working with the system to implement change, although introduced interventions may have unintended or unknown consequences (Ramalingam, 2013).

Connectivity and nonlinearity

Chapter seven uses the complexity thinking concepts of connectivity and nonlinearity to examine the implementation of a key recommendation of the *Ministerial Taskforce on Maternal Health in Papua New Guinea* (National Department of Health, 2009b), which was established following the 2006 DHS. The taskforce recommended the establishment of maternal health review committees at district, provincial and national levels, in alignment with National Department of Health policy and regulations established in 1991. The review of maternal deaths aims to assist in identifying ways to prevent future deaths by supporting the development of local solutions and also contributes to a national database which can inform policy makers (de Brouwere et al., 2014).

Using the complexity thinking concept of connectivity, analysis in chapter seven reveals sparse connectivity within the system and identifies this as one of the obstacles inhibiting the establishment of effective review committees in East New Britain. Participants also identify that insufficient attention has been given to the practical details involved in the process of establishing committees within the wider provincial governance system. Findings suggest a fragmented system in East New Britain, with many layers and challenges, including challenges in accessing funding. The system is comprised of individual health workers working within different governance structures, including the national hospital managed from Port Moresby with an independent board, several different church-managed health services, and the rural health services managed by the provincial health office. Analysis revealed limited connectivity among the parts of the system and the individual workers. This fragmentation and sparse connectivity creates a problematic layer in implementing recommendations. It also precludes the establishment of a maternal health care system to contribute to improving maternal and neonatal health. Moreover, while individual agents expressed surprise at the absence of review of poor outcomes, they did not appear to recognise their role in initiating the

process of review, as they are poorly connected with the national and international recommendations.

From a development perspective, Lopes (2002) posits that there is a delicate balance between individual people and formal institutions or systems that build a collective society or system. Dia (1996) suggests that if formal institutions are not rooted in local culture they will generally fail to command loyalty or trigger local ownership. This aligns with tenets from complexity thinking which identify how various feedback mechanisms in systems work to maintain the status quo (Klijn, 2008), resisting introduced changes. As discussed above, sustainable change arises from within the endogenous system, from the iterative actions and interactions of multiple system agents (Trenholm, 2012, p. 55). While change, such as the establishment of maternal health review committees, can be introduced from the exogenous environment, it can only be sustained if it aligns with the system and is taken up by system agents.

The lack of establishment of a provincial maternal health review committee in East New Britain additionally demonstrates nonlinearity, a complexity thinking tool used to reveal system behaviour. Nonlinearity describes situations that fail to demonstrate a direct cause-and-effect relationship. Most situations are nonlinear, so that when change happens, is it frequently disproportionate and unpredictable (Miller et al., 1998).

The establishment of maternal health review committees was first recommended in 1991 when the national maternal death register was established. The call for committees was repeated with the launch of the taskforce in 2009. An advisor from the National Department of Health has made visits to East New Britain to advocate for the establishment of a committee and formal letters and directives have been issued. In addition, a capacity building obstetrician from the MCHI has actively lobbied for establishment of a committee in the province. Yet at the time of fieldwork, no committee had been established[115] and data reveal that many mid-level health sector managers did not have an awareness of their role in establishing these review bodies.

This lack of establishment of provincial committees creates a follow on consequence at the national level of the system, where several participants commented on the inability to hold national maternal health review committee meetings in the absence of information coming from the provincial

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[115] Subsequent to fieldwork, a participant advised that the committee has been established (August 2015) and an inaugural meeting held. Retrospective analysis will reveal if the committee continues to function. Rihani (2002, p. 93) suggests that while 'command-and-control methods' may be effective temporarily when applied with sufficient force, they are useless in the long term as systems will generally revert to the status quo.

committees. This is a further dimension of complexity in systems, reflecting interdependencies and intricate interconnectivity. It is not possible for the national maternal health review committee to function in the absence of review committees at the provincial level.

Self-organisation and emergence

Chapter eight uses the complexity thinking concepts of self-organisation and emergence. Analysis in this chapter demonstrates that in East New Britain, as a result of institutional system constraints and attractors, few midwives are able to work in positions dedicated to providing women with midwifery care. Alternatively, midwifery positions are restricted. Some midwives are working in maternity sections in the national hospital, where they can offer emergency and intrapartum care; however, these facilities are inaccessible to the largely rural population. In the rural health services midwives hold management roles, as the sister or officer-in-charge. While these roles are beneficial for the individuals and essential for the functioning of the overall health system, they can remove midwives from providing care at the practice level, as the midwives are required to perform leadership and administrative tasks.

Other midwives, in urban-based day clinics, are only able to provide women with antenatal care one to two days a week with no facilities to offer emergency pregnancy care, or assistance during labour and birth, meaning these midwives are unable to practise across the midwifery scope. Other midwives have taken the available roles with NGOs in other health related areas, such as child health, HIV/AIDS, TB or malaria programmes. Midwives based in urban settings provide care for the minority of women who are urban-based or women who are able to travel to urban centres.

Analysis in chapter eight identifies that system constraints confining midwives to roles in urban settings have created a space within the system for the emergence of CHW midwives as a new category of health worker in Papua New Guinea. Although it is unclear if this category of health worker is emerging from within the endogenous system or being introduced by exogenous agents. For example, donor projects such as the MCHI (University of Technology, 2014) and the Asian Development Bank *Rural Primary Health Services Delivery Project* (Asian Development Bank, 2014) both have work streams focused on CHW midwife programmes. Focusing on the role of national and provincial agents, there appeared to be no engagement with international recommendations. On the contrary, the Papua New Guinean Health Workforce planning documents (National Department of Health, 2013a) make no provision for workforce requirements focused for reproductive and maternal health (reflecting path dependency mentioned above), and CHWs are noted as the key peripheral health workforce. Other government documents identify that CHWs with midwifery training, are expected to staff Community Health Posts (National Department of Health, 2011a, 2013e).

Notwithstanding the origins of the emerging role of CHW midwives, this thesis argues that the current six month education programme offered to CHW midwives risks repeating previous system failures of inadequately preparing health workers to be skilled birth attendants. The discussions in chapter eight, and the literature review in chapter five, trace the inherent jeopardy associated with inadequate preparation of birth attendants. Training of traditional (or village) birth attendants was a key global strategy from the 1970s until the mid-1990s and demonstrated little impact on maternal mortality in other contexts (de Brouwere et al., 1998, p. 778; Sibley et al., 2007; 2012). In Papua New Guinea, numerous programmes using community development approaches, including training village birth attendants, have likewise failed to demonstrate improved outcomes (Heather, 2010; McNee, 2011).

In Papua New Guinea between 2005 and 2009, the MCH double major programme for nurses, combining midwifery and child health nursing, failed to adequately prepare nurses to manage childbirth emergencies (Kruske, 2006). In this programme nurses graduated with insufficient theoretical or experiential knowledge and skills. Findings from this thesis suggest that the MCH nurse course has impacted for a decade on the quality of the health workforce in Papua New Guinea, potentially contributing to poor maternal health outcomes.

The issue of CHW midwives was one of the most frequently discussed during fieldwork. The analysis in chapter eight reveals that the emerging cadre of CHW midwives are likely to repeat the path dependent history of the system, with these health workers receiving inadequate education to fulfil globally agreed standards to practise as skilled birth attendants; this could result in minimal improvement of women's maternal health outcomes. Before an attendant can be considered 'skilled' there is a set of core and essential skills that the person must achieve. International recommendations now strongly argue that in order to achieve improved maternal and neonatal outcomes, birth attendants must have access to adequate preparation for practice. Thompson et al. (2011) argue that while there is considerable global diversity in the cadres of health workers providing sexual, reproductive, maternal and neonatal health services, a minimum of 18 months is necessary to achieve proficiency in midwifery competencies post-nursing or another health professional programme or a minimum of three years is required to meet essential standards in a direct entry programme.

The International Confederation of Midwives (2013) provides a set of core midwifery competencies, for midwives and others, which encompasses basic knowledge, technical and cognitive skills and behaviours which should be included in any curriculum. The current CHW midwifery programme in Papua New Guinea does not fulfil this recommendation, as skills are taught over six -months, with minimal theoretical content. Adegoke and van den Broek (2009, p. 38) suggest that many developing

countries, 'faced with immense HR problems' have a tendency 'to classify health personnel as 'Skilled Birth Attendants' even though curricula may not fully meet the set of criteria for this', compromising an optimal solution to improve maternal health.

This thesis argues, in agreement with international recommendations, that if Papua New Guinea elects to designate CHW midwives as a cadre of skilled birth attendant, then it is vital that they are truly skilled, with appropriate education, supervision and ongoing professional development (ten Hoope-Bender et al., 2006). This means that at minimum the CHW midwifery programme must be an 18 month programme meeting international standards. For CHW midwives, to be effective in improving maternal and neonatal health outcomes, it is essential that they receive an appropriate education programme, to ensure they have the necessary knowledge and skills to save women's and babies' lives. A short training course, without adequate theoretical knowledge and understanding will not enable these midwives to be appropriately skilled.

Looking to the future

There are similar models from other developing countries that Papua New Guinea can draw on to inform policy development. Many countries have improved maternal and neonatal health largely due to deploying midwives or other skilled birth attendants, working close to communities. 'When systems are consistently strengthened over a long period of time, investment in midwives is a realistic and effective strategy to reduce maternal mortality, including in resource-constrained contexts' (ten Hoope-Bender et al., 2014, p. 1227). For example, Afghanistan's creation of a new health cadre of 'community midwives' is a well-documented success in a hugely challenging context. Midwives initially completed an 18 month pre-registration programme that was lengthened to two years following a consultation processes after five years (Mohmand, 2013, p. 12). The development of midwives in communities saw maternal mortality decrease from 1,600 in 2002, to 327/100,000 in 2010 (Mohmand, 2013). Over 77% of the population live in rural areas where women were excluded from access to skilled and emergency care. The community midwives programme selected women from local communities, who completed a pre-registration programme and were then deployed back to their communities, with support and supervision (Mohmand, 2013; J. M. Smith, Currie, Azfar, & Rahmanzai, 2008; Turkmani et al., 2013).

In the words of a midwifery participant in the current study, health workers returning to the areas they are from has many advantages, because, '*someone comes from that village and then go back there, that is more reasonable, because somebody from that community would understand the language better, the culture better and the conditions' (MW13).* While the Afghanistan community midwifery programme has not been reviewed from a complexity perspective, Gohar, Zyaee, and

Turkmani (2015) and Speakman, Shafi, Sondorp, Atta, and Howard (2014) argue that it has had significant systemic transformational consequences, including increased economic benefits and empowerment for women. An additional positive influence from this programme has been the building of confidence of midwives to enable them to sit at the policy table and contribute to policy development more widely to improve women's lives (Gohar et al., 2015). This approach could benefit Papua New Guinea greatly.

The literature reviewed in chapter five reveals many calls to improve maternal health in the Papua New Guinea literature, and high-level commitment to global targets, such as the MDGs and international human rights treaties and more recently, in September 2015 as a signatory to the SDGs. However, to meet these commitments and improve maternal health requires sustained, deliberate policy and practice intervention, emerging from within the endogenous system, supported by exogenous partners. General health programmes and health-worker education programmes do not necessarily include the theoretical knowledge and specialist skills required to manage complex reproductive and maternal health complications. Knowledge and essential skills must be explicitly and consciously included in education programmes at the health workforce level (Starrs, 2014). Governance mechanisms at the local, district, and provincial scale are needed to effectively manage policy, planning, and budgeting across the system. Findings from this research indicate that in the East New Britain context, specific and deliberate system-wide focus on improving maternal health and ensuring universal access to midwives or other skilled birth attendance is absent at the practice, local, district, and provincial levels. Despite the identification of maternal health as a key focus in the national health plan (Government of Papua New Guinea, 2010), elsewhere the explicit focus and commitment is not apparent.

Improvements in maternal and neonatal health require sustained, deliberate intervention. From a complexity thinking perspective, change evolves from iterative, emergent systemic actions of multiple agents, or from a disruption to the status quo, triggering a path shifting transformation. The evidence in this thesis suggests that such a shift has not yet eventuated and is unlikely from within the endogenous system. For international development efforts to successfully improve maternal health in the long term, in addition to improving technical knowledge, strategies must explicitly work to disrupt the status quo and change the system path. The MCHI has focused on improving technical capacity, by building midwifery education capacity and increasing the number of midwives. This project has significantly contributed to improving midwifery education in Papua New Guinea; however, I argue that it may have limited long term implications without concurrent changes to the model of care, how services are provided and wider engagement from within the endogenous system from communities,

LLGs, district and provincial governments. In the future, consideration and priority is needed to ensure midwives are practising midwifery and that they are available close to communities.

Learning from the past

Over twenty years ago, Frank Schofield, a visiting Professor of Community Medicine at the Medical Faculty, University of Papua New Guinea, called for the development of effective rural community midwifery (Schofield, 1993). He called for midwives to be selected by their communities and supported with supplies and transport pathways, and he identified that the midwife must have sufficient education to recognise high risk pregnancies and receive official certification (Schofield, 1993). Importantly, Schofield (1993, p. 199) notes that Papua New Guinea does not need to 'reinvent the wheel', as 'successful approaches [have been] already discovered in other countries'. In this address, he called for a clearly stated policy and the political will to implement the well-tried practical programme, village by village. Findings from this thesis repeat these calls; to improve maternal health it is essential that the international development programmes align programmes with global recommendations and support the wider endogenous governance systems to support the education and deployment of midwives – whether they are nurse-midwives, the newly emerging CHW community midwives or a new cadre of direct entry midwives, meeting international standards.

Links with health workforce planning and ODA

The recently published *Health Sector Human Resource Policy* (2013) and supporting documents note that human resources for health have historically received insufficient attention. The policy suggests there is now increased policy attention, and the issue of human resources for health holds a 'higher position on the national development agenda' (National Department of Health, 2013a, p. 8). The policy identifies the importance of increasing the total number of health workers (National Department of Health, 2013g, p. 14). However, health workforce planning does not confer explicit attention to the workforce requirements for reproductive and maternal health. Surprisingly, the health workforce planning documents (National Department of Health, 2013g, p. 43) continue to budget for village birth attendants, yet no budget is allocated for midwifery education programmes.

The current Asian Development Bank project, implemented under the umbrella of the sector wide approach to operate in five provinces, identifies maternal and child health as a key focus of the health programme. However, the *Project Administration Manual* (Asian Development Bank, 2014) activities do not appear to prioritise midwives as an important health workforce for reproductive and maternal health. Alternatively, the project identifies support for 'training of one health worker in each facility in essential obstetric care including new born care, to address maternal and child mortality' (p. 5).

Documents suggest that these workers will be CHWs, and a consultant has been assigned to provide 'technical advice to the DOH in the development of the community health worker (CHW) curriculum' and 'technical advice to the training institutions on the training of community health workers (CHWs) in maternal health' (Annex 2, p. 2). History will reveal the success of the advice this consultant gives and the uptake by the Papua New Guinea system. To avoid repeating the failures of the past, it is vital that CHW midwives receive an adequate pre-registration education programme, or history will continue to be repeated into the future.

The Asian Development Bank (2014) project risks the continuation of the status quo by failing to prioritise a skilled health worker at the community level. The new Community Health Post policy goes some way to establishing infrastructure for safe birthing close to where women live, but the policy does not go far enough. The building blocks of the health system include infrastructure and skilled health workers, and I argue that more explicit attention is needed on deployment. The actions of individuals represent the strongest form of system resilience and, until the underlying system paradigms change, there will be little change or evolution of the system structures and consequently system outcomes (Carey & Crammond, 2015).

Contributions

Findings from this thesis contribute to the maternal health and development literature using concepts drawn from complexity thinking and international development. The findings identify intersecting systems and multiple layers of the maternal health care system to reveal where the system fails to meet the goal of ensuring optimal health outcomes for women and babies during pregnancy and childbirth. Within this thesis, I defined the maternal health care system as a bounded system for examination. The importance of a maternal health care system and the key role of midwives as skilled birth attendants are well established in the international health and development literature, yet this system is not a reality in the East New Britain or the wider Papua New Guinean context. The absence of a designated system to provide women (and their babies) with maternal health care is a significant defining feature of the research. I argue that the continued lack of a defined reproductive and maternal health care system has resulted in continued detrimental consequences for women, babies, and midwives. In the absence of a defined system there has been little focused policy advocacy. Midwives are non-existent at the policy table to advocate for maternal health when important policy and resourcing decisions are made and there is no high-level body to lobby for the importance of specific consideration to be given to human resources for reproductive and maternal health as an explicit health and development issue. Although maternal health is acknowledged at the macro level

as the most pressing health concern (Government of Papua New Guinea, 2010), at the policy table and at the practice level many other health concerns continue to take precedence.

Many women continue to receive inadequate care during pregnancy and are attended by unskilled birth attendants or family members during labour and birth. Yaipupu and Eves (2002) suggest that health promotion efforts largely focus on promotion of family planning and neglect other areas of reproductive health, including health promotion in communities to advocate for supervised birth. They recommend a campaign to promote the use of health services by women alongside the establishment of maternity waiting houses to support rural women to access services and improvements to pregnancy and childbirth services.

These calls have been repeated more recently by Melua (2011), Joseph (2013) and Tinning (2014), who call for increased government support and the utilisation of indigenous structures to improve reproductive health outcomes. However, to date, the findings from these research projects do not appear to have influenced policy development. The most recent national health plan does not develop a dedicated maternal health care system. The health sector human resource plan (National Department of Health, 2013a) does not identify a dedicated workforce to focus on reproductive health issues, such as maternal and neonatal health. Other recent projects negotiated with development partners, such as the Asian Development Bank (2014) rural primary health services project, do not specifically focus on educating midwives or any other skilled birth attendants. In other developing country settings, progress to improve maternal health has been backed by strong political commitment to improve maternal and child health, with financial support and deliberate programmatic action planning (Cortez, Saadat, Chowdhury, & Sarker, 2014). As the above discussion highlights, analysis in this thesis suggests there is little deliberate programmatic activity underway in Papua New Guinea and without this, long term change is unlikely.

Findings from this research support recent projects which call for changes to be made to the health system (Biddulph, 1993b; Joseph, 2013; Melua, 2011; Tinning, 2014; Vallely et al., 2013; Yaipupu & Eves, 2002), and calls for increased deliberate policy priority to be given to improving maternal health, by Papua New Guinean governance mechanisms, supported by international development partners. Priorities should be particularly focused on building stronger health systems, developing a dedicated workforce to provide maternal and neonatal health care, and improving health literacy in communities. This thesis contributes to the literature by arguing that without an established maternal health care system, there is insufficient policy and practice focus, advocacy and lobbying to ensure that important research findings are incorporated into policy and practice. In keeping with a complexity thinking lens, programmatic activity must occur across the whole system, to encourage

community engagement with health services for maternity care. However, 'there is no single, simple key to this development, no grand or magic formula to be adopted' (Ramalingam, 2013, p. 262). Rather, sustainable change has to come from within the system, resulting from the emergent sum of many actions of multiple agents.

This research differs from previous work undertaken in Papua New Guinea by clearly arguing for coherence with the large body of evidence calling for women to be attended by midwives who are skilled (Bhutta et al., 2014; Homer et al., 2014; Renfrew et al., 2014; Requejo & Bhutta, 2015, p. s78), and midwives (including CHW midwives) who are educated to meet the essential competencies for practice (International Confederation of Midwives, 2013). For too long intersecting systems have failed to recognise the importance of ensuring all women have access to skilled health workers, and in some cases women have been provided with care from health workers who are inadequately prepared for the important roles they perform.

This research was undertaken in the case study of a province, East New Britain, within a case study of a country, Papua New Guinea, to explore the complexities of implementing strategies to improve maternal health as a unique development challenge. It argues that for international development strategies to effectively improve maternal health, in addition to building technical knowledge and skills, exogenous strategies are more likely to be successful if they work to constructively disrupt the status quo of existing systems to generate change. Strategies to improve maternal health, like other international development interventions, are introduced as part of complex interconnections, behaviours, relationships and the dynamics of the wider social system (Ramalingam, 2013, p. 361). Interventions are not independent of other systems or institutions. This research advocates for more attention being given to working within the existing social systems. In this way, the process of implementation of international best-practice and the constructive disruption of the status quo could better protect maternal health via endogenous system change. Only then will the introduced strategies be sustainable in the long term.

Recommended maternal health interventions cannot be considered as 'technical' interventions standing separately or outside of other societal systems or development interventions. Local structures and existing social, cultural and political institutions are critical for sustainable development (Daly, 2015). Maternal health outcomes emerge from complex interactions and relationships within the wide array of agents, and interactions with multiple systems, not only the social determinants of health, but importantly the functioning of governance networks and interconnected political and social systems. By supporting local structures and existing institutions and communities, international development strategies can work to open up spaces for the

emergence of innovation and incremental ongoing change, and new practices to support maternal health.

This thesis recommends that international development agencies deliberately support the emergence of local change. However, it is essential within this process, to acknowledge the potential of limitations arising from within the local institutions, practices and traditions and intentionally work to raise awareness of these. Importantly, all international development interventions to improve reproductive and maternal health must ensure coherence and accountability with international evidence-based practice and standards.

This thesis has used tools from complexity thinking, enmeshed with ideas from midwifery and development thinking. It argues that maternal health care is provided within social systems that are continually created and recreated by multiple agents, acting within system structures and institutions, both formal and informal. Systems interact within the overall environment. On multiple levels, findings reveal the continued lack of priority within the overall environment to prioritise maternal health. Subsequently, 'minimally trained and unsupported women [are] working at the lowest level of the health system … [caring] for women in the poorest sectors of the population' (Langer et al., 2015, p. 1167). This reflects the general lack of priority given to women and perpetuates inequities. To provide adequate health care to eventually reduce maternal and perinatal morbidity and mortality, these health workers must be valued, and provided adequate education, compensation and support.

Future Work

This research has highlighted the importance of working with the existing systems and raised several areas for further investigation. An area for further investigation in the Papua New Guinea system arises from the complexity thinking concept of requisite variety. Prior to entering the field, I expected to see system diversity and different models of health service delivery aligned with the diversity of different communities and wider environment. However, my observations revealed a significant lack of system diversity or requisite variety within the maternal health care system. Alternatively, there was remarkable adherence to outdated models of care delivery and consistency of models of practice across the range of health facilities. In complexity thinking terms, this stands in contrast to what would be expected. Diversification is vital for systems as a tool to open new possibilities, try alternatives and seek solutions (Mitleton-Kelly, 2006, p. 228). System diversity underpins resilience and is evidence of a healthy system. Shani and Mohrman (2012, p. 230) argue that 'it is only through trying out and embedding many approaches that any complex ecosystem can recalibrate and refashion its activities to achieve positive cycles of renewal'. Further research could investigate the significance of the lack of diversity and its relationship to institutional transplantation (Kang, 2014).

Many participants in this study identified the challenges of distance and transport to services as barriers for women accessing care and as barriers for health workers carrying out patrols to provide health services. As Papua New Guinea is a country with a dispersed rural population, this has important consequences for women accessing services. Further research is needed to better understand the significance of accessibility to maternal and reproductive health care, and how best to work with communities to overcome these barriers.

The significance of quality of care, which has been flagged in this thesis, needs further in-depth research attention in the Papua New Guinean context, to specifically investigate how to better support midwives and other health workers to provide compassionate, respectful maternity care. Poor practice is a reflection of a gender inequality, non-functioning systems and non-recognition of the importance of midwives in providing women with maternity care (McConville, 2015). While some participants recognised the importance of ongoing professional development, within the other complexities of the system, this issue does not receive the attention it deserves. Further studies could explicitly investigate the extent of disrespect and abuse in maternity care in Papua New Guinea, its impact as a barrier for women, and develop strategies to improve quality of care.

The impact of regulation on the work of midwives and other health workers is another area that warrants more attention. In the Papua New Guinean context CHWs are a key nursing workforce, yet at present they are regulated by the Papua New Guinea Medical Board. Future research could investigate the impact of this on midwifery and CHW practice, philosophy and education pathways for these key health workers.

A final area that warrants further investigation is the influence of midwives being employed by extractive companies seeking to fulfil their corporate social responsibility obligations. Little is known about the influence of extractive companies employing health workers at mandated sites and there is 'no repository that systematically tracks volumes disbursed, numbers of projects or sector of activities involved' (Prizzon, 2014, p. 19). More research is needed to better understand how this intersects with national health workforce planning and the maternal health care system.

Reflections

In chapter two, I drew attention to Cilliers (2005, p. 256) caution to researchers working with concepts from complexity theory. Cilliers (2005) highlights the importance of researchers being 'careful about the reach of the claims being made and of the constraints that make these claims possible'. Likewise, to repeat a previous quote (see p.24), Buijs et al. (2009, p. 50) suggest that 'to say anything valuable about complex systems and their workings requires both a large amount of detail

and a thorough understanding of the contexts'. As an outside researcher, undertaking a small project and someone new to Papua New Guinea, I am cautious that the findings from this thesis may not accurately reflect the realities and perceptions of participants in the system/s that I have analysed and described. There are many perceptions and realities. It is not humanly possible to know everything about a system as there are too many variables and interdependencies. Furthermore, perception of reality involves individual interpretation, insight and understandings.

In this work, I have attempted to carefully understand the system, being conscious of my personal lens, as identified in chapter three. I have intentionally drawn on interdisciplinary scholarship and reflective research practice. I offer this work as a unique and different way to view the maternal health care system in East New Britain; and to contribute to ongoing global work that seeks to improve maternal and neonatal health outcomes, and women's lives.

Complexity thinking suggests that the adoption of international solutions, or adopting 'recipes' seldom works as anticipated because of 'unique actors, political situations, and random events that interfere with implementation or replications' (Anderson et al., 2005, p. 671); the real world is unpredictable and disorderly. In accord with complexity thinking, I do not close down interpretations, narrative and discourses through the provision of 'neat ends' and a promise of certainty (Richardson & Cilliers, 2001).

The art of using complexity thinking for facilitating change hinges on better understanding the workings of the system in order to find the right intervention. Sustainable, real change must come from deep within the people in human systems and societies. People's values, beliefs and priorities can contribute to, or can act to block, emergence and innovation, with deep connections to holding existing behaviours in place. To overcome the tendency to hold onto the status quo and generate change, international development, through a complexity thinking lens, makes a strong case for achieving a balance between top-down and bottom-up approaches, to support contextually specific emergence, to foster ownership and sustainability.

Appendices

Appendix Two: Documents collected during field work

Introducing ENB Booklet

National Health Plan 2011-2020 - Volume I & 2

Medium Term Development Plan (Health Sector) Aligned Projects and Programs, Vol 1 & 2, 2011-2015

National Health Services Standards for Papua New Guinea, 2011-2020

East New Britain Provincial Strategic Development Plan, 2011-2021

East New Britain Provincial Administration Corporate Plan, 2011-2013

Health Sector Review: East New Britain Province – assessment of districts performance, 2008-2013

2014 Provincial Annual Implementation Plan Template

St Mary's Hospital Strategic Plan, 2012 – 2016

PNG Acts and Regulations x 80

MCHI Community Health Worker Up-skilling Programme documents:

- Facilitator manual
- Participator manual
- Training Guide
- Log Book
- Teaching materials

East New Britain Provincial Health Office reports on: numbers of births in each facility, number of antenatal care consultations, complications recorded, family planning and immunization reports (2010, 2011, 2012, 2013)

5 year development plans

- Gazelle District (2009 – 2013)
    - Central Gazelle (2008-2012)
    - Inland Baining LLG (2008-2012)
    - Lassul Baining LLG (2009-2013)
    - Reimber Livuan LLG (2009-2013)
    - Toma Vunadidir LLG (2008-2012)
- Kokopo District (2008-2010)
    - Duke of York LLG (2008-2012)
    - Bitapaka LLG (2008-2012)
    - Kokopo Vunamami (2008-2012)
    - Ruluana LLG (2008-2012)
    - Kokopo Urban LLG (2008-2012)
- Pomio District
    - Central/Inland Pomio LLG (2008-2012)
    - East Pomio LLG (2008-2012)
    - Melkoi LLG (2008-2012)
    - Sinivit LLG (2008-2012)
    - West Pomio/Mamusi LLG (2008-2012)
- Rabaul District Plan (2010 – 2015)
    - Balanataman LLG (2008-2012)
    - Kombiu LLG (2008-2012)
    - Watom LLG (2008-2012)
    - Rabaul Urban LLG

Scales, Ian. (2010). Roads in Gazelle Peninsula Development: Impact of roads in the post-eruption economic landscape of East New Britain. Australian Agency for International Development, Commonwealth of Australia: Canberra (soft and hard copy)

Appendix Three: Ethics Documentation: University of Auckland Ethics Approval

06071333640PM56200197555.htm

Office of the Vice-Chancellor
Research Integrity Unit

THE UNIVER
OF AUCKL/
NEW ZEALAND
Te Whare Wānanga o Tāmaki M

The University of Auckland
Private Bag 92019
Auckland, New Zealand

Level 10, 49 Symonds Street
Telephone: 64 9 373 7599
Extension: 87830 / 83761
Facsimile: 64 9 373 7432

UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE

07-Jun-2013

MEMORANDUM TO:

Dr Yvonne Underhill-Sem
Development Studies

Re: Application for Ethics Approval (Our Ref. 8871)

The Committee considered your application for ethics approval for your project entitled **Exploring the complexities of midwives as a strategy for improving maternal health in Papua New Guinea**.

Ethics approval was given for a period of three years.

The expiry date for this approval is 07-Jun-2016.

If the project changes significantly, you are required to submit a new application to UAHPEC for further consideration.

In order that an up-to-date record can be maintained, you are requested to notify UAHPEC once your project is completed.

The Chair and the members of UAHPEC would be happy to discuss general matters relating to ethics approvals you wish to do so. Contact should be made through the UAHPEC Ethics Administrators at humanethics@auckland.ac.nz in the first instance.

All communication with the UAHPEC regarding this application should include this reference number: **8871**.

(This is a computer generated letter. No signature required.)

UAHPEC Administrators
University of Auckland Human Participants Ethics Committee

c.c. Head of Department / School, Development Studies
    Dr Anita Lacey
    Susan Crabtree

Additional information:
1. Do not forget to fill in the 'approval wording' on the Participant Information Sheets and Consent Forms, giving the dates of approval and the reference number, before you send them out to your participants.

2. Should you need to make any changes to the project, write to the UAHPEC Administrators by email (humanethics@auckland.ac.nz) giving full details of the proposed changes including revised documentation.

3. At the end of three years, or if the project is completed before the expiry, please advise UAHPEC of

Appendix Four: Information Sheet

THE UNIVERSITY OF AUCKLAND
FACULTY OF ARTS
NEW ZEALAND

CENTRE FOR DEVELOPMENT

STUDIES

Faculty of Arts

Human Sciences Building

Level 8, 10 Symonds Street
Auckland, New Zealand

Email: devstudies@auckland.ac.nz

INFORMATION SHEET - Infomation /toksave pepa

Title of project: Exploring the complexities of midwives as a strategy for improving maternal health in Papua New Guinea

Nem blo projek: lukluk long ol hevi blo ol wok blo ol midwife na usim displa luksave olsem rot blo helvim health blo ol mama long Papua Niugini

My name is Susan Crabtree and I am a doctoral student at the Centre for Development Studies at the University of Auckland, New Zealand. I am undertaking a research project which will lead to writing a thesis. The research explores how midwives are contributing to maternal health in Papua New Guinea.

Nem blo mi em Susan Crabtree na mi wanpela sumatin wokim stadi bilong mi, ol i kolim Dokota blo philosophy or long tok Englis ol kolim Phd. Mi woking dispel stadi long wanpela skul long Auckland University ol i kolim senta blo development studies. Bekos mi wokim displa skul igat wok mak we mi mas wokim, wok panim out (research) na ratim wanplea pepa ol kolim tesis. Displa studi mi wokim i lukluk long ol wok contribution blo midwife igo health blong ol mam long PNG.

The research will involve collecting information which will be analysed and will form the basis of my research project. All material collected will be kept confidential. The province the research is carried out in will be named in the research report and publications; however no individual people will be named unless permission has been given. Aside from myself as the

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researcher, only my research supervisors may have access to the interviews or have access to the transcripts of interviews. It is intended that one or more articles may be submitted for publication in scholarly journals and/or the findings from the research may be presented at academic conferences.

Displa wok panim aut (research) projek bai involim mi long askim na kissim ol information we displa ol information bai kamap main part blo displa projek. Olgeta toktok na information mi kissim em bai blo studi blo mi tasol na ol narapela no inap gat sanis long lukim o kisim displa ol information (em long tok inglis ol kolim confidential). .

Nem blo Ples na province mi wokim research long en bai kampapn long report mi raitm tasol nem blo wanwan manmeri tak part long research bai no inap kapmap long report. Tasol ol wanwan manmeri i givim to orait ok mi ken usim nem long report.

Ol information mi kolectim bai mi yet usimg na ol research supersivir blo mi tu bai gat sans long lukim ol displa information.

Ating ol panim blo research tu bai kamap lo wanpela o tuplea blong ol bikplea skul pepa ol kolim journal. Na tu ol result blo displa prokek bai mi go presentim long ol skul conference o miting.

What is involved? – Wanem ol samting istap insait?

I would like to carry out an interview with you as the researcher for this project. Before the interview, I will ask you to sign the attached consent. It is intended that the initial interview will take about an hour and this will be at a mutually agreed place and time. If we both agree, we may schedule a time for a follow-up interview to continue our discussion

Mi yet bai askim olgeta askim blong displa wok panim aut projek. Bipo long mi askim question mi bai askim yu long singnim displa tok orait pepa (Consent paper). Mi ting olsem displa askim taim bai kissim olsem wanplea hour na yumi mas wanble long taim na please blo miting. Na sapos yumi wanbel, yumi ken pamin wanpela taim bihain long bung ken na toktok moa.

Your participation in this research is entirely voluntary. If you agree to take part you are free to stop the interview at any time without having to give a reason and without penalty of any

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sort. After the interview is completed you are free to withdraw your responses and any information you have shared before 24 May 2014, after which time it will not be possible due to data collection having been completed and data analysis started.

Mi askim tasol long you take part long displa projek, na spose yu les em oait. Displa em long laik blong yu yet na nogat man/meri bai fosim yu long tak pat. Sapos yu tok orait long tak pat long displea interview, long an taim noken wari long stopim interview sapos yu no laik . em ok long stopin, em bai nogat mekim save or penalty sapos yu les, yu stopim interview long namel. Bihain lon interview sapos yu pilim olsem yu laik rausim sample toktok yu mekim lo interview yu ken mekim olsem (tasol bihain long 24 May 2014 inap long wanpela munn). Bihain long wanpela munn em bai hat long senesim ol toktok sapose yu laik rausim ol toktok yu bin wokim pinis, em long wanem writim blog displa pepa em bai stat pinis.

During the interview, I will ask you questions about you and your work, about your role in setting up or being part of the Maternal and Child Health Taskforce or the Initiative in Papua New Guinea and any challenges, thoughts or ideas you may have about your work. You do not have to answer any or all of the questions.

Long interview mi bai askim yu long ol wok blo yu, na Kontribution yu mekim long wok blo yu long health blo ol mam na pikinini initaive long Paua Nuigini , na tu mi bai askim yu long samplela ol challeng o hevim, na ol tingting na idea yu gat long displa wok blong yu long helpim health bilong mama na pikinini. Mi bai askim tasol, na yu ken givim bekim na sapose yu les long bekim samplea o olgeta question em orait tu.

If you agree, the interview will be recorded and later transcribed. During the interview I may also make notes on our discussion and both the notes and the transcribed data may be used for the final thesis. All information from you will be treated as confidential and only myself as the researcher and my research supervisors will have access to it. No information will be shared with your employer or anyone else. All data will be stored in a locked filing cabinet or as a password protected electronic documents and destroyed after 6 years.

Sapose yu tok orait lo ineterview ok ol toktok yu mekim bai mi rekotim na go skelim na raitim bihain. Long taim yumi toktok mi bai rait long pepa nan a rekotin na bihain bai displa ol toktok mi rekotim na raitim bai helpim long raitim pepa blong mi ol kolim Thesis. Olgeta toktok yu mekim bai narapel i nonap luksave. Mi tasol na ol supervisor tasol bai lukim ol

displa infomeson. Olgeta toktok na infomeson mi kissim long yu bai stap long wanpela sef ples we igat lok o hait namba we em bai hat long ol arapela ukim. Bihainm long 6pela yia bai dispea ol information bai ol kukim o tromai.

At the completion of the project, you are welcome to have a summary of the findings. If you would like a copy, please indicate on the consent form.

Long pinis blog dispel projek yu ken kissim sotpela pepa i soim ol kaikai or result blong displa studi. Sapos yu laikim displa ok, toksave na putim igo daun long kissim tok orait fom.

If you have any questions please contacted me on my digicel mobile: 7077 1613

Principle Researcher:

Susan Crabtree
Doctoral Student
Email: Scra859@aucklanduni.ac.nz
Telephone: Papua New Guinea is: 7077 1613
                    New Zealand: (+64) 9 570 6465

Research Supervisor and Head of Department:
Dr Yvonne Underhill-Sem
Centre for Development Studies, University of Auckland
Email: y.underhill-sem@auckland.ac.nz
Telephone: (+64) 9 373 7599 ext. 82311

Research Supervisor
Dr Anita Lacey
Department of Political Studies, University of Auckland
Email: a.lacey@auckland.ac.nz
Telephone: (+64) 9 373 7599 ext. 87241

Sapose yu gat askim long ol ethic samting, yu mas askim sia blong Auckland univesty ethic komoti long adres daunblo.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE

ON 7 June 2013 for (3) years, Reference 8871

For any queries: contact the Chair, The University of Auckland Human Participants Ethics

Committee, Research Office, Private Bag 92019, Auckland 1142.

Telephone: 09 373-7599 extn. 87830/83761.

Email: humanethics@auckland.ac.nz

APPROVED BY THE MEDICAL RESEARCH ADVISORY COMMITTEE, National Department of

Health, Waigani, NCD, Papua New Guinea, 8 July 2013, Reference: 13.23.

Appendix Five: Reports detailing MMR in Papua New Guinea since 1990

Year	Policy/Report	Selected Report findings	Estimated MMR
1990	Third National Health Plan, 1991-1995	Maternal Health noted to be a key focus area	
1991	Population, Family Health & Development: 19th Waigani Seminar[116]		600 – 1000 maternal deaths estimated per 100 000 live births between 1970 and 1986.
1995	Fourth National Health Plan, 1996-2000[117]	Acknowledged high maternal, infant and child mortality rates that need to be reduced to acceptable levels[117]	Maternal mortality estimated @ 800/100 000[118]
1996	Demographic and Health Survey 1996: National Report[119]		MMR estimated @370/100 000
2000	Fifth National Health Plan 2001-2010[120]	Noted a collapse of the health system[121] and that maternal and infant mortality rates remain unacceptably high.	MMR estimated @ 1200/100 000
2000	United Nations Millennium Development Goals	PNG Signatory to MDGs, MDG 5: Improve maternal health. With target 5.A. Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio.	
2009	Demographic and Health Survey 2006: National Report[122]		Reported MMR 733/100 000
2009	Ministerial Taskforce on Maternal Health[123]	Papua New Guinea is currently failing its mothers and the report shows that there is a crisis in maternal health.	2000 women estimated to die every year
2010	Sixth National Health Plan, 2011 – 2020[124]	Identified infectious diseases and maternal and child health as accounting for the greatest burden within the health system.	MMR estimated 733/100 000
2014	WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division estimates[125]	PNG listed as one of 20 countries with no data on maternal mortality (p.47). Estimated lifetime risk 1/120	Estimated MMR 220/100 000, range 110-450

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[116] Biddulph (1993b)

[117] Government of Papua New Guinea (1999b)

[118] Peabody et al. (1995), Biddulph (1993b, p.175)

[119] National Statistical Office of Papua New Guinea (1996)

[120] Government of Papua New Guinea (2000)

[121] United Nations (2009, p.25)

[122] National Statistical Office of Papua New Guinea (2009)

[123] National Department of Health (2009b)

[124] Government of Papua New Guinea (2010)

[125] World Health Organisation (2014c)

Appendix Six: Maternal Mortality Reporting Form

National Health Information System
Maternal Mortality Register

DEPARTMENT OF HEALTH

PAPUA NEW GUINEA MATERNAL MORTALITY REPORTING FORM
(All maternal death whether they occur in a health facility or in the community/home must be reported by any health worker whenever they hear about the event.)

Name.. Date of Death.....................Age(best estimate)..........

Place of Death................................District of Origin...................Province of origin.................

Parity (excluding this pregnancy)................, Gravida..........Children alive.........Children dead......,

Number of antenatal visits...................,   Seen by medical or nursing staff in labour. Yes/No,

Referred to hospital   Yes/No,   **This baby**, Liveborn, stillborn, NND: Birth weight =.................g

Date of delivery......................., Place of delivery...
Antenatal problems;
1..
2..
3..
Labour problems.
1..
2..
3..
Type of Delivery and Delivery problems.
1..
2..
3..
Post partum problems.
1..
2..
3..
Past Medical or Obstetrics History problems.
1..
2..
3..
Treatments given.
1..
2..
3.
....
Was this death avoidable, Yes/No.   If so, How ?..
                              Your name and position...
Please write The STORY of how this mother died over the page.
Every maternal death is a sad story but it needs to be told so that others might not die.

Appendix Seven: Role Delineation Chart[126]

	A	B	C	D	E	F	G	H
1	Role Delineation Matrix for Health Services in Papua New Guinea							
2	SERVICE GROUP & LEVEL DEFINITIONS							
3	CORE SERVICE GROUP DEFINITIONS (EACH SERVICE GROUP INCLUDES PUBLIC HEALTH)							
4	CORE SERVICE GROUP DEFINITIONS	Medical services	Child /neonatal /paed services	Maternal / reproductive services	Surgical services	Service support (Diagnostics & Allied health services)	Management & Leadership / Clinical / Public Health & Professional support	
5	DESCRIPTION OF LEVELS							
6	Level 1	Level 2	Level 3	Level 3	Level 4	Level 5	Level 6	Level 7
7	AID POST / PUBLIC HEALTH SERVICES & COMMUNITY	COMMUNITY HEALTH POST/ PUBLIC HEALTH SERVICES	RURAL HEALTH CENTRE/ PUBLIC HEALTH SERVICES	URBAN HEALTH SERVICES	DISTRICT HOSPITAL/ PUBLIC HEALTH SERVICES	PROVINCIAL HOSPITAL/ PUBLIC HEALTH SERVICES	REGIONAL HOSPITAL/ PUBLIC HEALTH SERVICES	highest complexity/ NATIONAL REFERAAL HOSPITALS /
8	Level 1: Least complex; Minimum standards for basic health care (outpatient services) & public health / primary health care / community based programs) in rural & remote settings inc community support (communities, homes, schools, & workplaces) (health island settings). Standard treatment guidelines are implemented and practiced.	Level 2: As for level 1 plus provide some inpatient short stay care as well as greater regularity and integration of outreach / mobile services (i.e. family and reproductive health, healthy child inc immunisation, TB (i.e. TB DOTS program), HIV/AIDs prevention, malaria prevention, and nutrition programs (breastfeeding and infant growth monitoring), and school and dental health.	Level 3: Minimum standards for level of care must provide medical, child health/paediatric, material/ and minor surgical services (inc public health / primary health care). Level 3 Provide inpatient care & some clinical support services. Provide core clinical support services include outreach and supervision programs.	Level 3: Urban clinics / settings: Minimum standard as for level 3 service delivery must provide medical, child health/paediatric, material/ and minor surgical services; excluding inpatient care; Provide 5 day 8 hour service with 24 hours on call; Provide day ward services with discharge or referral for further treatment; Conducts deliveries within a midwifery service; Conducts PHC / family health services, Family planning & Disease control / Health	Level 4 Minimum standards for level of care must provide medical, child health/paediatric, material/ and minor surgical services (inc public health); Provide clinical support services available; Provide Level 4 inpatient care. Provide SMO in rural medicine / MO rural health.	Level 5: Minimum standards must provide medical, child health/paediatric, material/ and surgical services (inc public health) Provide on site clinical & management support services; Provide some sub speciality services; provides support to & Provide a provincial referral role.	Level 6: Minimum standards must provide medical, child health/paediatric, material/ and surgical services (inc public health) Provide on site clinical & management support services; Provide some sub speciality services; provides complex treatment of patients from its individual region by referral.	Level 7: Most complex; Minimum standards must provide medical, child health/paediatric, material/ and surgical services (inc public health) Provide on site clinical & management support services; Provide full range of sub speciality services; provides a nation wide referral role for urgent and critical care.

Planning and consultation for the delineation of provincial and local health service levels should include all stakeholders, church based organisations, Non government organisations, private sector, etc as well with local LLG,

[126] National Department of Health (2013d)

Role Delineation Chart, p.2

Service Provision	Level 1	Level 2	Level 3	Level 4	Level 5
	least complex				
Staffing Requirements for AMBULATORY care settings inc public health (i.e. OPD, specialist clinics, outreach)					
Staff Requirements OPD care	Services provided include: -1 CHW working 5 shifts/week with afterhours on call arrangements & relief for annual leave & other extended absences. -Conduct general OPD services including Adult & Paediatrics for 15 minutes per attendance. -1 day per week for integrated outreach / public health /health promotion / patrols by sole officer.	Same services as Level 1 plus: -May have 1 NO: 1 CHWs (1 with post certificate midwifery training), covering shifts as required with shared arrangements for after hours on call. -General OPD services including Adult & Paediatrics for 15 minutes per attendance; -1 day per week for integrated outreach / public health / health promotion / patrol per officer (FTE). -Maternal, family planning & child health 15 minutes per attendance. -Leave relief provided within existing staffing numbers.	Same services as Level 2 plus: -Rural HC staffing numbers & skill mix based upon actual caseload & 21 shifts per week. -Urban clinic staffing & skill mix based upon actual caseload & 5 shits per week with after hours on call arrangements. -General OPD services including Adult & Paediatrics for 15 minutes per attendance; -1 day per week for integrated outreach / public health / health promotion / patrol per officer (FTE). -Maternal, family planning & child health for 15 minutes per attendance. -Leave relief for annual leave & other extended absences provided with in existing numbers.	Same services as Level 3 plus: -A ratio of 1NO/1CHW for maternal family planning & child health clinic only (with midwifery experience). -Medical officers & allied health professional numbers are expected to be at minimum levels in most level 4 rural health facilities. -Hospital staffing number & skill mix based upon actual caseload of each unit/ward & 21 shifts per week. -General OPD services to include Adult & Paediatrics for 15 minutes per attendance. -1 day per week for integrated outreach / public health / health promotion / patrol per officer (FTE). -Maternal, family planning & child health for 15 minutes per attendance. -Leave relief for annual leave & other extended absences provided from within existing numbers.	Same services as Level 4 plus: -Hospital staffing number (inc allied health) & skill mix based upon actual caseload of each unit/ward & 21 shifts per week. -General OPD services to include Adult & Paediatric for 15 minutes per attendance (with a ratio of 1 NO : 1 CHW). -Specialist clinics for 15 minutes per attendance for SMO + Nursing Officer support of 10 minutes average per attendance. -Maternal, family planning & child health - 15 minutes per attendance (ratio of 1 NO: 1 CHW for maternal family planning & child health clinic only (with midwifery experience) .
Staffing Requirements for INPATIENT care setting					

References

AbouZahr, C. (2001). Cautious champions: International agency efforts to get safe motherhood onto the agenda. In V. de Brouwere & W. van Lerberghe (Eds.), *Safe motherhood strategies: a review of the evidence* (pp. 384-414). Antwerp, Belgium: ITG Press.

AbouZahr, C. (2003). Safe motherhood: a brief history of the global movement 1947–2002. *British Medical Bulletin, 67*(1), 13-25. doi: 10.1093/bmb/ldg014

Adam, T., Lim, S. S., Mehta, S., Bhutta, Z. A., Fogstad, H., Mathai, M., . . . Darmstadt, G. L. (2005). Cost effectiveness analysis of strategies for maternal and neonatal health in developing countries. *BMJ, 331*(7525), 1107. http://dx.doi.org/10.1136/bmj.331.7525.1107

Adam, T., & de Savigny, D. (2012). Systems thinking for strengthening health systems in LMICs: need for a paradigm shift. *Health Policy and Planning, 27*(suppl 4), iv1-iv3. doi: 10.1093/heapol/czs084

Adegoke, A. A., & van den Broek, N. (2009). Skilled birth attendance-lessons learnt. *BJOG: An International Journal of Obstetrics & Gynaecology, 116*, 33-40. doi: 10.1111/j.1471-0528.2009.02336.x

Agyepong, I. A., Kodua, A., Adjei, S., & Adam, T. (2012). When 'solutions of yesterday become problems of today': crisis-ridden decision making in a complex adaptive system (CAS)—the Additional Duty Hours Allowance in Ghana. *Health Policy and Planning, 27*(suppl 4), iv20-iv31. doi: 10.1093/heapol/czs083

Aitken, I. (1991). The health services of Papua New Guinea. In J. A. Thomason, W. C. Newbrander & R.-L. Kolehmainen-Aitken (Eds.), *Decentralization in a developing country: the experience of Papua New Guinea and its health service* (pp. 23-35). Canberra, Australia: National Centre for Development Studies, Australian National University.

Albu, R., & Alto, W. (1989). Training of village midwives in the Southern Highlands Province. *Papua and New Guinea Medical Journal, 32*(2), 89-95.

Alhadeff-Jones, M. (2008). Three generations of complexity theories: Nuances and ambiguities. *Educational Philosophy and Theory, 40*(1), 66-82. doi: 10.1111/j.1469-5812.2007.00411.x

Allen, B. (2014). *Papua New Guinea National Census 2011: Rates of Population Change in Local Level Government Areas.* Canberra, Australia: Australian National University.Retrieved from http://ips.cap.anu.edu.au/sites/default/files/IB-2014-44-Allen-ONLINE.pdf

Allen, M., & Hasnain, Z. (2010). Power, pork and patronage: Decentralisation and the politicisation of the development budget in Papua New Guinea. *Commonwealth Journal of Local Governance*(6), 7-31. http://dx.doi.org/10.5130/cjlg.v0i6.1617

Alto, W. A., Albu, R. E., & Irabo, G. (1991). An alternative to unattended delivery—a training programme for village midwives in Papua New Guinea. *Social Science & Medicine, 32*(5), 613-618.

Ambang, T. (2015). Implementation of the National Health Plan in the PNG decentralised health system. *Contemporary PNG Studies, 22*, 105 - 118.

Anderson, R. A., Crabtree, B. F., Steele, D. J., & McDaniel, R. R. (2005). Case study research: The view from complexity science. *Qualitative Health Research, 15*(5), 669-685. doi: 10.1177/1049732305275208

Arthur, W. B. (1989). Competing technologies, increasing returns, and lock-in by historical events. *The Economic Journal, 99*(394), 116-131.

Asante, A., & Hall, J. (2011). *A review of health leadership and management capacity in Papua New Guinea*. University of New South Wales, Sydney: Human Resources for Health Knowledge Hub.Retrieved from https://sphcm.med.unsw.edu.au/sites/default/files/sphcm/Centres_and_Units/LM_PNG_Report.pdf

Ascroft, J., Sweeney, R., Samei, M., Semos, I., & Morgan, C. (2011). *Strengthening church and government partnerships for primary health care delivery in Papua New Guinea: Lessons from the international experience*. Retrieved from https://www.burnet.edu.au/system/publication/file/1226/MORGAN_WP16_Strengthening_church_and_government_partnerships_in_PNG.pdf

Ashby, W. R. (1956). *An introduction to cybernetics*. New York, U.S.A.: J. Wiley.

Ashby, W. R., & Goldstein, J. (2011). Variety, constraint, and the law of requisite variety. *Emergence: Complexity and Organization, 13*(1/2), 190. http://search.proquest.com/docview/1349787972?accountid=8424

Ashwell, H., & Barclay, L. (2009). A retrospective analysis of a community-based health program in Papua New Guinea. *Health Promotion International, 24*(2), 140-148. doi: 10.1093/heapro/dap009

Asian Development Bank. (2010). *Health Human Resources Subsector Analysis (Summary)*. Retrieved from http://www.adb.org/sites/default/files/linked-documents/41509-013-png-oth-01.pdf

Asian Development Bank. (2011). *Rural Primary Health Services Delivery Project*. Manila, Philippines: Asian Development Bank. Retrieved from http://www.adb.org/projects/documents/rural-primary-health-services-delivery-project-rrp

Asian Development Bank. (2014). *Papua New Guinea: Rural Primary Health Services Delivery Project*. Manila, Philippines: Asian Development Bank. Retrieved from http://www.adb.org/sites/default/files/project-document/81058/41509-013-pam-jun2014.pdf

Asian Development Bank. (2015a). *Asian Development Bank & Papua New Guinea: Fact Sheet* Manila, Philippines: Asian Development Bank.Retrieved from http://www.adb.org/sites/default/files/publication/27788/png.pdf

Asian Development Bank. (2015b). *Country Partnership Strategy: Papua New Guinea 2016-2020*. Manila, Philippines: Asian Development Bank. Retrieved from http://www.adb.org/sites/default/files/institutional-document/157927/cps-png-2016-2020.pdf

Asian Development Bank. (2015c). *Pacific Economic Monitor: Midyear review*. Manila, Philippines: Asian Development Bank.

Atun, R. (2012). Health systems, systems thinking and innovation. *Health Policy and Planning, 27*(suppl 4), iv4-iv8. doi: 10.1093/heapol/czs088

Australian Agency for International Development. (2009). *Tracking development and governance in the Pacific*. Canberra, Australia: Australian Agency for International Development. Retrieved from http://www.ausaid.gov.au/Publications/Documents/track_devgov09.pdf

Australian Agency for International Development. (2012a). International Day of the Midwife 2012. Retrieved 20 October 2012, from http://www.ausaid.gov.au/HotTopics/Pages/Display.aspx?QID=647

Australian Agency for International Development. (2012b). *Papua New Guinea Annual Report 2011*. Sydney: Australian Government. Retrieved from http://www.ausaid.gov.au/countries/pacific/png/Documents/png-appr-2011.pdf

Australian Awards. (2015). Australian Awards Scholarships: 2016 Information Booklet for PNG Applicants. Retrieved from http://www.australiaawards.org.pg/wp-content/uploads/2014/10/FINAL-Australia-Awards-Information-Booklet-for-PNG-Applicants-2016.pdf

Australian Government. (2013). *Aid Program Performance Report 2012 - 2013 Papua New Guinea*. Canberra: Australian Government. Retrieved from http://aid.dfat.gov.au/Publications/Documents/png-appr-2012-13.pdf

Australian Government. (2014). *Papua New Guinea Aid Program Performance Report 2013-2014*. Canberra: Australian Government. Retrieved from http://aid.dfat.gov.au/Publications/Documents/png-appr-2013-14.pdf

Avalos, N., Stuva, V. G., Heal, A., Lida, K., & Okazoe, N. (2015). Papua New Guinea and the natural resource curse. *Comparative Economic Studies, 57*(2), 345-360.

Averting Maternal Death and Disability. (2015). AMDD Brochure.   Retrieved May 2015, from http://www.amddprogram.org/sites/default/files/amddbrochureEn.pdf

Axline, W. A. (1986). *Decentralisation and Development Policy: Provincial government and the planning process in Papua New Guinea* (Vol. 26). Waigani, Papua New Guinea: PNG Institute of Applied Social and Economic Research.

Bailie, R., Matthews, V., Brands, J., & Schierhout, G. (2013). A systems-based partnership learning model for strengthening primary healthcare. *Implementation Science, 8*(1), 143. doi: 10.1186/1748-5908-8-143

Baker, G. R. (2011). The contribution of case study research to knowledge of how to improve quality of care. *BMJ Quality & Safety, 20*(Suppl 1), i30-i35. doi:10.1136/bmjqs.2010.046490

Ball, P. (2004). *Critical mass: how one thing leads to another: being an enquiry into the interplay of chance and necessity in the way that human culture, customs, institutions, cooperation and conflict arise*. London, U.K.: Heinemann.

Bangdiwala, S. I., Fonn, S., Okoye, O., & Tollman, S. (2010). Workforce resources for health in developing countries. *Public Health Reviews, 32*(1), 296-318.

Banks, G., & Scheyvens, R. (2014). Ethical Issues. In R. Scheyvens (Ed.), *Development fieldwork : a practical guide* (2nd ed., pp. 160-187). Los Angeles: London: Sage Publications Ltd.

Baraté, P., & Temmerman, M. (2009). Why do mothers die? The silent tragedy of maternal mortality. *Current Women's Health Reviews, 5*, 230-238.

Barot, S. (2009). Reclaiming the lead: Restoring US leadership in global sexual and reproductive health policy. *Guttmacher Policy Review, 12*(1), 12-17.

Barot, S. (2013). Abortion Restrictions in US Foreign Aid: The History and Harms of the Helms Amendment. *Guttmacher Policy Review, 16*(3)

Barss, P., & Blackford, C. (1985). Grand multiparity: benefits of a referral program for hospital delivery and postpartum tubal ligation. *Papua and New Guinea Medical Journal, 28*(1), 35-39.

Baser, H., & Morgan, P. (2008). *Capacity, change and performance*. Maastricht, Netherlands: European Centre for Development Policy Management.

Bashkar, R. A. (1997). *A Realist Theory of Science*. London, U.K.: Verso.

Bates, I., Boyd, A., Smith, H., & Cole, D. C. (2014). A practical and systematic approach to organisational capacity strengthening for research in the health sector in Africa. *Health Research Policy and Systems, 12*(1), 11. http://www.health-policy-systems.com/content/12/1/11

Bauze, A., Morgan, C., & Kitau, R. (2009). *Papua New Guinea: Developing an Investment Case for Financing Equitable Progress towards MDGs 4 and 5 in the Asia Pacfic Region. Phase 1: Mapping Report*. University of PNG and Burnet Institute.Retrieved from http://www.uq.edu.au/investmentcase/Mapping%20report/ICMappingReport-PNG.pdf

Begun, J. W., Zimmerman, B., & Dooley, K. (2003). Health care organisations as complex adaptive systems. In S. Mick & M. Wyttenbach (Eds.), *Advances in Health Care Organization Theory* (pp. 253 - 288). San Francisco, U.S.A.: Jossey-Bass.

Bell, C., Bignold, V., & Mercardo, R. (1973). The maternal and child health services. In C. Bell (Ed.), *The diseases and health services of Papua New Guinea*. Port Moresby, Papua New Guinea: Department of Health.

Beracochea, E., Gillespie, J., & Heywood, P. (1994). *A report on the interim evaluation of the child survival support project in Papua New Guinea*. Washington, U.S.A.: Office of Financial Aid.Retrieved from http://pdf.usaid.gov/pdf_docs/pdabj142.pdf

Berer, M., & Sundari Ravindran, T. (2000). Preventing maternal mortality: evidence, resources, leadership, action. In M. Berer & T. Sundari Ravindran (Eds.), *Safe Motherhood Initiative: Critical Issues* (pp. 1-7). London, U.K.: Blackwell Science Ltd for Reproductive Health Matters.

Bergström, S., & Goodburn, E. (2001). The role of traditional birth attendants in the reduction of maternal mortality. In V. de Brouwere & W. van Lerberghe (Eds.), *Safe motherhood strategies: a review of the evidence* (pp. 77-95). Antwerp, Belgium: ITG Press.

Bhutta, Z. A., Das, J. K., Bahl, R., Lawn, J. E., Salam, R. A., Paul, V. K., . . . Chou, V. B. (2014). Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost? *The Lancet, 384*(9940), 347-370. doi:10.1016/S0140-6736(14)60792-3

Bhutta, Z. A., Lassi, Z. S., & Mansoor, N. (2010). *Systematic review on human resources for health interventions to improve maternal health outcomes: evidence from developing countries*. Karachi, Pakistan: World Health Organisation.

Biddulph, J. (1993a). Editorial: Maternal Mortality - a continuing tragedy. *Papua and New Guinea Medical Journal, 36*(1), 1-3.

Biddulph, J. (1993b). Priorities for emerging problems in maternal child health in Papua New Guinea. In T. Taufa & C. Bass (Eds.), *Population family health and development: Papers from 19th Waigani Seminar, June 1991* (Vol. Two, pp. 164-175). Port Moresby: University of Papua New Guinea Press.

Birn, A.-E. (2009). The stages of international (global) health: histories of success or successes of history? *Global Public Health, 4*(1), 50-68. doi:10.1080/17441690802017797

Bohren, M. A., Hunter, E. C., Munthe-Kaas, H. M., Souza, J. P., Vogel, J. P., & Gülmezoglu, A. M. (2014). Facilitators and barriers to facility-based delivery in low-and middle-income countries: a qualitative evidence synthesis. *Reproductive Health, 11*(1), 71. doi:10.1186/1742-4755-11-71

Bokeno, M. (2007). Effective (linear) and emergent (nonlinear) mentoring: A practical context for practicing chaos. *Development and Learning in Organizations: An International Journal, 21*(5), 18-20. http://dx.doi.org/10.1108/14777280710779445

Bolger, J., Mandie-Filer, A., & Hauck, V. (2005). *Papua New Guinea's health sector.*: European Centre for Development Policy Management.Retrieved from ftp://ftp.wpro.who.int/scratch/HSD/Service_delivery_profiles/Papua%20New%20Guinea/Resources%20from%20the%20country,%20WHO,%20other%20organizations/PNG's%20Health%20Sector%20EDCPM%202005.pdf

Bolnga, J. W., Hamura, N. N., Umbers, A. J., Rogerson, S. J., & Unger, H. W. (2014). Insights into maternal mortality in Madang Province, Papua New Guinea. *International Journal of Gynecology & Obstetrics, 124*(2), 123-127. http://dx.doi.org/10.1016/j.ijgo.2013.08.012

Boons, F., van Buuren, A., Gerrits, L., & Teisman, G. (2009). Towards an approach of evolutionary public management. In G. Teisman, A. van Buuren & L. Gerrits (Eds.), *Managing complex governance systems* (pp. 231-249). London, U.K.: Routledge.

Bousquet, A., & Curtis, S. (2011). Beyond models and metaphors: complexity theory, systems thinking and international relations. *Cambridge Review of International Affairs, 24*(01), 43-62. doi:10.1080/09557571.2011.558054

Boyd, D., & Ito, K. (1988). Culture and Context: Reproductive decision making in Okapa District, Eastern Highlands Province. In N. McDowell (Ed.), *Reproductive decision making and the value of children in rural Papua New Guinea* (pp. 45-70). Papua New Guinea: Institute of Applied Social and Economic Research.

Bradley, S. C. (1985). Attitudes and practices relating to marital violence among the Tolai of East New Britain. In S. Toft (Ed.), *Domestic violence in Papua New Guinea: Papua New Guinea Law Reform Monograph No. 3* (pp. 32-71). Boroko, Papua New Guinea: Papua New Guinea, Law Reform Commission.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology, 3*(2), 77-101. doi:10.1191/1478088706qp063oa

Brodie, P. (2013, July). *Linking, Strengthening and Supporting - Strategies to Enhance Pacific Midwifery and Improve Women's Health. Brian Spurrett Oration.* Paper presented at the 10th PSRH Pacific Society for Reproductive Health Conference, Samoa. Retrieved from http://www.psrh.org.nz/data2/1_9_2013_3_1_4_R_PSRH_Newsletter_July2013.pdf

Brouwer, E. C., Harris, B. M., Tanaka, S., & the World Bank. (1998). *Gender Analysis in Papua New Guinea* (0821343947). Washington, U.S.A.: World Bank Publications.Retrieved from http://elibrary.worldbank.org.ezproxy.auckland.ac.nz/doi/pdf/10.1596/0-8213-4394-7

de Brouwere, V., Tonglet, R., & van Lerberghe, W. (1998). Strategies for reducing maternal mortality in developing countries: what can we learn from the history of the industrialized West? *Tropical Medicine & International Health, 3*(10), 771-782. 10.1046/j.1365-3156.1998.00310.x

de Brouwere, V., Zinnen, V., & Delvaux, T. (2013). *How to conduct maternal death reviews (MDR). Guidelines and tools for health professionals.* London, U.K.: International Federation of Gynecologists and Obsetricians, FIGO.Retrieved from http://www.figo.org/sites/default/files/uploads/project-publications/LOGIC/VfinalEdited%20MDR%20Guidelines%20final%202014.pdf

de Brouwere, V., Zinnen, V., Delvaux, T., & Leke, R. (2014). Guidelines and tools for organizing and conducting maternal death reviews. *International Journal of Gynecology & Obstetrics, 127*(Supplement 1), s21-s23. http://dx.doi.org/10.1016/j.ijgo.2014.07.006

Bryman, A., & Bell, E. (2011). *Business Research Methods* (3rd ed.). Oxford, U.K.: Oxford University Press.

Buasi, N. (2011). *The Implementation of Providing Support in Labour by a Person of the Birthing Woman's Choice at Port Moresby General Hospital (PMGH) in Papua New Guinea (PNG).* (Degree of Doctor of Midwifery), University of Technology, Sydney.

Buijs, J.-M., Eshuis, J., & Byrne, D. (2009). Approaches to researching complexity in public management *Managing Complex Governance Systems: Dynamics, Self-organization and Coevolution in Public Investments* (pp. 37-55). New York, U.S.A: Routledge.

Burton, J. (2005). Knowing about culture: the handling of social issues at resource projects in Papua New Guinea. In A. Hooper (Ed.), *Culture and Sustainable Development in the Pacific* (pp. 98-110). Canberra, Australian: ANU E Press and Asia Pacific Press. Retrieved from http://press.anu.edu.au/wp-content/uploads/2011/06/whole_book10.pdf

Bustreo, F., Say, L., Koblinsky, M., Pullum, T. W., Temmerman, M., & Pablos-Méndez, A. (2013). Ending preventable maternal deaths: the time is now. *The Lancet Global Health, 1*(4), e176-e177. http://dx.doi.org/10.1016/S2214-109X(13)70059-7

Butcher, K., & Martin, S. (2011). *Independent Progress Report of PNG Australia Sexual Health Improvement Program*. Canberra, Australia: AusAID. Retrieved from http://www.ausaid.gov.au/Publications/Documents/paship-ipr.pdf

Butler, M. J., & Allen, P. M. (2008). Understanding policy implementation processes as self-organizing systems. *Public Management Review, 10*(3), 421-440. doi:10.1080/14719030802002923

Byass, P., & Graham, W. J. (2011). Grappling with uncertainties along the MDG trail. *The Lancet, 378*(9797), 1119-1120. doi:10.1016/s0140-6736(11)61419-0

Byrne, A., & Morgan, C. (2011). *Improving maternal, newborn and child health in Papua New Guinea through family and community health care*. Melbourne, Australia: World Vision, COMPASS women's and children's health knowledge hub, Burnet Institute.Retrieved from http://www.worldvision.com.au/Libraries/3_3_1_Australia_and_the_Pacific_PDF_reports/Policy_Report_-_Family_and_Community_Care_PNG.pdf

Byrne, D. (2005). Complexity, configurations and cases. *Theory, Culture & Society, 22*(5), 95-111. doi:10.1177/0263276405057194

Byrne, D. (2009). Case-Based Methods: Why we need them; what they are; how to do them. In D. S. Byrne & C. C. Ragin (Eds.), *The SAGE handbook of case-based methods* (pp. 1-10). Los Angeles; London: Sage Publications Inc.

Byrne, D., & Callaghan, G. (2014). *Complexity Theory and the Social Sciences: The state of the art*. Oxon, U.K.: Routledge.

Byrne, M. (2011). Sustainabiliy Scholar Jack Liu on Globalization and 'Telecoupling', *Motherboard*. Retrieved from http://motherboard.vice.com/blog/sustainability-scholar-jack-liu-on-globalization-and-telecoupling

Byrom, S., & Downe, S. (2015). *The Roar Behind the Silence: why kindness and compassion and respect matter in maternity care*. Worldwide: Pinter & Martin.

Cahn, M., & Liu, M. (2008). Women and rural livelihood training: a case study from Papua New Guinea. *Gender & Development, 16*(1), 133-146. doi:10.1080/13552070701876342

Cairney, P. (2012). Complexity theory in political science and public policy. *Political Studies Review, 10*(3), 346-358. doi:10.1111/j.1478-9302.2012.00270.x

Cairney, P., & Geyer, R. (2015). Introduction. In R. Geyer & P. Cairney (Eds.), *Handbook on Complexity and Public Policy*. Cheltenham, U.K.: Edward Elgar Publishing Ltd.

Callaghan, G. (2008). Evaluation and Negotiated Order Developing the Application of Complexity Theory. *Evaluation, 14*(4), 399-411. doi: 10.1177/1356389008095485

Campbell, G. (1974). Maternal mortality at Goroka Base Hospital. *Papua and New Guinea Medical Journal, 17*(4), 335-341.

Campbell, J. L. (2001). Institutional analysis and the role of ideas in political economy. In J. L. Campbell & O. K. Pedersen (Eds.), *The rise of neoliberalism and institutional analysis*. New Jersey, U.S.A: Princeton University Press.

Campbell, O. (2001). What are maternal health policies in developing countries and who drives them? A review of the last half-century. *Studies in Health Services Organisation & Policy, 17*, 412-442.

Campbell, O., & Graham, W. J. (2006). Strategies for reducing maternal mortality: getting on with what works. *The Lancet, 368*(9543), 1284 - 1299. http://dx.doi.org/10.1016/S0140-6736(06)69381-1

Campos-Outcalt, D. (1989). Health services in Papua New Guinea. *Public Health, 103*(3), 161-169.

Campos-Outcalt, D., Kewa, K., & Thomason, J. (1995). Decentralization of health services in Western Highlands Province, Papua New Guinea: An attempt to administer health service at the subdistrict level. *Social Science & Medicine, 40*(8), 1091-1098. http://dx.doi.org/10.1016/0277-9536(94)00222-F

Carey, G., & Crammond, B. (2015). Systems change for the social determinants of health. *BMC Public Health, 15*(1), 662. doi:10.1186/s12889-015-1979-8

Carroli, G., Rooney, C., & Villar, J. (2001). How effective is antenatal care in preventing maternal mortality and serious morbidity? An overview of the evidence. *Paediatric and Perinatal Epidemiology, 15*(s1), 1-42. doi: 10.1046/j.1365-3016.2001.00001.x

Cassels, A., & Janovsky, K. (1998). Better health in developing countries: are sector-wide approaches the way of the future? *The Lancet, 352*(9142), 1777-1779. http://dx.doi.org/10.1016/S0140-6736(98)05350-1

Castan-Broto, V., Gislason, M., & Ehlers, M.-H. (2009). Practising interdisciplinarity in the interplay between disciplines: experiences of established researchers. *Environmental Science & Policy, 12*(7), 922-933. doi:10.1016/j.envsci.2009.04.005

Chambers, R. (2006). *Poverty unperceived: traps, biases and agenda*. Brighton, U.K.: University of Sussex.

Chandler, J. (2013). Taim bilong ol meri?: A new agenda in PNG. *Griffith Review*(40), 66.

Chapman, E., Reveiz, L., Sangalang, S., Manu, C., Bonfill, X., Munoz, S., & Abalos, E. (2014). A survey study identified global research priorities for decreasing maternal mortality. *Journal of Clinical Epidemiology, 67*(3), 314-324.

Checkland, P. (1999). *Systems thinking, systems practice: includes a 30-year retrospective*. Chichester, U.K.: John Wiley & Sons.

Chiles, T. H., Meyer, A. D., & Hench, T. J. (2004). Organizational emergence: The origin and transformation of Branson, Missouri's musical theaters. *Organization Science, 15*(5), 499-519. http://dx.doi.org/10.1287/orsc.1040.0095

Choe, S.-A., Kim, J., Kim, S., Park, Y., Kullaya, S. M., & Kim, C.-y. (2015). Do antenatal care visits always contribute to facility-based delivery in Tanzania? A study of repeated cross-sectional data. *Health Policy and Planning*, 1-8. doi:10.1093/heapol/czv054

Cilliers, P. (1998). *Complexity and postmodernism: Understanding complex systems*. London; New York: Routledge.

Cilliers, P. (2000). Rules and complex systems. *Emergence, A Journal of Complexity Issues in Organizations and Management, 2*(3), 40-50. doi:10.1207/S15327000EM0203_04

Cilliers, P. (2001). Boundaries, hierarchies and networks in complex systems. *International Journal of Innovation Management, 5*(2), 135-147.

Cilliers, P. (2002). Why we cannot know complex things completely. *Emergence, 4*(1/2), 77-84. doi:10.1080/15213250.2002.9687736

Cilliers, P. (2005). Complexity, deconstruction and relativism. *Theory, Culture & Society, 22*(5), 255-267. doi: 10.1177/0263276405058052

Cilliers, P. (2013). Understanding Complex Systems. In J. P. Sturmberg & C. M. Martin (Eds.), *Handbook of systems and complexity in health* (pp. 27 - 38). New York: Springer.

Cilliers, P., & Preiser, R. (2010). *Complexity, difference and identity: an ethical perspective*. Dordrecht ; New York: Springer.

Cleland, J., Bernstein, S., Ezeh, A., Faundes, A., Glasier, A., & Innis, J. (2006). Family planning: the unfinished agenda. *The Lancet, 368*(9549), 1810-1827. doi:10.1016/S0140-6736(06)69480-4

Cohen, L., Manion, L., & Morrison, K. (2000). *Research Methods in Education* (5th ed.). London, U.K.: Routledge Falmer.

Collier, P. (2008). *The bottom billion: Why the poorest countries are failing and what can be done about it*. Oxford, U.K.: Oxford University Press.

Commonwealth Local Government Project. (n.d.). The local goverment system in Papua New Guinea. Retrieved 2 July 2013, from http://www.clgfpacific.org/userfiles/3/files/Papa%20New%20Gunea.pdf

de Coning, C. H. (2012). *Complexity, peacebuilding and coherence: implications of complexity for the peacebuilding coherence dilemma.* (Doctor of Applied Ethics PhD), Stellenbosch University, South Africa.

Connell, J. (1997). Health in Papua New Guinea: a Decline in Development. *Australian Geographical Studies, 35*(3), 271-293. doi:10.1111/1467-8470.00027

Connell, J. (2005). *Papua New Guinea: the struggle for development*. Australia: Routledge.

Cook, R. J., Dickens, B. M., & Fathalla, M. F. (2003). *Reproductive health and human rights : integrating medicine, ethics, and law*. Oxford; New York: Clarendon Press.

Cooke-Davies, T., Cicmil, S., Crawford, L., & Richardson, K. (2007). Mapping the strange landscape of complexity theory, and its relationship to project management. *Project Management Journal, 38*(2), 50-61.

Cornia, G. A., Jolly, R., & Stewart, F. (Eds.). (1989). *Adjustment with a human face*. New York, U.S.A: Oxford University Press.

Corrêa, S. (1999). *Implementing ICPD: moving forward in the eye of the storm*. University of the South Pacific, Suva, Fiji: Development Alternatives with Women for a New Era (DAWN).Retrieved from http://www.dawnnet.org/feminist-resources/sites/default/files/articles/implicpd.pdf

Cortez, R., Saadat, S., Chowdhury, S., & Sarker, I. (2014). *Maternal and Child Survival: Findings from five countries experience in addressing maternal and child health challenges*. Washington, U.S.A: World Bank.Retrieved from https://openknowledge.worldbank.org/bitstream/handle/10986/20757/912940WP0Mater00Box385330B00PUBLIC0.pdf?sequence=1

Corti, L., & Thompson, P. (2006). Secondary analysis of archived data. In C. Seale, G. Gobo, J. F. Gubrium & D. Silverman (Eds.), *Qualitative Research Practice* (pp. 297-313). London, U.K.: Sage Publications Inc.

Costa, M., & Sharp, R. (2011). *The Pacific Island Countries Fiji, Papua New Guinea (PNG), Samoa, Solomon Islands, Vanuatu and Tuvalu*. University of South Australia, Australia: Hawke Research Institute.Retrieved from http://w3.unisa.edu.au/hawkeinstitute/research/gender-budgets/documents/pic.pdf

Costello, A., Azad, K., & Barnett, S. (2006). An alternative strategy to reduce maternal mortality. *The Lancet, 368*(9546), 1477-1479. http://dx.doi.org/10.1016/S0140-6736(06)69388-4

Crichlow, R. (2013). Applications of Complex Dynamics: An Approach to Refractory Health Policy Interventions. In J. P. Sturmberg & C. M. Martin (Eds.), *Handbook of Systems and Complexity in Health* (pp. 563-579). NSW, Australia: Springer.

Crowe, S., Cresswell, K., Robertson, A., Huby, G., Avery, A., & Sheikh, A. (2011). The case study approach. *BMC Medical Research Methodology, 11*(1), 100. http://www.biomedcentral.com/1471-2288/11/100

Curry, G. N., Koczberski, G., Lummani, J., Ryan, S., & Bue, V. (2012). Earning a Living in PNG: From Subsistence to a Cash Economy. In M. Robertson (Ed.), *Schooling for Sustainable Development: A Focus on Australia, New Zealand, and the Oceanic Region* (pp. 159-184). London, U.K.: Springer.

Curtis, S., & Riva, M. (2010). Health geographies I: complexity theory and human health. *Progress in Human Geography, 34*(2), 215-223. doi: 10.1177/0309132509336026

Dahl, C. M., & Boss, P. (2005). The use of phenomenology for family therapy research. In D. H. Sprenkle & F. P. Piercy (Eds.), *Research methods in family therapy* (2nd ed., pp. 63-84). New York, U.S.A: Guilford.

Daly, P. (2015). Embedded wisdom or rooted problems? Aid workers' perspectives on local social and political infrastructure in post-tsunami Aceh. *Disasters, 39*(2), 232-257. doi: 10.1111/disa.12105

David, P. A. (1985). Clio and the Economics of QWERTY. *The American economic review, 75*(2), 332-337.

Davies, S. E. (2010). Reproductive Health as a Human Right: A Matter of Access or Provision? *Journal of Human Rights, 9*(4), 387-408. doi:10.1080/14754835.2010.522922

Davis-Floyd, R. (2001). La partera profesional: articulating identity and cultural space for a new kind of midwife in Mexico. *Medical anthropology, 20*(2-3), 185-243.

Davy, C. (2007). Contributing to the wellbeing of primary health care workers in PNG. *Journal of health organization and management, 21*(3), 229-245. http://dx.doi.org/10.1108/14777260710751717

Dawson, A., & Gray, N. (2010). *Human Resources for Health in Maternal, Neonatal and Reproductive Health at the Community Level: A Synthesis of the Literature with a focus on the Asia Pacific Region* Australia: UNSW, Burnet Institute.Retrieved from https://sphcm.med.unsw.edu.au/sites/default/files/sphcm/Centres_and_Units/MNRH_literature_synthesis.pdf

Dawson, A., Howes, T., Gray, N., & Kennedy, E. (2011). *Human resources for health in maternal, neonatal and reproductive health at community level: A profile of Papua New Guinea*. Human Resources for Health Knowledge Hub and Burnet Institute: Sydney, Australia.Retrieved from http://www.hrhhub.unsw.edu.au/HRHweb.nsf/resources/MNRH_PNG-Web.pdf/$file/MNRH_PNG-Web.pdf

Day, B. (2009). The primacy of politics: charting the governance of the Papua New Guinea health system since Independence. *Papua New Guinea Medical Journal, 52*(3/4), 130.

Deleye, C., & Lang, A. (2014). Maternal health development programs: comparing priorities of bilateral and private donors. *BMC international health and human rights, 14*(1), 31. doi:10.1186/s12914-014-0031-x

Denoon, D. (1989). *Public health in Papua New Guinea: Medical possiblity and social contraint, 1884-1984*. Cambridge: Cambridge University Press.

Denoon, D. (2005). *A trial separation : Australia and the decolonisation of Papua New Guinea*. Retrieved from http://press.anu.edu.au?p=185491

Denzin, N. K., & Lincoln, Y. S. (2011). *The Sage handbook of qualitative research* (4th ed.). California, U.S.A.: Sage Publications Inc.

Department for Community Development. (2011). *National Policy for Women and Gender Equality 2011-2015*. Port Moresby, Papua New Guinea: Department for Community Development

Department of National Planning and Monitoring. (2010). *Papua New Guinea – Millennium Development Goals Second National Progress Comprehensive Report for Papua New Guinea, 2010*. Port Moresby, Papua New Guinea: Department of National Planning and Monitoring. Retrieved from http://www.undp.org/content/dam/undp/library/MDG/english/MDG%20Country%20Reports/Papua%20New%20Guinea/MDG%20PNG%20COMPREHENSIVE%20REPORT%202010_Proof_6%20Change_1Feb2012revLB.pdf

Devlin, M. (2010). *Decentralization Without Disintegration: Provincial Government in Papua New Guinea, 1972-1985*. Innovations for Successful Societies. Princeton University. Princeton, U.S.A. Retrieved from http://www.princeton.edu/successfulsocieties/content/data/policy_note/PN_id129/Policy_Note_ID129.pdf

Dia, M. (1996). *Africa's management in the 1990s and beyond: reconciling indigenous and transplanted institutions*. Washington, D.C., U.S.A.: World Bank Publications.

Diamond, J. (2005). *Collapse: How societies choose to fail or succeed*. London, U.K.: Penguin.

Dickson, R. (1993). Proceedings of the national strategy meeting on the health of women in Papua New Guinea. In T. Taufa & C. Bass (Eds.), *Population family health and development: Papers from 19th Waigani Seminar, June 1991*. Port Moresby: University of Papua New Guinea Press.

Downe, S. (2008). *Normal childbirth: Evidence and debate*. London, U.K.: Elsevier Health Sciences.

Duke, T. (2004). Slow but steady progress in child health in Papua New Guinea. *Journal of paediatrics and child health, 40*(12), 659-663. doi: 10.1111/j.1440-1754.2004.00506.x

East New Britain Provincial Administration. (2011). *East New Britain Provincial Strategic Development Plan 2011 - 2021*. East New Britain: Provincial Government

Ebbinghaus, B. (2005). *Can path dependence explain institutional change?: Two approaches applied to welfare state reform*. Cologne, Germany: Max Planck Institute for the Study of Societies.Retrieved from http://edoc.vifapol.de/opus/volltexte/2007/44/pdf/dp05_2.pdf

Edwards, K. (1992). Maternal survival and village delivery [editorial]. *Papua and New Guinea Medical Journal, 35*(2), 79-83.

El-Noush, H., Silver, K. L., Pamba, A. O., & Singer, P. A. (2015). Innovating for women's, children's, and adolescents' health. *BMJ, 351*(Suppl1), 49 - 52. doi: 10.1136/bmj.h4151

Elzinga, G. (2005). Vertical-horizontal synergy of the health workforce. *Bulletin of the World Health Organisation, 83*(4), 241-320.

Emmott, S., Lee, K., Weelen, P., Kawe, W., & Leslie, S. (2009). *CBSC: The Capacity Building Service Centre in Papua New Guinea. Independent Evaluation Report*. Retrieved from http://www.ausaid.gov.au/countries/Documents/cbsc-ier.pdf

England, K. V. (1994). Getting personal: Reflexivity, positionality, and feminist research. *The Professional Geographer, 46*(1), 80-89.

Eoyang, G. H. (2011). Complexity and the dynamics of organizational change. In P. M. Allen, Steve; McKelvey, Bill (Ed.), *The SAGE handbook of complexity and management* (pp. 317-332). Thousand Oaks, U.S.A.: Sage Publications Inc.

Eppel, E., Matheson, A., & Walton, M. (2011). Applying complexity theory to New Zealand public policy: Principles for Practice. *Policy Quarterly, 7*(1), 48-55.

Errington, F., & Gewertz, D. (1993). The triumph of capitalism in East New Britain? A contemporary Papua New Guinean rhetoric of motives. *Oceania, 64*(1), 1-17.

Escobar, A. (1995, 2012). *Encountering development: The making and unmaking of the Third World*. New Jersey, U.S.A: Princeton University Press.

Escobar, A. (2007). 'Post-development' as concept and social practice. In A. Ziai (Ed.), *Exploring post-development : theory and practice, problems and perspectives* (pp. 18-31). London ; New York: Routledge.

Esteva, G. (1992). Development. In W. Sachs (Ed.), *The Development Dictionary: A Guide to Knowledge as Power* (pp. 6-25). London, U.K.: Zed Publishers.

Etherington, K. (2004). *Becoming a reflexive researcher : using our selves in research*. London ; Philadelphia: Jessica Kingsley Publishers.

Eyben, R. (2012). *The hegemony cracked: the power guide to getting care onto the development agenda*. Brighton, U.K.: Institute of Development Studies.

Family Care International. (2015). Saving Women's Lives: The Skilled Care Initiative.   Retrieved April, 2015, from http://www.familycareintl.org/en/issues/35

Farrelly, T., & Nabobo-Baba, U. (2014). Talanoa as empathic apprenticeship. *Asia Pacific Viewpoint, 55*(3), 319-330. doi: 10.1111/apv.12060

Fathalla, M. F. (1997, Aug). *President speech FIGO Congress opening ceremony*. Paper presented at the XV FIGO World Congress of Gynecology and Obstetrics, Copenhagen, Denmark

Fathalla, M. F., Sinding, S. W., Rosenfield, A., & Fathalla, M. (2006). Sexual and reproductive health for all: a call for action. *The Lancet, 368*(9552), 2095-2100. doi:10.1016/S0140-6736(06)69483-X

Fauveau, V., Sherratt, D. R., & Bernis, L., de. (2008). Human resources for maternal health: multi-purpose or specialists. *Human Resources for Health, 6*(1), 21. doi:10.1186/1478-4491-6-21

Feeny, S. (2003). The impact of foreign aid on poverty and human well-being in Papua New Guinea. *Asia Pacific Development Journal, 10*(2), 73.

Feeny, S. (2013). Service delivery and human development in Papua New Guinea: the performance of provincial governments. *Journal of the Asia Pacific Economy, 18*(1), 71-85. doi:10.1080/13547860.2012.742680

Feeny, S., Leach, M., & Scambary, J. (2012). Measuring Attitudes to National Identity and Nation-building in Papua New Guinea. *Political Science, 64*(2), 121-144. doi: 10.1177/0032318712466762

Ferguson, J. (1994). *The anti-politics machine:" development," depoliticization, and bureaucratic power in Lesotho*. Minneapolis, U.S.A.: University of Minnesota Press.

Filer, C. (2011). The Political Construction of a Land Grab in Papua New Guinea *(READ Pacific Discussion Paper 1).* Canberra, Australia: Australian National University, Crawford School of Economics and Government.

Filippi, V., Ronsmans, C., Campbell, O., Graham, W. J., Mills, A., Borghi, J., . . . Osrin, D. (2006). Maternal health in poor countries: the broader context and a call for action. *The Lancet, 368*(9546), 1535-1541. doi:10.1016/S0140-6736(06)69384-7

Fiti-Sinclair, R. (2002). Childbirth in Papua New Guinean villages and in Port Moresby General Hospital. In V. Lukere & M. Jolly (Eds.), *Birthing in the Pacific: beyond tradition and modernity* (pp. 56-78).

Flanagan, P. (2015). PNG growth - the measurement challenge. Retrieved from http://devpolicy.org/png-growth-the-measurement-challenge-20151027/

Fleetwood, S. (2004). An ontology for organisation and management studies. In S. Fleetwood & S. Ackroyd (Eds.), *Critical realist applications in organisation and management studies* (pp. 25-50). London: Routledge.

Fleming, J. R. (1994). What in the world is being done about TBAs? An overview of international and national attitudes to traditional birth attendants. *Midwifery, 10*(3), 142-147.

Foster-Rosales, A. (2010). Maternal Mortality: The eye of the storm. In P. Murthy & C. L. Smith (Eds.), *Women's global health and human rights* (pp. 279 - 286). Sudbury, Mass.: Jones and Bartlett Publishers.

Francis, B. (1999). Rationalisation and professionalisation: a comparison of the transfer of registered nurse education to higher education in Australia and the UK. *Comparative education, 35*(1), 81-96.

Freedman, L. P., Graham, W. J., Brazier, E., Smith, J. M., Ensor, T., Fauveau, V., . . . Agarwal, K. (2007). Practical lessons from global safe motherhood initiatives: time for a new focus on implementation. *The Lancet, 370*(9595), 1383-1391. doi: 10.1016/s0140-6736(07)61581-5

Freedman, L. P., & Kruk, M. E. (2014). Disrespect and abuse of women in childbirth: challenging the global quality and accountability agendas. *The Lancet, 384*(9948), e42-e44. http://dx.doi.org/10.1016/S0140-6736(14)60859-X

Fullerton, J. T., Johnson, P. G., Thompson, J. B., & Vivio, D. (2011). Quality considerations in midwifery pre-service education: exemplars from Africa. *Midwifery, 27*(3), 308-315. doi:10.1016/j.midw.2010.10.011

Gaines, A. D., & Davis-Floyd, R. (2004). On Biomedicine. In C. Ember & M. Ember (Eds.), *Encyclopedia of medical anthropology* (pp. 95-109). Yale, U.S.A.: Springer.

Gaskin, I. M. (2011). *Birth matters: a midwife's manifesta*. New York, U.S.A.: Seven Stories Press.

Gatrell, A. C. (2005). Complexity theory and geographies of health: a critical assessment. *Social Science & Medicine, 60*(12), 2661-2671. doi:10.1016/j.socscimed.2004.11.002

Gazelle District Administration. (2008). *Gazelle District Development Plan: Five Year Plan (2008 - 2012)*. Kerevat, Papua New Guinea: Gazelle District Administation.

Gergen, K. J. (2011). The self as social construction. *Psychological Studies, 56*(1), 108-116. doi: 10.1007/s12646-011-0066-1

Gerrits, L., Marks, P., & van Buuren, A. (2009). Coevolution: A Constant in Non-Linearity. In G. Teisman, A. van Buuren & L. Gerrits (Eds.), *Managing complex governance systems : dynamics, self-organization and coevolution in public investments* (pp. 134 - 153). New York ; London: Routledge.

Geyer, R. (2003). Beyond the Third Way: the science of complexity and the politics of choice. *The British Journal of Politics & International Relations, 5*(2), 237-257. doi: 10.1111/1467-856X.00105

Geyer, R., & Rihani, S. (2010). *Complexity and public policy: a new approach to twenty-first century politics, policy and society*. New York: Routledge.

Gibson, J., & Rozelle, S. (2004). Is it better to be a boy? A disaggregated outlay equivalent analysis of gender bias in Papua New Guinea. *Journal of Development Studies, 40*(4), 115-136. doi: 10.1080/00220380410001673210

Gill, K., Pande, R., & Malhotra, A. (2007). Women deliver for development. *The Lancet, 370*(9595), 1347-1357. doi: 10.1016/s0140-6736(07)61577-3

Glassman, A., & Chalkidou, K. (2012). *Priority-setting in health: building institutions for smarter public spending*. Washington, DC, U.S.A.: Center for Global Development.Retrieved from http://www.cgdev.org/sites/default/files/1426240_file_priority_setting_global_health_FINAL_0.pdf

Global Health Workforce Alliance. (2013). Papua New Guinea.   Retrieved 22 April 2013, from http://www.who.int/workforcealliance/countries/png/en/index.html

Gohar, F., Zyaee, P., & Turkmani, S. (2015, July). *Is Empowerment a Trickle-Down Effect of the Afghanistan Midwifery Education Programme?* Paper presented at the International Confederation of Midwives, Asia Pacific Regional Conference, Yokohama, Japan

Goldin, I., & Mariathasan, M. (2014). *The butterfly defect: How globalization creates systemic risks, and what to do about it*. New Jersey, U.S.A.: Princeton University Press.

Goldstein, J. (2011). Emergence in complex systems. In P. M. Allen, Steve; McKelvey, Bill (Ed.), *The SAGE Handbook of Complexity and Management* (pp. 65-78). London, U.K.: Sage Publications Inc.

Goldstein, J., Hazy, J. K., & Lichtenstein, B. B. (2010). *Complexity and the nexus of leadership: Leveraging nonlinear science to create ecologies of innovation*. New York, U.S.A.: Palgrave Macmillan.

Golson, J., & Gardner, D. S. (1990). Agriculture and Sociopolitical Organization in New Guinea Highlands Prehistory. *Annual Review of Anthropology, 19*, 395-417. doi: 10.2307/2155971

Goodburn, E., & Campbell, O. (2001). Reducing maternal mortality in the developing world: sector-wide approaches may be the key. *BMJ: British Medical Journal, 322*(7291), 917.

Goodburn, E., Chowdhury, M., Gazi, R., Marshall, T., & Graham, W. (2000). Training traditional birth attendants in clean delivery does not prevent postpartum infection. *Health Policy and Planning, 15*(4), 394-399. doi: 10.1093/heapol/15.4.394

Goodin, R. E. (1998). *The theory of institutional design*. Cambridge, U.K.: Cambridge University Press.

Gouy, J. (2009). Papua New Guinea's intergovernmental financing reforms: An assessment. *Pacific Economic Bulletin, 24*(1), 113-129.

Gouy, J., Kapa, J., Mokae, A., & Levantis, T. (2010). Parting with the past: is Papua New Guinea poised to begin a new chapter towards development? *Pacific Economic Bulletin, 25*(1), 1-23.

Government of Australia and Government of Papua New Guinea. (2008). *Partnership for Development between the Government of Australia and the Government of Papua New Guinea*. Retrieved from http://www.ausaid.gov.au/Publications/Documents/png-partnership08.pdf

Government of Papua New Guinea. (1986). *National Health Plan, 1986 – 1990*. Boroko, Papua New Guinea: Government of Papua New Guinea

Government of Papua New Guinea. (1999a, Feb). *Statement by Kappa Yarka Leader of PNG Delegation to ICPD Review Conference*. Paper presented at the Hague Forum, The Netherlands. Retrieved from http://www.un.org/popin/icpd/icpd5/hague/papua.pdf

Government of Papua New Guinea. (1999b). Statement by Mr. Joseph Demas, Acting Director, Office of National Planning. Papua New Guinea's Representative to the United Nations General Assembly Special Session on International Conference on Population and Development (ICPD + 5). New York, U.S.A.: United Nations.

Government of Papua New Guinea. (2000). *National Health Plan 2001 - 2010*. Port Morseby, Papua New Guinea: Government of Papua New Guinea

Government of Papua New Guinea. (2010). *National Health Plan 2011-2020: Back to Basics*. Waigani NCD, Papua New Guinea: National Department of Health

Government of Papua New Guinea. (2011). *National Health Service Standards Volume One*. Waigani, Papua New Guinea: National Department of Health

Government of Papua New Guinea. (2012). *Health Research Policy: A guide to doing health research in Papua New Guinea*. Waigani, Papua New Guinea: National Department of Health.Retrieved from http://www.health.gov.pg/publications/HealthResPolicy.pdf

Government of Papua New Guinea. (2015). *2015 National Budget: Volume 1 Economic and development policies*. Waigani: Government of Papua New Guinea. Retrieved from http://www.treasury.gov.pg/html/national_budget/files/2015/Vol1-Economic%20and%20Development%20Policies.pdf

Grady, D. (2010). Maternal Deaths Decline Sharply Across the Globe, *The New York Times*. Retrieved from http://www.nytimes.com/2010/04/14/health/14births.html?pagewanted=all

Graham, W. J., Ahmed, S., Stanton, C., AbouZahr, C., & Campbell, O. (2008). Measuring maternal mortality: An overview of opportunities and options for developing countries. *BMC Medicine, 6*(1), 12. doi:10.1186/1741-7015-6-12

Graham, W. J., Bell, J. S., & Bullough, C. H. (2001). Can skilled attendance at delivery reduce maternal mortality in developing countries. In V. de Brouwere & W. Van Lerberghe (Eds.), *Safe motherhood strategies: a review of the evidence* (pp. 97-130). Antwerp, Belgium: ITG Press.

Gray, D. E. (2013). *Doing research in the real world* (3rd ed.). London, U.K.: Sage Publications Inc.

Grundy, J., Hoban, E., Allender, S., & Annear, P. (2014). The inter-section of political history and health policy in Asia–The historical foundations for health policy analysis. *Social Science & Medicine, 117*, 150-159. doi:10.1016/j.socscimed.2014.07.047

Gruskin, S., Cottingham, J., Hilber, A. M., Kismodi, E., Lincetto, O., & Roseman, M. J. (2008). Using human rights to improve maternal and neonatal health: History, connections and a proposed practical approach. *Bulletin of the World Health Organization, 86*(8), 589-593.

Guastello, S. J. (1995). *Chaos, catastrophe, and human affairs: Applications of nonlinear dynamics to work, organizations, and social evolution*. New Jersey, U.S.A: Lawrence Erlbaum Assoc.

Guest, G., & McLellan, E. (2003). Distinguishing the Tress from the Forest: Applying Cluster Analysis to Thematic Qualitative Data. In J. Goodwin (Ed.), *Sage Secondary Data Analysis*. London, U.K.: Sage Publications Inc.

Guliani, H., Sepehri, A., & Serieux, J. (2012). What impact does contact with the prenatal care system have on women's use of facility delivery? Evidence from low-income countries. *Social Science & Medicine, 74*(12), 1882-1890. doi:10.1016/j.socscimed.2012.02.008

Gustafsson, B. (2007). *Poverty and informal social safety nets in Papua New Guinea: A literature survey*. NCD, Papua New Guinea: The National Research Institute.

Haggis, T. (2010). Approaching complexity: A commentary on Keshavarz, Nutbeam, Rowling and Khavapour. *Social Science and Medicine, 70*(10), 1475-1477.

Hammar, L. (2008). Fear and loathing in Papua New Guinea. In L. Butt & R. Eves (Eds.), *Making sense of AIDS: Culture, sexuality and power in Melanesia* (pp. 60-79). U.S.A: University of Hawai'i Press.

Hannigan, B. (2013). Connections and consequences in complex systems: Insights from a case study of the emergence and local impact of crisis resolution and home treatment services. *Social Science & Medicine, 93*, 212-219. doi:10.1016/j.socscimed.2011.12.044

Harriss, J. (2002). The case for cross-disciplinary approaches in international development. *World Development, 30*(3), 487-496. doi:10.1016/S0305-750X(01)00115-2

Harvey, S., Blandón, Y., McCaw-Binns, A., Sandino, I., Urbina, L., Rodríguez, C., . . . Djibrina, S. (2007). Are skilled birth attendants really skilled? A measurement method, some disturbing results and a potential way forward. *Bulletin of the World Health Organization, 85*(10), 783-790.

Hasnain, Z., Keefer, P., & Menzies, N. (2014). Formal Rules, Clientelism, and the Allocation of Project Funds across Villages in Papua New Guinea. In B. L. Verena Fritz, Rachel Ort (Ed.), *Problem-Driven Polictical Economy Analysis: The World Bank's Experience* (pp. 211-231). Washington, DC: World Bank.

Hauck, K., & Smith, P. C. (2015). *The Politics of Priority Setting in Health: A Political Economy Perspective*. London, U.K.: Center for Global Development, Imperial College London.Retrieved from http://cgdev.org.488elwb02.blackmesh.com/sites/default/files/hauck-smith-politics-priority-setting-health-wp414.pdf

Hauck, V., Mandie-Filer, A., & Bolger, J. (2005). *Ringing the church bell: The role of churches in governance and public performance in Papua New Guinea. Discussion paper No 57E*. Maastricht, The Netherlands: European Centre for Development Policy Management.

Haynes, P. (2008). Complexity theory and evaluation in public management: A qualitative systems approach. *Public Management Review, 10*(3), 401-419. doi:10.1080/14719030802002766

Health and Social Care Information Centre. (2015). *Compendium of Maternity Statistics, England*. Leeds, England: Health and Social Care Information Centre.Retrieved from http://www.hscic.gov.uk/catalogue/PUB17333/comp-of-mat-stat-2015-rep.pdf

Health Quality & Safety Commission New Zealand. (2014). *Eighth Annual Report of the Perinatal and Maternal Mortality Review Committee: Reporting mortality 2012*. Wellington, New Zealand: Perinatal and Maternal Mortality Review Committee.Retrieved from http://www.hqsc.govt.nz/assets/PMMRC/Publications/eighth-PMMRC-report-June-2014.pdf

Heather, R. (2010). *Applying Kabeer's social relations approach to village health volunteers in rural Papua New Guinea.* (Masters of Development Studies), Victoria University of Wellington, Wellington, New Zealand.

Henderson, L., & Tulloch, J. (2008). Incentives for retaining and motivating health workers in Pacific and Asian countries. *Human Resources for Health, 6*(1), 18. doi:10.1186/1478-4491-6-18

Henn, M., Weinstein, M., & Foard, N. (2006). *A short introduction to social research* (2nd ed.). London, U.K.: Sage Publications Inc.

Heylighen, F., Cilliers, P., & Gershenson, C. (2007). Complexity and philosophy. In J. Bogg & R. Geyer (Eds.), *Complexity, science and society* (pp. 117-134). Oxford: Radcliffe.

Hill, P. (2005). *Sector-Wide Approaches (SWAps) and Maternal and Newborn Health (MNH)*. Brisbane, Australia: Australian Centre for International & Tropical Health & Nutrition, The University of Queensland Retrieved from http://www.researchgate.net/profile/Peter_Hill/publication/43505536_Sector-wide_approaches_(SWAPS)_and_Maternal_and_Newborn_Health_(MNH)/links/0c96053cd9df05c372000000.pdf

Hill, P. S., Buse, K., Brolan, C. E., & Ooms, G. (2014). How can health remain central post-2015 in a sustainable development paradigm? *Globalization and Health, 10*(1), 18. doi:10.1186/1744-8603-10-18

Holmes, W., Wambo, G., Gabong, R., Kavang, E., Luana, S., Sawa, A., . . . Natcli, L. (2011). 'Because it is a joyful thing to carry a baby': involving men in reproductive, maternal and newborn health in East New Britain, Papua New Guinea. *Papua New Guinea Medical Journal, 55*(1-4), 24-34.

Homer, C. (2015, July). *The State of the Pacific Midwifery - Education, Regulation, Association and the Workforce*. Paper presented at the 11th Pacific Society for Reproductive Health Conference, Suva, Fiji

Homer, C., Friberg, I. K., Dias, M. A. B., ten Hoope-Bender, P., Sandall, J., Speciale, A. M., & Bartlett, L. A. (2014). The projected effect of scaling up midwifery. *The Lancet, 384*(9948), 1146-1157. doi: 10.1016/S0140-6736(14)60790-X

ten Hoope-Bender, P., de Bernis, L., Campbell, J., Downe, S., Fauveau, V., Fogstad, H., . . . McFadden, A. (2014). Improvement of maternal and newborn health through midwifery. *The Lancet, 384*(9949), 1226-1235. doi:10.1016/S0140-6736(14)60930-2

ten Hoope-Bender, P., Liljestrand, J., & MacDonagh, S. (2006). Human resources and access to maternal health care. *International Journal of Gynecology & Obstetrics, 94*(3), 226-233. doi:10.1016/j.ijgo.2006.04.003

Houchin, K., & MacLean, D. (2005). Complexity Theory and Strategic Change: an Empirically Informed Critique. *British Journal of Management, 16*(2), 149-166. doi:10.1111/j.1467-8551.2005.00427.x

Howard-Grabman, L. (2000). Bridging the gap between communities and service providers: developing accountability through community mobilisation approaches. *IDS bulletin, 31*(1), 88-96.

Howes, S., Mako, A., Swan, A., Walton, G., Webster, T., & Wiltshire, C. (2014). *A lost decade? Service delivery and reforms in Papua New Guinea 2002 - 2012*. Port Moresby, Papua New Guinea and Canberra, Australia: National Research Institute & ANU Development Policy Centre. Retrieved from http://devpolicy.org/PEPE/PEPE_A_lost_decade_FULL_REPORT.pdf

Hulme, D. (2009). *The Millennium Development Goals (MDGs): a short history of the world's biggest promise*. Manchester, U.K.: University of Manchester.

Hulme, D., & Toye, J. (2006). The case for cross-disciplinary social science research on poverty, inequality and well-being. *Journal of Development Studies, 42*(7), 1085-1107. doi:10.1080/00220380600884050

Hunt, P., & De Mesquita, J. B. (2007). *Reducing Maternal Mortality: The contribution of the right to the highest attainable standard of health*. University of Essex. U.K.: Human rights centre: with UNFPA.

Hunter, B., Berg, M., Lundgren, I., Ólafsdóttir, Ó. Á., & Kirkham, M. (2008). Relationships: the hidden threads in the tapestry of maternity care. *Midwifery, 24*(2), 132-137. doi:10.1016/j.midw.2008.02.003

Hurst, D. K., & Zimmerman, B. (1993). From Life Cycle to Ecocycle: A New Perspective on the Growth, Maturity, Destruction and Renewal of Complex Systems. *Journal of Management Inquiry, 3*(4), 339 - 354.

Independent Expert Review Group. (2014). *A post-2015 Vision: Executive Summary: the third report of the independent Expert Review Group (iERG) on Information and Accountability for Women's*

and Children's health. Geneva, Switzerland: World Health Organisation.Retrieved from
http://www.who.int/woman_child_accountability/ierg/reports/iERG2014-
ExecutiveSummary-EN.pdf?ua=1

Independent State of Papua New Guinea. (1975). *Constitution of the Independent State of Papua New Guinea*. Port Moresby, Papua New Guinea: Government of Papua New Guinea. Retrieved from http://www.wipo.int/wipolex/en/text.jsp?file_id=199188

International Confederation of Midwives. (2011). ICM International Definition of the Midwife. Retrieved November 2012, from http://www.internationalmidwives.org/assets/uploads/documents/Definition%20of%20the%20Midwife%20-%202011.pdf

International Confederation of Midwives. (2013). *Essential Competencies for Basic Midwifery Practice*. International Condederation of Midwives.Retrieved from http://www.internationalmidwives.org/assets/uploads/documents/CoreDocuments/ICM%20Essential%20Competencies%20for%20Basic%20Midwifery%20Practice%202010,%20revised%202013.pdf

International Confederation of Midwives. (2014a). ICM International Definition of the Midwives: Scope of Practice.   Retrieved January 2015, from http://www.internationalmidwives.org/who-we-are/policy-and-practice/icm-international-definition-of-the-midwife/

International Confederation of Midwives. (2014b). *Philosophy and Model of Midwifery Care*. Retrieved from http://www.internationalmidwives.org/assets/uploads/documents/CoreDocuments/CD2005_001%20V2014%20ENG%20Philosophy%20and%20model%20of%20midwifery%20care.pdf

International Labour Organisation. (2008). *Social Health Protection: An ILO strategy towards universal access to health care*. Switzerland: International Labour Office.Retrieved from http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---soc_sec/documents/publication/wcms_secsoc_5956.pdf

Irwin, G. (1992). *The prehistoric exploration and colonisation of the Pacific*. United Kingdom: Cambridge University Press.

Izard, J., & Dugue, M. (2003). *Moving Toward a Sector-Wide Approach: Papua New Guinea, The health sector development program experience*. Manila, Philippines: Asian Development Bank.Retrieved from http://www.adb.org/sites/default/files/publication/29756/health-sector-development-program-png.pdf

Jackson, R. (2010). *(Un)safe routes: Maternal mortality and Ethiopia's development agenda.* (Doctor of Philosophy), Deakin University, Melbourne, Australia. Retrieved from http://dro.deakin.edu.au/eserv/DU:30033063/jackson-unsaferoutes-2010.pdf

James, P., Nadaraiah, Y., Haive, K., & Stead, V. (2012). *Sustainable Communities, Sustainable Development: Other paths for Papua New Guinea*. Honolulu, USA: University of Hawai'i Press.

Jayasuriya, R., Whittaker, M., Halim, G., & Matineau, T. (2012). Rural health workers and their work environment: the role of inter-personal factors on job satisfaction of nurses in rural Papua New Guinea. *BMC Health Services Research, 12*(1), 156. doi:10.1186/1472-6963-12-156

Jervis, R. (1997). Complexity and the analysis of political and social life. *Political science quarterly, 112*(4), 569-593.

Jessop, R. (2003, Nov). *Governance, Governance Failure, and Meta-Governance: Policies, Governance and Innovation for Rural Areas*. Paper presented at the International Seminar, , Universita della Calabria, Arcavacata di Rende, Italy. Retrieved from http://ceses.cuni.cz/CESES-136-version1-3B_Governance_requisite_variety_Jessop_2002.pdf

Johanson, R., Newburn, M., & Macfarlane, A. (2002). Has the medicalisation of childbirth gone too far? *BMJ, 324*(7342), 892-895. http://dx.doi.org/10.1136/bmj.324.7342.892

Johnson, D. J. (1973). Obstetric Services in Papua New Guinea. In J. P. Bell (Ed.), *The diseases and health services of Papua New Guinea : a basis for national health planning* (pp. 486-490). Port Moresby: Department of Public Health.

Johnson, L. (2010). Right to Maternal Health Care: Developing International Human Rights Law to Prevent Maternal Mortality, The. *U. Botswana LJ, 11*, 39-80.

Johnson, R. W. (2011). *Fire Mountains of the Islands*. Canberra, Australia: ANU Press.

Jolly, M. (1994). *Women of the Place: Kastom, colonialism and gender in Vanuatu*. Switzerland: Harwood Academic Publishers.

Jolly, M. (1998). Introduction - Colonial and postcolonial plots in histories of maternities and modernities. In K. Ram & M. Jolly (Eds.), *Maternities and modernities: Colonial and postcolonial experiences in Asia and the Pacific*. Cambridge, U.K.: Cambridge University Press.

Jones, P. (2012). Pacific Urbanisation and the rise of informal settlements: trends and implications from Port Moresby. *Urban Policy and Research, 30*(2), 145-160. doi: 10.1080/08111146.2012.664930

Joseph, N. (2013). *Improving maternal health using participatory action research with women living in rural Papua New Guinea.* (Doctor of Philosophy in Nursing), University of Newcastle, New South Wales, Australia.

JTA International. (2012). Support to Maternal Health in Papua New Guinea.   Retrieved September 2012, from http://www.jtai.com.au/news/support-to-maternal-health-in-papua-new-guinea/

Kaiser, K. (2009). Protecting respondent confidentiality in qualitative research. *Qualitative Health Research, 19*(11), 1632-1641. doi: 10.1177/1049732309350879

Kanbur, R. (2002). Economics, social science and development. *World Development, 30*(3), 477-486. doi:10.1016/S0305-750X(01)00117-6

Kang, N. (2014). Towards middle-range theory building in development research: Comparative (historical) institutional analysis of institutional transplantation. *Progress in Development Studies, 14*(3), 221-235. doi: 10.1177/1464993414521338

Kannampallil, T. G., Schauer, G. F., Cohen, T., & Patel, V. L. (2011). Considering complexity in healthcare systems. *Journal of biomedical informatics, 44*(6), 943-947. doi:10.1016/j.jbi.2011.06.006

Karel, H. S. (1999). VBAs: an alternative obstetric care in rural Papua New Guinea. *Pacific Health Dialog, 6*(2), 326-332.

Kase, P. (2011). Health Sector Policy Priorities and Implementation Challenges *Speech to CIMC National Development Forum*. Waigani, Papua New Guinea: National Parliament.

Kase, P. (2012). *Urgent Circular Instruction NO: 19/2012*. Circular. National Department of Health. Waigani, Papua New Guinea. Retrieved from http://www.rhtu.org.pg/wp-content/uploads/2014/01/C.192013-Mat-death-reporting.pdf

Kauffman, S. (1993). *The origins of order: Self organization and selection in evolution*. U.K.: Oxford University Press.

Kauffman, S. (1995). *At home in the universe: The search for the laws of self-organization and complexity*. Oxford, U.K.: Oxford University Press.

Kavalski, E. (2007). The fifth debate and the emergence of complex international relations theory: notes on the application of complexity theory to the study of international life. *Cambridge Review of International Affairs, 20*(3), 435-454. doi: 10.1080/09557570701574154

Kendall, T. (2015). Critical Maternal Health Knowledge Gaps in Low- and Middle-Income Countries for Post-2015: Researchers' Perspectives, *Working Paper No. 2. Women and Health Initiative*. Boston, U.S.A.: Harvard T.H. Chan School of Public Health.

Kerber, K. J., de Graft-Johnson, J. E., Bhutta, Z. A., Okong, P., Starrs, A., & Lawn, J. E. (2007). Continuum of care for maternal, newborn, and child health: from slogan to service delivery. *The Lancet, 370*(9595), 1358-1369. doi:10.1016/S0140-6736(07)61578-5

Kernick, D. (2006). Wanted—new methodologies for health service research. Is complexity theory the answer? *Family Practice, 23*(3), 385-390. doi: 10.1093/fampra/cml011

Kerr, R. S., & Weeks, A. D. (2015). Lessons from 150 years of UK maternal hemorrhage deaths. *Acta Obstetricia et Gynecologica Scandinavica, 94*(6), 664-668. doi: 10.1111/aogs.12635

Ketan, J. (2013). *Political Governance and Service Delivery in Western Highlands Province, Papua New Guinea*. SSGM Discussion Paper 2013/9. ANU Research School of Pacific and Asian Studies, State, Society and Governance in Melanesia Program. Canberra. Retrieved from http://ips.cap.anu.edu.au/sites/default/files/SSGM-DP-2013-9-Ketan-ONLINE.pdf

Khan, M. (2009). *Evaluation of Maternity Worldwide Gimbie Integration Maternal Health Programme*. Ethiopia: Big Lottery Fund.Retrieved from http://www.maternityworldwide.org/wp-content/uploads/2012/07/Ethiopia-BLF-Evaluation-2009.pdf

Ki-moon, B. (2010). *Global Strategy for Women's and Children's Health*. New York, U.S.A: United Nations.Retrieved from http://www.who.int/pmnch/topics/maternal/20100914_gswch_en.pdf?ua=1

Kickbusch, I. (2000). The development of international health policies—accountability intact? *Social Science & Medicine, 51*(6), 979-989. doi:10.1016/S0277-9536(00)00076-9

Kidu, C. (2009). Maternal Health in Papua New Guinea. In J. Boston (Ed.), *Eliminating World Poverty: Global goals and regional progress* (pp. 179 - 186). Wellington: Victoria University of Wellington Institute of Policy Studies.

King, S., Passey, M., & Dickson, R. (2013). Perceptions and use of maternal health services by women in rural coastal Madang Province. *Papua New Guinea Medical Journal, 56*(1-2), 5.

Kirby, B. (2011). Maternal deaths in PNG. *O&G Magazine, 13*(3), 57-59.

Kirch, P. (2010). Peopling of the Pacific: A holistic anthropological perspective. *Annual Review of Anthropology, 39*, 131-148. doi: 10.1146/annurev.anthro.012809.104936

Kirigia, J. M., Mwabu, G. M., Orem, J. N., & Muthuri, R. D. (2014). Indirect cost of maternal deaths in the WHO African Region in 2010. *BMC Pregnancy and Childbirth, 14*(1), 299. doi:10.1186/1471-2393-14-299

Klijn, E.-H. (2008). Complexity Theory and Public Administration: What's New? *Public Management Review, 10*(3), 299-317. doi: 10.1080/14719030802002675

Kloos, H. (1998). Primary Health Care in Ethiopia: From Haile Sellassie to Meles Zenawi. *Northeast African Studies, 5*(1), 83-113. http://www.jstor.org/stable/41931184

Knox, S., & Burkard, A. W. (2009). Qualitative research interviews. *Psychotherapy Research, 19*(4-5), 566-575. doi:10.1080/10503300802702105

Koblinsky, M., & Campbell, O. (2003). Factors affecting the reduction of maternal mortality. *Reducing maternal mortality: learning from Bolivia, China, Egypt, Honduras, Indonesia, Jamaica, and Zimbabwe. Washington, DC: The World Bank*, 5-37.

Koblinsky, M., Timyan, J., & Gay, J. (1993). *The health of women: a global perspective*. Boulder, U.S.A.: Westview Press.

Kokopo District Administration. (2008). *Kokopo District 5 year Development Plan (2008 - 2010)*. Kokopo, Papua New Guinea: Kokopo District Adminstration.

Kolehmainen-Aitken, R.-L. (1991). Decentralization and health workforce development. In J. Thomason, W. C. Newbrander & R.-L. Kolehmainen-Aitken (Eds.), *Decentralization in a developing country : the experience of Papua New Guinea and its health service* (pp. 101-117). Canberra: National Centre for Development Studies, Australian National University.

Kolehmainen-Aitken, R.-L. (1992). The impact of decentralization on health workforce development in Papua New Guinea. *Public Administration and Development, 12*(2), 175-191.

Kolehmainen-Aitken, R.-L. (2004). Decentralization's impact on the health workforce: Perspectives of managers, workers and national leaders. *Human Resources for Health, 2*(5), 1-11. doi:10.1186/1478-4491-2-5

Kovács, G., & Spens, K. M. (2005). Abductive reasoning in logistics research. *International Journal of Physical Distribution & Logistics Management, 35*(2), 132-144. http://dx.doi.org/10.1108/09600030510590318

Kruske, S. (2006). *Papua New Guinea Midwifery Education Review: Final Report.* Australia: Charles Darwin University. Retrieved from http://www.cdu.edu.au/sites/default/files/nursing/documents/pngmidwiveryreviewfinalrepo rt.pdf

Kuczynski, L., & Daly, K. (2003). Qualitative methods as inductive (theory generating) research: psychological and sociological approaches. In L. Kuczynski (Ed.), *Handbook of dynamics in parent-child relations* (pp. 373 - 392). Thousand Oaks, California, U.S.A.: Sage Publications Inc.

Kuhn, L. (2008). Complexity and Educational Research: A critical reflection. *Educational Philosophy & Theory, 40*(1), 177-189. doi: 10.1111/j.1469-5812.2007.00398.x

Kuhn, L. (2009). *Adventures in complexity: For organisations near the edge of chaos*. Devon, U.K.: Triarchy Press Limited.

Kuhn, L., Woog, R., & Salner, M. (2011). Utilizing Complexity for Epistemological Development. *World Futures: The Journal of New Paradigm Research, 67*(4-5), 253-265. doi: 10.1080/02604027.2011.585886

Kura, S., Vince, J., & Crouch-Chivers, P. (2013). Male involvement in sexual and reproductive health in the Mendi district, Southern Highlands Province of Papua New Guinea: a descriptive study. *Reproductive Health, 10*, 46. doi:10.1186/1742-4755-10-46

Kwa, E. (1999). Provincial government reforms and the plight of the Motu Koitabu people. In H. Gaudi (Ed.), *Partners in coastal development: the Motu Koitabu people of Papua New Guinea*. Apia, Samoa: UNESCO Apia Office.

L'Engle, M. (1963). *A Wrinkle in Time*. U.S.: Farrar, Straus & Giroux.

de Laine, M. (1997). *Ethnograpy: Theory and Applications in health research*. Sydney, Australia: MacLennan & Petty.

Land, T., & Hauck, V. (2003). *Building coherence between sector reforms and decentralisation: do SWAps provide the missing link?* Maastricht, the Netherlands: European Centre for Development Policy Management.

Land, T., Hauck, V., & Baser, H. (2009). *Capacity Change and Performance: Capacity development: between planned interventions and emergent processes: implications for development cooperation*. Maastricht, The Netherlands: European Centre for Development Policy Management. Retrieved from http://api.ning.com/files/olhoMvSOMBXRuY2uiIhZaE7VgQ*VGKQFVA2A8rRMCpqirYZkv8t0Q 8ok2ujhe4I432STIa9kRzphqv24sZr-20hg*mhgDAL1/Day1Session2Levy.pdf

Lane, S. D. (1994). From population control to reproductive health: an emerging policy agenda. *Social Science & Medicine, 39*(9), 1303-1314.

Lange, M. M. (2011). Progress. In E. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Vol. Spring Edition). Stanford, U.S.A.: Standford University.

Langer, A., Meleis, A., Knaul, F. M., Atun, R., Aran, M., Arreola-Ornelas, H., . . . Frenk, J. (2015). Women and Health: the key for sustainable development. *The Lancet, 386*(9999), 1165-1210. doi: 10.1016/S0140-6736(15)60497-4

Lanham, H. J., Leykum, L. K., Taylor, B. S., McCannon, C. J., Lindberg, C., & Lester, R. T. (2013). How complexity science can inform scale-up and spread in health care: understanding the role of self-organization in variation across local contexts. *Social Science & Medicine, 93*, 194-202. doi: 10.1016/j.socscimed.2012.05.040

Larcom, S. (2015). *Legal Dissonance: The Interaction of Criminal Law and Customary Law in Papua New Guinea*. New York, U.S.A.: Berghahn Books.

Leavesley, M. G., Bird, M. I., Fifield, L. K., Hausladen, P. A., Santos, G. M., & Tada, M. L. d. (2002). Buang Merabak: Early Evidence for Human Occupation in the Bismarck Archipelago, Papua New Guinea. *Australian Archaeology*(54), 55-57. doi: 10.2307/40287575

Leifer, R. (1989). Understanding organizational transformation using a dissipative structure model. *Human Relations, 42*(10), 899-916.

Leiter, M. (1995). *A trip report on the evaluation of the ten step check system for all sick children: A child survival intervention developed and implemented by the Child Survival Suppport Project*. Manila, Phillipines: U.S. Agency for International Development.Retrieved from http://pdf.usaid.gov/pdf_docs/pdabl040.pdf

van Lerberghe, W., & de Brouwere, V. (2000). Of blind alleys and things that have worked: history's lessons on reducing maternal mortality. In V. de Brouwere & W. van Lerberghe (Eds.), *Safe motherhood strategies: a review of the evidence* (pp. 7-35). Antwerp, Belgium: ITG Press.

van Lerberghe, W., Matthews, Z., Achadi, E., Ancona, C., Campbell, J., Channon, A., . . . Fogstad, H. (2014). Country experience with strengthening of health systems and deployment of midwives in countries with high maternal mortality. *The Lancet, 384*(9949), 1215-1225. doi: 10.1016/S0140-6736(14)60919-3

Levy, D. L. (2000). Applications and limitations of complexity theory in organization theory and strategy. *Public Administration and Public Policy, 79*, 67-88.

Lewin, R. (2000). *Complexity*. Chicago, U.S.A.: University of Chicago Press.

Lewis, C. S. (1955). *The Magician's Nephew*. England: The Bodley Head.

Lewis, G. (2003). Beyond the Numbers: reviewing maternal deaths and complications to make pregnancy safer. *British Medical Bulletin, 67*(1), 27-37. doi: 10.1093/bmb/ldg009

Liamputtong, P. (2008). Doing research in a cross-cultural context: Methodological and ethical challenges. In P. Liamputtong (Ed.), *Doing cross-cultural research* (pp. 3-20). Netherlands: Springer.

Liamputtong, P., & Ezzy, D. (2005). *Qualitative Research Methods* (2nd ed.). South Melbourne, Victoria: Oxford University Press.

Lichtenstein, B. B., & McKelvey, B. (2011). Four types of emergence: a typology of complexity and its implications for a science of management. *International Journal of Complexity in Leadership and Management, 1*(4), 339-378. doi: 10.1504/IJCLM.2011.046439

Lipsky, M. (2010). *Street-level bureaucracy, 30th Ann. Ed: Dilemmas of the individual in public services*. New York: Russell Sage Foundation.

Lipu, J. (2013). *Registration of Double Major Graduates from 2005 - 2009*. Department of Health, National Health policy & coporate services division. Unpublished Letter. Retrieved from http://www.rhtu.org.pg/wp-content/uploads/2014/01/C-re-Registn-as-Midwives-of-Dble-Major-Grads-2005-2009.pdf

van Lonkhuijzen, L., Dijkman, A., van Roosmalen, J., Zeeman, G., & Scherpbier, A. (2010). A systematic review of the effectiveness of training in emergency obstetric care in low-resource environments. *BJOG: An International Journal of Obstetrics & Gynaecology, 117*(7), 777-787. doi: 10.1111/j.1471-0528.2010.02561.x

Lopes, C. (2002). Should we mind the gap? In S. Fukuda-Parr & C. Lopes (Eds.), *Capacity for development: new solutions to old problems* (pp. 121-146). New York, U.S.A.: Earthscan Publications Ltd.

Lopes, C. (2003). Does the New Development Agenda Encapsulate Real Policy Dialogue? In J. Olsson & L. Wohlgemuth (Eds.), *Dialogue in Pursuit of Development* (pp. 39-52). Sweden: The Nordic Africa Institute.

Luker, V. (2008). Papua New Guinea: Epidemiological transition, public health and the Pacific. In M. J. Lewis & K. L. MacPherson (Eds.), *Public Health in Asia and the Pacific: Historical and comparative perspectives* (pp. 250-275). Oxon, U.K.: Routledge.

Luker, V. (2013). The double disease burden in Papua New Guinea. In M. J. Lewis & K. L. Macpherson (Eds.), *Health transitions and the double disease burden in Asia and the Pacific: histories of responses to non-communicable and communicable diseases* (pp. 252 - 278). London: Routledge.

Lule, E., Ramana, G., Ooman, N., Epp, J., Huntington, D., & Rosen, J. E. (2005). *Achieving the millennium development goal of improving maternal health: determinants, interventions and challenges*. Washington, U.S.A.: The World Bank.Retrieved from http://siteresources.worldbank.org/HEALTHNUTRITIONANDPOPULATION/Resources/281627-1095698140167/LuleAchievingtheMDGFinal.pdf

Lyon, P. (2009). *A Brief Account of Capacity Development in AusAID, 2004-2009*. Canberra: Australian Agency for International Development

Macfarlane, J. E. (2009). Common themes in the literature on traditional medicine in Papua New Guinea. *Papua New Guinea Medical Journal, 52*(1-2), 44-53.

Macinko, J., Starfield, B., & Shi, L. (2003). The contribution of primary care systems to health outcomes within Organization for Economic Cooperation and Development (OECD) countries, 1970–1998. *Health Services Research, 38*(3), 831-865. doi: 10.1111/1475-6773.00149

Macintyre, M. (2004). 'Thoroughly modern mothers': Maternal aspirations and declining mortality on Lihir Island, Papua New Guinea. *Health Sociology Review, 13*(1), 43-53. doi: 10.5172/hesr.13.1.43

MacPherson, S. (1980). *The Development of Basic Health Services in Papua New Guinea, with particular reference to the Southern Highlands Province.* (Doctor of Philosophy), University of Nottingham, Nottingham, U.K. Retrieved from http://eprints.nottingham.ac.uk/13992/1/276953.pdf

Maguire, S., Allen, P., & McKelvey, B. (2011). Complexity and management: Introducing the SAGE handbook *The SAGE handbook of complexity and management* (pp. 1-26). Thousand Oaks, California, U.S.A.: Sage Publications Inc.

Mahoney, J. (2000). Path dependence in historical sociology. *Theory and Society, 29*(4), 507-548. doi: 10.1023/A:1007113830879

Maine, D. (2007). Detours and shortcuts on the road to maternal mortality reduction. *The Lancet, 370*(9595), 1380-1382. http://dx.doi.org/10.1016/S0140-6736(07)61580-3

Maine, D., & Rosenfield, A. (1999). The Safe Motherhood Initiative: why has it stalled? *American Journal of Public Health, 89*(4), 480-482. doi: 10.2105/AJPH.89.4.480

Maisonneuve, G. (2006). The women's movement in Papua New Guinea as a vehicle to enhance women's participation in development. *Contemporary PNG Studies: DWU Research Journal, 4*, 10-30.

Makowiecka, K., Achadi, E., Izati, Y., & Ronsmans, C. (2008). Midwifery provision in two districts in Indonesia: how well are rural areas served? *Health Policy and Planning, 23*(1), 67-75. doi: 10.1093/heapol/czm036

Mapira, P., & Morgan, C. (2010). The contribution of church health services to maternal health care provision in Papua New Guinea. *Papua New Guinea Medical Journal, 54*(3-4), 139-146.

Maraga, S., Namosha, E., Gouda, H., Vallely, L., Rare, L., & Phuanukoonnon, S. (2011). Sociodemographic factors associated with maternal health care utilization in Wosera, East Sepik Province, Papua New Guinea. *Papua New Guinea Medical Journal, 54*(3/4), 154.

Martin, K. (2013). *The death of the big men and the rise of the big shots: custom and conflict in East New Britain* (Vol. 3). Oxford; New York: Berghahn books.

Mason, M. (2008). What Is Complexity Theory and What Are Its Implications for Educational Change? *Educational Philosophy and Theory, 40*(1), 35-49. doi:10.1111/j.1469-5812.2007.00413.x

Maxwell, J. A. (2013). *Qualitative research design : an interactive approach* (3rd ed.). Thousand Oaks, U.S.A.: Sage Publications Inc.

May, R. J. (2003). Turbulence and Reform in Papua New Guinea. *Journal of Democracy, 14*(1), 154-165.

May, R. J. (2009). Policy making on Decentralization. In R. J. May (Ed.), *Policy Making and Implementation: Studies from Papua New Guinea* (pp. 203 - 232). Australia: ANU E Press.

May, R. J. (2016). Papua New Guinea in 2015: A year of complexitites. *Asian Survey, 56*(1), 123-128. doi: 10.1525/AS.2016.56.1.123.

McConville, F. (2015, July). *Quality of Care in Midwifery Services: Latest evidence, tools and materials*. Paper presented at the International Confederation of Midwives, Asia Pacific Regional Conference, Yokohama, Japan

McDonagh, M., & Goodburn, E. (2001). Maternal health and health sector reform: opportunities and challenges. In V. de Brouwere & W. van Lerberghe (Eds.), *Safe motherhood strategies: a review of the evidence* (pp. 367-382). Antwerp, Belgium: ITG Press.

McDowell, N. (1988). Reproductive Decision Making and the Value of Children in Traditional Papua New Guinea. In N. McDowell (Ed.), *Reproductive Decision Making and the Value of Children in Rural Papua New Guinea* (Vol. Monograph 27, pp. 9-43). Boroko: Papua New Guinea: Papua New Guinea Institute of Applied Social & Economic Research.

McIntyre, D., & Klugman, B. (2003). The human face of decentralisation and integration of health services: experience from South Africa. *Reproductive Health Matters, 11*(21), 108-119. doi:10.1016/S0968-8080(03)02166-9

McKelvey, B. (1997). Perspective-quasi-natural organisation science. *Organisation Science, 8*(4), 351-380.

McKelvey, B. (2003). Emergent order in firms: Complexity science vs. the entanglement trap. In E. Mitleton-Kelly (Ed.), *Complex Systems and Evolutionary Perspectives of Organisations: Applications of Complexity Theory to Organisations* (pp. 99-126). Bingley, U.K.: Emerald Group Publishing Ltd.

McNee, A. (2011). Improving maternal and child health in PNG: The issue is not what to do, but how to do it. Retrieved from http://devpolicy.org/improving-maternal-and-child-health-in-png-the-issue-is-not-what-to-do-but-how-to-do-it20111205/

McNee, A. (2012a). Illuminating the local: can non-formal institutions be complementary to health system development in Papua New Guinea? Australian National University: Crawford School of Public Policy.

McNee, A. (2012b). *Rethinking Health Sector Wide Approaches through the lens of aid effectiveness*. Retrieved from https://devpolicy.anu.edu.au/pdf/papers/DP_14_-_Rethinking_health_sector_wide_approaches_through_the_lens_of_aid_effectiveness.pdf

McPherson, N. (1994). Modern Obstetrics In A Rural Setting: Women And Reproduction In Northwest New Britain. *Urban Anthropology and Studies of Cultural Systems and World Economic Development, 23*(1), 39-72.

McPherson, N. (2012). Black and Blue: Shades of Violence in West New Britain, PNG. In M. Jolly & C. Stewart (Eds.), *Engendering Violence in Papua New Guinea* (pp. 47-72). Canberra, Australia: ANU E Press.

Meadowcroft, J. (2007). Who is in charge here? Governance for sustainable development in a complex world. *Journal of Environmental Policy & Planning, 9*(3-4), 299-314. doi: 10.1080/15239080701631544

Meadows, D. (1999). Leverage Points: Places to intervene in a system. Hartland, VT, U.S.A: The Sustainability Institute.

Mellam, A., & Aloi, D. (2003). *Transparency International Country Study Report: Papua New Guinea 2003*. Berlin, Germany: Transparency International

Melua, R. (2011). *Exploring the use of the Maternal Waiting House (MWH) in Keiruku-Hiri, Central Province : a study in Papua New Guinea.* (Master of Pulic Health Masters), University of Auckland, Auckland.

Mercer, J. S., & Skovgaard, R. L. (2002). Neonatal transitional physiology: a new paradigm. *The Journal of Perinatal & Neonatal Nursing, 15*(4), 56-75.

Merrett-Balkos, L. (1998). Just add water: remaking women through childbirth, Anganen, Southern Highlands, Papua New Guinea. In K. Ram & M. Jolly (Eds.), *Maternities and modernities: colonial and postcolonial experiences in Asia and the Pacific* (pp. 213-238). Cambridge, U.K.: Cambridge University Press.

Midwifery Council of New Zealand. (2011). *Statement on Cultural Competence for midwives*. Wellington, New Zealand: Midwifery Council of New Zealand.Retrieved from http://www.midwiferycouncil.health.nz/images/stories/pdf/cultural%20competence%20statement.pdf

Miller, W. L., Crabtree, B. F., McDaniel, R., & Stange, K. C. (1998). Understanding change in primary care practice using complexity theory. *The Journal of Family Practice, 46*(5), 369.

Milliez, J. (2009). Rights to safe motherhood and new-born health: Ethical issues. *International Journal of Gynecology & Obstetrics, 106*(2), 110-111. doi: 10.1016/j.ijgo.2009.03.019

Mingers, J. (2011). The contribution of systemic thought to critical realism. *Journal of Critical Realism, 10*(3), 303-330. http://dx.doi.org/10.1558/jcr.v10i3.303

Mingers, J., & White, L. (2010). A review of the recent contribution of systems thinking to operational research and management science. *European Journal of Operational Research, 207*(3), 1147-1161. doi:10.1016/j.ejor.2009.12.019

Mitleton-Kelly, E. (2003a). Complexity research-approaches and methods: The LSE Complexity Group integrated methodology. In A. Keskinen, M. Aaltonen & E. Mitleton-Kelly (Eds.), *Organisational Complexity* (pp. 56 - 77). Helsinki, Finland: Finland Futures Research Centre, Turku School of Economics and Business Administration.

Mitleton-Kelly, E. (2003b). Ten principles of complexity and enabling infrastructures. In E. Mitleton-Kelly (Ed.), *Complex Systems and Evolutionary Perspectives on Organisations: The application of complexity theory to organisations*. Oxford, U.K.: Elsevier Science Ltd.

Mitleton-Kelly, E. (2006). A complexity approach to co-creating an innovative environment. *World Futures: The Journal of New Paradigm Research, 62*(3), 223-239. doi: 10.1080/02604020500509553

Mitleton-Kelly, E. (2015). Effective policy making: addressing apparently intractable problems. In R. Geyer & P. Cairney (Eds.), *Handbook on complexity and public policy* (pp. 111 - 130). Cheltenham, U.K.: Edward Elgar Publishing.

Mohmand, K. A. (2013). *Community Midwifery Education Program in Afghanistan*. Washington, U.S.A: World Bank.Retrieved from https://openknowledge.worldbank.org/bitstream/handle/10986/18701/870760WP0Box030fery0Education0FINAL.pdf?sequence=1

Mola, G. (1989). Maternal death in Papua New Guinea, 1984-1986. *Papua and New Guinea Medical Journal, 32*(1), 27-31.

Mola, G., & Aitken, I. (1984). Maternal mortality in Papua New Guinea 1976-1983. *Papua and New Guinea Medical Journal, 27*(2), 65.

Mola, G., & Kirby, B. (2013). Discrepancies between national maternal mortality data and international estimates: the experience of Papua New Guinea. *Reproductive Health Matters, 21*(42), 191-202. http://dx.doi.org/10.1016/S0968-8080(13)42725-8

Moore, C. (2003). *New Guinea: Crossing boundaries and history*. USA: University of Hawaii Press.

Moraitis, C. (2007). Speech by the Australian High Commissioner at the official launch of the PNG Australia Sexual Health Improvement Program. Waigani, Port Moresby: Australian High Commission, Papua New Guinea.

Morçöl, G. (2012). *A complexity theory for public policy*. New York, U.S.A.: Routledge.

Morçöl, G. (2014). Complex Governance Networks: An Assessment of the Advances and Prospects. *Complexity, Governance & Networks, 1*(1), 1-12. doi: 10.7564/14-CGN5

Morgan, G. (2006). *Images of organization*. California, U.S.A.: Sage Publications Inc.

Morgan, P. (2005). *The idea and practice of systems thinking and their relevance for capacity development*. Maastricht, the Netherlands: European Centre for Development Policy Management.Retrieved from http://www.ecdpm.org/Web_ECDPM/Web/Content/Navigation.nsf/index2?readform&http://www.ecdpm.org/Web_ECDPM/Web/Content/Content.nsf/0/55508ad7813bc1b7c12570c000496e82?OpenDocument

Morin, E. (2007). Restricted complexity, general complexity. In C. Gershenson, D. Aerts & B. Edmonds (Eds.), *Worldviews, science and us: Philosophy and complexity.* (pp. 5-29). Singapore: World Scientific.

Morris, I. (2011). *Why the west rules-for now: The patterns of history, and what they reveal about the future*. London, U.K.: Random House

Morrison, K. (2010). Complexity theory, school leadership and management: questions for theory and practice. *Educational Management Administration & Leadership, 38*(3), 374-393. doi: 10.1177/1741143209359711

Muecke, S. (2005). Effects of rotating night shifts: literature review. *Journal of Advanced Nursing, 50*(4), 433-439. doi: 10.1111/j.1365-2648.2005.03409.x.

Nabobo-Baba, U. (2008). Decolonising framings in Pacificresearch: Indigenous Fijian Vanua Research Frame-work as an organic response. *AlterNative: An International Journal of Indigenous Peoples, 4*(2), 140-154.

National AIDS Council. (2006). *National Strategic Plan on HIV/AIDS*. Port Moresby, Papua New Guinea: National AIDS Council.Retrieved from http://pharmacy.utah.edu/ICBG/pdf/WebResources/HIVandNationalAidsCouncilpublications/Papua_New_Guinea_National_Strategic_Plan_on_HIV_AIDS_2006-2010.pdf

National Department of Health. (2009a). *Child Health Policy and Plan 2009-2020*. Port Moresby, Papua New Guinea: National Department of Health

National Department of Health. (2009b). *Ministerial Taskforce on Maternal Health in Papua New Guinea.* Port Moresby: Government of Papua New Guinea. Retrieved from http://www.unfpa.org/sowmy/resources/docs/library/R149_DOH_PNGUINEA_2009_Ministerial_Taskforce_report_final_version_3.pdf

National Department of Health. (2011a). *National Health Service Standards for Papua New Guinea 2011-2020, Volume One*. Port Moresby: Government of Papua New Guinea

National Department of Health. (2011b). *National Tuberculosis Management Protocol*. Port Moresby, Papua New Guinea: National Department of Health.Retrieved from http://www.adi.org.au/wp-content/uploads/2013/07/2011_NDOH_National-TB-Treatment-Protocol.pdf

National Department of Health. (2013a). *Health Sector Human Resource Policy*. Port Moresby, Papua New Guinea: National Department of Health. Retrieved from http://www.health.gov.pg/publications/HRH%20fP_IG_2014.pdf

National Department of Health. (2013b). *Health Workforce 'Enhancement Plan' 2013 – 2016, Volume 1*. Port Moresby, Papua New Guinea: National Department of Health. Retrieved from http://www.health.gov.pg/publications/SEV_One.pdf

National Department of Health. (2013c). *Maternal Mortality in Papua New Guinea: The stories BEYOND the numbers*. Port Moresby, Papua New Guinea: National Department of Health and World Health Organisation.

National Department of Health. (2013d). *National Health Service Standards Tool Kit for Districts Rural Health Services: Levels 1-4 in Papua New Guinea: ' Targeted investment in improving service delivery to people living in the rural areas'*. Port Moresby, Papua New Guinea: Government of Papua New Guinea

National Department of Health. (2013e). *PNG Community Health Post Policy: February 2013*. Port Moresby, Papua New Guinea: National Department of Health

National Department of Health. (2013f). *Supporting Evidence to the Arrest Plan 2013 – 2016*. Port Moresby, Papua New Guinea: National Department of Health. Retrieved from http://www.health.gov.pg/publications/V2%203rd_2013.pdf

National Department of Health. (2013g). *Supporting Evident Document to the Health Workforce 'Enhancement Plan' 2013-2016, Volume 2*. Port Moresby, Papua New Guinea: National Department of Health. Retrieved from http://www.health.gov.pg/publications/SEV_Two.pdf

National Department of Health. (2014a). *National Malaria Control Strategic Plan 2014 - 2018*. Waigani: National Department of Health

National Department of Health. (2014b). *National Sexual & Reproductive Health Policy*. Port Moresby, Papua New Guinea: National Department of Health. Retrieved from http://www.rhtu.org.pg/wp-content/uploads/2013/02/National_SRH_Policy_June_2014.pdf

National Health Information System. (n.d.). *Maternal Mortality Register: Maternal Mortality Reporting Form*. Department of Health. Port Moresby, Papua New Guinea.

National HIV/AIDS Support Project. (2005). *East New Britain Province: Social Mapping Project*. Port Moresby, Papua New Guinea: National AIDS Council.Retrieved from http://www.crr.unsw.edu.au/media/File/ENB_Report.pdf

National Research Institute. (2010). *Papua New Guinea District and Provincial Profiles*. Port Moresby, Papua New Guinea: National Research Institute.Retrieved from http://www.nri.org.pg/research_divisions/cross_divisional_projects/Web%20Version%20Profiles%20Report%2020140410.pdf

National Statistical Office of Papua New Guinea. (1996). Demographic Health Survey: Health Statistics. Retrieved May 2015, from http://www.spc.int/prism/country/pg/stats/Pop_Soc_%20Stats/Social/Health/health.htm

National Statistical Office of Papua New Guinea. (2009). *Demographic and Health Survey 2006: National Report*. Port Moresby, Papua New Guinea: National Statistical Office. Retrieved from http://www.phtpacific.org/sites/default/files/surveys_dev_reports/90/files/PNG_DemographicHealthSurvey-2006_2009-07_GoPNG.pdf

National Statistical Office of Papua New Guinea. (2012). *Preliminary Figures Papua New Guinea Census 2011*. Port Moresby, Papua New Guinea: National Statistical Office. Retrieved from https://spmt.files.wordpress.com/2010/09/preliminary-figures-census-2011-1.pdf

National Statistical Office of Papua New Guinea. (2014). *Final Figures Papua New Guinea National Population and Housing Census 2011*. Port Moresby, Papua New Guinea: National Statistical Office

National Strategic Plan Taskforce. (2009). *Papua New Guinea Vision 2050*. Port Moresby, Papua New Guinea: Government of Papua New Guinea. Retrieved from http://www.treasury.gov.pg/html/publications/files/pub_files/2011/2011.png.vision.2050.pdf

Negin, J. (2010). Sector-Wide Approaches for health: an introduction to SWAps and their implementation in the Pacific region. *Health Policy and Health Finance Knowledge Hub* (Vol. 2). Sydney School of Public Health and Menzies Centre for Health Policy: University of Sydney, Australia.

Nelson, H. (2000). Liberation: the end of Australian rule in Papua New Guinea. *Journal of Pacific History, 35*(3), 269-280.

Nembou, C. (2013). Amalgamation and affiliation in higher education in Papua New Guinea: The Divine Word University experience. *Contemporary PNG Studies: DWU Research Journal, 18*, 70-81.

Nessa, S. (1995). Training of traditional birth attendants: success and failure in Bangladesh. *International Journal of Gynecology & Obstetrics, 50*, S135-S139.

New Zealand Aid Programme. (2015). Indicative programme allocations 2012/13 - 2014/15. Retrieved May 2015, from http://www.aid.govt.nz/about-aid-programme/aid-statistics/aid-allocations-201213-201415

New Zealand College of Midwives. (2015). *Midwives handbook for practice*. Christchurch, New Zealand: New Zealand College of Midwives

Nichol, R. (2011). *Growing up indigenous: developing effective pedagogy for education and development*. Rotterdam; Boston: Sense Publishers.

Norberg, J., & Cumming, G. S. (2008). Scale and Complex Systems. In J. Norberg & G. S. Cumming (Eds.), *Complexity theory for a sustainable future* (pp. 246 - 276). U.S.A.: Columbia University Press.

Nugent, R., & Feigl, A. (2010). *Where have all the donors gone? Scarce donor funding for non-communicable diseases*. Washington, D.C., U.S.A.: Center for Global Development.Retrieved from http://www.cgdev.org/files/1424546_file_Nugent_Feigl_NCD_FINAL.pdf

Nugus, P., Carroll, K., Hewett, D. G., Short, A., Forero, R., & Braithwaite, J. (2010). Integrated care in the emergency department: a complex adaptive systems perspective. *Social Science & Medicine, 71*(11), 1997-2004. doi:10.1016/j.socscimed.2010.08.013

Nursing Council of Papua New Guinea. (2003). *Specialist Nursing Competency Standards: Midwifery*. Port Moresby NCD: Pacific Health Legislation. Retrieved from http://health.legislation.polhncourses.org/index.php?option=com_content&view=article&id=56:specialist-nursing-competency-standards-midwifery&catid=38:papua-new-guinea&Itemid=62

Nyamtema, A., Urassa, D., Pembe, A., Kisanga, F., & van Roosmalen, J. (2010). Factors for change in maternal and perinatal audit systems in Dar es Salaam hospitals, Tanzania. *BMC Pregnancy Childbirth, 10*, 29. doi:10.1186/1471-2393-10-29

Nyanzi, S., Manneh, H., & Walraven, G. (2007). Traditional birth attendants in rural Gambia: beyond health to social cohesion. *African Journal of Reproductive Health, 11*(1), 43-56. http://www.jstor.org/stable/30032487

Oakley, A. (1981). Interviewing women: A contradiction in terms. In H. Roberts (Ed.), *Doing feminist research* (pp. 30 - 61). London, U.K.: Routledge.

van Olmen, J., Criel, B., van Damme, W., Marchal, B., van Belle, S., van Dormael, M., . . . Kegels, G. (2012). Analysing Health System Dynamics. A framework. *Studies in Health Services Organization & Policy, 28*(2nd edition), 1-116.

van Olmen, J., Marchal, B., van Damme, W., Kegels, G., & Hill, P. (2012). Health systems frameworks in their political context: framing divergent agendas. *BMC Public Health, 12*(1), 774. doi:10.1186/1471-2458-12-774

Organisation for Economic Co-operation and Development. (2015). The High Level Fora on Aid Effectiveness: A History. In *Aid Effectiveness.* Retrieved June 2015, from http://www.oecd.org/dac/effectiveness/thehighlevelforaonaideffectivenessahistory.htm

Ormston, R., Spencer, L., Barnard, M., & Snape, D. (2013). The Foundations of Qualitative Research. In J. Ritchie, J. Lewis, C. M. Nicholls & R. Ormston (Eds.), *Qualitative research practice: A guide for social science students and researchers*. London, U.K.: Sage Publications Inc.

Pacfic Society for Reproductive Health. (2015). Welcome to the Pacific Society for Reproductive Health. Retrieved May 2015, from http://www.psrh.org.nz/index.aspx

Paina, L., & Peters, D. H. (2012). Understanding pathways for scaling up health services through the lens of complex adaptive systems. *Health Policy and Planning, 27*(5), 365-373. doi: 10.1093/heapol/czr054

Paley, J., & Eva, G. (2011). Complexity theory as an approach to explanation in healthcare: A critical discussion. *International Journal of Nursing Studies, 48*(2), 269-279. http://dx.doi.org/10.1016/j.ijnurstu.2010.09.012

Papoutsaki, E., & Rooney, D. (2006). Colonial legacies and neo-colonial practices in Papua New Guinean higher education. *Higher Education Research & Development, 25*(4), 421-433. doi: 10.1080/07294360600947434

Papua New Guinea Department of Health. (1999). *Report on national community health volunteer forum & technical workshop, Port Moresby 5 - 16 July 1999*. Port Moresby, Papua New Guinea: Department of Health.

Papua New Guinea Tourism Promotions Authority. (2008). Welcome to Papua New Guinea. Retrieved from http://www.tpa.papuanewguinea.travel/

Pathmanathan, I., & Liljestrand, J. (2003). *Investing in maternal health learning from Malaysia and Sri Lanka*. *Health, nutrition, and population series* Retrieved from http://site.ebrary.com/lib/auckland/Doc?id=10194456

Paxton, A., Maine, D., Freedman, L. P., Fry, D., & Lobis, S. (2005). The evidence for emergency obstetric care. *International Journal of Gynecology & Obstetrics, 88*(2), 181-193. doi:10.1016/j.ijgo.2004.11.026

Peabody, J. W., Edwards, K., Maerki, S. C., & Molyneaux, J. W. (1995). *Papua New Guinea National Health Plan: Technical report: The epidemiologic, economic and organisational analysis*. California, U.S.A: RAND Labour and Population Program.Retrieved from http://www.rand.org/content/dam/rand/pubs/drafts/2008/DRU1223.pdf

Peberdy, M. A., Ornato, J. P., Larkin, G. L., Braithwaite, R. S., Kashner, T. M., Carey, S. M., . . . Praestgaard, A. H. (2008). Survival from in-hospital cardiac arrest during nights and weekends. *Jama, 299*(7), 785-792. doi:10.1001/jama.299.7.785.

Perreira, K. M., Bailey, P. E., de Bocaletti, E., Hurtado, E., de Villagrán, S. R., & Matute, J. (2002). Increasing awareness of danger signs in pregnancy through community-and clinic-based education in Guatemala. *Maternal and Child Health Journal, 6*(1), 19-28. doi:10.1023/A:1014360015605

Pfeiffer, J. (2003). International NGOs and primary health care in Mozambique: the need for a new model of collaboration. *Social Science & Medicine, 56*(4), 725-738. doi:10.1016/S0277-9536(02)00068-0

Pieper, L. (2004). *Deterioration of Public Administration in Papua New Guinea—Views of Eminent Public Servants*. Canberra, Australia: Australian Agency for International Development.

Pierson, P. (2000). Increasing returns, path dependence, and the study of politics. *American Political Science Review, 94*(02), 251-267. http://dx.doi.org/10.2307/2586011

Piotti, B., Chilundo, B., & Sahay, S. (2006). An Institutional Perspective on Health Sector Reforms and the Process of Reframing Health Information Systems Case Study From Mozambique. *The Journal of Applied Behavioral Science, 42*(1), 91-109. doi: 10.1177/0021886305285127

Plsek, P. E., & Greenhalgh, T. (2001). The challenge of complexity in health care. *British Medical Journal, 323*(7313), 625.

Plsek, P. E., & Wilson, T. (2001). Complexity, leadership, and management in healthcare organisations. *British Medical Journal, 323*(7315), 746.

PNG - Australia Ministerial Forum. (2012). *Schedule to the Papua New Guinea - Australia Partnership for Development*. Retrieved from http://www.ausaid.gov.au/countries/Documents/outcome_health_schedule.pdf

Polier, N. (1999). Culture, Community and the Crisis of Modernity in Papua New Guinea. *Political and Legal Anthropology Review, 22*(1), 55-65.

Pollitt, C. (2009). Complexity Theory and Evolutionary Public Administration: A Sceptical Afterword. In G. Teisman, A. v. Buuren & L. Gerrits (Eds.), *Managing complex governance systems : dynamics, self-organization and coevolution in public investments* (pp. 213-230). New York ; London: Routledge.

Pomio District Administration. (2009). *Pomio District Five Year Development Plan*. Pomio, Papua New Guinea: Pomio District Administration.

Pöschl, R., & Pöschl, U. (1985). Childbirth on Kiriwina Trobriand Islands Milne Bay Province. *Papua and New Guinea Medical Journal, 28*(3), 137-145.

Pourbohloul, B., & Kieny, M.-P. (2011). Complex systems analysis: towards holistic approaches to health systems planning and policy. *Bulletin of the World Health Organisation, 89*, 242. doi: 10.2471/BLT.11.087544

Powell-Jackson, T., Borghi, J., Mueller, D. H., Patouillard, E., & Mills, A. (2006). Countdown to 2015: tracking donor assistance to maternal, newborn, and child health. *The Lancet, 368*(9541), 1077-1087. doi:10.1016/S0140-6736(06)69338-0

Prashanth, N. S., Marchal, B., Devadasan, N., Kegels, G., & Criel, B. (2014). Advancing the application of systems thinking in health: a realist evaluation of a capacity building programme for district managers in Tumkur, India. *Health Research Policy and Systems, 12*(1), 42. doi:10.1186/1478-4505-12-42

Prata, N., Passano, P., Rowen, T., Bell, S., Walsh, J., & Potts, M. (2011). Where there are (few) skilled birth attendants. *Journal of Health, Population, and Nutrition, 29*(2), 81.

Preiser, R., & Cilliers, P. (2010). Unpacking the Ethics of Complexity: concluding reflections. In P. Cilliers & R. Preiser (Eds.), *Complexity, difference and identity: an ethical perspective* (pp. 265-287). Dordrecht ; New York: Springer.

Presern, C., Bustreo, F., Evans, T., & Ghaffar, A. (2014). Accelerating progress on women's and children's health. *Bulletin of the World Health Organisation, 92*(7), 467-467A. http://dx.doi.org/10.2471/BLT.14.142398

Prizzon, A. (2014). *The age of choice: Papua New Guinea in the new aid landscape*. London, U.K.: Overseas Development Institute.Retrieved from http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9396.pdf

Qizilbash, M. (2006). Human Development. In D. A. Clark (Ed.), *The Elgar Companion to Development Studies* (pp. 245-249). Northampton, U.S.A: Edward Elgar Publishing Inc.

QSR International Pty Ltd. (2014). NVivo qualitative data analysis software. 10.0.637.0 SP6. Retrieved from http://www.qsrinternational.com/default.aspx

Rabaul District Administration. (2009). *District Development Plan 2008 - 2012*. Rabaul, Papua New Guinea: Rabaul District Administration.

Ramalingam, B. (2013). *Aid on the edge of chaos: rethinking international cooperation in a complex world*. Oxford, U.K.: Oxford University Press.

Ramalingam, B., Jones, H., Reba, T., & Young, J. (2008). *Exploring the science of complexity: Ideas and implications for development and humanitarian efforts*. London, U.K.: Overseas Development Institute.

Razee, H., Whittaker, M., Jayasuriya, R., Yap, L., & Brentnall, L. (2012). Listening to the rural health workers in Papua New Guinea – The social factors that influence their motivation to work. *Social Science & Medicine, 75*(5), 828-835. doi:10.1016/j.socscimed.2012.04.013

Regis, J. (2000). WWF's Partnership with the Foi of Lake Kutubu, Papua New Guinea. In R. Webber, J. Bulter & P. Larson (Eds.), *Indigenous Peoples and Conservation Organizations: Experiences in collaboration* (pp. 91 - 111). U.S.A: Williams Production Group.

Reid, J. (1983). Educating mothers: how effective are MCH clinics? *Papua and New Guinea Medical Journal, 26*(1), 25-28.

Reilly, B., Brown, M., & Flower, S. (2014). *Political Governance and Service Delivery in Papua New Guinea (PNG): A Strategic Review of Current and Alternative Governance Systems to Improve Service Delivery*. National Capital District, Papua New Guinea: The National Research Institute

Reilly, B., & Phillpot, R. (2002). "Making Democracy Work" in Papua New Guinea: Social Capital and Provincial Development in an Ethnically Fragmented Society. *Asian Survey, 42*(6), 906-927. doi: 10.1525/as.2002.42.6.906

Renfrew, M. J., Homer, C., Downe, S., McFadden, A., Muir, N., Prentice, T., & ten Hoope-Bender, P. (2014). Midwifery: an executive summary for The Lancet's series. *The Lancet, 384*(9948)

Renzio, P. d. (2000). *Bigmen and Wantoks: social capital and group behaviour in Papua New Guinea*. Oxford, U.K.: Oxford Department of International Development.Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.199.2663&rep=rep1&type=pdf

Reproductive Health Training Unit. (2013). Reproductive Health Training Unit. Retrieved December 2014, from http://www.rhtu.org.pg/

Republic of Malawi. (2005). *Road map for accelerating the reduction of maternal and neonatal mortality and morbidity in Malawi*. Malawi: Ministry of Health. Retrieved from http://www.unicef.org/malawi/MLW_resources_roadmap.pdf

Requejo, J., & Bhutta, Z. A. (2015). The post-2015 agenda: staying the course in maternal and child survival. *Archives of Disease in Childhood, 100*(Suppl 1), S76-S81. doi:10.1136/archdischild-2013-305737

Requejo, J., Bryce, J., Barros, A. J., Berman, P., Bhutta, Z., Chopra, M., . . . Maliqi, B. (2015). Countdown to 2015 and beyond: fulfilling the health agenda for women and children. *The Lancet, 385*(9966), 466-476. doi:10.1016/S0140-6736(14)60925-9

Requejo, J., Bryce, J., Victora, C. G., Deixel, A., Barros, A. J., Bhutta, Z., . . . Lawn, J. E. (2014). *Fulfilling the Health Agenda for Women and Children: The 2014 Report*. Geneva, Switzerland: UNICEF and World Health Organisation.Retrieved from http://www.countdown2015mnch.org/documents/2014Report/The2014report/Countdown_The_2014_Report_final.pdf

Rhodes, M. L., & MacKechnie, G. (2003). Understanding public service systems: Is there a role for complex adaptive systems theory? *Emergence, 5*(4), 57-85. doi: 10.1207/s15327000em0504_6

Rice, D. (2013). Street-Level Bureaucrats and the Welfare State Toward a Micro-Institutionalist Theory of Policy Implementation. *Administration & Society, 45*(9), 1038-1062. doi: 10.1177/0095399712451895

Richardson, K., & Cilliers, P. (2001). What is complexity science? A view from different directions. *Emergence, 3*(1), 5-23.

Rihani, S. (2002). *Complex systems theory and development practice understanding non-linear realities*. New York, U.S.A.: Zed Books.

Riley, J. C. (2008). *Low income, social growth, and good health: a history of twelve countries*. California, U.S.A.: University of California Press.

Rist, G. (1997). *The history of development: from western origins to global faith*. London, U.K.: Zed Books.

Ritchie, J., Zwi, A. B., Blignault, I., Bunde-Birouste, A., & Silove, D. (2009). Insider–outsider positions in health-development research: reflections for practice. *Development in Practice, 19*(1), 106-112. doi: 10.1080/09614520802576526

Ronsmans, C., Endang, A., Gunawan, S., Zazri, A., McDermott, J., Koblinsky, M., & Marshall, T. (2001). Evaluation of a comprehensive home-based midwifery programme in South Kalimantan, Indonesia. *Tropical Medicine & International Health, 6*(10), 799-810. doi:10.1046/j.1365-3156.2001.00780.x

Ronsmans, C., & Graham, W. J. (2006). Maternal mortality: who, when, where, and why. *The Lancet, 368*(9542), 1189-1200. doi: 10.1016/s0140-6736(06)69380-x

Room, G. (2011). *Complexity, institutions and public policy agile decision-making in a turbulent world*. Cheltenham, U.K.: Edward Elgar Publishing Ltd.

Room, G. (2015). Complexity, power and policy. In R. Geyer & P. Cairney (Eds.), *Handbook on Complexity and Public Policy* (pp. 19 - 31). Cheltenham, U.K.: Edward Elgar Publishing Ltd.

Rosenfield, A., & Maine, D. (1985). Maternal Mortality - A neglected Tragedy: Where is the M in MCH? *The Lancet, 326*(8446), 83-85. http://dx.doi.org/10.1016/S0140-6736(85)90188-6

Rosenfield, A., & Min, C. J. (2009). A history of international cooperation in maternal and child health. In J. Ehiri (Ed.), *Maternal and Child Health* (pp. 3-17). New York: U.S.A.: Springer.

Rowland, T., McLeod, D., & Froese-Burns, N. (2012). *Comparative study of maternity systems*. Wellington, New Zealand: Ministry of Health.Retrieved from http://www.health.govt.nz/system/files/documents/publications/comparative-study-of-maternity-systems-nov13.pdf

Sa'avu, M., Duke, T., & Matai, S. (2014). Improving paediatric and neonatal care in rural district hospitals in the highlands of Papua New Guinea: a quality improvement approach. *Paediatrics and international child health, 34*(2), 75-83. http://dx.doi.org/10.1179/2046905513Y.0000000081

Sachs, W. (1992). Introduction. In W. Sachs (Ed.), *The Development Dictionary: A guide to knowledge as power* (pp. 1 - 5). London, U.K.: Zed Books Ltd.

Safe Motherhood Alliance. (2014). Safe Motherhood Alliance Papua New Guinea.   Retrieved June 2015, from http://www.safemotherhood.org.pg/

Saint Mary's Hospital. (2011). *St. Mary's Hospital – Vunapope Strategic Plan 2012 – 2016*. East New Britain, Papua New Guinea: St. Mary's Hospital.

Sakeah, E., Doctor, H. V., McCloskey, L., Bernstein, J., Yeboah-Antwi, K., & Mills, S. (2014). Using the community-based health planning and services program to promote skilled delivery in rural Ghana: socio-demographic factors that influence women utilization of skilled attendants at birth in Northern Ghana. *BMC Public Health, 14*(1), 344. doi:10.1186/1471-2458-14-344

Sakeah, E., McCloskey, L., Bernstein, J., Yeboah-Antwi, K., Mills, S., & Doctor, H. V. (2014). Can community health officer-midwives effectively integrate skilled birth attendance in the community-based health planning and services program in rural Ghana? *Reproductive Health, 11*(1), 90. doi:10.1186/1742-4755-11-90

Saldaña, J. (2013). *The coding manual for qualitative researchers* (2nd ed. ed.). Los Angeles, U.S.A.: Sage Publications Inc.

Sandall, J., Soltani, H., Gates, S., Shennan, A. H., & Devane, D. (2015). Midwife-led continuity models versus other models of care for childbearing women. *Cochrane Database of systematic Reviews*(9) doi: 10.1002/14651858.CD004667.pub4

Say, L., Chou, D., Gemmill, A., Tunçalp, Ö., Moller, A.-B., Daniels, J., . . . Alkema, L. (2014). Global causes of maternal death: a WHO systematic analysis. *The Lancet Global Health, 2*(6), e323-e333. doi:10.1016/S2214-109X(14)70227-X

Say, L., Souza, J. P., & Pattinson, R. C. (2009). Maternal near miss – towards a standard tool for monitoring quality of maternal health care. *Best Practice & Research Clinical Obstetrics & Gynaecology, 23*(3), 287-296. http://dx.doi.org/10.1016/j.bpobgyn.2009.01.007

Scales, I. (2010). *Roads in Gazelle Peninsula development: Impact of roads in the post-eruption economic landscape of East New Britain*. Canberra, Australia: Australian Agency for International Development.

Scaletta, N. M. (1986). Childbirth: A Case History from West New Britain, Papua New Guinea. *Oceania, 57*(1), 33-52.

Scheyvens, R., & McLennan, S. (2014). Introduction. In R. Scheyvens (Ed.), *Development fieldwork : a practical guide* (2nd ed.). Los Angeles, U.S.A.: Sage Publications Inc.

Schofield, F. (1993). The need for village midwives: A policy for rural social development. In T. Taufa & C. Bass (Eds.), *Population family health and development: Papers from 19th Waigani Seminar* (Vol. 2, pp. 194-199). Port Moresby: University of Papua New Guinea Press.

Schumacher, E. (1987). Village midwife training on the Huon Peninsula. *Papua and New Guinea Medical Journal, 30*(3), 213-217.

Scott, B. (2005). *Re-imagining PNG: Culture, democracy and Australia's role*. New South Wales, Australia: Lowy Institute of International Policy.

Scott, V., Schaay, N., Olckers, P., Nqana, N., Lehmann, U., & Gilson, L. (2014). Exploring the nature of governance at the level of implementation for health system strengthening: the DIALHS experience. *Health Policy and Planning, 29*(suppl 2), ii59-ii70. doi: 10.1093/heapol/czu073

Sen, A. (1999). *Development as freedom*. Oxford, U.K.: Oxford University Press.

Sen, G., Govender, V., & Cottingham, J. (2007). *Maternal and neonatal health: surviving the roller-coaster of international policy*. Bangalore, India: Indian Institute of Management Bangalore. Retrieved from http://fkilp.iimb.ernet.in/pdf/maternal_health_rc/background_readings/Policy_Analysis/Sen_etal_Mat_neonatal_mortality.pdf

Senanayake, P., & Hamm, S. (2004). Sexual and reproductive health funding: donors and restrictions. *The Lancet, 363*(9402), 70.

Sepoe, O. V. (2000). *Changing gender relations in Papua New Guinea: the role of women's organisations*. New Delhi, India: UBS Publishers' Distributors Ltd.

Shah, I. H., & Say, L. (2007). Maternal mortality and maternity care from 1990 to 2005: uneven but important gains. *Reproductive Health Matters, 15*(30), 17-27. doi:10.1016/S0968-8080(07)30339-X

Shani, A. B. R., & Mohrman, S. A. (2012). Learning to organize for sustainable health care: Rigor, reflection and relevance. In S. A. Mohrman, A. B. R. Shani & C. Worley (Eds.), *Organizing for sustainable health care* (Vol. 2, pp. 227-249). Bingley, U.K.: Emerald Group Publishing Limited.

Shann, F. (1979). Port Moresby or the bush? *Papua and New Guinea Medical Journal, 22*(3), 170-176.

Sharp, P. (1982). Ghosts, witches, sickness and death: the traditional interpretation of injury and disease in a rural area of Papua New Guinea. *Papua and New Guinea Medical Journal, 25*(2), 108-115.

Shiffman, J., & Smith, S. (2007). Generation of political priority for global health initiatives: a framework and case study of maternal mortality. *The Lancet, 370*(9595), 1370-1379. doi:10.1016/S0140-6736(07)61579-7

Sibley, L., & Sipe, T. A. (2004). What can a meta-analysis tell us about traditional birth attendant training and pregnancy outcomes? *Midwifery, 20*(1), 51-60. doi:10.1016/S0266-6138(03)00053-6

Sibley, L., Sipe, T. A., Brown, C. M., Diallo, M. M., McNatt, K., & Habarta, N. (2007; 2012). Traditional birth attendant training for improving health behaviours and pregnancy outcomes. *The Cochrane Library*(8) doi: 10.1002/14651858.CD005460.pub3

Sibley, L., Sipe, T. A., & Koblinsky, M. (2004). Does traditional birth attendant training improve referral of women with obstetric complications: a review of the evidence. *Social Science & Medicine, 59*(8), 1757-1768. doi:10.1016/j.socscimed.2004.02.009

Signal, L. N., Walton, M. D., Mhurchu, C. N., Maddison, R., Bowers, S. G., Carter, K. N., . . . McKerchar, C. W. (2013). Tackling 'wicked'health promotion problems: a New Zealand case study. *Health Promotion International, 28*(1), 84-94. doi: 10.1093/heapro/das006

Simet, J. L. (2000). Copyrighting traditional Tolai knowledge? In K. Whimp & M. Busse (Eds.), *Protection of intellectual, biological and cultural property in Papua New Guinea* (pp. 62-80). Australia: Asia Pacific Press.

Smith, H. (Writer) & C. Hackel (Director). (2001). Rediscovering Dave Brubeck. Washington D.C., U.S.A.: Hedrick Smith Productions

Smith, J. B., Coleman, N. A., Fortney, J. A., Johnson, J. D.-G., Blumhagen, D. W., & Grey, T. W. (2000). The impact of traditional birth attendant training on delivery complications in Ghana. *Health Policy and Planning, 15*(3), 326-331. doi: 10.1093/heapol/15.3.326

Smith, J. M., Currie, S., Azfar, P., & Rahmanzai, A. J. (2008). Establishment of an accreditation system for midwifery education in Afghanistan: maintaining quality during national expansion. *Public Health, 122*(6), 558-567. doi:10.1016/j.puhe.2008.03.009

Smith, L. T. (2012). *Decolonizing methodologies: research and indigenous peoples* (2nd ed.). London & New York: Zed Books.

Smith, S. (2014). Political contexts and maternal health policy: Insights from a comparison of south Indian states. *Social Science & Medicine, 100*, 46-53. doi:10.1016/j.socscimed.2013.10.029

Snow, R. C., Laski, L., & Mutumba, M. (2014). Sexual and reproductive health: Progress and outstanding needs. *Global Public Health, 10*(2), 149-173. doi:10.1080/17441692.2014.986178

Snowden, D. (2009, Nov-Dec). *Complexity and the implications for strategy*. Paper presented at the Innovation dialogue - Being strategic in the face of complexity, Wageningen, Netherlands. Retrieved from http://edepot.wur.nl/247893

Soltani, H., & Sandall, J. (2012). Organisation of maternity care and choices of mode of birth: a worldwide view. *Midwifery, 28*(2), 146-149. doi:10.1016/j.midw.2012.01.009

Souza, J. P., Widmer, M., Gülmezoglu, A. M., Lawrie, T. A., Adejuyigbe, E. A., Carroli, G., . . . Hofmeyr, J. (2014). Maternal and perinatal health research priorities beyond 2015: an international survey and prioritization exercise. *Reproductive Health, 11*(1), 61. doi:10.1186/1742-4755-11-61

Spark, C. (2014). An Oceanic revolution? Stella and the construction of new femininities in Papua New Guinea and the Pacific. *The Australian Journal of Anthropology, 25*(1), 54-72. doi: 10.1111/taja.12066

Speakman, E. M., Shafi, A., Sondorp, E., Atta, N., & Howard, N. (2014). Development of the Community Midwifery Education initiative and its influence on women's health and empowerment in Afghanistan: a case study. *BMC women's health, 14*(1), 111. doi:10.1186/1472-6874-14-111

Stacey, R. D. (1996). *Complexity and creativity in organisations*. San Francisco, U.S.A.: Berrett-Koehler.

Staff Reporter. (2015). O'Neill applauds NGO, *Papua New Guinea Post-Courier*. Retrieved from http://www.postcourier.com.pg/Stories/oneill-applauds-ngo/#.VcFWNvmqpBe

Standing, H. (2002). An overview of changing agendas in health sector reforms. *Reproductive Health Matters, 10*(20), 19-28. doi:10.1016/S0968-8080(02)00089-7

Standish, B. (2013). 'Governance is Political in Papua New Guinea'. *IBS Journal of Business & Research, 6*

Stanton, C., Blanc, A. K., Croft, T., & Choi, Y. (2007). Skilled care at birth in the developing world: progress to date and strategies for expanding coverage. *Journal of Biosocial Science, 39*(01), 109-120. doi:10.1017/S0021932006001271

Starfield, B., Shi, L., & Macinko, J. (2005). Contribution of primary care to health systems and health. *Milbank Quarterly, 83*(3), 457-502. doi: 10.1111/j.1468-0009.2005.00409.x

Starrs, A. M. (1997). *The safe motherhood action agenda: Priorities for the next decade*. New York, U.S.A: Family Care International.Retrieved from http://files.givewell.org/files/DWDA%202009/Interventions/Maternal%20Mortality/SafeMotherhoodActionAgenda.pdf

Starrs, A. M. (2006). Safe motherhood initiative: 20 years and counting. *The Lancet, 368*(9542), 1130-1132. http://dx.doi.org/10.1016/S0140-6736(06)69385-9

Starrs, A. M. (2014). Survival convergence: bringing maternal and newborn health together for 2015 and beyond. *The Lancet, 384*(9939), 211-213. http://dx.doi.org/10.1016/S0140-6736(14)60838-2

Starrs, A. M., World Bank, World Health Organisation, & United Nations Fund for Populations Activities. (1987). *Preventing the tragedy of maternal deaths : a report on the International Safe Motherhood Conference, Nairobi, Kenya, February 1987*. New York, U.S.A: Family Care International.Retrieved from http://apps.who.int/iris/handle/10665/62871#sthash.BzPoPljc.dpuf

Steedman, P. (1991). On the relations between seeing, interpreting and knowing. In F. Steier (Ed.), *Research and reflexivity* (pp. 53-62). London, U.K.: Sage Publications Inc.

Stewart-Withers, R., Banks, G., McGregor, A., & Litea, M.-S. (2014). Qualitative Research. In R. Scheyven (Ed.), *Development Fieldwork: A practical guide* (pp. 59-80). London, U.K.: Sage Publications Ltd.

Storeng, K. T., & Béhague, D. P. (2014). "Playing the Numbers Game": Evidence-based Advocacy and the Technocratic Narrowing of the Safe Motherhood Initiative. *Medical Anthropology Quarterly, 28*(2), 260-279. doi: 10.1111/maq.12072

Storey, D. (2010). *Urban poverty in Papua New Guinea*. Port Moresby, Papua New Guinea: National Research Institute

Sturmberg, J. P., Martin, C. M., & Katerndahl, D. A. (2014). Systems and complexity thinking in the general practice literature: an integrative, historical narrative review. *The Annals of Family Medicine, 12*(1), 66-74. doi: 10.1370/afm.1593

Sumner, A., & Tribe, M. (2008a). Development studies and cross-disciplinarity: Research at the social science–physical science interface. *Journal of International Development, 20*(6), 751-767. doi:10.1002/jid.1494

Sumner, A., & Tribe, M. (2008b). *International development studies : theories and methods in research and practice*. Los Angeles, U.S.A.: Sage Publications Inc.

Sweeney, R., & Mulou, N. (2012). Fee or free? Trading equity for quality of care for primary health care in Papua New Guinea. *International Health, 4*, 283-288. doi:10.1016/j.inhe.2012.07.003

Sydow, J., Schreyögg, G., & Koch, J. (2009). Organizational path dependence: Opening the black box. *Academy of Management Review, 34*(4), 689-709.

Sydow, J., Windeler, A., Müller-Seitz, G., & Lange, K. (2012). Path constitution analysis: A methodology for understanding path dependence and path creation. *BuR-Business Research, 5*(2), 155-176. doi:10.1007/BF03342736

Tabatabaie, M. G., Zahra, M., & AbouAli, V. (2012). Home birth and barriers to referring women with obstetric complications to hospitals: a mixed-methods study in Zahedan, southeastern Iran. *Reproductive Health, 9*(5) doi: 10.1186/1742-4755-9-5

Tainter, J. (1990). *The collapse of complex societies*. Cambridge, U.K.: Cambridge University Press.

Tammisto, T. (2010). Strengthening the State: Logging and neoliberal politics in East New Britain, Papua New Guinea. *Suomen Antropologi: Journal of the Finnish Anthropological Society, 35*(1), 43-59.

Teisman, G. R., & Klijn, E.-H. (2008). Complexity theory and public management: An introduction. *Public Management Review, 10*(3), 287-297. doi: 10.1080/14719030802002451

The Partnership for Maternal Newborn & Child Health. (2014). Policy Brief: Placing healthy women and children at the heart of the post-2015 sustainable development framework.   Retrieved from http://www.who.int/pmnch/post2015_policybrief.pdf

Thelen, K. (2003). How Institutions Evolve: Insights from comparative hsitorical analysis. In J. Mahoney & D. Rueschemeyer (Eds.), *Comparative historical analysis in the social sciences* (pp. 208 - 240). New York, U.S.A.: Cambridge University Press.

Thelen, K. (2004). *How institutions evolve: The political economy of skills in Germany, Britain, the United States, and Japan*. Cambridge, U.K.: Cambridge University Press.

Thomas, N. (1995). Exchange Systems, Political Dynamics, and Colonial Transformations in Nineteenth Century Oceania. In P. Bellwood, J. J. Fox & D. Tryon (Eds.), *The Austronesians: Historical and comparative Perspectives* (pp. 287-308). Canberra, Australia: ANU E Press.

Thomas, T., Gausman, J., Lattof, S. R., Wegner, M. N., Kearns, A. D., & Langer, A. (2014). Improved maternal health since the ICPD: 20 years of progress. *Contraception, 90*(6S), S32-S38. doi:10.1016/j.contraception.2014.06.026

Thomason, J. (1993). The implications of uncontrolled population growth for the provision of rural health services. In T. Taufa & C. Bass (Eds.), *Population family health and development: Papers from 19th Waigani Seminar, June 1991* (Vol. 1, pp. 287-300). Port Moresby: University of Papua New Guinea Press.

Thomason, J., & Kase, P. (2009). Policy Making in Health. In R. J. May (Ed.), *Policy Making and Implementation: Studies from Papua New Guinea* (pp. 117-130). Canberra, Australia: ANU E Press.

Thomason, J., Newbrander, W. C., & Kolehmainen-Aitken, R.-L. (1991). *Decentralization in a developing country: the experience of Papua New Guinea and its health service*. Canberra, Australia: National Centre for Development Studies, Australian National University.

Thompson, J. B., Fullerton, J. T., & Sawyer, A. J. (2011). The International Confederation of Midwives: Global Standards for Midwifery Education (2010) with Companion Guidelines. *Midwifery, 27*(4), 409-416. http://dx.doi.org/10.1016/j.midw.2011.04.001

Thorsen, V. C., Sundby, J., & Meguid, T. (2014). Easier said than done: Methodological challenges with conducting maternal death review research in Malawi. *BMC Medical Research Methodology, 14*(1), 29. doi:10.1186/1471-2288-14-29

Tinning, Z. (2014). *Indigenous women's perceptions on community based family planning in rural Morobe of Papua New Guinea.* (Masters of Public Health), Auckland University of Technology, Auckland.

Tolley, H. C. (2012). *Sector wide approaches from a complexity perspective : insights for development from Solomon Islands and Tonga.* (PhD - Development Studies), University of Auckland, Auckland.

Townsend, P. (1995). *Traditional birth attendants in Papau New Guinea: An interim report*. NCD, Papua New Guinea: National Research Institute

Travis, P., Bennett, S., Haines, A., Pang, T., Bhutta, Z., Hyder, A. A., . . . Evans, T. (2004). Overcoming health-systems constraints to achieve the Millennium Development Goals. *The Lancet, 364*(9437), 900-906. doi:10.1016/S0140-6736(04)16987-0

Trenholm, S. (2012). *Using Complexity Theory to Understand the Organisational Response to Resurgent Tuberculosis Across London.* (Doctor of Philosophy), Kings College London, London, U.K.

Trenholm, S., & Ferlie, E. (2013). Using complexity theory to analyse the organisational response to resurgent tuberculosis across London. *Social Science & Medicine, 93*, 229-237. http://dx.doi.org/10.1016/j.socscimed.2012.08.001

Trochim, W. M., Cabrera, D. A., Milstein, B., Gallagher, R. S., & Leischow, S. J. (2006). Practical challenges of systems thinking and modeling in public health. *American Journal of Public Health, 96*(3), 538-546. doi: 10.2105/AJPH.2005.066001

Tsoukas, H. (1998). Introduction: chaos, complexity and organisation theory. *Organisation, 5*(3), 291-313.

Turkmani, S., Currie, S., Mungia, J., Assefi, N., Rahmanzai, A. J., Azfar, P., & Bartlett, L. (2013). 'Midwives are the backbone of our health system': Lessons from Afghanistan to guide expansion of midwifery in challenging settings. *Midwifery, 29*(10), 1166-1172. doi:10.1016/j.midw.2013.06.015

van Uden, J., Richardson, K. A., & Cilliers, P. (2001). Postmodernism revisited. *Complexity science and the study of organisations, Tamara: Journal of Critical Postmodern Organizational Science, 1*(3), 53-68.

Underhill-Sem, Y. (2000). *(Not) speaking of maternities: pregnancy and childbirth in Wanigela, Oro Province, Papua New Guinea.* (PhD Thesis), The University of Waikato, Hamilton.

Underhill-Sem, Y. (2001). 'The baby is turning': child-bearing in Wanigela, Oro Province, Papua New Guinea. In I. Dyck, N. D. Lewis & S. McLafferty (Eds.), *Geographies of Women's Health* (pp. 197-212). London, New York: Routledge.

United Nations. (2009). *Report on the status of women in Papua New Guinea and the Autonomous Region of Bourgainville 2008. CEDAW/C/PNG/3. .* Geneva: United Nations. Retrieved from http://www2.ohchr.org/english/bodies/cedaw/docs/CEDAW.C.PNG.3.pdf

United Nations. (2014). *Report of the Operational Review of the Implementation of the Programme of Action of the International Conference on Population and Development and its Follow-up Beyond 2014*. New York, U.S.A.: United Nations. Retrieved from http://icpdbeyond2014.org/uploads/browser/files/icpd_global_review_report.pdf

United Nations. (2015a). Goal 5: Improve Maternal Health.   Retrieved May 2015, from http://www.un.org/millenniumgoals/maternal.shtml

United Nations. (2015b). *The Millennium Development Goals Report, 2015*. New York, U.S.A: United Nations. Retrieved from http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf

United Nations. (2015c). Transforming our world: the 2030 Agenda for Sustainable Development. Retrieved from https://sustainabledevelopment.un.org/post2015/transformingourworld

United Nations. (n.d.). Australia will invest around US$1.5 billion (A$1.6 billion) over the five years to 2015 on interventions evidence shows will improve maternal and child health outcomes. In *Partnerships for SDGs.* Retrieved September 2015, from https://sustainabledevelopment.un.org/partnership/?p=1114

United Nations Children's Fund. (2012). Papua New Guinea United Nations Development Assistance Framework 2012-2015. Papua New Guinea: United Nations.

United Nations Children's Fund, World Health Organisation, & United Nations Population Fund. (1997). *Guidelines for Monitoring the Availability and Use of Obstetric Services*. New York, U.S.A: United Nations Children's Fund

United Nations Development Programme. (2013). *Human Development Report 2013: The Rise of the South: Human Progress in a Diverse World*. New York, U.S.A: United Nations Development Programme.Retrieved from http://hdr.undp.org/sites/default/files/reports/14/hdr2013_en_complete.pdf

United Nations Development Programme. (2014a). *2014 National Human Development Report: Papua New Guinea*. Port Moresby: United Nations. Retrieved from http://hdr.undp.org/sites/default/files/2014_png_national_human_development_report.pdf

United Nations Development Programme. (2014b). *Human Development Report 2014: Sustaining Human Progress: Reducing Vulnerabilities and Building Reslilience*. New York, U.S.A: United Nations Development Programme.Retrieved from http://hdr.undp.org/sites/default/files/hdr14-report-en-1.pdf

United Nations General Assembly. (1999a). *Key actions for the further implementation of the Programme of Action of the International Conference on Population and Development*. New York, U.S.A: United Nations. Retrieved from http://www.un.org/popin/unpopcom/32ndsess/gass/215a1e.pdf

United Nations General Assembly. (1999b). *Report of the Commission on Population and Development acting as the preparatory committee for the twenty-first special session of the General Assembly*. New York, U.S.A.: United Nations. Retrieved from http://www.un.org/popin/unpopcom/32ndsess/gass/as212e.pdf

United Nations General Assembly. (2000). United Nations Millennium Declaration: Resolution adopted by General Assembly *A/RES/55/2*: United Nations.

United Nations Habitat Regional Technical Cooperation Division. (2010). *Papua New Guinea: Kokopo City Profile*. Nairobi, Kenya: United Nations.

United Nations Millennium Declaration. (2000). *General Assembly Resolution 55/2*. Retrieved from http://www.un.org/millennium/declaration/ares552e.htm

United Nations Population Fund. (2008). *Making Reproductive Rights and Sexual and Reproductive Health A Reality for All: Reproductive rights and sexual and reproductive health framework*. New York: United Nations Population Fund.Retrieved from http://www.unfpa.org/webdav/site/global/shared/documents/UNFPA_SRH_Framework_FinalVersion.pdf

United Nations Population Fund. (2011). *The State of the World's Midwifery: Delivering Health, Saving Lives.* New York, USA: United Nations Population Fund. Retrieved from http://www.unfpa.org/sowmy/resources/docs/main_report/en_SOWMR_Full.pdf

United Nations Population Fund. (2014). *The State of the World's Midwifery, 2014: A Universal Pathway. A Woman's Right to Health.* New York, USA: United Nations Population Fund. Retrieved from http://www.unfpa.org/sites/default/files/pub-pdf/EN_SoWMy2014_complete.pdf

United Nations Program on HIV/AIDS. (2012). *Global AIDS Report 2012: Country Progress Report Papua New Guinea*. Port Moresby, Papua New Guinea: National AIDS Council Secretariat.Retrieved from http://www.unaids.org/sites/default/files/en/dataanalysis/knowyourresponse/countryprogressreports/2012countries/ce_PG_Narrative_Report.pdf

United States Agency for International Development. (1989). *Project Paper: PNG child survival support*. U.S.A.: USAID.Retrieved from http://pdf.usaid.gov/pdf_docs/PDCBD397.pdf

University of Technology. (2013). Maternal and Child Health Initiative Papua New Guinea. Retrieved May 2013, from https://www.uts.edu.au/research-and-teaching/our-research/who-collaborating-centre/key-strength-areas/primary-health-care-3

University of Technology. (2014). *Phase I: Final Report PNG Maternal and Child Health Initiative (MCHI)*. Sydney, Australia: University of Technology.

Vacca, A., & Bird, G. (1977). Maternal mortality in Papua New Guinea 1973-1975. *Papua and New Guinea Medical Journal, 20*(2), 89.

Vallely, L. M., Homiehombo, P., Kelly, A. M., Vallely, A., Homer, C. S., & Whittaker, A. (2013). Exploring women's perspectives of access to care during pregnancy and childbirth: A qualitative study from rural Papua New Guinea. *Midwifery, 29*(10), 1222-1229. doi:10.1016/j.midw.2013.03.011

Villar, J., Ba'aqeel, H., Piaggio, G., Lumbiganon, P., Belizán, J. M., Farnot, U., . . . Donner, A. (2001). WHO antenatal care randomised trial for the evaluation of a new model of routine antenatal care. *The Lancet, 357*(9268), 1551-1564. doi:10.1016/S0140-6736(00)04722-X

Voigt, M. (2001). The change from general nurse education to a nursing diploma in Papua New Guinea. *Contemporary Nurse, 10*(3-4), 142-146.

Waiko, J. (1993). *A short history of Papua New Guinea*. Melbourne, Australia: Oxford University Press.

Wakai, N. (2012). My beautiful country Papua New Guinea. Retrieved from http://asopa.typepad.com/asopa_people/2012/06/my-beautiful-country-papua-new-guinea.html

Walby, S. (2003, April). *Complexity theory, globalisation and diversity*. Paper presented at the Conference of the British Sociological Association, University of York. Retrieved from http://web.iaincirebon.ac.id/ebook/moon/globalization/Complexity%20Theory%20realism%20and%20path%20dependency.pdf

Walby, S. (2007). Complexity theory, systems theory, and multiple intersecting social inequalities. *Philosophy of the Social Sciences, 37*(4), 449-470. doi: 10.1177/0048393107307663

Walby, S. (2009). *Globalization and inequalities: Complexity and contested modernities*. London, U.K.: Sage Publications Ltd.

Waldrop, M. M. (1992). *Complexity: the emerging science at the edge of order and chaos*. New York, U.S.A.: Simon & Schuster.

Walker, A. (2008). Double Duty: Linking Sexual and Reproductive Health in Papua New Guinea. Retrieved June, 2015, from http://www.unfpa.org/news/double-duty-linking-sexual-and-reproductive-health-papua-new-guinea

Walsh, D. (2010). Evolution of current systems of intrapartum care. In D. Walsh & S. Downe (Eds.), *Essential midwifery practice: Intrapartum care* (pp. 1-12). West Sussex, U.K.: Blackwell Publishing Ltd.

Walsh, D., & Evans, K. (2014). Critical realism: An important theoretical perspective for midwifery research. *Midwifery, 30*(1), e1-e6. http://dx.doi.org/10.1016/j.midw.2013.09.002

Walton, M. (2014). Applying complexity theory: A review to inform evaluation design. *Evaluation and program planning, 45*, 119-126. doi:10.1016/j.evalprogplan.2014.04.002

Weeks, S., & Guthrie, G. (1984). Papua New Guinea. In R. Thomas & T. Postlethwaite (Eds.), *Schooling in the Pacific Islands: Colonies in Transition* (pp. 29-64). Oxford, U.K.: Pergamon.

Weil, O., & Fernandez, H. (1999). Is safe motherhood an orphan initiative? *The Lancet, 354*(9182), 940-943.

Wells, M. (1985). Midwifery services in Madang Province, Papua New Guinea: a proposal. *Papua and New Guinea Medical Journal, 28*(3), 147-153.

Wheatley, M. J. (2010). *Leadership and the new science: Discovering order in a chaotic world*. San Francisco, U.S.A.: Berrett-Koehler.

White, W. (1989). Profiles (Sylvia Earle), *The New Yorker,* pp. 41-65.

Whitfield, L., & Buur, L. (2014). The politics of industrial policy: ruling elites and their alliances. *Third World Quarterly, 35*(1), 126-144. doi: 10.1080/01436597.2014.868991

Wikimedia Foundation Inc. (2015). East New Britain Province.   Retrieved June 2015, from https://en.wikipedia.org/wiki/East_New_Britain_Province

Willis, C. D., Riley, B. L., Best, A., & Ongolo-Zogo, P. (2012). Strengthening health systems through networks: the need for measurement and feedback. *Health Policy and Planning, 27*(suppl 4), iv62-iv66. doi: 10.1093/heapol/czs089

Wiltshire, C., & Mako, A. (2014). *Financing PNG's Free Primary Health Care Policy: User Fees, Funding and Performance*. Crawford School of Public Policy, The Australian National University. Development Policy Centre and National Research Institute. Retrieved from http://devpolicy.org/PEPE/Financing-PNGs-free-primary-health-care-policy-user-fees-funding-and-performance.pdf

Windybank, S., & Manning, M. (2003). Papua New Guinea on the brink. *Centre for Independent Studies: Issue Analysis, 30*

Winterson, J. (1985). *Oranges are not the only fruit*. London, U.K.: Pandora Press.

de Wit, V. (2003). *Technical Assistance Completion Report*. Manila, Philippines: Asian Development Bank.Retrieved from http://www.adb.org/sites/default/files/project-document/70507/tacr-reg-5825.pdf

Woodhill, J. (2010). Capacities for institutional innovation: a complexity perspective. *IDS bulletin, 41*(3), 47-59.

World Bank. (1995). *Papua New Guinea: Delivery Public Services: Volumes I & II*. Washington DC: World Bank.

World Bank. (2012). *Papua New Guinea - Country gender assessment for the period 2011-2012.* Washington D.C.: The World Bank.Retrieved from http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/02/27/000333037_20130227115054/Rendered/PDF/755800WP0PNG0C00Box374338B00PUBLIC0.pdf

World Bank. (2013). *Below The Glass Floor: Analytical review of expenditure by Provinicial Administrations on Rural Health from Health Function Grants & Provincial Internal Revenue*. Washington, USA: the World Bank.Retrieved from http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2014/02/07/000333037_20140207122707/Rendered/PDF/845210WP0v20Be0x382123B00PUBLIC0pdf.pdf

World Bank. (2014). *Assessment of Health Financing Options — Papua New Guinea*. Washington DC: World Bank.Retrieved from http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2014/11/25/000470435_20141125142038/Rendered/PDF/927290WP0P12830s0Report0020140FINAL.pdf

World Bank. (2015). Progress Towards the MDGs.   Retrieved May 2015, from http://www.worldbank.org/en/publication/global-monitoring-report/report-card/progress-towards-the-mdgs

World Bank. (2016). Papua New Guinea Overview.   Retrieved May 2016, from http://www.worldbank.org/en/country/png/overview

World Bank, Morris, I., & Somanathan, A. (2011). *Papua New Guinea (PNG) health workforce crisis: A Call to Action*. Washington D.C., U.S.A: Human Resources Division of the National Department of Health (NDoH) and the Secretariat for the PNG Universities Review and the World Bank.Retrieved from http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/01/24/000333037_20130124103924/Rendered/PDF/NonAsciiFileName0.pdf

World Health Organisation. (1948). *Constitution of the World Health Organisation*. New York, U.S.A.: World Health Organisation.Retrieved from http://www.who.int/governance/eb/who_constitution_en.pdf

World Health Organisation. (1952). *Expert Committee on Maternity Care: A Preliminary Survey. Technical Report Series, No. 51*. Geneva, Switzerland: World Health Organisation.Retrieved from https://extranet.who.int/iris/restricted/bitstream/10665/40188/1/WHO_TRS_51.pdf

World Health Organisation. (1974). *Health and Family Planning. World Population Conference, Working Paper. No. 136.* Geneva, Switzerland: World Health Organisation.

World Health Organisation. (1996). *Mother-Baby Package: Implementing safe motherhood in countries.* Geneva, Switzerland: World Health Organisation.Retrieved from http://www.who.int/maternal_child_adolescent/documents/who_dhe_msm_9411/en/

World Health Organisation. (1999). *Reduction of maternal mortality. A joint WHO/UNFPA/UNICEF/World Bank statement.* Geneva: World Health Organisation.Retrieved from http://apps.who.int/iris/bitstream/10665/42191/1/9241561955_eng.pdf

World Health Organisation. (2000). *The World Health Report 2000: Health systems: Improving performance*. Geneva: World Health Organsiation

World Health Organisation. (2004a). *Beyond the Numbers: Reviewing maternal deaths and complications to make pregnancy safer*. Geneva: World Health Organisation.

World Health Organisation. (2004b). *Making pregnancy safer: the critical role of the skilled attendant. A joint statement by WHO, ICM and FIGO*. Geneva: World Health Organisation. Retrieved from http://whqlibdoc.who.int/publications/2004/9241591692.pdf

World Health Organisation. (2005a). Delhi Declaration on Maternal, Newborn and Child Health *Lives in the Balance: The Partnership Meeting for Maternal, Newborn and Child Health.* Geneva, Switzerland: World Health Organisation.

World Health Organisation. (2005b). *The World Health Report 2005: make every mother and child count*. Geneva, Switzerland: World Health Organisation. Retrieved from http://www.who.int/whr/2005/whr2005_en.pdf

World Health Organisation. (2006). *The World Health Report 2006: Working together for health*. Geneva: WHO. Retrieved from http://www.who.int/whr/2006/whr06_en.pdf

World Health Organisation. (2008a). *Fact Sheet: Skilled birth attendant*. Geneva: World Health Organisation. Retrieved from http://www.who.int/maternal_child_adolescent/events/2008/mdg5/factsheet_sba.pdf?ua=1

World Health Organisation. (2008b). *Spotlight on statistics: A fact file on health workforce statistics* Geneva: World Health Organisation.Retrieved from http://www.who.int/hrh/statistics/spotlight_2.pdf

World Health Organisation. (2010a). Investing in our common future: Joint Action Plan for Women's and Children's Health.   Retrieved September 2015, from http://www.who.int/pmnch/topics/maternal/201006_jap_pamphlet/en/

World Health Organisation. (2010b). *WHO country cooperation strategy: Papua New Guinea 2010 - 2015*. Manila, Philippines: WHO Regional Office for the Western Pacific. Retrieved from http://www.who.int/countryfocus/cooperation_strategy/ccs_png_en.pdf

World Health Organisation. (2011). *Papua New Guinea Country Profile 2011*. Geneva: WHO. Retrieved from http://www.wpro.who.int/countries/png/25PNGpro2011_finaldraft.pdf

World Health Organisation. (2012). *Safe abortion: technical and policy guidance for health systems*. Geneva, Switzerland: World Health Organisation. Retrieved from http://apps.who.int/iris/bitstream/10665/70914/1/9789241548434_eng.pdf?ua=1

World Health Organisation. (2013a). *Maternal Death Surveillance and Response: Technical Guidance.* Geneva, Switzerland: World Health Organisation. Retrieved from http://www.unfpa.org/sites/default/files/pub-pdf/Maternal_Death_Surveillance_and_Response_0.pdf

World Health Organisation. (2013b). *Western Pacific Region Nursing/Midwifery Databank: Papua New Guinea*. Geneva: World Health Organisation. Retrieved from http://www.wpro.who.int/hrh/about/nursing_midwifery/db_png_2013.pdf

World Health Organisation. (2014a). *The Global Health Workforce Alliance 2013 Annual Report: Rising to the grand challenge of human resources for health*. Geneva, Switzerland: World Health Organisation. Retrieved from http://www.who.int/workforcealliance/knowledge/resources/ghwa_anual_report_2013.pdf?ua=1

World Health Organisation. (2014b). Papua New Guinea Country Cooperation Strategy at a glance. Retrieved 5 July 2012, from http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_png_en.pdf

World Health Organisation. (2014c). *Trends in Maternal Mortality: 1990 to 2013. WHO, UNICEF, UNFPA, the World Bank and the United Nations Population Fund Division*. Geneva, Switzerland: World Health Organisation.Retrieved from http://apps.who.int/iris/bitstream/10665/112682/2/9789241507226_eng.pdf

World Health Organisation. (2014d). *A Universal Truth: No Health Without A Workforce*. Geneva: World Health Organisation.Retrieved from http://www.who.int/workforcealliance/knowledge/resources/GHWA-a_universal_truth_report.pdf?ua=1

World Health Organisation. (2015a). Health statistics and information systems: maternal mortality ratio (per 100,000) live births.   Retrieved September 2015, from http://www.who.int/healthinfo/statistics/indmaternalmortality/en/

World Health Organisation. (2015b). Maternal health.   Retrieved from http://www.who.int/topics/maternal_health/en/

World Health Organisation. (2015c). Papua New Guinea Health Profile.   Retrieved 8 May 2015, from http://www.who.int/gho/countries/png.pdf

World Health Organisation. (2015d). *Strategies towards ending preventable maternal mortality*. Geneva, Switzerland: World Health Organisation.Retrieved from http://www.everywomaneverychild.org/images/EPMM_final_report_2015.pdf

World Health Organisation. (2015e). *Trends in Maternal Mortality: 1990 to 2015. WHO, UNICEF, UNFPA, the World Bank and the United Nations Population Fund Division*. Geneva, Switzerland: World Heatlh Organisation.Retrieved from http://apps.who.int/iris/bitstream/10665/194254/1/9789241565141_eng.pdf?ua=1

World Health Organisation and the National Department of Health. (2012). *Health Service Delivery Profile: Papua New Guinea*. Papua New Guinea: National Department of Health.Retrieved from http://www.wpro.who.int/health_services/service_delivery_profile_papua_new_guinea.pdf

World Health Organisation and United Nations Children's Fund. (1978) Declaration of Alma-Ata. *International Conference on Primary Health Care, Alma-Ata, USSR, 6-12 September 1978*. Geneva, Switzerland: World Health Organisation.

World Health Organisation and United Nations Children's Fund. (2013). *Accountability for maternal, newborn and child survival: The 2013 Update*. Geneva, Switzerland: World Health

Organisation.Retrieved from
http://www.healthynewbornnetwork.org/sites/default/files/resources/Countdown_2013-Update_noprofiles.pdf

Worldatlas. (2015). Papua New Guinea.   Retrieved October, 2015, from
http://www.worldatlas.com/webimage/countrys/oceania/pg.htm

Xiao, Y., Zhao, K., Bishai, D. M., & Peters, D. H. (2013). Essential drugs policy in three rural counties in China: what does a complexity lens add? *Social Science & Medicine, 93*, 220-228. doi:10.1016/j.socscimed.2012.09.034

Yaipupu, J., & Eves, R. (2002). *Rapid Formative Research to Inform Health Promotion for Safe Motherhood in Papua New Guinea*. Port Moresby, Papua New Guinea: Department of Health. Retrieved from https://www.academia.edu/538133/2002_Rapid_Formative_Research_to_Inform_Health_Promotion_for_Safe_Motherhood_in_Papua_New_Guinea._Papua_New_Guinea_Department_of_Health

Yamin, A. E. (2008). Beyond Compassion: The Central Role of Accountability in Applying a Human Rights Framework to Health. *Health and Human Rights, 10*(2), 1-20.

Yamin, A. E. (2013). From ideals to tools: applying human rights to maternal health. *PLoS Med, 10*(11), 1 - 4. doi: e1001546. doi:10.1371/journal.pmed.1001546

Yamin, A. E., & Boulanger, V. M. (2014). Why Global Goals and Indicators Matter: The Experience of Sexual and Reproductive Health and Rights in the Millennium Development Goals. *Journal of Human Development and Capabilities, 15*(2-3), 218-231. doi: 10.1080/19452829.2014.896322

Yamin, A. E., Boulanger, V. M., Falb, K. L., Shuma, J., & Leaning, J. (2013). Costs of inaction on maternal mortality: qualitative evidence of the impacts of maternal deaths on living children in Tanzania. *PLoS ONE, 8*(8), e71674. doi: 10.1371/journal.pone.0071674

Yates, A. (2015, July). *Maternal and Child Health Initiative in PNG*. Paper presented at the PSRH Conference: Reproductive Health in the Pacific Beyond 2015 - Greater investments & partnerships for improved results, Suva, Fiji

Yin, R. K. (2014). *Case study research: Design and methods* (5th ed.). California, U.S.A.: Sage Publications Inc.

Zimmerman, B., & Dooley, K. (2001). Mergers versus emergers: structural change in health care systems. *Emergence, A Journal of Complexity Issues in Organizations and Management, 3*(4), 65-82. doi: 10.1207/S15327000EM0304_5

Zimmerman, B., Lindberg, C., & Plsek, P. (1998). *Lessons from complexity science for health care leaders*. U.S.A: Edgeware.