The Mortality of Orphaned, Illegitimate and Abandoned Children from Colonial New Zealand times

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Except where otherwise indicated
this thesis is my own work.

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Abstract

Infant and child mortality has usually been looked at in socio-economic terms, while recent European studies have looked at the loss of a parent and illegitimacy as independent risk factors for early death. But did New Zealand's new migrant population share these risk factors considering the extremely low child mortality rates and high life expectancy seen in New Zealand compared to Europe at the end of the 19th century?

Reconstitution of families who had resided in either Tolaga Bay or Little Akaloa settlements of New Zealand from early colonial times through to the 20th century was undertaken and followed through subsequent generations creating a data base of 2379 individuals.

As in Europe the loss of a parent as a child did increase the risks of premature death. The younger an individual became an orphan, the greater the risk of child mortality. However the risk after loss of a mother was far greater than the loss of a father. This risk is reduced significantly with remarriage of the remaining parent whilst the child is less than 10 yrs of age. Increased risks of premature death continued past childhood for those who lost parents in the first 2 yrs of life with a much lower median age at death.

Although relatively uncommon in the data set used, illegitimacy increased the risk of premature death with twice the risk of death in childhood and the lowest median survival of 51 years.

Double orphans and illegitimate children showed differing patterns of cause of death than single orphans and non-orphans. Cause of death also varied depending on the age at orphaning, the gender of the orphan and with which parent was lost.

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Chapter 1: Introduction

1.0 Purpose of this Research

The reproductive potential of any population is always limited by the availably of resources for parents to reproduce and then continue to care for their off spring. These resources differ in availability in any particular region and therefore parents must conceive differing ways of coping with these limitations for their children to survive to adulthood and reproduce themselves (Beise and Voland 2002; Quinlan and Quinlan 2007). But what would happen if one or both parents were not available to care for their offspring? Illegitimacy, abandonment, divorce or parental death can change the family structure for all family members, which may lead to different life chances especially for children. Do these shifts in family structure impact upon child survivorship in predictable ways and how do they affect the life chances of those children?

Certainly human infants compared to any other Great Ape are able to survive orphaning at a much younger age, which is largely possible due to a younger age at weaning (Watts and Pusey 1993). This has lead to an extended childhood unique to humans where children are dependent on either their parents or other adults for nutrition and protection (Gluckman and Hanson 2006; Quinlan and Quinlan 2007). Although the first year of life is the most hazardous for all human infants, historic studies suggest orphans have a much greater risk of death as children than non-orphans although overall survivorship to at least 15 years of age was still high (Andersson et al. 1996; van Poppel 2000). But is this the case today? Does this differential risk with orphaning still exist in regions where child mortality is low and life expectancy is high?

Historical information on one parent families may give invaluable information to assist with today's modern family situations (Kypri et al. 2000) and even more so in third world countries where high parental and infant mortality rates comparable to 19th century Europe are still common place. Indeed the commonest cause of double orphaning in the world today is the Acquired Immune deficiency Syndrome (AIDS) pandemic, particularly in sub-Saharan Africa (Nyamukapa et al. 2008). Lessons from the past are especially relevant to the third

world countries of today where living conditions and medical care is more reminiscent of the 19th and early 20th century's situation in Western Europe, North America and Australasia.

The purpose of this thesis is to examine the possible increased risks of dying for orphaned, illegitimate or abandoned children in New Zealand (NZ) from early colonial times. This study is in response to recent research from other regions of the world, particularly Europe, which suggests a very high risk of premature death in this group of children (van Poppel 2000). Yet in NZ the situation for colonists was very different to the conditions seen in Europe in the 19th century with less overcrowding, a more temperature climate and generally better living conditions for the majority of the European settlers (King 2003). As a result NZ showed a lower rate of infant and child mortality in the same period than that seen in Britain and continental Europe, with life expectancy the highest seen in the western world at the dawn of the 20th century (Pool and Cheung 2002). Do illegitimate and orphaned children in NZ follow the same pattern of life chances seen for these children in Europe or do these differing conditions create lesser or alternate outcomes?

1.1 The Impact of Family Structure on Childhood Mortality

Research into historic infant mortality has generally been in terms of socio-economic status of the family and changes across differing time periods (Der et al. 1999; Weir 1995). Most often mortality statistics have been presented on either a community or nationally with little ability to relate this information back to specific situations or individuals. If mortality statistics are placed within the family setting, the family's income, social status or ownership of property are used as a basis for comparing child mortality statistics between groups (Klasen 1998; Sawchuk et al. 2002; Weir 1995). In the last 10 years more interest however, has been placed on parental loss as an independent risk factor for child mortality. This is an attempt to examine possible outcomes for orphans from psychological effects such as grief, stress and depression as well as the socio-economic implications of parental loss.

Double orphans (where both biological parents have died) experienced extreme increases in deaths especially in infants aged one to two years of age when their parents died (Beekink et al. 1999). Survival was often dependent on the family or institute into which they were placed. However in 19th century Europe it was found that by five years of age (at the time of orphaning) mortality figures are comparable with children of the same age with both parents still alive (Beekink et al. 1999).

Although the majority of orphan studies are historical, since the 1980s the AIDS pandemic has caused huge orphaning numbers in the late 20th century renewing concerns over the welfare of children left without parents (Nyamukapa and Gregson 2005; Nyamukapa et al. 2008; Stover et al. 2007). The AIDS pandemic is the largest cause of double orphaning in the world today and figures released by UNICEF/WHO (2006) show that children who have lost both parents have a 10% risk of suicide, rates well in excess of that seen in both single orphans and non-orphans. Studies of the mental health of the children orphaned through parents dying from AIDS generally show both higher levels of depression and stress (Cluver and Gardner 2007). These studies also show a differential in the levels of mental ill health and well being depending on the caregivers who are left to look after the orphans suggestive of the situations seen in historic research.

1.1.1 Increased Risk of Child Mortality by Parental Loss

The roles of the mother and father in the parenting of children are many and varied, therefore when examining outcomes for single orphans (those that have only lost one of their parents) which parent is lost may cause very different life prospects or risks of childhood mortality. Mothers undoubtedly provide many of the immediate caring functions such as breastfeeding, food, warmth, supervision and nurturing but fathers may contribute to most of these functions and therefore division of parenting roles is not easy to assess or uniform between families (Beise and Voland 2002). Therefore how the loss of a parent impacted on an orphan may differ depending on the role that parent played in the child's life, the age of orphaning and the specific needs to the orphan's wellbeing at that particular time and age.

Studies from Europe over the last decade would indicate a high level of mortality risk in the first 15 years of life if there is a loss of a parent early in that child's life regardless of economic status. The risk for child mortality was greatest for those infants who lost their mothers in the first 3 months of their lives (Beekink et al. 1999; van Poppel 2000). When peri-natal deaths are removed due to parturition difficulties (stillbirths, difficult deliveries or prematurity), there is still an increased risk of dying for infants who lose their mother or father in the first 1-2 months of life. This increased risk of death is shown to continue until the child has reached the age of 15 years but appears to be much greater in children who lose their mother compared with the loss of their father (Andersson et al. 1996; Beekink et al. 1999; van Poppel 2000). Mortality in neonates after losing their mother are in the majority due to breast feeding cessation with increased deaths due to weaning diarrhoea or failure to thrive (Sawchuk et al. 2002; van Poppel 2000).

The same studies suggest that almost no increase occurs with the loss of the father and that any increased risk of death is usually due to death from the same cause as the father. For example, children dying of the same contagious disease as their fathers, or in group deaths such as drowning or deaths in fires (van Poppel 2000). It is suggested that the loss of a father may cause differential outcomes solely due to economic difficulties the family encounter after the loss of the breadwinner (Andersson et al. 1996) but this may not be the case in pioneering families where physical capabilities to provide a living were even more vital to the families than money alone.

1.1.2 Risks when Orphaned at Older Ages

Rates of orphaning increase as children age with increasing likelihood of one or both of their parents dying with time. Mothers more commonly died in association with childbirth, while fathers were more susceptible to accidental or violent deaths. Therefore increased rates of double orphaning are seen in the older aged children. Simultaneous loss of parents was less common except in epidemic or violent death situations such as house fires or wars (van Poppel 2000).

Older infants from 3 months to 5 years at the time of death of their parent showed almost no increased risk of dying over the same time period in European studies from the 19th century (van Poppel 2000). Andersson et al.'s study from Sweden (1996) also showed no differential in child mortality in children orphaned after one year of age compared with non-orphaned regardless of whether the mother or father was lost.

Preston and Haines (1991) demonstrate higher child mortality among female-headed households in the early 20th century USA. Other more contemporary studies suggest an increase in deaths may be seen among older children (particularly sons) with the loss of their father especially in accidental deaths but also that psychiatric conditions may lead to increased violent deaths or suicides (Beautrais 2003; Brookes 2003; Cherlin 1983; Weitoft et al. 2003). Deaths which occur later in the child's life may be due to less supervision, such as with increased accidental deaths (Kypri et al. 2000), or less care during subsequent illnesses, compared with those children whose mother was still present to nurse and administer to them (Brookes 2003; van Poppel 1995; van Poppel 2000).

Studies looking at one parent families in the 20th century also suggest increased mortality rates when the child is older when the family splits; either due to parental loss or with marital breakdown (Weitoft et al. 2003). Increased rates of morbidity as well as increased risks of

mortality are also being investigated in living populations in one parent families (Hayward and Gorman 2004) and with step-parents (Daly and Wilson 1996). These considerations may be reflected in outcomes for orphans over the age of 15 using historical data.

Divorce was relatively uncommon until the late 19th century in Europe affecting very few children under the age of 18 years (van Poppel 2000). Desertion by parents was also seldom seen but historical information on this or on the affects of divorce is lacking (van Poppel 2000).

1.1.3 Gender differentials in the life chances of orphans

Studies also suggest a differential between the genders in their mortality risks after losing a parent (Beise and Voland 2002; Klasen 1998). The apparent value of the orphan either to the family or the society in which they live may cause variations in the care given to that orphan. A family who may already have older children may see a female infant of less value than a male infant or vice versa. Orphans with no siblings may be greatly prized regardless of sex by the remaining parent or grandparents. Klasen (1998) suggests females are less likely to survive with excess female mortality seen in contemporary South and East Asia suggesting that males are more valued for future prospects of the family, while some suggest an increased chance of survival for a female infant when the father is lost from the family or in differing occupational groupings (Beise and Voland 2002). Beise and Voland (2002) showed that among land owners who traditionally left their farms to the eldest son female children were more likely to die following parental death than males were. Labourers, however, in the same region valued males above females for the economic potential for the family income.

In some African countries today differential education is seen among the female orphans especially in those that have lost their mothers. Education has long reaching implication for life chances of these children especially in terms of socio-economic status as an adult (Nyamukapa et al. 2008).

1.1.4 Illegitimacy Risks

Illegitimacy has also been studied as a cause of high infant and child mortality rates. In historic Europe, compared with orphans, children born to unwed mothers were in an even more disadvantaged position recording the highest mortality rates, 40-50% higher than that of legitimate children (van Poppel 2000). Malherbe (2007) examines this issue in South Africa in early Victorian times where social ostracism and economic factors put considerable stress both on the single mother and the illegitimate child. Orphans on the other hand were seen as

children who deserved extra care and attention from society (van Poppel 2000). Certainly the absence of a father had consequences for the economic position of both the mother and illegitimate child compared to widowed mothers and their children. No inherited property, life insurance or widows' pensions or help from charitable agencies were available to the illegitimate child and their mothers (van Poppel 2000).

Papers on infant mortality in Europe during the 19th century highlight the fact that in some cities illegitimacy rates were as high as 49%, while that those in rural areas were much lower. Most countries in Europe in the 19th century ranged from 5-10% of children being born out of wedlock (van Poppel 2000). These high figures obviously impact greatly on the infant mortality rates in European countries in the 19th century.

1.1.5 Amelioration of Risks

The greatest support an orphan receives is from the surviving parent but this support can be affected in various ways. If family and social support is readily available when a spouse dies the risks of increased mortality for the orphaned children may well be lessened. But if the widow or widower is greatly affected by grief and stress after the loss of their spouse children may not receive the care and attention required for them. Stress will always be greater in the event of minimal support especially if there is accompanying financial stress. During the 19th and early 20th centuries there were no governmental social support services to call upon, therefore close family and community support was vital in caring for these children.

Multiple studies have looked into the issue of remarriage (Andersson et al. 1996; Knodel and Lynch 1985; van Poppel 1995) and step-parenting to examine outcomes for step-children in terms of mortality (Beekink et al. 1999; van Poppel 2000). Some authors such as Andersson et al. (1996) suggest an increased survival rate for step-children while others suggest increased risk for the child due to differential care from the new step-parent (van Poppel 2000). Fairy tales such as Cinderella and Snow White portrayed step-mothers as "evil" often putting their own biological children first while contemporary studies show a much higher rate of child abuse and even death due to direct personal violence from the step-father (Daly and Wilson 1995; Daly and Wilson 1996).

The effect of remarriage and the care received from the step-parent on the orphaned child may reflect both the age at which they are orphaned, which parent was lost, and who the new step-parent was thus producing multiple possible outcomes for the orphaned child.

1.2 Questions Remaining

From the literature reviewed if is accepted that orphaned children have an increased risk of child mortality compared to those children who still have parents. However there are debates concerning at what age at orphaning these risks diminish to the same level as the non-orphaned children's risk of death. Some feel most of the increased risk is in children under three months of age when dependency on breast milk is highest, while others extend this to the one or two year age at orphaning group. Few suggest any increased risk of child mortality in children who are orphaned after the age of five years (van Poppel 2000).

It is also accepted in the work reviewed above that motherless orphans have higher risks than fatherless children. There are some authors who suggest, however, that loss of a father has no affect on mortality risks aside from purely socio-economic concerns (Beekink et al. 1999; van Poppel 2000). There are also debates about whether the age at which the parent is lost may alter the risks of child mortality depending on which parent died.

Gender bias is considered in studies of child mortality however its role among orphan childhood deaths has not been discussed. The Swedish parishes reviewed from the 19th century found males had the highest risks of child mortality despite expecting the female sex could have a negative influence on outcomes. It was expected, "that in predominantly rural societies, boys seem to have been more appreciated and cared for than girls" (Andersson et al. 1996:985). Gender bias in orphaned children's mortality risk was not however addressed in this article however.

Another aspect that is not commonly discussed in historical works is the long term effects of orphaning. Andersson et al. (1996) does discuss the reduction in social status as indicated by comparison of the occupations of orphans with their fathers. Contemporary studies particularly those concerning the large number of orphans left following the AIDS pandemic do address these long term effects. Wide ranging effects of losing one or both parents include: immediate welfare concerns, longer term medical issues, education, socio-economic prospects but especially the long term psychological problems suffered by these children through into adulthood (Nyamukapa et al. 2008).

There is also considerable debate both historically and in more recent situations concerning the effects that step-parents have on orphaned children's life prospects. Many suggest a positive outcome when orphans acquired a step-parent while others suggest different outcomes depending on whether the step-parent was a step-mother or step-father. There is

also debate as to whether any effects whether positive or negative for the orphan differs depending on the age at which the child is orphaned or acquires the step-parent (van Poppel 2000).

1.3 Questions Posed in this Thesis

This thesis will address the orphan situation in the 19th and early 20th century among families and their descendants from two regions of NZ posing the question of whether a colony with better survivorship has a different experience to historic Europe. The extent of orphaning and illegitimacy will be examined to assess both the extent of the problem in NZ but to also compare with selected contemporary European communities.

Whether there are increased risks of mortality for orphaned, abandoned or illegitimate children will be explored and the question of whether this risk differs depending on the age at which the children are orphaned addressed. Any increased risk will also be examined in terms of which parent was lost and how it varies across childhood. The role of gender bias and its relationship to age of orphaning will be analysed.

In particular, the questions of whether step-parents ameliorate the increased risk of child mortality will be investigated. Direct comparisons will be possible between Andersson et al.'s study (1996) from 19th century Sweden into improved survival prospects for orphans after acquisition of a step-parent.

The dimensions of age at orphaning and gender will also be considered among analysis of the cause of death of illegitimate, orphaned and non-orphaned individuals. The cause of death investigation will examine both the child and adult mortality of orphans compared to the non-orphaned and illegitimate groups. Differing mortality risk will be extended beyond 15 years of age in order to examine possible long term effects of orphaning.

These questions will make it possible to determine what were common patterns in the risks experienced by orphans, illegitimate and abandoned children historically, how these risks are experienced in a particular colonial situation, and whether these risks extend beyond childhood.

Chapter 2: Background

2.0 Introduction

Before looking at the specific subject of illegitimate and orphaned children and their life chances in NZ, we must first address how NZ differed from the British Isles and Continental Europe in the 19th century from where their families originated. Not all countries that people migrated too were equal and the conditions that greeting new migrates provided very different opportunities. Levels of poverty and overcrowding frequently mirrored conditions in Europe and in North American east coast cities that had been colonies for almost three hundred years. New Zealand was the last country to be colonized in the world and therefore presented vastly different conditions form those found in Europe in the 19th century.

The period under investigation in NZ stretches from 1850 for deaths and up to 1915 for births. This encompasses the major period of colonisation and also NZ's relative isolation from the rest of the world. This period also corresponds largely to the Victorian era in Britain and covers the second half of the 19th century from which much of the European figures are derived.

2.1 The Conditions of Colonisation

At the height of the industrial revolution in Europe in the 19th century, European countries were expanding their territories throughout the world. Massive overcrowding in European cities had lead to high rates of infectious diseases such as tuberculosis, typhus, cholera and other diarrhoeal diseases due to poor sanitary conditions. These infectious diseases coupled with poor nutritional status caused high infant mortality and an overall lower life expectancy especially among the poor (Borrie 1972). Poor living conditions, famine and disease as well as war and political unrest encouraged large numbers of peasants, refugees and homeless to migrate to countries with better life prospects in the 18th and 19th centuries (King 2003; Molloy 1991).

In the 18th and 19th centuries large numbers of Scottish refugee families from the land clearances in Scotland had emigrated to Canada and North America (Guillemette and Légaré 1989; Molloy 1991). France was colonising many South Pacific Islands and England was extending its empire into the newly discovered Australasian region, first sending their overflowing numbers of convicts to Botany Bay from 1788 and Van Diemen's Land in the

early 19th century (King, 2003). Settlers soon followed the penal settlements to Australia but formal colonisation events did not begin in earnest in NZ until the signing of the Treaty of Waitangi in 1840 (Pool 1991) when people from throughout the British Isles and Ireland sought a new life in the antipodes.

Many hoped the new territories would provide better living and working conditions and would enable them to have a better life for themselves and their families (Guillemette and Légaré 1989; Molloy 1991). Ireland and Nova Scotia were ravaged by the potato famine in the 1845-1849 period and large numbers of people emigrated all over the world including to NZ, to find better prospects for food, employment and land procurement (Molloy 1986). Not surprisingly, this massive shift of people into new territories was not matched with available housing, water supply, sewage and waste disposal (Kaplan 1988). Those who fled to North America often found conditions not dissimilar to those they had left. Unemployment and land shortages on the east coast of North America meant large numbers of Irish immigrants moved into Poor Houses, with diseases from overcrowding continuing to kill those unable to rise above the poverty level (Sirianni and Higgins 1995).

2.2 Why was New Zealand different?

2.2.1 Population Composition

Unlike the North American situation, the population of NZ was small, still consisting of mainly the indigenous NZ Maori and a few Europeans in small pockets of populations. After the signing of the Treaty of Waitangi in 1840, large numbers of Europeans flooded into the country (King 2003; Pool 1991). By 1858 the European population numbered just under 60,000 (New Zealand Government 1912). The Maori population was soon swamped by Europeans and their population declined rapidly in the 1840s and 50s. In the 1860s and 70s the European population almost doubled, not from new immigrants but by their own progeny. The Maori population declined then levelled off and it was not until the 1890s that a major increase in their population occurred when birth rates soared with an average of eight children per family (Pool 1973).

2.2.2 European Colonists

NZ immigration was typified by large and extended families moving together to establish new ‘home’ communities in the 19th century (Pool et al. 2007). The New Zealand Company arranged shiploads of settlers from England and Ireland to move to the Wellington region in the 1840s, while the Canterbury Society was responsible for the establishment of the English

settlement of Christchurch in the 1850s (Denoon et al. 2000). Young single men were always more common amongst the immigrants than single women living in NZ, but this was especially so during the gold rushes in the later part of the 19th century (Lancaster and Donovan 1966) when men migrated to NZ from Australia, America, Canada, China and European regions (Denoon et al. 2000; King 2003; Molloy 1986). As a result, by 1900 the proportion of elderly females in NZ was low and males outnumbered women. Additionally, the overall population had a very low mean age (Lancaster and Donovan 1966).

2.2.3 Living Conditions

Often initial living conditions were substandard in the newly colonised countries such as NZ and Australia and new immigrants lived in tents or temporary shelters, followed by rudimentary housing (Denoon et al. 2000; Mayo 2006). These living conditions, along with the constant struggle of earning a living and finding food, placed great pressure on the physical and mental wellbeing of the newcomers (Kaplan 1988). However, except for a minority of large land owners, settlers had left behind the class systems of their home countries and had a greater ability for self determination. The population consisted largely of self employed people primarily in the farming sector or in the trades (King 2003).

2.2.4 Climate

NZ differed in several important ways to other colonies. The climate in NZ was more temperate to that in Europe and even in urban areas almost all families had a garden plot which provided fresh vegetables and fruit all year round. Less crowded urban settings and a large rural community meant the majority of settlers had access to clean drinking water even if the sanitary arrangements were still poor (Pool et al. 2007). Even in the urban areas most families lived in houses set apart from others allowing less transmission of germs than in the crowded apartments or tenements common in Europe and the United States of America in the 19th century (Pool et al. 2007).

2.2.5 Diseases

Emigrants leaving their countries of origin were also responsible for bringing diseases with them (Haggett 1993). Although in the 19th century travel to NZ took months aboard sailing ships, some diseases such as tuberculosis managed to stay with those on board ship and pass with their hosts to the new destinations (Adams 1977). Molloy (1986) showed that 52.4% of single females aged 17-40 in the Nova Scotian Waipu colonial community (in the North Island of NZ) died from tuberculosis alone. Once Australia's population was more

established more acute infections (such as measles) were brought to NZ aboard the trading vessels frequently plying between the two countries (Haggett 1993). Nevertheless, NZ had freedom from some diseases such as smallpox and malaria due to both its isolation and climatic conditions (Boughton 2002).

2.2.6 Causes of Death

Although both Maori and European children died of the same infectious diseases, adult Maori also perished during the initial contact period before immunity to the newly introduced diseases was achieved (Adams 1977). Most adult colonials (initial generation) had experienced these infections as children in Europe and were immune to these diseases in NZ. However, the following generations were not and European children died from the same infectious diseases as Maori children although not necessarily to the same extent (Lange 1999). Some were more protected living in small isolated population centres as children but on venturing out into larger population centres such as Christchurch they became ill with these infections during adulthood (Mayo 2006). Although most mortality statistics from NZ show a marked dissimilarity between the European and Maori populations, especially in terms of infectious diseases (Lange 1999; Pool 1973; Pool 1977; Pool et al. 2007; Rice and Bryder 1988). This may reflect the difference between the economic and communal living situations of the two groups at that time rather than any biological difference.

Europeans also experienced early adult deaths. Men had high numbers of deaths attributed to accidents and drowning and although many of these men were single others left widows and multiple children fatherless (Molloy 1986). This, along with young women dying from factors related to childbirth, left numerous children motherless and affected the economic capacity of the father (Molloy 1986). In the case of husbands dying women were left to fend for themselves and their children, necessitating role diversification, or rapid remarriage (Crotty 1989; Mayo 2006; Molloy 1986; Ogilvie 1990). Children in NZ during the 19th century colonial period also showed high mortality rates from accidental death as did men. This fell significantly in the later 19th and early 20th century when general family size dropped and possibly better supervision occurred (Pool et al. 2007).

New Zealand was also free of many of the tropical diseases found in the Pacific, such as malaria, dengue fever, leprosy or yellow fever (Houghton 1996). Unlike Australia, NZ only had one outbreak of smallpox in 1913, which was quickly contained (Boughton 2002; Campbell 2003). However, after the First World War NZ was less isolated from the rest of

the world and the Spanish Flu pandemic arrived in 1918 (Johnson and Mueller 2002). With the world wide depression in the 1930s NZ's mortality rose but those living in cities were hit harder than those able to be more self-sufficient on the land (Denoon et al. 2000; Pool et al. 2007; Wanhalla 2006).

New Zealand in the early 20th century became a country of the British Empire in its own right and as such provided eager young NZ men to supplement the Empire's armies in both World Wars. New Zealand contributed a very high percentage of young men to these forces but unfortunately also lost a high number in casualties (King 2003). This high loss contributed to the sex ratio almost reaching 50/50 by 1918 (New Zealand Government 1922a).

Overall in NZ it has been the change in infant mortality and fertility patterns which has had the greatest impact on the increased life expectancy of the late 19th and 20th century (Ball and Pool 1998; Pool et al. 2007). Throughout the period 1881-1941 NZ's death rates were lower for both males and females than those in England and Wales. The difference was largely due to lower death rates in the NZ one year to under five years of age group and the very large decline in infant mortality (Lessof 1949). Under registration of deaths alters these figures and but this was generally higher within the Maori community (Pool 1973). All three countries shared the same regulations concerning registration of births and deaths and NZ's system is based entirely on the British system and therefore apart from NZ's Maori population should have similar registration rates (Lessof 1949).

2.3 Reasons for Selection of Research Population

The data that this thesis is based on came initially from people who resided in either Tolaga Bay or Little Akaloa. Family reconstitutions were made around these individuals and they and their families were followed down through several generations to create the data base.

Two regions from NZ were selected to avoid single area bias in figures and analysis. One settlement each from NZ's two main islands were selected for data gathering; Tolaga Bay (TB), on the east coast of NZ's North Island and Little Akaloa (LA), from Banks Peninsula from the South Island (Figure 2.1). The indigenous Maori populations of both regions had early close contact with Europeans in the 1830s-1840s. Initially this was with single men in the whaling and flax trade industries. Many early marriages between European men and Maori women are evident in both sub-populations.

The two regions are both situated on the eastern coastline of NZ and as with most early European settlements in NZ were initially accessed by boat rather than by land routes. Similarly, both regions were settled by European immigrants. Little Akaloa was settled in the 1840s and the 1850s after the Canterbury Society assisted immigrant ships arrived in Lyttelton harbour (Ogilvie 1990). Although Tolaga Bay had early contact with Europeans, both with traders, whalers and missionaries, migration into the region saw the largest influx of European settlers later in the 1880-1890s (Mackay 1967). Rather than coming directly from external migration these settlers often arrived to settle in Tolaga Bay through internal migration from other regions of NZ.

Figure 2.1: Map of New Zealand with location of Tolaga Bay and Little Akaloa.

As a large amount of the land which became available for settlement in the 1880s and 1890s in the Tolaga Bay region was taken up by rich land owners for the establishment of sheep stations, migration into the area had a larger number of single men than that at Little Akaloa. Land owners tended to have families but the workers both on the farms and timber industries were largely single and often had no other extended family members in the vicinity (Donald 2003).

The Tolaga Bay sub-population consists of a larger percentage of Maori or part-Maori individuals than the Little Akaloa group. However, a large number of these individuals were excluded due to insufficient information for inclusion into the final population for study.

2.3.1 Genealogical Resources

Both regions had large genealogical resources available to provide the initial data base for this research. Banks Peninsula and Christchurch regions have extensive church records dating from early 1850s but unfortunately any church records in existence for Tolaga Bay were lost in the 1931 Napier earthquake (personal correspondence with the Reverend Stephen Donald from Tolaga Bay).

Using death registrations along with other sources of birth, baptismal, death, burial and marriage information, accurate family reconstitutions have been possible in this research for those individuals included in the final data set. This has enabled child mortality information to be placed within the context of their family to further investigate the mortality risk on children when the loss of a parent occurred in NZ from 1850. This information will enable comparisons to be made between this NZ data set and those of mainly European communities already researched. This research will be able to follow individuals throughout their lives and ultimately to their deaths. Data concerning each individual's parents, spouses, children, occupations and cause of death have all been collected to give valuable information on the life history of orphans and non-orphans. Comparisons between these two groups, along with the illegitimate and abandoned children in the sample, will make it possible to extend conclusions beyond the 15 years of age.

European studies of the risk of dying for children who have lost a parent or who were illegitimate follow individuals to the age of 15 years. This is principally due to the use of parish and local census records to track individuals from birth through to death. However, due to frequent migration out of their location of birth after the age of 15 years, many

individuals are lost to follow-up and therefore only deaths up to the age of 15 years have been studied (Andersson et al. 1996; Beekink et al. 1999; van Poppel 2000).

With the use of official birth, death and marriage records, and genealogical information individuals can be followed through from birth to death despite migration in or out of the Little Akaloa and Tolaga Bay, thus supplying valuable data for this research. This has enabled further investigation of the mortality risks through into adulthood and using death registration records has allowed cause of death information to be assessed.

In NZ no census information is available for socio-economic comparisons to be made for the 19th century or early 20th century. However, death records in NZ give extremely useful information from 1870 onwards including the names and occupation of parents along with cause and place of death (Pool and Cheung 2002). Registration was instigated in 1848 for the European segment of the population but the earlier death registrations are less robust in the information collected (Neill et al. 1995). Compared with other colonial countries however, NZ's death registration was, and still is, of a high standard with very high rates of registration (Mathers et al. 2005; Pool and Cheung 2002).

2.3.2 Tolaga Bay

Tolaga Bay is a predominantly traditional Maori based community, which was formally colonised by Europeans later than most regions in NZ. Maori and later European settlers tended to be socially separate, mainly mixing only when in the local town (Figure 2.2) and in Gisborne, the regional capital of the East Coast (Donald 2003).

Many hills and valleys were already cleared and under cultivation by the Maori at the time of European settlement. Large amounts of produce and crops were available to the early settlers and the majority of the land was ripe for farming without the need for land clearance. Blocks of native trees were soon exploited in this region by the pioneers and beaches and rocky shores supplied a wealth of marine resources for the local people. The river and ocean provided valuable navigable waters for transport, communication and access to food resources (Mackay 1967).

Figure 2.2 - Uawa River flowing through Tolaga Bay Township to the bay 1920's
(From Donald 2003: front cover)

Despite early European contact and intermarriage with local Maori, Tolaga Bay had a large Maori population who continued to live traditionally. A wide separation remained socially, within land ownership, employment, the law and health (Donald 2003). Development of European settlement in the area was slow compared with other regions in NZ. Larger numbers did not arrive until the 1880s and 1890s when extensive land packages were leased for sheep farming from the local Maori owners. Many of these new residents came to the region from elsewhere in NZ consisted of a high proportion of single men looking for work on the sheep stations and in the forestry industry (Donald 2003; Mackay 1967).

2.3.3 Little Akaloa

In contrast Little Akaloa is a small coastal settlement on the northern aspect of Banks Peninsula in the South Island. The landscape is extremely rugged, with high eroded volcanic peaks leading down steep valleys to the beaches and bays. The nearest communities are those of Akaroa to the south and Christchurch to the east, both of which were accessible by boat rather than by land initially (Ogilvie 1990). Little Akaloa was without Maori locals at the time of European settlement due to previous tribal warfare. Those Maori who remained in the Peninsula region frequently married Europeans and were assimilated into the 'European culture' (Jacobson 1914; Ogilvie 1990). By the 1840s up to seven ex-whalers had temporary camps in Little Akaloa to fell trees to supply timber for domestic and ship building activities

on the Peninsula but it was not until the early 1850s that Little Akaloa was colonised by mainly English and Scottish immigrants. Many had arrived on board vessels in 1850. First the "Monarch" arrived in 1850, which was the first English ship to bring 52 passengers from England, 40 of which disembarked at Akaroa to colonise the Canterbury region (Jacobson 1914). In December of that year the first four ships of the Canterbury Association arrived in Lyttelton Harbour with 791 English immigrants aboard. The first settlers were Messrs Bennett and Rix, both working as sawyers (tree fellers) (Jacobson 1914). Mr. Jones soon followed and purchased the first section of land in the Bay from the Canterbury Association. The whole bay was densely forested and tree felling was the major industry until enough land was cleared to instigate farming. Tracks were cut through the bush both to Duvauchelle's Bay in Akaroa Harbour in 1869 and to the next large bay, Okains. However, these tracks were rough and transport was either by foot or horse. Most large commodities and mail were transported by sea to Lyttelton including timber for construction of the Christchurch settlement (Jacobson 1914; Ogilvie 1990). The settlement continued to grow in the 1860s with schools opening in Little Akaloa and nearby Chorlton (Mayo 2006; Ogilvie 1990) (Figure 2.3).

Figure 2.3 - Little Akaloa in the late 1870's
(From Ogilvie 1990:109)

Cheese, grass-seed and wool became the most common export from the bay once most of the wood was exhausted and the bay became the home to many farmer settlers (Jacobson, 1914).

These settlers often had close family or communities ties even prior to emigration to NZ (Mayo, 2006). Intermarriage between neighbouring families or into families from the next bays around from Little Akaloa was common. This produced a close-knit inter-related group of colonials centred on the initial development area of Little Akaloa (Mayo, 2006).

Descendents soon outstripped the available land in Little Akaloa and the neighbouring areas and in the 1880s and 1890s saw many young single men moving to areas where land was available. This was often to the North Island where large tracts of land were opening up for settlement. Others moved to larger population settlements such as nearby Christchurch for job opportunities outside of farming (Crotty, 1989).

Therefore, both regions for selection have a number of similarities but also show quite marked differences especially in how the communities integrated together. Little Akaloa was a very close tight knit community with a small number of founding families with extensive intermarriage connections between neighbours. The majority of the residents were English and Scottish settlers and until the available land was exhausted stayed close to home. The majority of settlers owned their own land which they developed into small family holdings capable of being self supporting. Tolaga Bay had a large number of Maori residents and settlers were from a larger number of European backgrounds with greater numbers of single male landless labourers. The community was much less integrated and there was a greater socio-economic gradient across the population from rich land owners to the general labourers who worked for them. The majority of the Maori continued to live independent lives but large numbers of families who had mixed ancestry integrated the two segments of the wider community.

2.4 Differences to Europe

The populations of both Little Akaloa and Tolaga Bay were more rural, isolated and smaller in size than most European communities of the 19th century. Although no absolute population numbers are available for either Tolaga Bay or Little Akaloa due to the lack of complete census information available in NZ, Little Akaloa's population at its peak was approximately 300 persons, while Tolaga Bay and its environs was between 500 and 750 persons. Both European colonists and Maori families tended to be large until the late 1890s and most children reached adulthood compared with Europe at the time. Life expectancy at birth was higher in NZ for both males and females compared to England and European countries on average by three years (Lessof 1949; New Zealand Government 1922a).

Living conditions in both communities was generally good with high degrees of self determination. English based medical care available in both regions and higher levels of service were based in the regional centres. Fresh fruit, vegetables, dairy products and large amounts of meat was generally available and provided good nutrition (Pool 1991). Less infectious diseases were endemic and epidemics were less frequent due to small population sizes and less overcrowding compared to European communities. However, Maoris who continued to live traditionally had a greater likelihood of contracting contagious diseases due to poorer sanitation and more densely packed living arrangements (Pool 1991).

In colonial NZ women were always found in lower numbers than the men and as a result female marriage rates were generally high (Pool et al. 2007). Widows frequently remarried and went on to have more children by their second husbands. Widowers also had high remarriage rates but single women were not always available to meet the demand in the 19th century. Thus, integrated families were common in NZ during this period largely due to the death of a spouse rather than divorce (Pool et al. 2007).

2.5 Likely outcomes for orphans and illegitimate children in New Zealand

I would expect NZ to show similar levels of orphaning to Europe with deaths in childbirth contributing mostly to mother loss and accidental deaths particularly drowning, the highest cause for paternal deaths. Although life expectancy overall was higher in NZ than that seen in Europe, NZ did have more deaths in the younger adult category. Overall therefore the orphan rates are likely to be similar to those in Europe but age at orphaning at father lose may be somewhat earlier in NZ.

As infant and child mortality was also lower in NZ I would expect orphaned children to have better survival prospects to those seen in Europe. Illegitimate child numbers were also low in NZ and it could be expected in a developing colony that these children would fare better than illegitimate children in Europe.

High remarriage rates in NZ resulted in large numbers of step-parents. In Molloy's (1986) work on kin investment in NZ's Waipu community in caring for orphaned children we would expect decreased risks of childhood mortality and better lift prospects for these children. In communities in NZ were remarriage was common and frequently amongst neighbours, relatives or friends I would expect positive outcomes for children who acquired step-parents.

Chapter 3: Materials and Methods

3.0 Data Collection

This project is based upon genealogical information collected about my mother's family members who immigrated to Little Akaloa in the 1850s and my father's family members, one of whom immigrated to the East Coast region of NZ in the 1830s working in the whaling and flax trade industries and married a Maori woman from Tokomaru Bay, just north of Tolaga Bay. This data set has been researched and compiled over the last 26 years by me with considerable help from family members, especially my paternal uncle Rex Moore. To expand my data set, histories on families who resided in Tolaga Bay and Little Akaloa settlements and their descendents have also been included and further researched (Baker 2003; Crotty 1989; Dixon 1987; Donald 2003; Halbert 1999; Mayo 2006; Smith 1993; Winterburn et al. 2003).

Mortality information has been accessed from the New Zealand Department of Births, Deaths and Marriages (NZ BDM) in Wellington. Six visits of five days duration were required to gather death registration information for those individuals under study. As this information was accessible on microfilm only, it has not been possible due to time and cost constraints to research mortality cause for all persons eligible for inclusion. Over 3300 individuals' death certificates were able to be examined during these six visits (much gratitude must be given to the Registrar General for waving the cost of these certificates for my research purposes).

Of these 3300 records 251 were excluded as they were the incorrect person being researched and 229 where further excluded as their births had occurred after the 1915 cut off year. To avoid skewing of data, the final birth year inclusion has been set at 1915. Individuals born before 1916 who were still alive as of August 2010 made up less than 0.001% of the initial 8747 persons researched. This level is sufficiently low to avoid any skew in the figures used in the mortality analysis. The majority of individuals included died prior to 1988 (later death data were not available from the Department of Births, Deaths and Marriages). Those persons who died after this date and are still included have had cause of death available from previously purchased death certificates. As death date and mortality information is required for statistical analysis, individuals who are still alive will not be included (95 years of age plus as of August 2010). This leaves a data set of 2914 individuals made up from the two

sub-populations, 1101 from the Tolaga Bay families and 1813 from the Little Akaloa descendants (Table 3.1).

More in depth information on each individual's parental deaths for orphan status have required further investigation and this information has not always been available and more difficult generally to find, especially in the case of Maori persons who died in the 19th and first 20 years of the 20th centuries.

Table 3.1: Inclusion Criteria for final Little Akaloa & Tolaga Bay Families data set.

Inclusion Criteria	Deaths	Births	Marriages	*Comment
Residence	Must have been a resident or a descendent of residents from Little Akaloa & Tolaga Bay			
Dates	From 1850*	Before 1916*	Before 1935*	*all dates must be accurate
Death Registration	In New Zealand*	No restriction	No restriction	*War deaths included
Spouses	In New Zealand	No restriction	Included if married before 1935*	*unless already a descendent
Cause of Death	Must be known, the majority from death registration information			
Parents	Known death date	No restriction	Known*	*required for illegitimacy status

3.1 Data Sources

Information on individuals has been collected initially from genealogical information. This has been accomplished by utilising both oral and written material from family members. This information has then been expanded by further research on my part from established genealogical sites and official registration records. These include birth, death and marriage records; parish baptismal, marriage and burial information; cemetery records; census or electoral rolls; school entrance registration; shipping and passenger lists; historical documents or newspapers and finally residential, property ownership and postal address information. Extensive use of genealogical websites such as Ancestry.co.uk and FamilySearch.org has enabled access to overseas information especially from the United Kingdom. NZ information has also been obtainable from numerous websites; such as the new official Births, Deaths and Marriages (NZ BDM) site, several cemetery database sites and CDs produced by the New Zealand Society of Genealogists Inc. Prior to the opening of the new BDM website in April 2010, this information was only obtainable using microfiches from local libraries which only record the name, year and registrations numbers for each birth, death or marriage. These

registration numbers (3300 in total) for all deaths in my data set were required and compiled by me to enable access the records when researching the microfilms at the Department of BDMs in Wellington.

All data was initially been entered on the Family Tree Maker (Version11, 2003) software, which is produced by the Church of the Latter Day Saints. This has enabled natal family reconstitution, family history notes as well as descendant lineages to be integrated into the research, data collection and discussion.

3.2 Official Registration

NZ's official registration records of births and deaths began in 1848 but became compulsory only from 1855 for deaths and 1856 for births (Neill et al. 1995). Despite this there are large numbers of known births and deaths which to not appear on these official registers. This may have been due to the cost of registration, remoteness of location from registration offices or more commonly that those persons were Maori where such convention was not regarded as necessary or important. Maori *whakapapa* (genealogical) knowledge had always been passed down through oral means and not formally recorded in written forms until much later.

Official death information is absent prior to 1848, and extremely limited initially, individuals who died after 1850 only are included in this study. Local Tolaga Bay birth and death registration was first recorded in 1909, registration had previously occurred in Gisborne and been recorded as such. Therefore, actual birth and death registrations attributable to Tolaga Bay (especially the Maori population) prior to 1909 are poor. Little Akaloa has always been included in the Akaroa registration district for both births and deaths (Neill et al. 1995). Generally, in this region there was a high registration of both births and deaths. Very early events however, are better represented in Church records (Peninsula Church Registry), as are many Maori or part-Maori persons' births or deaths from this region.

Birth registrations in NZ initially recorded dates of birth, name, sex, parents, father's occupation and mother's maiden name. Prior to 1875 the full birth date and frequently the names of the parents is unavailable on the NZ BDM site. This site also only records births which occurred over 100 years ago. Therefore any births which occurred after August 1910 have been under represented in the final thesis population. Although these births can be found on the microfiches available at the local libraries this information lacks full date of birth and more importantly parentage. From 1876 marriage certificates also included place of marriage of parents, age and birth place of each parent and informant particulars (Neill et al. 1995).

Both birth and marriage information has been compiled to confirm relationship data on the families and individuals under study in this thesis.

Death registrations in NZ were initially more informative than those recorded in England. Date of death, full name, sex, age, occupation, cause of death and informant were recorded. From 1876 onwards quite exceptional amounts of information are to be found on death certificates in NZ (See Appendix 3). In addition to details already supplied spouses' name, birth location, how long resident in NZ, date of birth, age and sex of living issue and internment details are now available (Neill et al. 1995). England and other European countries in the 19th century, however, had much better census, tax and parish records than NZ at the time. Overseas studies therefore usually utilise these resources over death registration records (Andersson et al. 1996; Day 2000). By accessing death registration documents for the individuals in this study, any shortcomings in the genealogical data collected have been able to be addressed to a large degree. However, when information has been found to be incomplete or inaccurate some individuals have been removed from the study.

Marriage registration in NZ was recorded from 1854 onwards. As notification of marriage was sent directly to the central registration location from minister's records rather than through the district offices, no location apart from NZ is given in the index of records. Initially certificates included: date, place, ages and names of those married, marital status, occupations of bride and groom; name of the minister and witnesses. From 1880 onwards age, place of birth, parents' names, occupation and residence were also included at registration (Neill et al. 1995) (Appendix 4).

From 1913 through to 1961 (births & deaths; marriage registry from 1911-1958) an alternative registration system became available to Maori. This Maori Register unfortunately suffers from several problems. Firstly the only location recorded in the index is NZ for births, deaths and marriages. The next most difficult problem is in the recording of names. Usually names are registered with the surname first and Christian names following. However, names are often found reversed while some names stated may be colloquial such as Girly, Sonny or Blossom. Full Maori names are sometimes difficult to place in the correct order, only partially entered or were spelt incorrectly. Names may not be consistent across the birth, death and marriage records for any one person. For example, Henry George may become George Henry or Henare George with switches between Maori and English versions of the

same name. Some Europeans who were married to Maori also adopted Maori versions of their name (e.g. William Mackey to Wiremu Maki) and were registered on the Maori register rather than the general register.

No occupations are recorded on the Maori register, neither for the deceased nor their fathers, while information on children only records the number of surviving female or male offspring, but without specific ages. This caused great difficulties when trying to research Maori family descendants and with attempting confirmation of parentage. The greatest exclusion of individuals from the initial 8750 persons investigated was in the main due to difficulties in confirming parentage. Information on the spouse was often poor or absent and there is no location or date of marriage included on the Maori registration forms to further assist in research.

As with the combined registers, non-registration still occurred quite often on the Maori Register. Despite accurate burial or christening information no registration for either death or births was able to be found for these individuals. Ages on death certificates were also more likely to be inaccurate due to uncertainty about the year of birth. This was especially the case for these born in the early 19th century before formal registrations started, and particularly in the case of Maori individuals. The Maori Register entries also had greater "blanks" in supplied information than those on the General Register. Whenever possible birth dates have been checked independently from death information by using birth registration or baptismal records. Unfortunately many Maori individuals have been excluded due to both difficulties with non-registration issues or the inability to confirm relationships due to multiple name use. Although many Maori have been excluded from the study, those who remain provide valuable information on this section of the communities under study. All information included on Maori persons and their families (including population numbers, births, marriage and death information) is largely unavailable from the official statistics of NZ which commonly only reflects the Pakeha portion of NZ's population.

3.3 New Zealand Statistics for Cause of Death

Direct comparisons with NZ death statistics for causes of death (COD) is difficult as categories have changed over time both in definitions and groupings. In 1861 comment is made of 133 out of a total of 1109 deaths occurring from drowning or other external causes but no other COD were discussed. By 1881 COD were reported in age categories and divided into classes such as miasmic diseases thought to be caused from bad air which included

infectious diseases such as measles and diphtheria but also non-communicable conditions such as croup. Other infectious diseases such as tuberculosis (TB) and pneumonia could be found either in their own grouping (TB) or recorded under the region of the body affected such as respiratory diseases in the case of pneumonia (New Zealand Government 1882). Unfortunately the extremely good detailed information for COD by age group is changed in the statistical reports produced by the Government to COD for each sex in 1900 with condensed cause of death categories lacking the detail of previous years. Infectious diseases previously listed under the miasmic grouping such as measles were lost within a unknown category, possibly constitutional or respiratory diseases (New Zealand Government 1901).

In 1908 the COD classification system was changed for the first time to the Bertillon Index of Diseases which was now being used in England, European countries and Australia. Unfortunately comparisons with earlier COD statistics was then impossible unless the category definition had not changed as in the case of TB or deaths from cancers for example (New Zealand Government 1912). However, Bertillon's classification is much more in keeping with current medical terms and understanding and therefore is more compatible with my cause of death groupings. From 1908 the COD statistics are given in detail for the infant mortality but otherwise each COD was given as total number and no longer divided into each age at death or sex categories (New Zealand Government 1912; New Zealand Government 1922a).

3.4 Other Official Lists

3.4.1 New Zealand Electoral Rolls

Individuals also appear in other official lists in NZ, such as the electoral rolls from 1853. However, electoral rolls initially only included males who owned land. Maori men were only able to vote from 1867, and from 1908 those of more than half- Maori descent were required to register on the Maori Roll. Still, however, many Maori failed to register despite the legislation entitling them to vote (Donald 2003). From 1881, all men regardless of land ownership were able to vote and by 1893 women were included on electoral rolls for the first time following the suffragette movement in NZ (King 2003). Unfortunately the 1911 electoral roll which would have been extremely helpful was not available at the time that the data base was assembled, but was published in late 2010.

3.4.2 Census Records

Census information from the United Kingdom has also been used from 1841 onwards and is available in 10 yearly intervals. This has been particularly helpful for persons born or married before official registration commenced in England in September 1837 (See Appendix 2). Unfortunately NZ has not retained specific family information from their census returns and only collective population numbers are available for use (Statistics New Zealand 2010). Due to the lack of family information in NZ from census sources, I have had to reconstruct natal family groups from all other available resources open to me. Some local early partial census information may be found in NZ's historic papers; while others may be found in historic works such as the 1851 census found in Mackay (1967) for Poverty Bay which lists European men's names, occupation, wife and children. Children include "half-castes" but if a wife was Maori she was not included on the census.

3.4.3 Parish Records

When official government registration did not occur, parish records can provide important information and allow family lineage reconstruction (Willigan and Lynch 1982). Baptisms, marriages and burials are commonly recorded in church records. Parish records only include those who went to church (or had a church to attend) and therefore individuals may not appear if they were not church goers or lived in small remote centres (Willigan and Lynch 1982).

Information sometimes includes residential and parental information including occupation and mother's maiden names. Parish marriage information may include parents' names, mothers' maiden names, occupations of the bride's and groom's fathers and of the bride and groom. Age and residential address and witnesses were also frequently recorded but this varies between different churches and regions. Cemetery burial information often includes place of birth, date of birth, occupation, residence, how long resident in NZ if born overseas, death and burial dates, along with burial location.

Little Akaloa, along with the wider Banks Peninsula and Christchurch regions has extensive parish records (held at Christchurch library) which has provided invaluable information not only on baptisms, marriages and burials, but extensive family information including residences, occupations of parents, and spouses of the deceased.

Parish records for Little Akaloa's St Luke's church are to be found in the Christchurch public library. Baptism records prior to its building in 1882 (Mayo 2006; Ogilvie 1990), are

contained in the 'Peninsula Register' which was kept by Ministers from Christchurch who travelled out to the Peninsula to perform baptisms and marriages prior to most of the settlements having formal churches or clergy. Otherwise most early marriages and baptisms were performed in Akaroa, as Catholic and Anglican churches had been established there in the 1840s. Baptism tended to be carried out within a month or so of birth as death in infancy was common. Some infants and all stillbirths did not receive baptism; stillbirths therefore were usually buried outside consecrated land and may not appear on burial registers until 1913 when registration of stillbirths became compulsory in NZ. Baptism of children of various ages (often from one family) may have taken place when the visiting minister arrived, the most famous being Bishop Selwyn who visited Little Akaloa on August 4th 1853. Children's' ages at baptism ranged up to 6 years of age at the time of Selwyn's visit (Ogilvie 1990) and therefore baptismal timing should not always be equated to birth year.

Records held in the Christchurch library give particularly detailed information for the Canterbury and Banks Peninsula region. Sources for the same type of extended baptismal, marriage and burial information for the Tolaga Bay region were not available, with the Anglican Church records only commencing in the early 20th century. Unfortunately these were all lost in the 1931 Napier earthquake which destroyed the central Anglican Ministry buildings which housed the records (personal communication with Rev. Stephen Donald).

3.4.4 Burial and Cemetery Records

Within Little Akaloa as in other early colonial settlements, burials originally took place in the front or back yards of people's residential properties. During the diphtheria epidemic of 1865 victims were buried together at Long Lookout Point, the location of a Maori massacre in 1831 (Mayo 2006; Ogilvie 1990). Little Akaloa churchyard was donated by the Waghorn family for community burials, the first of which is recorded in 1871. Later in 1882 St Luke's church was built alongside the cemetery. Alternative cemeteries were also used in nearby Okains Bay and Akaroa where both Catholic and Protestant cemeteries were located. If individuals or families had moved, often to nearby Christchurch several cemeteries were used for internment but frequently those who were born in Little Akaloa were returned there for burial.

Tolaga Bay has several cemeteries used for burial or ashes internment. Maori had adapted Christian burial practices in the majority since the Mission were first established in 1838 (Mackay 1967). The largest one is the public cemetery (burials date from the 1880s onwards)

which includes a large Returned Services Association (RSA) section; the Maori *Urupa* (cemetery) is located next to this cemetery on the cliff at the northern end of Tolaga Bay and pre-dates the public cemetery. Each *marae* (Maori tribal meeting place) also have cemeteries within their wider precincts, with persons frequently interred without headstones or inscriptions. Several unmarked Maori cemeteries were also known of in family histories, for example the Rangiuia family cemetery is believed to be located under the local Tolaga Bay school buildings. Recent (2008) school building construction at the Tolaga Bay School, unearthed the lost Mission cemetery dated from the late 1830s to 1840s. Information regarding the Reverend Charles Baker's Mission and cemetery can still be found in original Mission documents held by the Anglican Church (personal communication with the Rev. Stephen Donald).

I undertook personal searches of all graveyards in Tolaga Bay and its surrounding regions as well as numerous cemeteries in Banks Peninsula. This was particularly important for the *marae* cemeteries as their information is not available on the burial websites and Genealogy Society CDs used in my research. All available inscriptions were recorded for both dates and family relationships. Many burial plots in both communities do not have headstones. Headstones became more popular in the later Victorian times, earlier grave markings in NZ were often constructed of wood and no longer survive, and the cost of more permanent markers was often prohibitive for relatives. Stillbirths, infants and single persons (without family, including paupers) tended not to have gravestones. Sometimes infants' names or collective statements may be placed on parental headstones at a later date such as "John and Mary and their infant sons". When available, cemetery records were accessed for information and these often included names of those interred along with burial dates even when no headstones existed.

3.5 Family Genealogy Records

Genealogical information gathered from personal papers has been verified wherever possible by using official NZ, Australian and United Kingdom birth, death and marriage registrations (Sources of Genealogical Information section). However, not all official registration information is correct and was usually based on information supplied by the next of kin (Willigan and Lynch 1982). For example when the death certificate (Appendix 3) of George Stephenson Crotty was registered, Charles his youngest son was the informant. Several mistakes are present as can be seen from their earlier marriage certificate details (Appendix

4). Often though family information can be more correct than the official sources and in some cases is the only source for information.

3.6 The Completeness of the Records

Stillbirths in NZ did not need to be officially registered prior to 1913 and rarely appeared on official lists, if they were recorded officially they were entered on the birth registration forms only and not on the death registers. Other deaths frequently not recorded officially were those of babies or younger infants, especially during the earlier years of registration and frequently in Maori families well into the 20th century. In the case of Maori family histories or *whakapapa*, a lot of the information on these families has only been able to be obtained in this manner.

The NZ official infant and child mortality figures undoubtedly undercounted those children who died under 15 years of age. The Maori infant and child mortality numbers were more likely not to appear in the official NZ figures due to under registration in the 19th century and were often not registered well into the 1920s and 1930s (Pool 1991). Of my 8750 original researched individuals, 128 (1.5%) with known date of death and burial had no death registration and were therefore excluded from the study as cause of death was unknown. Over 17% of these individuals died under 15 years of age which also gives an indication of the level of under registration of childhood deaths in 19th and early 20th century NZ. The children who died early in the life were less likely to have headstones, birth or burial information and therefore infant mortality is probably the most under-represented in the official figures. However as 83% of individuals from my data set were non-registered deaths were over the age of 15 years all, official NZ figures were undoubtedly less than the true number of deaths.

Numerous attempts have been made to compensate for this missing data from census as well as birth, death and marriage statistics but true figures will never be accurately assessed although as time passed in the colonial period generally the figures improved. Maori figures, however, were always less accurate than those of the European settlers (Pool 1973; Pool 1991)

3.7 Exclusion

Of the 535 excluded people (Table 3.2), at least 83 (15.5%) were of Maori ancestry with incomplete information recorded on their death registration records (Maori Register); and as minimal numbers of Maori births, marriages or deaths were registered until well into the 20th

century this caused difficulties in finding the correct parental death records for these individuals (The Department of Internal Affairs 2010). Only 28 deaths registered on the Maori Register had sufficient information for inclusion in the final analysis. Of the 230 NZ born individuals excluded, 36% of these were Maori. A further 35 of those excluded were

Table 3.2 - Exclusion Numbers by sub-populations.

	Persons with known cause of death	People without known parental death dates	Total number of people included in the LA/TB Families
Little Akaloa	1813	227	1586
Tolaga Bay	1101	308	793
Total	2914	535	2379

born in Ireland where BDM records are only accessible in person from the Irish General Register Office in Dublin (Irish General Register Office 2010) and 49 (9%) were from Scotland where the need to purchase death information limited further research. Another 26 had emigrated from Continental Europe where genealogical information was more difficult to access from NZ. This is also the case for the 30 who emigrated from Australia, when sometimes they or their parents had already moved there from Europe or the United Kingdom. Double immigration events make tracking persons much more difficult, but men who arrived in NZ on whaling or trading vessels as seaman are almost impossible to identify and to then track back to their homelands. Of those excluded, 15 individuals had no known country of origin and there was very limited information on their death registration which made research on their parents unsuccessful.

The biggest reason for an inability to record parent's death information however, is the commonness of both surname and Christian names. The Smith (13), Brown (7), Wilson (6), Taylor (7) and Williams (7) proved too much on numerous occasions, as did Mary, John, Ann, Elizabeth, William and George. When the right 'John Smith' that I was researching could not be confirmed (or his parents), they were unfortunately excluded. Compounding the research problems with names were the large number of persons without middle names, and the use of aliases, abbreviated names or nicknames. This was a major difficulty with the persons of Maori ancestry, along with the use of Anglicized names which were often

interchanged during their lifetimes with their Maori versions. Maternal change of name at marriage was also less common in the Maori population and surnames were not often used in the 19th century. When surnames were used they may not always be the same as their father or mother, thus making researching children's parents even more difficult.

In summary, only those individuals who had extremely robust information recorded were included in the final data set for analysis and comment. A larger proportion of Maori individuals were excluded than those of European descent. Many persons were excluded when the information found could not be confirmed beyond doubt.

3.8 Analysis of information

All individuals' names, dates of birth, death, marriage, causes of death and occupations has been entered onto a Microsoft EXCEL spreadsheet initially following transfer from the Family Tree Maker programme. Six fields were added for further comparisons: the parental death year, age at orphaning, orphan category, father's occupation, and step-parenting dates of remarriage along with the child's age at this event.

This EXCEL spreadsheet was then imported into the PASW Statistics 18 software (formerly SPSS), which has been used for the statistical investigations and comparisons in this thesis. Significance levels have been set at the 95% confidence level or P-values of 0.05 unless otherwise stated. If P-values are highly significant, less than 0.001, this figure is used instead of the absolute value. Tables and graphs have also been constructed using Microsoft EXCEL software as required and Chi-squared statistics for comparing frequencies have been used both in EXCEL and PASW software packages. Two-sample T-tests and ANOVA have been used to analyse means with PASW software.

Risk of death in children has been assessed using relative risk with 95% confidence levels. The 95% confidence level is used to reflect the significance value of 0.05, and the relative risk factor allows for trends to be looked for rather than setting hypotheses with yes/no answers when looking for significant P-values (Gardner and Altman 1986). Use of relative risks enables direct comparisons to be made with Andersson et al.'s 1996 study from Sweden on increased risks of mortality under the age of 15 years seen in orphaned children and the affects step-parents may have on altering this risk. This study will be discussed in particular with my thesis results as direct comparisons are able to be made between the two data sets. By using relative risks, smaller sub-sets can be viewed when they are unlikely to achieve significance due to small cell sizes.

Survival curves have been constructed using the PASW survival function and comparisons have been calculated using the Wilcoxon (Gehan) statistic. Survival curves enable the rates of survival to be viewed in greater detail across the life course and give a median survival age for each category (Lee and Wang 2003). This better reflects the age at death which is not evenly distributed across age groups, although the average age at death and median age of survival are very close to each other in the LA/TB families.

3.9 Equivalency of Little Akaloa & Tolaga Bay Families with New Zealand Population

To enable the sample results to be discussed in terms of being applicable to NZ as a whole, the sample data needs to show equivalency with the NZ population at the time.

NZ total population figures are available from 1851 and are largely summarized at 10 year intervals from this date (New Zealand Government 1892). The 1851 population is given as a total European population and has not been separated into male and female subtotals. Figures from 1861, 1871 and 1881 show the sex distribution but it is not until 1891 that age/sex distribution figures are available (Appendix 6). Individuals included in the final sample have birth years prior to 1916; therefore only 1891, 1901 and 1911 have been available for age/sex distribution comparisons between the LA/TB families and the NZ population (Table 3.3). Using the sex distribution as the main test of equivalency for the full period under investigation, each census year figures were compared between the thesis population and the NZ population figures, using a two sided Chi-squared (x^2) tests. For all census years no statistically significant differences were found between the sex distribution of the LA and TB families and the NZ population with high P-values which ranged from 0.692 to 1.932 (df 1).

As seen in Table 3.3, in comparison to Europe's populations in the 19th & early 20th centuries where the sex ratio was equal, NZ's population for the same time periods consisted of a far higher percentage of males than females (New Zealand Government 1922b). As previously discussed the imbalance between the male and female numbers in NZ during the 19th and early 20th centuries was due to the higher number of men immigrating into the new colony (King 2003).

Table 3.3: Comparisons between the LA/TB Families & NZ Population Sex Distribution in census years.

	LA/TB Families Sex Distribution			New Zealand Population Sex Distribution		
Year	**Male %**	**Female%**	**Total Pop**	**NZ Male %**	**NZ Female %**	**Total NZ**
1851	50.00%	50.00%	82			26,797
1861	56.11%	43.89%	221	61.67%	38.33%	99,021
1871	57.43%	42.57%	505	58.64%	41.36%	256,393
1881	55.33%	44.67%	956	55.03%	44.97%	489,933
1891	57.89%	42.11%	1420	53.12%	46.88%	626,658
1901	58.83%	41.16%	1720	52.54%	47.46%	772,719
1911	59.35%	40.65%	1872	52.74%	47.26%	1,008, 468

Note: NZ figures are from the New Zealand Official Year-book 1921-1922:45.

The Maori population data for NZ are only given as a total population figure throughout this same time period (New Zealand Government 1922a). As the thesis population's final number of 2379 included only 28 Maori registrations and with some of these individuals being of mixed ancestry it is unlikely that the comparison with the NZ European population figures is affected to a significant degree. Twenty-two (78.6%) of the Maori death registrations were descended from the Tolaga Bay families; therefore the two sub-populations will be compared in both sex distribution and numbers of orphaned children (Chapter 4).

A more visual comparison can be seen between the LA/TB families and the NZ population in Figures 3.1 & 3.2. Both graphs show the exponential increase in population size throughout the second half of the 19th century and then a slight slowing of population growth into the early 20th century. The males outnumber the females in both populations and it is not until after 1916 that female numbers nearly equal those of males (New Zealand Government 1932).

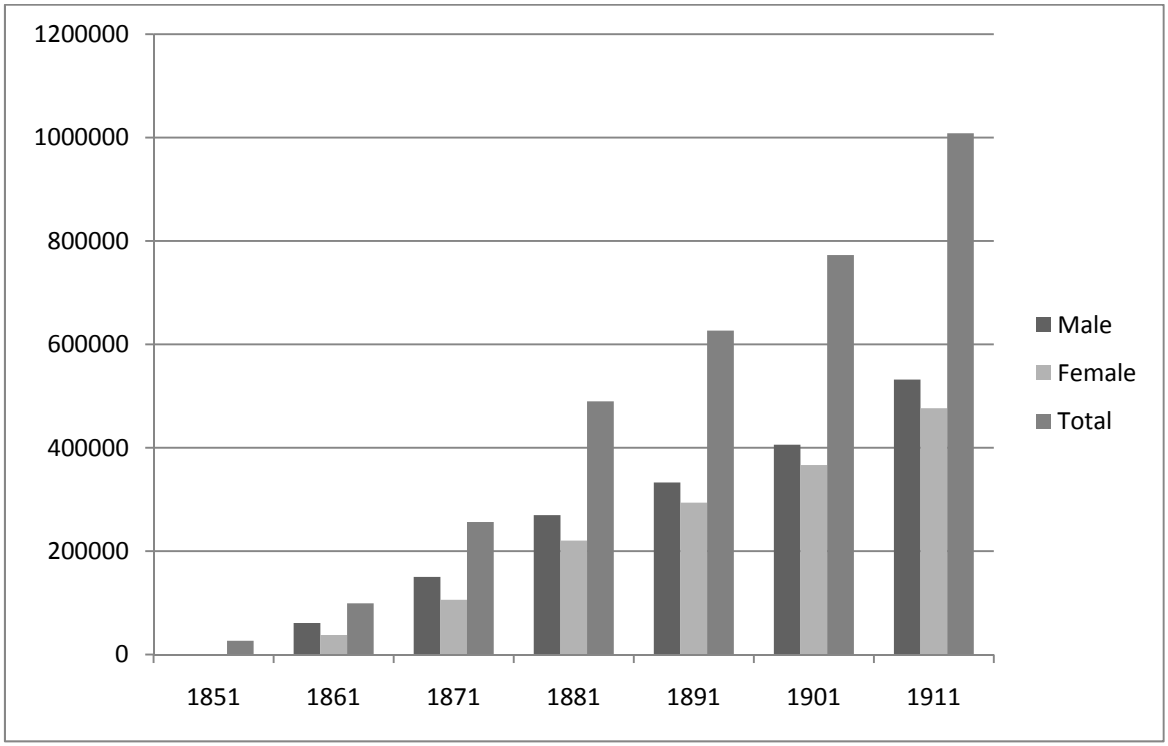

Figure 3.1: NZ population sex distribution in census years 1851-1911.
Note: NZ figures from NZ Official Year Book 1921-1922:45

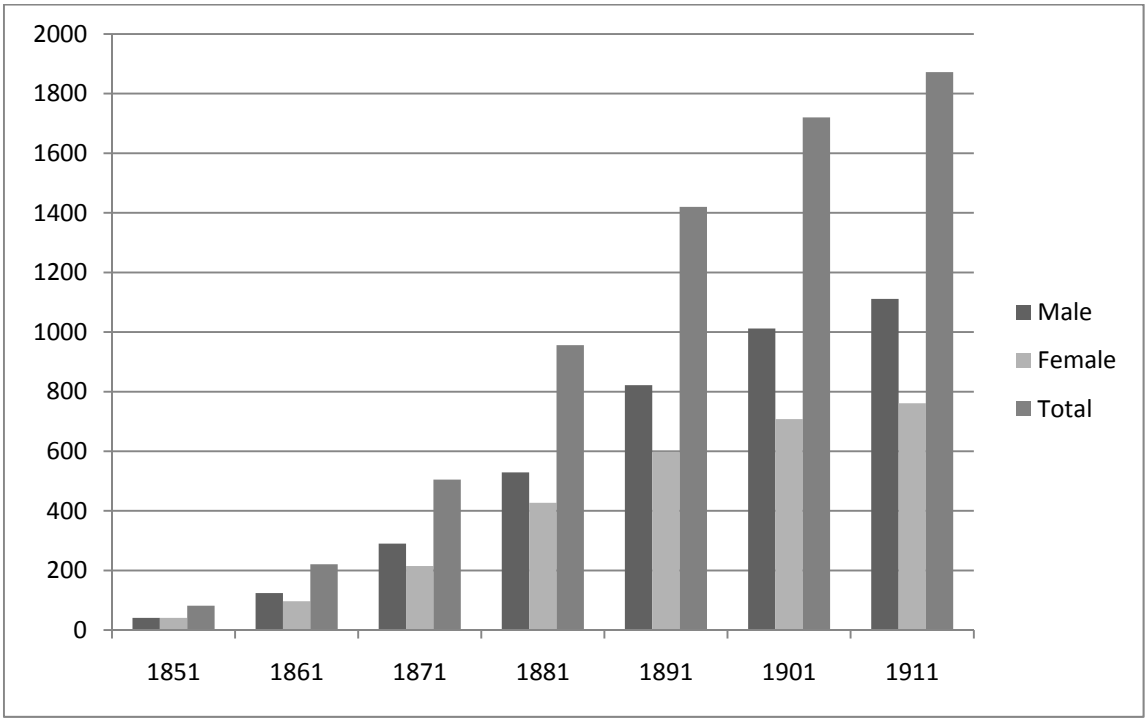

Figure 3.2: Sex distribution of the LA/TB family's data in census years 1851-1911.

The LA/TB families in my thesis population therefore generally follow the pattern on the NZ population in sex distribution and a rapidly increasing population growth especially in the 19th century.

LA/TB families and the NZ population was compared for each of the 3 dates of 1891, 1901 and 1911 by first using two-sided x^2 tests (Figure 3.3). All 3 cohorts were found to be comparable with p-values of 0.93-1.85 (df 16), despite the differences seen in specific cells. The age/sex comparisons (Appendix 6) between the LA/TB families and the NZ population (New Zealand Government 1912) show a larger percentage of younger individuals (less than 15yrs of age), both male and female especially in the LA/TB families in 1891. This situation is almost reserved in the 1911 figures.

The 1891 figures are explained somewhat by the 535 individuals excluded from the final thesis population of 2379, over 90% of whom were over 15 years of age by 1891. Again the majority (305) of those persons excluded were not born in NZ. The 1911 figures are more likely to be explained by the available information on birth registrations. Only births registered up to August 1910 were able to be researched on-line from the NZ BDM website. Therefore any births occurring in the sub-populations from August 1910 through to December 1911 unless already known of have not been included in my research data base, and therefore may have reduced the possible figures for the under 5 years of age group.

As these cell differences seemed somewhat larger than would be expected a more conservative Kolmogorov-Smirov test was undertaken between each population in the 10 year cohorts and by sex. This statistical test not only examines the maximum differences between cells but also the ranking between cells (Shennan 1997). All six tests gave minimum levels lower than the maximum differences seen for each calculation. This analysis used extremely high N values as the entire NZ population was used for comparisons. This high N value gives proportionally lower minimum levels following calculation using this method and therefore the H_0 of population equivalency was not upheld using this method.

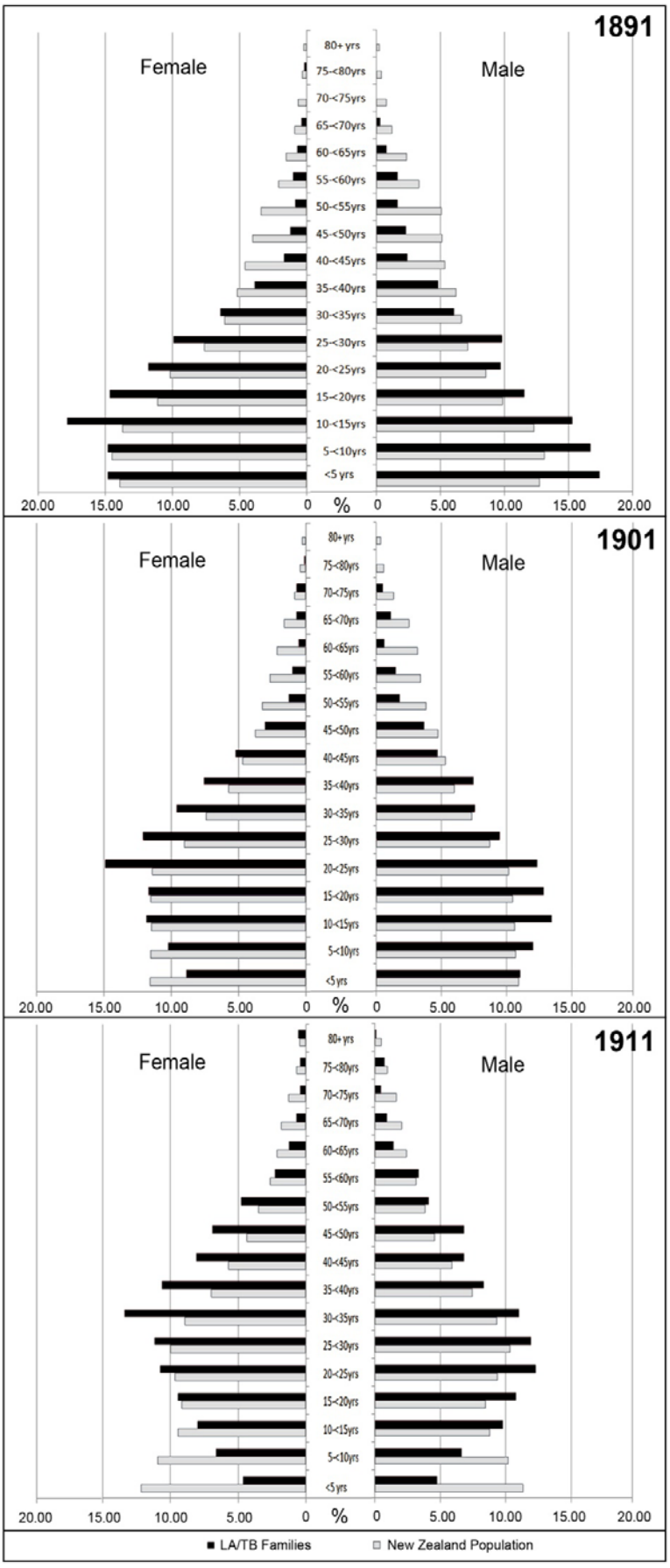

Figure 3.3: Comparisons between LA/TB Families and NZ Populations (%) in 1891, 1901 and 1911 census years

The data set has a higher percentage (86.63%) of NZ born individuals than that found in the general NZ population at the time (Table 3.4). However, it is also by the nature of my population data that the LA/TB families differs somewhat to that seen in the general NZ population at the time. The original data set contained people who had migrated to NZ in the very early phases of NZ's European history. These included missionaries who settled in the 1820s, whalers and traders in the 1830s along with very early migrants in the 1840s. The LA/TB families were well settled, married and with flourishing by 1850 when my starting death date occurs.

As this thesis is studying families from LA and TB, their descendants and orphans in particular it will therefore be more slanted towards married couples (hence higher female percentages than the NZ population at the time) and more NZ born individuals. Males in the LA/TB families were 86% NZ born and as were almost the same number of females at 87.4%.

By 1891 59% of NZ's population was native born and those from the British Commonwealth (which includes the British Isles, Ireland, Australia and other commonwealth countries) made up another 35.5% (New Zealand Government 1912), while in total the thesis population had a lower level of 12.65%. The other regions made up 3% of the NZ population and less than 1% of the LA/TB families. Therefore most of the difference between my population and the NZ's are the number of NZ born individuals.

By 1911 NZ's native born individuals were up to 70%, closer to the percentage seen in the thesis population under study (New Zealand Government 1912).

Table 3.4: Region and Country of Origin of the LA/TB Families.

Region	Country of Birth	Number	% of Total	Regional No.	Regional %
NZ	NZ	2061	86.63 %	2061	86.63%
British Isles & Ireland, Australia and other Commonwealth Countries	England	216	9.08%	301	12.65%
	Cook Islands	1	0.04%		
	India	1	0.04%		
	Australia	21	0.88%		
	Scotland	45	1.89%		
	Ireland	13	0.55%		
	Wales	3	0.10%		
	Jersey	1	0.04%		
Scandinavia	Denmark	5	0.21%	6	0.25%
	Norway	1	0.04%		
Continental Europe	Germany	2	0.08%	5	0.22%
	Poland	1	0.04%		
	Austria	2	0.08%		
United States of America	USA	4	0.17%	4	0.17%
Other	Syria	1	0.04%	2	0.08%
	Unknown	1	0.04%		
LA/TB Families Totals		**2379**	**100.00 %**	**2379**	**100.00 %**

3.10 Definition of Orphans, Abandoned and Illegitimate children

A child is said to be orphaned in this study when one or other of their parents die before they are 15 years of age (based on the definition used by UNICEF) (Unicef 2003). If only one of their parents die they are deemed single orphans but if they were unfortunate enough to have lost both of their parents before they reach adulthood (15 years) they become double orphans. Non-orphans are children who have both biological parents alive when they reached 15 years of age. The single orphans have been divided into either maternal orphan (motherless) or paternal orphan (fatherless) categories for further investigation of possible differences between these sub-categories.

Fifteen years of age is used in as a cut off for three reasons. First, UNICEF uses this age in the majority of the statistics presented on orphans. Second, this is the age where individuals are classed as children in child mortality studies. Third, the youngest age of marriage and motherhood in my population was 15 years. When analysis includes the fatherless category this includes the illegitimate group of children, however, if the group category is described as

orphan only this will exclude the illegitimate children. If they are both included they will be described as orphaned and illegitimate children.

Illegitimate children in this study are those children who are born to single mothers, the mothers were either unmarried or widowed. Children who were born with two biological parents regardless of marital status are classed as legitimate in this study. I have made this distinction compared to the legal description of born out of wedlock because children who were brought up by both of their parents experienced different life chances and de facto marriages were common among the LA/TB families.

The definition of abandonment for this study was based on whether one or both parents left their children when they were under 15 years of age. Unfortunately this situation was more difficult to research as no legal registration of such events were available and family histories were the main source of information for this category. Divorce between parents has not been included in this category.

Orphaning, illegitimacy and abandonment are all conditions where children lost one or both parents. Illegitimate children only ever had a mother, orphans lost one or both parents at various ages and abandoned children in this study were left by their fathers during childhood. However, these three categories produce quite different life circumstances.

The majority of orphaned children only lost one parent and were more likely to receive support from their families and the wider communities. Illegitimate children, however, were usually born with less family support, therefore they and their mothers often had a worse socio-economic situation to contend with. Abandoned children may not suffer the same problems as orphaned children as both parents were still alive although no longer living together. Grief over a parent's death, or those effects felt by the remaining parent may be quite different with variable socio-economic factors contributing to the situation. They may also not receive as much sympathy and help as children who have been orphaned by the wider community. Abandoned children were also unable to gain step-parents who may have been able to ameliorate their living situation. Orphaned and illegitimate children were both in a position to gain from their remaining parents' marriage. This means that each type of family situation may have different possible outcomes for the children involved.

3.11 Conclusions

The data set is not fully representative of NZ as a whole but indicative of the growing NZ population. Unfortunately it was not possible to capture the Maori experience with either significant difference in family structure or child mortality rates. But the advantage of having extremely accurate death information and family reconstructions has enabled questions of orphan, illegitimate and abandoned children's life chances to be addressed.

Occupational differences and educational status may also differ between groups but this question is too large and requires more investigation for this thesis to undertake at this time. Socio-economic factors have not been able to be addressed in this thesis due to the non availability of this information in NZ due to the lack of specific individual census data.

Chapter 4: The Risks for Orphans, Illegitimate and Abandoned children

4.0 Introduction

In this chapter the life risks for orphaned, illegitimate or abandoned children will be compared with those who had both parents alive throughout childhood. I wish to examine what is happening in terms of mortality up to the age of 15 years in these groups of children, then beyond 15 years into adulthood to assess any long term effects after parental loss.

4.1 Illegitimate children

Only 14 children or 0.6% of the LA/TB families were illegitimate in the true sense. These children were either born to single mothers or widows (Table 4.1). This reflected a low level of illegitimacy in my population but also in NZ with illegitimate children only making up 3.5% of births in 1891 (New Zealand Government 1892) and 4% recorded by 1916 (New Zealand Government 1922a) compared to that seen in Continental Europe and England in the mid 19th century with illegitimacy up to 49% in some large cities and 9-10% in more rural locations (van Poppel 2000).

The births of illegitimate children born to widows occurred more than nine months after the death of their husbands but were registered under the deceased husband's name and were brought up alone by their widowed mothers. One widow did remarry seven years after the birth of the illegitimate child, when her other four children by her first marriage were aged from 9 to 15 years of age. Only one illegitimate child was orphaned under the age of 15 years in this population. Her mother died when she was 10 years of age but her stepfather of eight years was still alive to care for her after the loss of her mother.

Table 4.1 - Illegitimate Children in combined sub-populations by sex

	Male Illegitimate	Males With Step-father	Female Illegitimate	Females With Step-father	Total	% of Illegitimate Children
Born to single mother	4	3	8	4	12	85.71%
Born to widowed mother	1	0	1	1	2	14.29%
Total	5	3/5	9	5/9	14	100%
%	35.71%	60.00%	64.20%	55.56%	100%	

Of note is that 13 of the 14 (92.86%) of the illegitimate children are from the Little Akaloa sub-population, while only 4 out of the 16 (25%) of the children who were born before their parent's marriages were from the Tolaga Bay sub-population. This fact is probably not due to a difference in illegitimacy rates in the two cohorts but undoubtedly due to the more robust marriage and family history information for the Little Akaloa descendants and the absence of de facto marriages in this group. Many Maori marriages were by tradition de facto in nature, neither being registered in the European fashion when occurring nor again being dissolved by divorce, rather by just moving out (New Zealand Government 1892; Pool et al. 2007). Also a number of probable illegitimate children have been excluded from the analysis due to insufficient information on their parents, both marital status and death information (in the majority from the Tolaga Bay families).

There are 23 further children from the total who were born before their parent's marriage and are therefore by legal definition in NZ illegitimate, they were however brought up in stable family settings with both biological parents present. These children therefore have not been included in the illegitimacy figures. The eldest child of one of these couples was probably the son of the legitimate husband, with the couple marrying once the first husband had died (after the birth of their 10^{th} and last child). A similar situation occurred when the third wife of an Irish immigrant to the Tolaga Bay region ran away to Australia with a ship's Captain when pregnant with her third child and bigamously married him there, later returning to the South Island to reside. The final situation involved a married man with two families, the first with his legal wife and the second with his mistress. He married the mistress once his first wife had died, and long after their combined five children had been born. Seven further children who were born before their parents married had mixed ancestry, four having a European father and mother of full Maori descent, with the father of the remaining three children being

Maori and their mother of half Maori descent. Both sets of parents had registered marriages: the couple from Tolaga Bay marrying at the Registry Office in Gisborne several years after their children were born; while the couple from Banks Peninsula married 15 years after they were married in the Maori custom when a minister was visiting Pigeon Bay. Several of their children were baptised at the same occasion (Ogilvie 1990).

Therefore although the English laws governing marriage and illegitimacy were established into NZ law from 1848 the actual situation occurring within the fledgling colony was not quite so straight forward. In 1891 for example only eight marriages where both parties were Maori were contracted under British law (these were excluded from the NZ official marriage statistics at the time) and European/Maori unions were exempted from the necessity of complying with the Provisions of the NZ Marriage Act (New Zealand Government 1892). Maori traditions, regional isolation, exemptions and the ability to avoid "legal" arrangements made the state of marriage a more fluid state in NZ to that seen in England at the time.

4.2 Abandoned children

Abandonment is a difficult situation to access with accuracy, and only seven children have had this status confirmed, five (0.21% of the thesis population) of whom were under 15 years of age at the time of abandonment. Of note is that no child was abandoned by both parents, therefore true abandonment did not occur in my thesis population.

One situation was where the father went to the Otago goldfields and never returned leaving two children still less than 15 years. Although their father died on the goldfields his death date was unknown and unregistered, therefore unfortunately he was not able to be declared legally dead for seven years. His widow was unable to remarry until the seven years has passed. The second instance is where a father remarried after the death of his first wife and left his two children by his first marriage with their maternal grandparents and immigrated with his second wife to Australia. These two children were obviously orphaned when their mother died one year prior to their father moving to Australia. The third entailed an Irish trader leaving his Maori de facto wife and their two children (five & six years of age at the time) in Tolaga Bay, to marry an English woman in Gisborne in 1851 (the first European marriage registered on the East Coast). Only the six year old is included in the final thesis population as no death registration was found for her sister's death in 1899. These four children although physically abandoned by their fathers however may have continued to

receive financial support or even had some contact with their fathers. This amount of detail is unknown.

These children will be analysed separately initially but any significance may not be found due to the small numbers and their level of abandonment is probably less extreme than cases seen in Europe. The two children who had previously lost their mother will be included in the motherless single orphan analysis and the two whose father was lost on the goldfields will be included in the non-orphan category, as will the 6 year old girl from Tolaga Bay. None of the abandoned children died under 15 years of age (Table 4.2) and their median age at death was 66 years well in excess of the 53 years of the thesis population as a whole although this was not significant (P=0.125, df 2133).

Table 4.2: Risks of dying before the age of 15 years comparing all births from Little Akaloa & Tolaga Bay families combined (%).

	Number	Dead before 15 yrs	% Dead before 15 yrs
Live Births	2371	282	11.89%
Non-abandoned	2367	282	11.91%
Abandoned	5	0	0.00%

4.3 Children of Divorced parents

The first divorce in the data set was dated at 1889, but divorces did not occur commonly until after 1918 and the First World War (New Zealand Government 1932; Pool et al. 2007). Only four children (0.17%) under the age of 15 years from the 2379 total were known to have parents who divorced. They will not be analysed separately because of the small numbers, but also because other children in the thesis population may be in a similar situation yet research to date has not been able to confirm such information.

4.4 Recorded Stillbirths

Recorded stillbirths only numbered eight or 0.3% of all births. Although not being directly affected by orphaning, 25% of the stillbirths were also associated with simultaneous maternal deaths, often leaving older children motherless. This was the case for four children in the thesis population. Only live births will be included in orphaning analyses. Stillbirths are under-represented in the thesis population as they did not require official registration until 1913 in NZ (The Department of Internal Affairs 2010).

4.5 The Frequency of Orphaning

Of the 2371 live births in the final sample almost one in five (18.6%) were orphaned before they were 15 years of age. Most of these were single orphans with only 26 double orphans (Table 4.3).

Unfortunately NZ statistics do not give equivalent information on orphans to that of the LA/TB families researched. The 1912 NZ year-book in its first statement under the heading of 'Orphanhood of Children' says "Although this subject is not one of general interest, it may be desirable to summarize two of the tables... on orphaning" (NZ Government 1912:167). Statistics from NZ give how many children may be left fatherless but express this as the average number of children left fatherless in 10 year cohorts rather than a cumulative percentage of children orphaned (New Zealand Government 1932). No mention is made of children losing their mothers at all, there is however some information given on some public orphanages (35 institutions recorded in 1912) with the numbers of first admission orphans given in any one year (New Zealand Government 1912). Private and church orphanages are not always represented in this information and therefore little can be deduced from these figures overall. In 1891 there were only six "orphan asylums" in the colony with 59 male and 119 female "inmates", these children probably being under 6 years of age. Over this age children lived in "industrial schools": institutions where basic schooling, food, board and instruction for possible future employment were provided (New Zealand Government 1892). No further breakdown is available in the 1891 Official NZ Hand-book but if the number of orphanages had increased to 35 by 1912 the need to house orphans was growing, although from these figures most of the orphaned children in the colony were cared for within private homes, either by the surviving parent or other extended family members.

Table 4.3: Orphaning numbers for live births in LA/TB Families.

	Orphans Total No.	Single Orphans	Double Orphans	Non-Orphans	Total
Number	441	415	26	1916	2371
%	18.6%	17.5%	1.1%	80.8%	100%

4.5.1 Single Orphans

In the final data set 249 (10.5%) children lost their mother prior to 15 years of age. Fewer children lost their father before 15 years of age, at 220 or 9.3% of the total sample; this

number excludes the five abandoned and 14 illegitimate children. Single orphans numbered 415 (17.5%); these children lost either the mother or father at less than 15 years of age.

Children obviously became orphans at different ages. Of the total number of orphaned children 6.2% lost a parent prior to the age of one year, a further 4.1% in the next year of life, 17.3% between the ages of two years and less than five years and 72.5% between five years and less than 15 years of age. Although slightly more lost their mothers than their fathers, children did so in slightly different patterns for the loss of their mothers and fathers across childhood (Figure 4.1). Children had an increased risk of their fathers dying as they got older with a gradual rise seen in paternal deaths from three years and then a sharp rise after 12 years. Mothers died more frequently than fathers from birth until 12 years of age but had a steady decline from eight years of age.

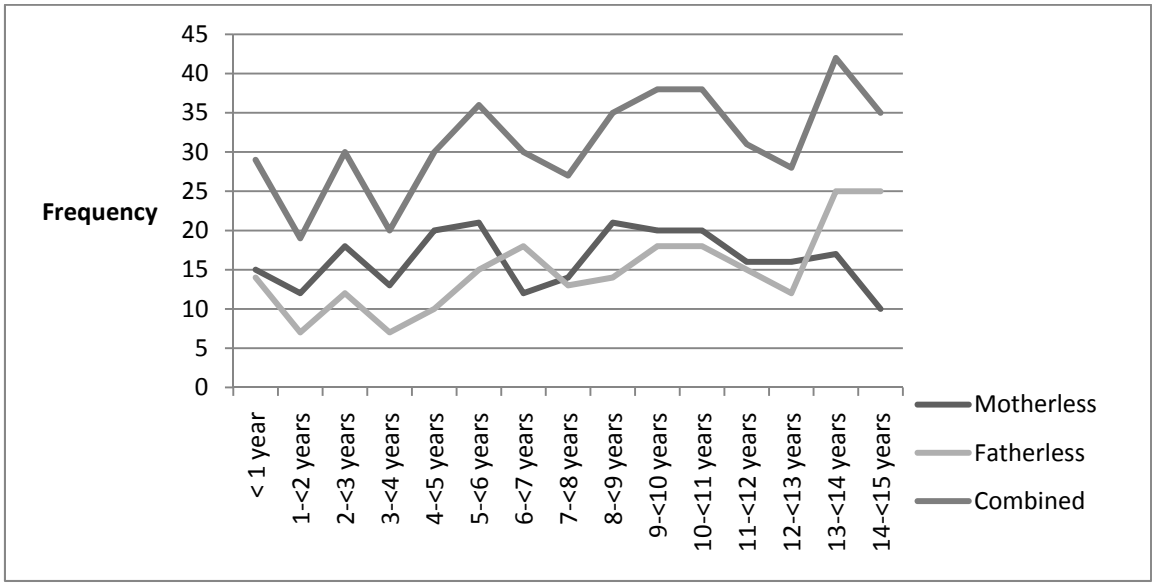

Figure 4.1: Age at orphaning in parental loss and combined categories.

The loss of a mother tends to peak every two-three years consistent with child birth intervals and higher risks of maternal deaths, and decreases as the child ages and the mother is less likely to be still reproducing. The father loss trend tends to increase across childhood consistent with general paternal aging mortality risks.

4.5.2 Double Orphans

There were 26 double orphans who had lost both biological parents before the age of 15 years. These were only 1.1% of the total 2371 live born children. The parents of double orphans in the past did not usually die at the same time as each other; however this was the

case for one double orphan who was killed along with both her parents during a Maori raiding party in 1868. This child was one of only two double orphans who lost either of their parents before they were aged one year. Harold Loffler lost his father when he was 6-9 months of age, his mother when he was six years of age and immigrated to Gisborne when he was 18 years of age from England. In fact 17 (65.4%) of the double orphans did not lose both their parents until they were aged 10 years or over and only six (23%) of the double orphans lost one of their parents before two years of age, when the increased risks of premature death in orphans is highest. Eleven (42.3%) of the double orphans lost their fathers before their mothers died.

Of note however, is that nine (34.6%) of the double orphans were born and orphaned before coming to NZ. Of the 14 illegitimate only one (7%) was born in England, while 57 (13.8%) of the 414 single orphans were born overseas but overall 89.9% of single orphans lost their parent in NZ. This factor will be discussed further when analysing orphan and illegitimate death statistics.

4.6 Orphan Comparisons in Sub-populations

Before undertaking analysis of the orphans in the data set it is necessary to determine if the two sub-populations showed any differences in orphaning numbers or orphaning categories. The two populations had originally resided in different areas and communities. Tolaga Bay (TB) had more persons of Maori descent and less self employed land owners than Little Akaloa (LA) and this difference may be reflected in orphaning rates. This was not found to be the case with the comparison between orphan types in the LA and TB families by sex (Table 4.4) showing no statistical difference in either the frequencies of orphans (P=0.068, df 7); the sex of orphans (P=0.180, df 7) or the mean age of death (P=0.487, df 2369). As there is no statistical difference found between the two sub-populations of LA and TB families, further investigation and analysis of orphans from the data set will use the combined LA & TB family data.

Table 4.4: Orphan numbers in Little Akaloa (LA) and Tolaga Bay (TB) sub-populations by sex.

	Single Orphans & Illegitimate	Double Orphans	Total No. Of Orphans & Illegitimate	Total No. Of Non-orphans	Row Totals
Females LA	141	6	147	548	695
% of row total	20.3%	0.9%	21.2%	78.8%	100%
Females TB	57	5	62	254	316
% of row total	18.0%	1.6%	19.6%	80.4%	100%
Males LA	150	6	156	728	884
% of row total	17.0%	0.6%	17.6%	82.4%	100%
Males TB	81	9	90	386	476
% of row total	17.0%	1.9%	18.9%	81.1%	100%
Total Columns	429	26	455	1916	2371
%	18.1%	1.1%	19.2%	80.8%	100%

4.7 Simultaneous death of a parent and child

Children who died at the same time as both or either of their parents usually did so as a result of accidents, such as drowning, house fires, contagious diseases or with maternal deaths (problems at or around delivery) (van Poppel 2000). In the thesis population however only one child died at the same time as both her parents, all three murdered by a Maori raiding party in 1876. A further three drowned along with their mother when returning home to Tolaga Bay from Gisborne by ship after her confinement. The ship floundered and nearly all on board were lost. Two children were stillborn with their mothers also dying in childbirth. No children in this sample died at the same time as their parents from infectious disease.

4.8 Analysis of Childhood Deaths in Little Akaloa/Tolaga Bay Families

4.8.1 Illegitimate children's risk of childhood death

When comparing the risk of death under the age of 15 years, the illegitimate children had a 21.43% risk of death the highest risk group in the LA/TB families (Table 4.5). Legitimate children had almost half this risk at only 11.84%. The comparison between the relative risk of dying for illegitimate children with legitimate children shows no statistical significance with the 95% confidence level bridging the relative risk level of one (Table 4.5). The three children who died under the age of 15 years were all born to unmarried mothers. The two

children born to widows had the longest survival of all the illegitimate children with an average age at death of 72.5 years compared to only 37 years on average for the illegitimate children born to unmarried mothers. The numbers of illegitimate children are too small in the thesis population to reach significance but certainly the trend towards this is reflected in not only the higher percentages of childhood deaths but also the higher relative risk rates.

Table 4.5: Risks of dying before the age of 15 years comparing relative risks between legitimate and illegitimate births in the LA/TB families.

	Number	Dead before 15 yrs	% Dead before 15 yrs	Relative Risk	Confidence Level 95%
Legitimate	2357	279	11.84%	1.00	-
Illegitimate	14	3	21.43%	1.82	0.66-4.97

4.8.2 Orphans' risk of childhood death

The LA/TB figures for infant and child mortality were 6.45% and 11.89% respectively. My thesis population is in keeping with the NZ total population where by 1896 the likelihood of surviving to age 10 years was 89% (males & females combined), the same as that seen overall in the LA/TB families (Pool and Cheung 2002). Although there are obviously differences in the percentages of children dying under 15 years of age in my population compared with those seen in Europe in the 19th century (van Poppel 2000), this does not explain the differences seen in the overall orphan survival rates. The reasons for this difference may become more apparent when the numbers are analysed in age of orphaning groups and when the effects of step-parenting are investigated.

Comparisons of the risks of early deaths between orphaned and non-orphaned children in the LA/TB families show a lower percentage risk of dying under the age of 15 years in the orphaned group as a whole. Non-orphans in the thesis population had a 13.2% risk of dying before 15 years, while orphans were half this value at 6.6%. The relative risk value of 0.501 and 95% confidence level of 0.348-0.722 show this to be statistically significant, along with both the motherless and fatherless orphan categories. However despite a lower relative risk with only one double orphan dying under the age of 15 years, the double orphans result was not significant with the confidence level crossing the 1.00 relative risk rate of the non-orphans. Again low numbers of double orphans in my data set make statistical significant levels unlikely to be found.

These higher risks of child mortality in non-orphans can be explained due to the fact that children are not all orphaned from birth but over the course of 15 years and therefore the orphan figures are not directly comparable with the non-orphaned children. This comparison was possible with the illegitimate children as they were illegitimate from birth. These wide orphan categories are therefore of limited use when assessing over all risks of childhood deaths in this data set.

When examining those children who died under 15 years of age by orphan status and by gender however some differences are evident. Male child mortality by orphan status in the LA/TB families shows no deaths in either the illegitimate or double orphaned groups (Figure 4.2), while the single orphans and non-orphans have similar survival curves (P=0.87, df 3).

Figure 4.2: Male deaths under 15 year's cumulative survival by orphan status.

Female child mortality in the LA/TB families (Figure 4.3), however, shows very early deaths (<2 yrs) in both the illegitimate and double orphans groups, while the single orphans and non-orphans had almost identical survival curves. The difference between the illegitimate/double orphans and the single/non-orphans was statistically significant (P=0.03, df 1). This difference may indicate gender bias in preferential care for the male children, especially as all the illegitimate children that died before 15 years were females. The one female double orphan who died did so at the time of her parent's death, so no gender bias was apparent in that case.

Figure 4.3: Female under 15 year deaths cumulative survival by orphan status.

Note must be made here of the number of orphans who were not born in NZ. This is especially the case for the double orphans where 9 (34.6%) of the 26 immigrated to NZ when they were more than 15 years of age. This group of double orphans have already survived the increased risk periods of both infant and childhood mortality and it is therefore not surprising that there is only one death prior to 15 years in this group. It also takes time for a child to become a double orphan as both parents need to die and in the LA/TB families over 65% did not lose both parents until they were already aged over 10 years. If the double orphan category is recalculated using the NZ born individuals only, the percentage of deaths under 15 years is 5.88% and RR= 0.467 (95% confidence levels between 0.07 and 3.15). The result remains non-significant.

4.8.3 Childhood Deaths by Parental Loss

Motherless orphans in my population did however follow the European trend by showing a higher relative risk of childhood death than fatherless orphans (RR 0.576 versus RR 0.356) (Andersson et al. 1996). There were eight children who lost their mothers in the peri-natal period (less than one week of age); with 62.5% of these children dying before they were one year of age and 75% dead before two years of age (Figure 4.4). When analysed by sex it is evident that the majority of the difference seen between the motherless and fatherless orphans is accounted for by greater deaths in the motherless and fatherless female children (Figure

4.4). The median survival age for both fatherless and motherless male children was 12 years while the fatherless female median survival age was only five years and the motherless female median survival age was less than one year of age. The difference between the frequency of male and female orphans who died under the age of 15 years was statistically significant (P=0.02, df 1), as was the difference between motherless male and female children who died in childhood (P=0.005, df 1). The difference between the fatherless males and females who died in childhood was not statistically significant (P=0.69, df 1).This confirms the greater risk for children who lost their mother compared with their father but also highlights a gender bias favouring male children especially they had lost their mothers.

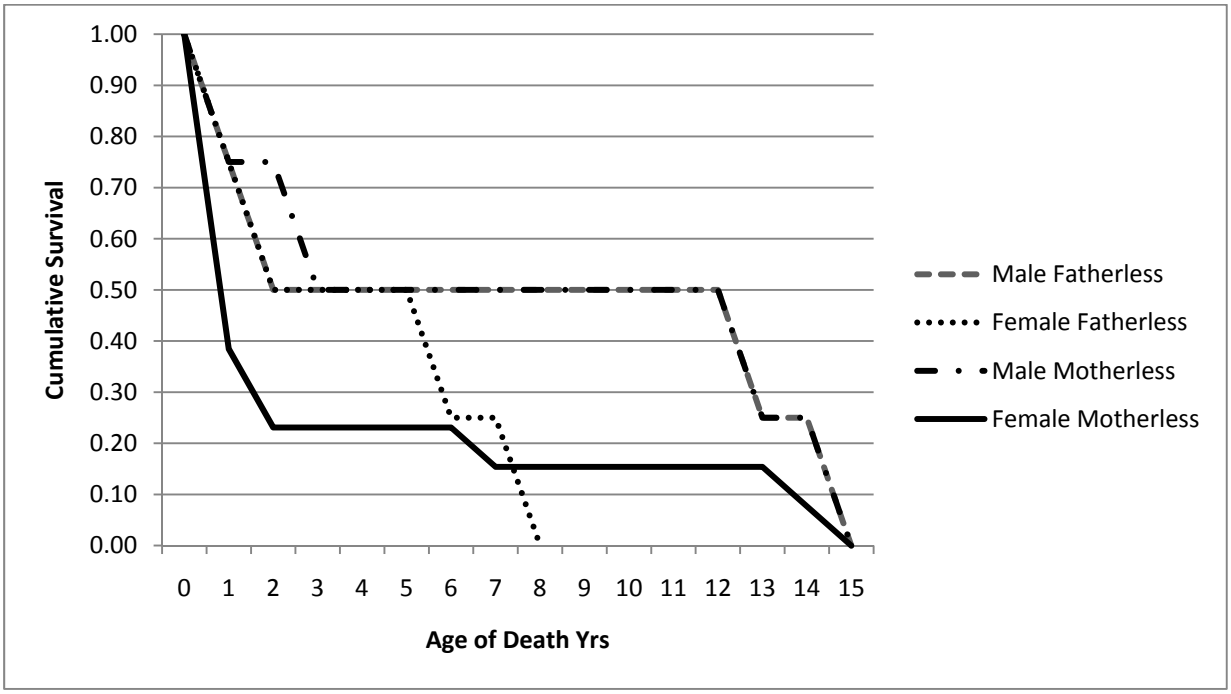

Figure 4.4: Under 15 yrs deaths cumulative survival by parent loss and sex.

4.8.4 Childhood Deaths by Age at Parental Loss

To further investigate whether my population has any evidence for increased early mortality in orphans a more detailed breakdown of orphaning events is required. Age at orphaning categories have been analysed separately to examine any significant differences among the orphaned groups (Table 4.6).

Table 4.6: Relative risks of dying before age 15yrs by age at orphaning.

	Number	Dead before the age of 15 years	%	Relative Risk	Confidence Level
Live births	2371	282	11.85		
Children with Parents alive	2340	139	5.94	1.00	-
Motherless in 1st yr	**16**	**11**	**68.75**	**11.57**	**8.01-16.72**
Fatherless in 1st yr	28	3	10.71	1.80	0.61-5.32
Children who died 1st yr		153	6.45		
At the age of 1 year	2218	Survived			
Children with parents alive	2120	52	2.45	1.00	-
Motherless 1-<5 yrs	63	3	4.76	1.94	0.623-6.05
Fatherless 1-<5yrs	**35**	**4**	**11.43**	**4.66**	**1.78-12.18**
Children who died 1-<5 yrs		59	2.66		
At the age of 5 years	2159	Survived			
Children with parents alive	1989	46	2.31	1.00	-
Motherless 5-<10 yrs	90	1	1.11	0.48	0.07-3.44
Fatherless 5-<10 yrs	80	2	2.50	1.08	0.27-4.37
Children who died 5-<10 yrs		49	2.46		
At the age of 10 years	2110	Survived			
Children with parents alive	1938	15	0.77	1.0	-
Motherless 10-<15 yrs	**80**	**4**	**5.00**	**6.46**	**2.19-19.02**
Fatherless 10-<15 yrs	90	2	2.22	2.81	0.65-12.10
Children who died 10-<15 yrs	21	21	1.08		
At the age of 15 years	2089	Survived			

Note: Figures in bold are statistically significant. Fatherless includes illegitimate children.

A similar pattern to that seen in the Swedish study (Andersson et al. 1996) appears with a high relative risk (RR) of 11.57 or a 68.75% chance of an infant who became motherless in their first year of life dying before the age of 15 years. Fatherless children in the same category showed almost twice the risk of dying than children with both parents still alive (RR 1.8). Only the motherless group result however was statistically significant (Table 4.6).

The other orphan groups with significant increased risk of childhood death in the LA/TB families were the children who lost their father the 1-<5 years of age and the children who lost their mother 10-<15 years of age categories. This increased risk in the fatherless 1-<5 year category is also reflected past the age of 15 years in the lower mean age at death of the children who lost their fathers under the age of two years (Figure 4.7). The same is not true for the motherless 10-<15 years of age group however. An increased risk of childhood death was not seen in Andersson et al.'s study (1996) as they did not examine orphaning beyond the age of 10 years, however, contemporary studies which suggest children whose parents had married more than once seriously increased their risks of childhood death (Hayward and Gorman 2004). This increased risk was thought to be due either to increased competition with new half-siblings or differential care from the step-parent (van Poppel 2000).

Children who lost one or both of their parents between the age of five and 10 years did not show any increased risk of childhood death in either the motherless or fatherless categories.

4.9 Survival of Illegitimate and Orphaned children after 15 years of age

As my study is able to follow all individuals through to death beyond 15yrs of age, the mean (average) age at death was assessed for each group of children (Table 4.7). As seen when examining childhood deaths both single and double orphans appear to live longer on average than the non-orphaned group. The difference between the non-orphaned and single orphan was significant (P=0.004, df 2335). The illegitimate children's mean age at death appears considerably lower than the non-orphans at 43.5 years but this difference was not significant again probably due to the small number of illegitimate children in the LA/TB families (P= 0.237, df 1934).

Table 4.7: Mean Age at Death in Total Population & Orphan Categories

Child Grouping	Number alive at birth	Mean Age at Death (all live births)	Number alive at 15 years	Mean Age at Death (those who survived to 15 yrs)
Total Population	2371	53.1 yrs	2089	59.9 yrs
Non-Orphans	1916	52.4 yrs	1661	60.1 yrs
Single Orphans	415	56.6 yrs	392	59.3 yrs
Double Orphans	26	59.5 yrs	25	61.9 yrs
Illegitimate	14	42.1 yrs	11	53.4 yrs

Mean age of death was then calculated for children who had survived the first 15 years of life for the same orphan groups (Table 4.7). There was no significant difference between any of the orphaned or illegitimate categories which can be seen on the whisker plot (Figure 4.5).

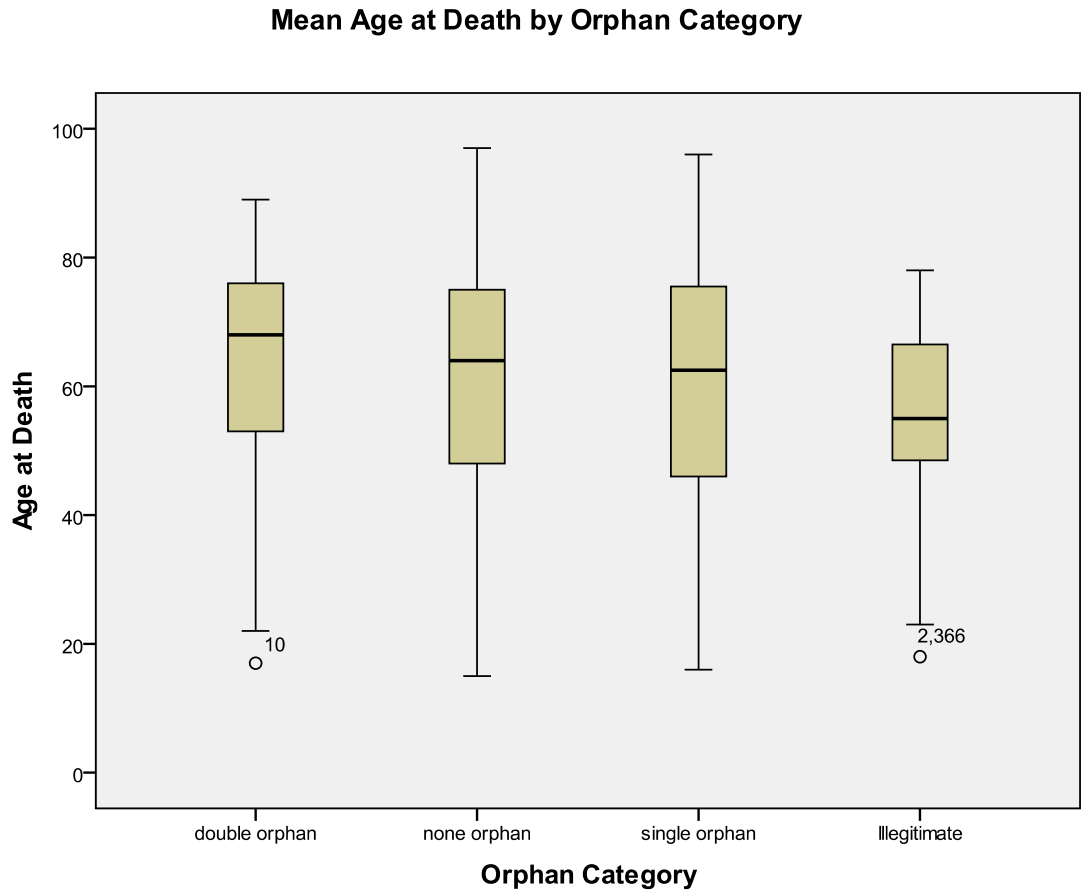

Figure 4.5: Mean Age at Death Whisker-plot by orphan category for all individuals who survived to 15 yrs of age

The use of the broader orphan categories however when displayed in survival curves (Figure 4.6) show the definite trend for overall poorer survival prospects for the illegitimate group of children compared with the non-orphaned children with 21% dead by 15 years, 50% dead by 55 years and no illegitimate persons surviving past 78 years of age. Single and double orphans follow very similar survival curves to the non-orphan group. Pair wise comparisons between the four orphan categories however were shown to be significant (P=0.035, df 3), with the illegitimate children showing a significantly lower survival curve to that of the double orphans (P=0.022, df 1) and the single orphans (P=0.044, df 1). Surprisingly the difference between the non-orphans and the illegitimate children was not statistically significant (P=0.125, df 1).

Again the general grouping of children into non-orphan, orphan and illegitimate groups does not show sufficiently fine grain to truly assess the effects of early orphaning and any effects this may have on later life expectancy except in the illegitimate group.

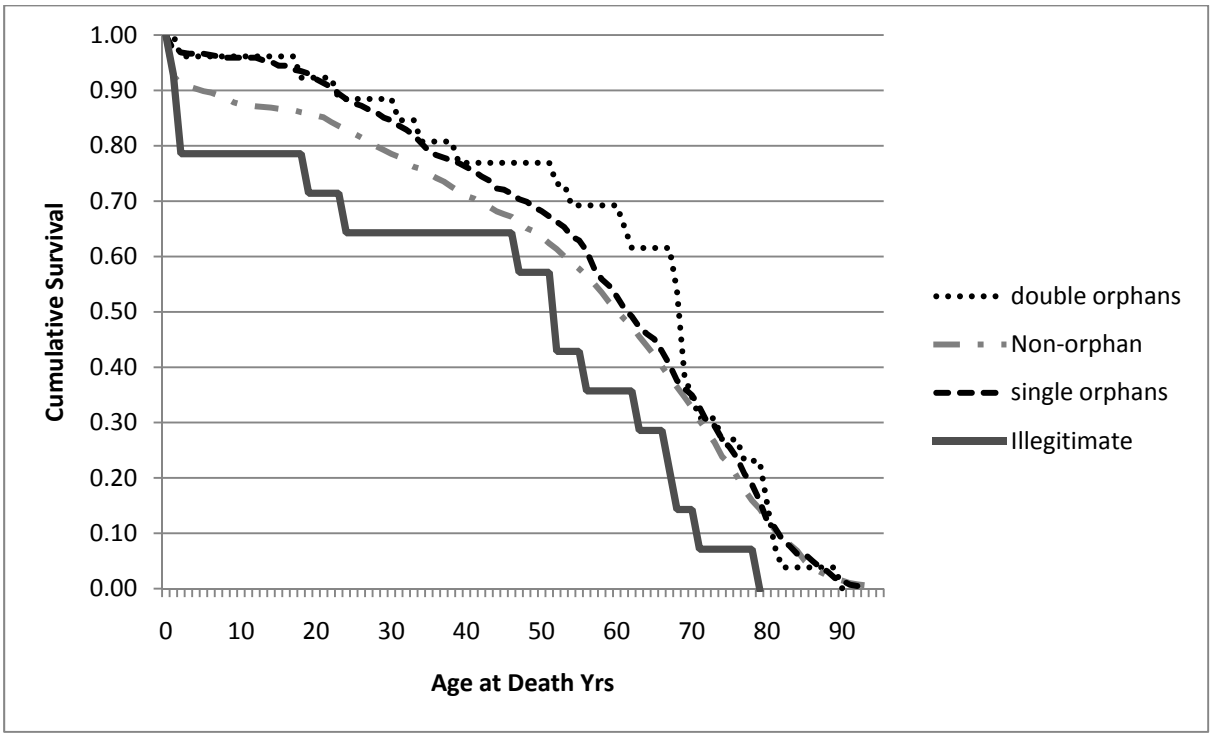

Figure 4.6: Cumulative Survival by Orphan Status.

An analysis of both motherless and fatherless orphans' mean age at death was therefore calculated by dividing individuals into age at orphaning categories (Figures 4.7). This analysis shows statistically significant lower mean age at death in children orphaned through father loss under the age of two years (40-42.5yrs) than those aged 2-15 years (P=<0.05, df 4). This pattern is not expected from the data seen in European studies where increased risk of child mortality was non-significant in the fatherless group (Andersson et al. 1996; van Poppel 2000). As the European orphan mortality studies do not continue past the age of 15 years, it is unknown whether they too may have found significant differences in mean age at death.

The same trend is evident for the motherless orphans in Figure 4.7, however only those infants who lost their mother under one year of age shows a statistically significant difference in mean age at death compared to the older aged motherless orphans (P=<0.005 df 4). Their mean age at death (19 years) was however half that seen in the fatherless group and consisted

of 15 individuals in this 0-1 year orphan group (P=0.019, df 1). The fatherless group included 28 infants in the 0-12 month orphan group, 14 of these were the illegitimate children thus

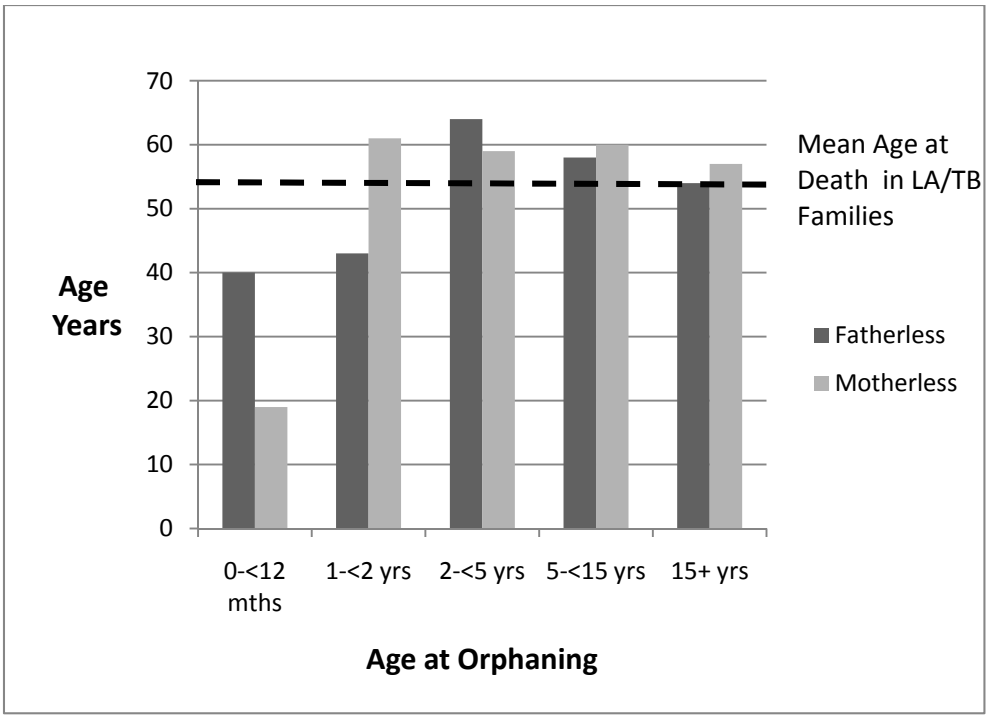

Figure 4.7: Mean age at death by age at orphaning category

leaving 14 in the group where their fathers had actually died. The mean (average) age of death for the illegitimate children was 43 years of age (range 0-78 years); the remaining 14 children who became fatherless in the first year of their lives mean age of death was 38 years (range 0-75 years). Both these means are well above that seen in the motherless infant orphans, with no statistical significance between the illegitimate or the infants who lost their father in their first year of life.

4.10 Survival Graphs for Age at Parent Loss

To further investigate the affects of parental loss on orphaned and illegitimate children's life expectancy, survival graphs were collated for each group. Survival curves can more clearly display any differences between groups unlike the mean age of death which is skewed due to the unevenness of the frequencies of age at death within human populations. Survival curves also show the age of crossover where survival of one category relative to another improves. The analysis is by gender of the child not just that of the parent which is lost. These survival

curves had been created on SPSS statistical software using the Life Tables function and pair wise comparisons are calculated using the Wilcoxon (Gehan) statistic.

The most dramatic difference is to be seen in the survival curves when the individuals are analysed in age category at mother loss by sex (Figures 4.8 & 4.9). It must be remembered that children who lose a parent in the four age-at-orphaning categories have already survived up until that time; for example the 5-<15 years in the 4th category will have survived to at least 5 years of age, and therefore appear to do better than the non-orphaned or illegitimate group. It is only after the loss of that parent in the orphaned groups that their survival can then start to decline.

Survivorship was significantly less among infants who lost their mothers, with a 75% death rate before two years, while children who lost their mothers after one year of age showed similar rates of survival to non-orphans in the LA/TB families (Figure 4.8). The under one

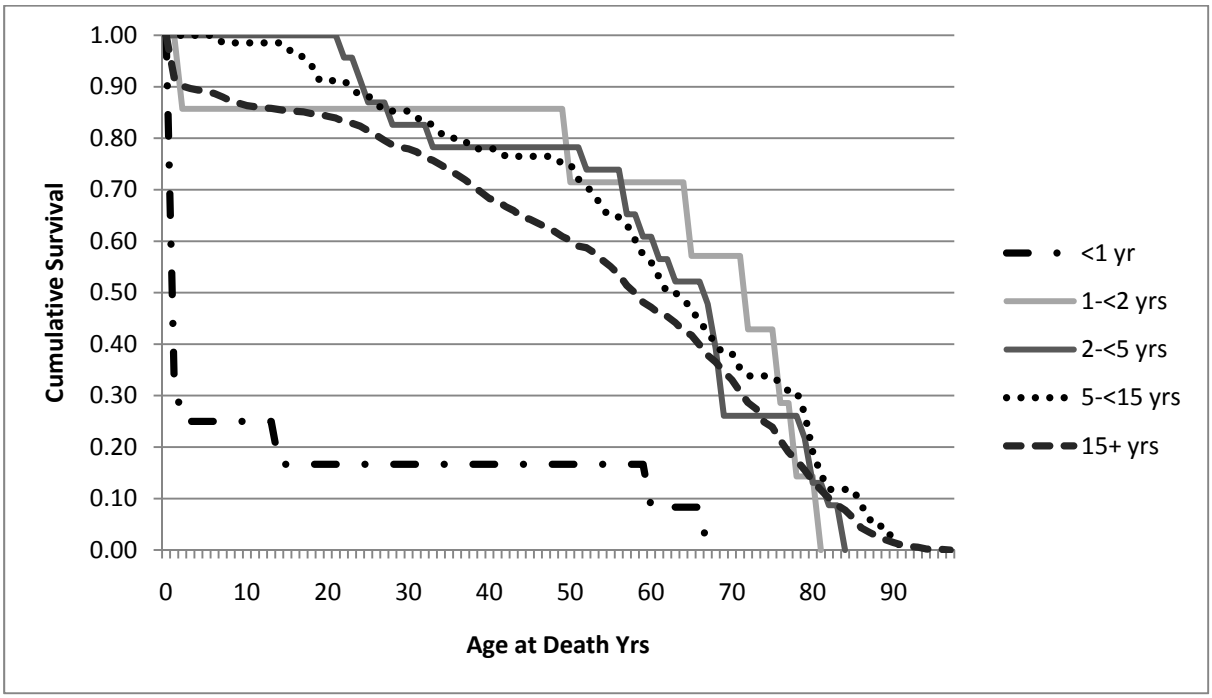

Figure 4.8: Female cumulative survival curves in age at mother loss categories.

year age at orphaning category was statistically significant with all other orphan and non-orphan groups (each comparison P<0.005, df 1) (Table 4.8). Of note the other statistically significant pair-wise comparison was seen between the motherless children orphaned between five and 15 years and the 15+ year group (non-orphans). The non-orphans have a median time of survival of 60.17 years, while those in the 5-<15 years orphaned group

survived longer at 64 years (P=0.007, df 1). Despite the orphan categories of 1-<2 years and 2-<5 years both having higher median survival times which were even higher than the 5-<15 year group, no significant P-values are seen when compared with the non-orphan group. This most likely reflects the smaller numbers found in these two categories (12 & 52 respectively) compared with the 168 found in the 5-<15 years age at orphaning category.

Table 4.8: Pair wise comparisons Wilcoxon (Gehan) statistic between age at mother loss categories.

Age at Orphaning mother loss	1yr-<2 yrs	2yrs-<5 yrs	5yrs-<15yrs	15+yrs
<1 yr	**P=0.002**	**P<0.005**	**P<0.005**	**P<0.005**
1yr-<2 yrs	-	P=0.399	P=0.580	P=0.296
2yrs-<5 yrs	P=0.399	-	P=0.500	P=0.373
5yrs-<15yrs	P=0.580	P=0.500	-	**P=0.007**
15+yrs	P=0.194	P=0.373	**P=0.007**	-

Note: All significant P-values appear in bold.

When the survival curve graphs are divided by gender, the less than one year age at mother loss females had a 75% death rate before two year of age (Figure 4.8) while the male orphans have a better survival chance with a lower death rate of 32% under one year of age (Figure 4.9). This would suggest some sort of differential care of infant orphans depending on their gender, in this case with the orphaned female infants dying more than twice as often as the orphaned male infants. This differential in care appears to continue until two years of age with the survival curves of both the female and male children who were orphaned after two years of age having similar survival curves.

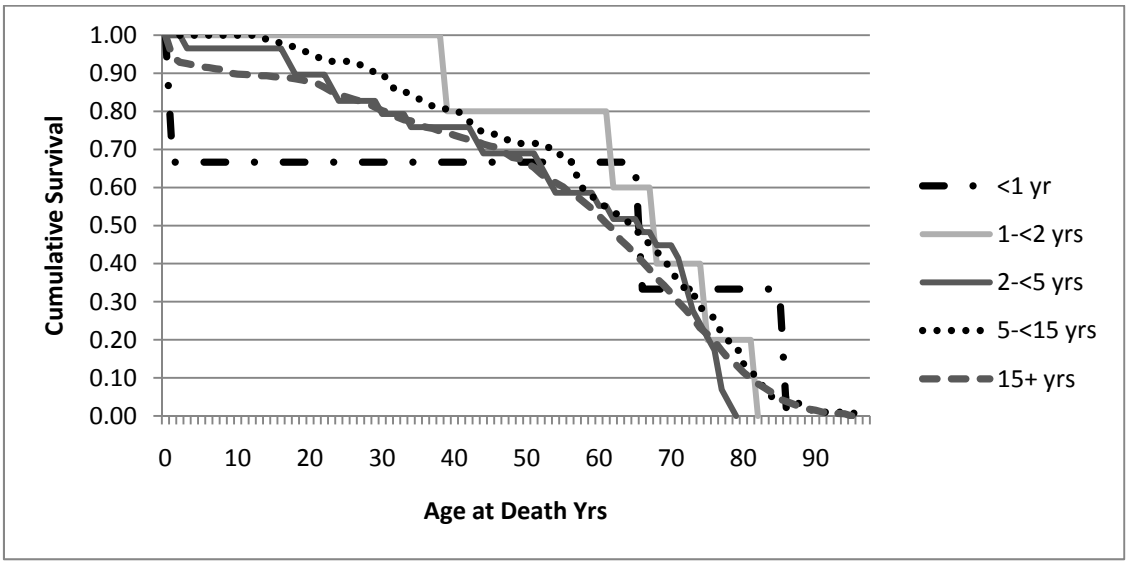

Figure 4.9: Male cumulative survival curves in age at mother loss categories.

Examining the same age orphaning categories for father loss reveals a less precipitous death rate in the under one year age group than that seen in the mother loss group (Figure 4.10). Nevertheless, this category along with the illegitimate and 1-<2years age group do show similar survival curves in contrast to the 2<5 years, 5-<15years and 15+ years groups.

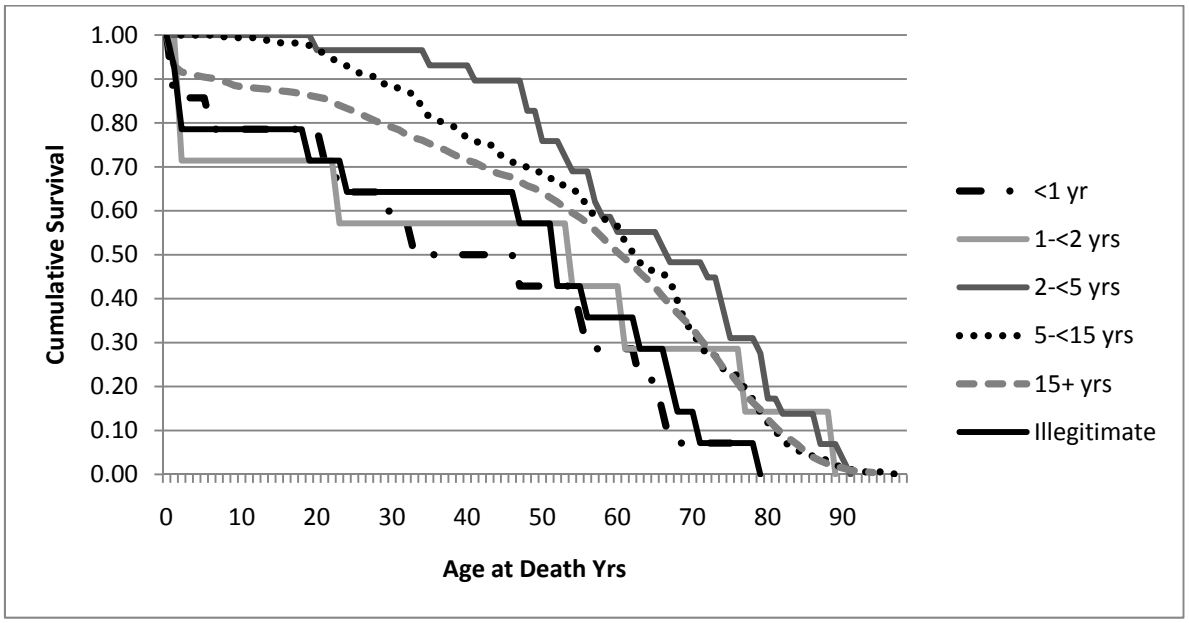

Figure 4.10: Cumulative survival curves by age at father loss, combined sexes.

The pair-wise comparisons for the combined sexes' father loss categories show significant differences between the less than one year orphan category compared with three other age at orphaning categories (Table 4.9). The infant orphan and illegitimate categories show similar reduced survival times with median survival 46 and 51.5 years respectively. The illegitimate children also show significant decreased survival compared to both the 2-<5 years and 5-<15 years orphan groups but probably because of the small number of illegitimate children compared with the 15+ group this value is not statistically significant (P=0.109, df 1). It must be noted also that the Wilcoxon (Gehan) statistic is a two-sided test, which therefore states whether there is a difference between categories. If we are looking at the illegitimate children having a reduced survival compared with the non-orphans a one-sided P-values will halve the original Wilcoxon (Gehan) statistic, which in this case would be 0.055 which is approaching significance.

Table 4.9: Pair wise comparisons Wilcoxon statistic between age at orphaning father loss categories.

Age at Orphaning Father loss	1yr-<2 yrs	2yrs-<5 yrs	5yrs-<15yrs	15+yrs	Illegitimate
<1 yr	P=0.681	**P=0.002**	**P=0.004**	**P=0.025**	P=0.613
1yr-<2 yrs	-	P=0.201	P=0.262	P=0.510	P=0.822
2yrs-<5 yrs	P=0.201	-	P=0.126	**P=0.035**	**P=0.011**
5yrs-<15yrs	P=0.262	P=0.126	-	P=0.119	**P=0.041**
15+yrs	P=0.510	**P=0.035**	P=0.119	-	P=0.111
Illegitimate	P=0.822	**P=0.011**	**P=0.041**	P=0.111	-

Note: All significant P-values appear in bold.

When this age category for father loss is divided into males and females they reveal a differential between the two sexes (Figures 4.11 & 4.12). In both survival curves those children orphaned between 5-15 years and 15+ years have very similar survival patterns. The 2-<5 years orphan category shows better survival curves for both males and females while the under one year, 1-<2 years and illegitimate groups all show decreased survival patterning but this is more pronounced in the females. In fact the difference seen in the female fatherless orphans contributes most to the significance of the combined fatherless group (female P=0.029, df 5 and males P=0.472, df 5).

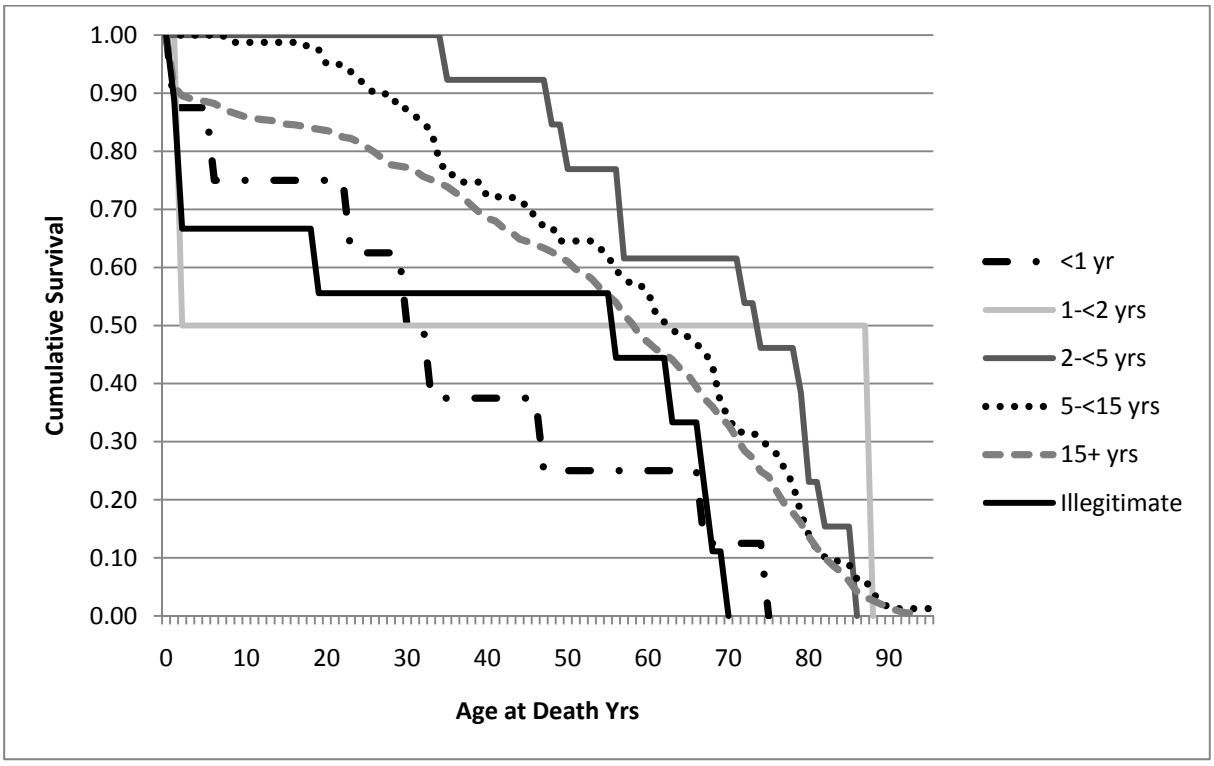

Figure 4.11: Female cumulative survival curves by age at father loss categories.

Table 4.10 Pair-wise comparisons Wilcoxon (Gehan) statistic between age at father loss categories.

Age at Father loss in Females	1yr-<2 yrs	2yrs-<5 yrs	5yrs-<15yrs	15+yrs	Illegitimate
<1 yr	P=0.794	**P=0.005**	**P=0.016**	**P=0.080**	P=0.923
1yr-<2 yrs	-	P=1.00	P=0.939	P=0.858	P=0.634
2yrs-<5 yrs	P=1.00	-	P=0.100	**P=0.032**	**P=0.018**
5yrs-<15yrs	P=0.939	P=0.100	-	P=0.109	**P=0.048**
15+yrs	P=0.858	**P=0.032**	P=0.109	-	P=0.181
Illegitimate	P=0.634	**P=0.018**	**P=0.048**	P=0.181	-

Note: All significant P-values appear in bold.

Females less than one year at age at father loss showed statistically significant differences in their survival to all other age at father loss categories but not to illegitimate children (Table 4.10). Females who were also orphaned in the 2-<5 yrs category showed improved survival compared with both the non-orphaned group and the illegitimate children. The illegitimate female children also had poorer survival prospects than those females orphaned between 5-<15 yrs.

Male children who lost their fathers at any age had no statistical differences seen in survival prospects between any of the age categories including the illegitimate children (Table 4.11).

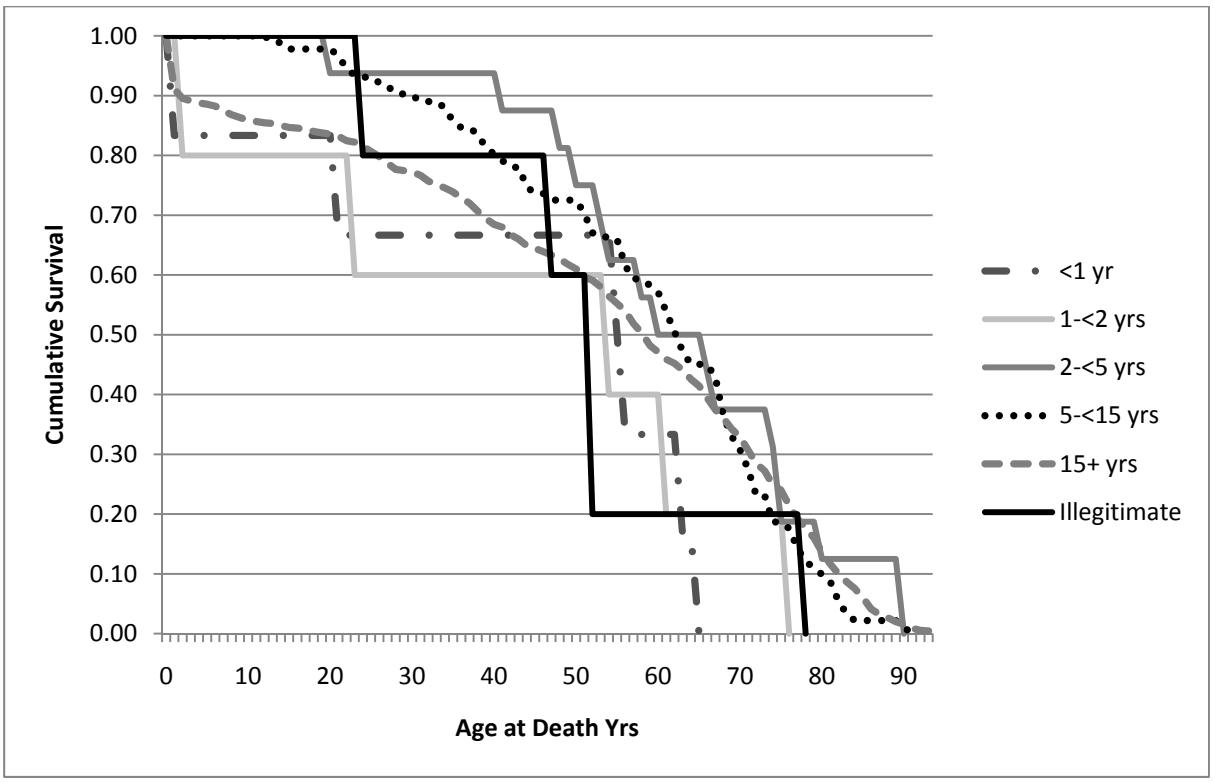

Figure 4.12: Male cumulative survival curves by age at father loss categories.

Table 4.11: Male pair-wise comparisons Wilcoxon (Gehan) statistic between age at father loss categories.

Age at Father loss in Males	1yr-<2 yrs	2yrs-<5 yrs	5yrs-<15yrs	15+yrs	Illegitimate
<1 yr	P=1.00	P=0.172	P=0.099	P=0.172	P=0.855
1yr-<2 yrs	-	P=0.302	P=0.219	P=0.331	P=0.917
2yrs-<5 yrs	P=0.302	-	P=0.597	P=0.406	P=0.186
5yrs-<15yrs	P=0.219	P=0.597	-	P=0.535	P=0.326
15+yrs	P=0.331	P=0.406	P=0.535	-	P=0.45
Illegitimate	P=0.917	P=0.186	P=0.326	P=0.45	-

Note: All significant P-values appear in bold.

4.11 Deaths over 15 years by Age at Parent Loss

Survival graphs were produced for those persons who had survived to 15 years of age by age at parent loss. The male fatherless orphans have been graphed first (Figure 4.13) and show no statistical significance between any age at father loss category. The female fatherless orphans however show statistically significant poorer survival prospects for the less than one year age at father loss category to that of the 2-<5 yr category (P=0.02, df 1), with a median age at death of 46 years compared with the 2-<5 yr age at father loss group at 73.5 years (Figure 4.14). The other pair-wise comparisons were not statistically significant, despite the differences seen between the survival curves of the female <1 yr category at father loss and the other age at orphaning categories.

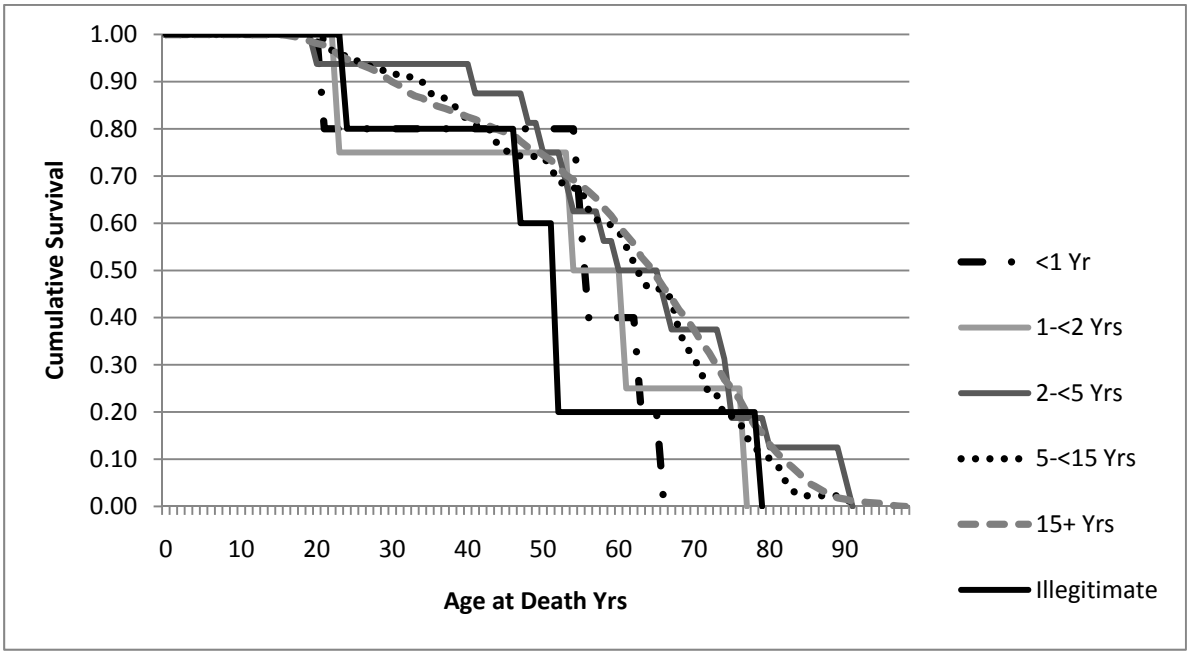

Figure 4.13: Cumulative survival for males who died after 15 yrs by age-at-father loss categories.

Figure 4.14: Cumulative survival for females who died after 15 yrs by age at father loss categories.

Persons who died over 15 years of age when analysed in age at mother loss categories by sex (Figures 4.15 & 4.16) show no statistical significance in survival prospects between any age at mother loss categories for either males or females.

Figure 4.15: Cumulative survival of male who died after 15 yrs by age at mother loss categories.

Figure 4.16: Female deaths over 15 yrs cumulative survival in age at mother loss categories.

Therefore among orphans who survived childhood, only the females less than one year at the time of their father's death show any decreased chances of survival compared with all other age at orphaning categories.

4.12 Conclusions

As in Europe in the 19th century illegitimate children have the poorest survival prospects both in terms of child mortality risk and long term survival in the LA/TB families. However, single and double orphans showed no statistically significant difference to the non-orphaned group of children when analysed as a whole.

As expected motherless orphans had higher risks of child mortality (8%) compared to those children who had lost their father (3%) especially if their mother was lost in their first year of life. There was, however, an even greater risk of early deaths for the motherless and fatherless females than that of the male orphans. This higher risk of death in female orphans was unexpected as generally male children are less robust in early childhood with higher death rates than female children and this certainly was the case in NZ in the 19th century. For example in 1895 deaths in NZ children aged less than one year numbered 1469; the male death rate was 81.03 per 1000 live births and females considerable less at 68.9 (New Zealand

Government 1901). The much higher rate of female orphan deaths would therefore indicate a gender bias against the young female orphans (<2yrs) in particular.

The age at which are child was orphaned gave the most statistically significant differences with the motherless infants having 64.8% likelihood of dying before they were 15 years old. Unlike the European situation the children who lost their fathers before two years of age were also at high risk of childhood death but children who lost either parent between two and ten years of age had no increased risk of childhood death compared to the non-orphaned children, with the children who were orphaned between 2-5 years having better survival prospects than even the non-orphaned group. From 10-15 years however, motherless orphans again showed an increased risk of childhood death but this same trend was not seen for the fatherless orphans.

In those children who survived to 15 years of age the effects of orphaning is still apparent in some groups. The females who lost their fathers in infancy had the lowest survival chances in adulthood with a median survival of 46 years, those who were illegitimate had the second lowest survival chances with a median survival of 51.3 years closely followed by the males who lost their fathers as infants at 55 years. This would indicate that the motherless orphans survived less well under the age of 15 years, while residual effects were more likely in the children who lost their fathers when less than one year of age or who were illegitimate.

Chapter 5: Step-parents

5.0 Orphans acquiring step-parents

High step-parenting rates in LA/TB families may account for the low child mortality rates seen among these orphans. The possible impact of step-parents upon orphans' mortality this will be examined with analysis by the age of parental loss.

Almost 32% (143/455) of orphaned or illegitimate children in my population gained a step-parent before they were 15 years of age. Of the 249 children who lost their mother when aged less than 15 yrs , 89 (35.74%) got a step-mother before the age of 15 yrs, while only 56 (25.22%) of the 220 children who became fatherless prior to the age of 15 yrs acquired a step-father. This difference was statistically significant (P=0.007, df 1).

5.1 The role of step-parents in modifying the risk of childhood death

Table 5.1 examines the relative risks for all live born children dying under the age of 15 years and how this risk may be modified with the acquisition of step-parents. The children who lost mothers when aged less than one year or over 10 years show an increased risk of childhood death. Children who lost fathers between one and two years have the increased risk of early death. But this table also looks at the effect made when step-parents are acquired by the orphans. Significantly all orphans in the under five year at age at orphaning who did not acquire a step-parent (either a step-mother or step-father) had significantly increased risks of death before the age of 15 years (Table 5.1). Only one of the infants (aged less than one year) and none of the 31 children orphaned between one and five years who acquired a step-mother died before the age of 15 years. All of infants who lost their mothers and did not get a step-mother died before of 15 years of age.

It must be noted however that only one of these infants reached the age of one year. Therefore the possibility arises that they died before their father could remarry. The average age of the orphans who acquired a step-mother in this group was between two and three years. However the date of remarriage is the only measurable data which indicates care from someone other than the remaining parent. This is clearly not the case with the majority of the orphaned infants probably being cared for either by close relatives (often the grandparents) or nannies/housekeepers employed by their father.

Table 5.1: Relative Risk of dying before 15 years of age

	Number	Dead before the age of 15 years	%	Relative Risk (RR)	Confidence Level 95%
Live births	2371	282	11.85	-	-
Children with Parents alive	2340	139	5.94	1.00	-
Motherless before 1 yr	**16**	**11**	**68.75**	**11.57**	**8.01-16.72**
Stepmother before 15 yrs	6	1	16.66	2.86	0.47-16.91
No stepmother before 15 yrs	10	10	100	16.83	14.33-19.78
Fatherless before 1 yr	28	3	10.71	1.80	0.61-5.32
Stepfather before 15 yrs	**13**	**0**	**0.00**	**0.00**	**-**
No stepfather before 15 yrs	**15**	**3**	**20.00**	**3.37**	**1.21-9.38**
Children who died 1st yr		153	6.45		
At the age of 1 year	2218	survived			
Children with parents alive	2120	52	2.45	1.00	-
Motherless 1-4 yrs	63	3	4.76	1.94	0.623-6.05
Stepmother before 15 yrs	**31**	**0**	**0.00**	**0.00**	**-**
No stepmother before 15 yrs	**32**	**3**	**9.38**	**3.82**	**1.26-11.60**
Fatherless 1-4 yrs	**35**	**4**	**11.43**	**4.66**	**1.78-12.18**
Stepfather before 15 yrs	**19**	**0**	**0.00**	**0.00**	**-**
No stepfather before 15 yrs	**16**	**4**	**25.00**	**10.19**	**4.18-24.82**
Children who died 1-4 yrs		59	2.66		
At the age of 5 years	2159	survived			
Children with parents alive	1989	46	2.31	1.00	-
Motherless 5-9 yrs	90	1	1.11	0.48	0.07-3.44
Stepmother before 15 yrs	**35**	**0**	**0.00**	**0.00**	**-**
No stepmother before 15 yrs	55	1	1.82	0.79	0.11-5.60
Fatherless 5-9 yrs	80	2	2.50	1.08	0.27-4.37
Stepfather before 15 yrs	**20**	**0**	**0.00**	**0.00**	**-**
No stepfather before 15 yrs	60	2	3.33	1.44	0.36-5.80

Children who died 5-9 yrs		49	2.46		
At the age of 10 years	2110	survived			
Children with parents alive	1938	15	0.77	1.0	-
Motherless 10-14 yrs	**80**	**4**	**5.00**	**6.46**	**2.19-19.02**
Stepmother before 15 yrs	**17**	**3**	**17.65**	**22.80**	**7.26-71.57**
No stepmother before 15 yrs	63	1	1.59	2.05	0.28-15.29
Fatherless 10-14 yrs	92	2	2.17	2.81	0.65-12.10
Stepfather before 15 yrs	**2**	**1**	**50.00**	**64.60**	**14.78-282.30**
No stepfather before 15 yrs	90	1	1.11	1.44	0.19-10.75
Children who died 10-14 yrs	21	21	1.08		
At the age of 15 years	2089	survived			

Note: Based upon Table 2 from Andersson et al.1996:983, significant results appear in bold.

Two excellent examples of these types of situations are found in my population. The first of these involves George Mason's family from Little Akaloa when in 1853, Hemi his Maori wife of eleven years and mother of five boys died. Their youngest child was just under three years and the eldest only 10 years of age at this time. George Mason asked his friend and neighbour Joshua Rix if his adopted daughter Elizabeth could keep house and look after the children for him. Elizabeth was just 14 years of age when she moved into the Mason household to look after the four boys (one of the eight year old twins had previously been adopted by Hemi's extended family from the West Coast). Seven months later at the age of 15 years Elizabeth and George married and go on to have 15 children, eleven of who survived to adulthood. All four children who Elizabeth cared for after the loss of their mother lived beyond 15 years although the youngest died aged 16 years from tuberculosis (Mason and Hitchen 1987).

The second example involves Frederick and Christina Cutbush from Ross on the West Coast. Christina was a granddaughter of George Mason from Little Akaloa. Unfortunately Christina died in childbirth with her third baby and Emma her younger sister moved into the Cutbush home to care for the baby and the two older children. Within six months Frederick had married his sister-in-law Emma and together they had seven further children. All of

Christina's three children including the baby orphaned at birth lived well past the mean age of death for my population (68-88 years) despite their early orphaning (Mason and Hitchen 1987).

Another option was available in some cases for a child following the loss of a parent was to enter an orphanage. Such an occurrence happened after Sarah Jane Coggins died in childbirth from a post-partum haemorrhage following the delivery of her sixth child. Her husband William was a railway ganger and was away from home frequently due to his employment. After his wife's death he placed his four older children in an orphanage and the newborn was sent north to an unrelated couple in Auckland. This child unfortunately died at seven months of age from a respiratory infection but the other four children all survived to adulthood with their father remarrying 15 months after the death of his first wife. All four children were then retrieved from the orphanage and brought up by their new step-mother along with five new half-siblings and one step-sister.

Gaining a step-father was also advantageous for the children who were orphaned under one year, under five years and under 10 years, so much so that no children in these groups died under the age of 15 years. This was also the case for motherless orphans in the under five years and 10 years categories who gained step-mothers. The group of infant orphans also appeared to be much better off with only one out of six children dying before 15 years of age. This group was not significant however with a 95% confidence level bridging the RR of 1 (CL 0.47-16.91).

The children who were orphaned between 5 and 10 years of age appear to be the least affected by orphaning, with slight increases in RR for both motherless and fatherless orphans but neither level are significant. No children who gained step-parents in this age group died under the age of 15 years and only three children in total dying under 15 years of age from this age at orphaning category.

Step-parents may not always provide reduced risks of childhood death. In the LA/TB families the children orphaned when over the age of 10 years had an increased risk of childhood death after their remaining parent remarried. Not only is the risk of death increased in the children who lost their mothers over 10 years of age but those who acquired a step-mother had more than three times the risk of dying under 15 years of age (RR 22.80). The effect was even greater for the children who acquired a step-father before they were 15 years of age with a RR of 64.60 (Table 5.1).

5.2 Double-Orphans who acquired step-parents

There were four double orphans who acquired step-parents after their first biological parent had died, none of these step-parents were related to the orphans but after the loss of the orphans' second biological parent they continued to care for these children. Three of these four children were male. The average age at death for those double orphans who gained a step-parent was 79 years, while those without a step-parent was significantly lower at 55.65 year (Mann-Whitney U Test P=0.008, df 24). Even having just one remaining step-parent when both biological parents are deceased gives increased benefit to the orphaned child. Along with the remaining step-parent, two of the four families also contained older step and half siblings, firmly placing these orphans within a wider family setting.

5.3 Single-Orphans who acquired step-parents

My population showed high percentages of both maternal and paternal orphans gaining step-parents in the under 10 year age group. Almost half (48.52%) acquired step-mothers and over one third (36.36%) gained step-fathers.

5.3.1 Step-fathers

Of the paternal single orphans, 23.7% acquired step-fathers when still aged less than 15 years, with 22 female and 24 male fatherless orphans gaining a step-father. No step-fathers were related to the orphans, although five fatherless orphans saw their mother remarry within 10 months to their father's business partner. The average age of gaining a step-father in female orphans was 7.5 years of age, while that for the male orphans was slightly higher at 8.79 years, but this difference was not significant (P=0.216, df 1).

5.3.2 Step-mothers

Of the 221 maternal single orphans, 86 or 38.9% gained step-mothers. This was statistically significantly higher than the percentage of fatherless orphans (Chi-square P= 0.009, df 1). Two step-mothers were related to two of the step-children; both were sisters of the deceased mother. One orphan gained two-stepmothers who were sisters but otherwise unrelated to the orphan but were related to the his step-siblings. The average age at death of those two children who gained a related step-mother was 82.5 years compared with 57.44 years for those with unrelated step-mothers. Although there was only a small number of related step-mothers the difference in survival for those orphans was significant (Mann-Whitney U T P=0.043, df 84). It would therefore appear to be even more beneficial for the orphan to be related to their new step-mother.

Marriage with a deceased wife's sister was not legalised in NZ until 1880 (New Zealand Government 1901), so aunts as step-mothers could only occur after this date. Legalised marriage with a brother of the deceased husband, however, did not occur until 1900 although both laws were retrospective so that any such marriages had occurred were classed as valid and any children born in them deemed to be legitimate(New Zealand Government 1901).

This difference in remarriage rates would suggest widowers felt they needed to remarry quickly to provide a step-mother for their children. This, however, may have been a lot harder to achieve than desired as males far outnumbered the females in the NZ population until after the First World War (New Zealand Government 1922a). Possibly even larger numbers of step-mothers would have been acquired if the number of available women was higher in NZ's colonial times when men greatly outnumbered women in the colony. Interestingly though, only one-quarter of widows remarried despite the higher number of single men seen in NZ at the time. This may reflect the widow's choice in whether she remarried, possibly less so if she had older children who could help around the household or were able to bring income home or perhaps work on the family farm. Equally if she was older with several children to support she may not have been as appealing to single men looking to start a family of their own.

5.4 Illegitimate children acquiring step-parents

Of the 14 illegitimate children (nine females & five males), 57% of these mothers subsequently married while the child was still under 15 years of age, with no difference seen (P=1.75, df 1) between the sexes of the illegitimate children (Table 4.1). The average age of the child when their mother married was 6.25 years, with all eight mothers marrying before their children were aged 12, none however before their child was two years of age.

There was a noticeable difference when comparing the sex of the illegitimate child with the age of acquiring a step-father. The five female children on average acquired a step-father at four years of age, while the three male children were older, with an average of 10 years. Despite the small numbers involved this difference was statistically significant (T-test P=0.012, df 6). This suggests that the mother of an illegitimate female child was more likely to marry when that child was at a young age (pre-school), than those mothers with illegitimate male children whose marriage was more likely to occur later when the child was well into their schooling. Possible reasons for this may include the new father seeing female step-children as less of a threat, or indeed maybe in greater need of a step-father, or

conversely the mother of the illegitimate children feeling that female children would require step-fathers earlier than male children. No comparable figures are available from any overseas studies.

Also of note is that all the step-fathers were bachelors when they married and therefore had no previous issue before the marriage. They were therefore apparently happy to invest time, money and energy on the step-child to enable them to marry and have children of their own, in a country where females of reproductive age were sought after due to their scarcity.

The illegitimate children who acquired a step-father had a statistically significant better chance of survival than those illegitimate without a step-father (T-Test P= 0.045, df 12). Those illegitimate children without a step-father only lived half the time (27.5 years) of those illegitimate who gained a step-father (53 years).

5.5 Conclusions

High rates or remarriage of widowed parents occurred in the LA/TB families, with more maternal orphans acquiring a step-mother than did the paternal orphans acquiring a step-father. This was despite greater numbers of males in the population available for marriage than females in 19th century NZ. Children who were orphaned less than 10 years of age were more likely to gain a step-parent than those children after the age of 10 years; probably both due to decreased time before they reached the age of 15 years but also the likelihood that their parents were of an older age making remarriage less common.

Illegitimate children had the highest likelihood of gaining at step-father at 57%. Female illegitimate children gained a step-father much sooner than the male illegitimate children.

Those children who acquired step-parents under the age of 10 years had much higher survival prospects than the orphaned children who did not get a step-parent. This improved survival with gaining a step-parent occurred whether the step-parent was a step-mother or step-father.

Acquiring a step-mother who was genetically related to the orphan produced the best survival prospects available to an orphan. There were no related step-fathers in the LA/TB families, so no conclusions can be made in the same regard as the related step-mothers.

However, in the LA/TB families those children who were aged over 10 years when they acquired step-parents suffered negative survival prospects for childhood deaths. Acquiring a step-father at this time was the most hazardous with three times the risk of dying before 15

years if a step-mother was acquired, however the number of children in this category was very small overall (4 out of 19 children).

Chapter 6: Life Chances

6.0 Survival and Cause of Death

Being orphaned when less than two years of age particularly with the loss of a mother increased the risk of premature death significantly in the LA/TB families. This was reflected in the increased child mortality risks but if a child survived to 15 years of age, overall survival appeared to be the same or better than the non-orphaned children. Illegitimacy also carried increased risks for child mortality along with decreased overall survivorship as an adult.

However mortality is a finite measure of outcomes for orphans, so in this chapter I will examine how orphaning or illegitimacy may have impacted on those children in other ways. I will firstly examine the cause of death to see if any variation is seen between particular groups, then marital status and future family structure.

6.1 Cause of Death in Little Akaloa/Tolaga Bay Families

Cause of death for the 2379 individuals in the LA/TB families have been collected and categorised, in the majority of cases this information was obtained from death registrations in the Department of Births, Deaths and Marriages, death certificates from deaths which occurred after 1988, or from family history information. This information was initially entered verbatim and then reduced within EXCEL to 136 wide death code categories (Appendix 5). After transfer to SPSS statistical software these codes were further compacted into 17 categories (Highlighted in bold Appendix 5; note war & murder COD have been combined) and the eight stillbirths have been removed from further investigations.

These 17 categories enabled frequency analysis of COD to be undertaken examining trends in the thesis population in total and then between sexes, orphan, and age at orphaning categories. These are further compressed into six causes of death categories: cardiac and cerebral as they are the two largest categories, then the rest of the non-communicable diseases, communicable diseases, accidents and violent deaths (Table 6.1). This was required to enable statistical analysis to achieve higher numbers within categories for comparison purposes.

Following the COD analysis for the 2371 live births in the LA/TB families, separate investigation will be made into the child (under 15 years of age) and adult causes of death. These age groups will also then be examined by sex and orphan categories as appropriate.

Table 6.1: Cause of death in the LA/TB families (live births).

COD	Frequency %	Compressed Codes	Frequency %
Cardiac	24.6	**Cardiac Deaths**	24.6
Cerebral	10.6	**Cerebral Deaths**	10.6
Endocrine	1.4	**Other Non-communicable Diseases**	33.0
Gastro-Intestinal	2.5		
Maternal	1.9		
Neoplasia	15.0		
Old Age	1.6		
Respiratory	1.4		
Renal	2.7		
Other	6.5		
Infections (ex. TB & Flu)	10.0	**Communicable Diseases**	21.7
Respiratory Infection	6.0		
Influenza	1.9		
Tuberculosis	3.8		
Accidents	6.0	**Accidents**	6.0
Suicide	1.3	**Suicide**	1.3
War & Murder	2.8	**Violent Deaths**	2.8
Total Columns %	100.0		100.0

The largest percentage of deaths were caused by non-communicable diseases, most of these were cardiac deaths (almost 25%). This cause of death was seen generally in older persons with the largest two causes being cardiac ischemia and heart failure with a slightly higher percentage seen in males but this difference was not statistically significant (P=0.268, df 1). Cerebral deaths were primarily due to cerebro-vascular accidents, either intracranial haemorrhages or thromboses and made up just over 10% of all deaths. Cerebral deaths also occurred more commonly in the older age categories. The other non-communicable diseases were largely made up of neoplastic (cancers) diseases and renal failure, with comparable sex distribution for each (Table 6.2).

Table 6.2 and Figure 6.1 show the cause of death categories for males and females. Females had a higher percentage of communicable deaths, cerebro-vascular accidents, endocrine disorders such as diabetes and thyroid disease and a higher percentage of tubercular deaths.

Males, as expected, had higher levels of accidental deaths, suicides and war deaths. Overall the small differences seen between the males and female cause of death were not statistically significant however (P=0.32, df 6).

Table 6.2: Cause of death by sex in the LA/TB Families %.

COD	Male	Female	Compressed Codes	Male	Female
Cardiac	27.5	20.8	**Cardiac Deaths**	27.5	20.8
Cerebral	9.3	12.5	**Cerebral Deaths**	9.3	12.5
Endocrine	0.8	2.3	**Other Non-communicable Diseases**	29.9	37.1
Gastro-Intestinal	2.4	2.8			
Maternal	-	4.3			
Neoplasia	14.5	15.4			
Old Age	1.3	2.0			
Respiratory	1.5	1.3			
Renal	3.0	2.3			
Other	5.4	6.2			
Infections (ex. TB & Flu)	8.2	12.3	**Communicable Diseases**	19.7	24.3
Respiratory Infection	6.0	6.0			
Influenza	1.9	1.8			
Tuberculosis	3.5	4.3			
Accidents	7.4	4.2	**Accidents**	7.4	4.2
Suicide	1.8	0.7	**Suicide**	1.8	0.7
War & Murder	4.5	1.2	**Violent Deaths**	4.5	1.2
Total Columns %	100.0	100.0		100.0	100.0

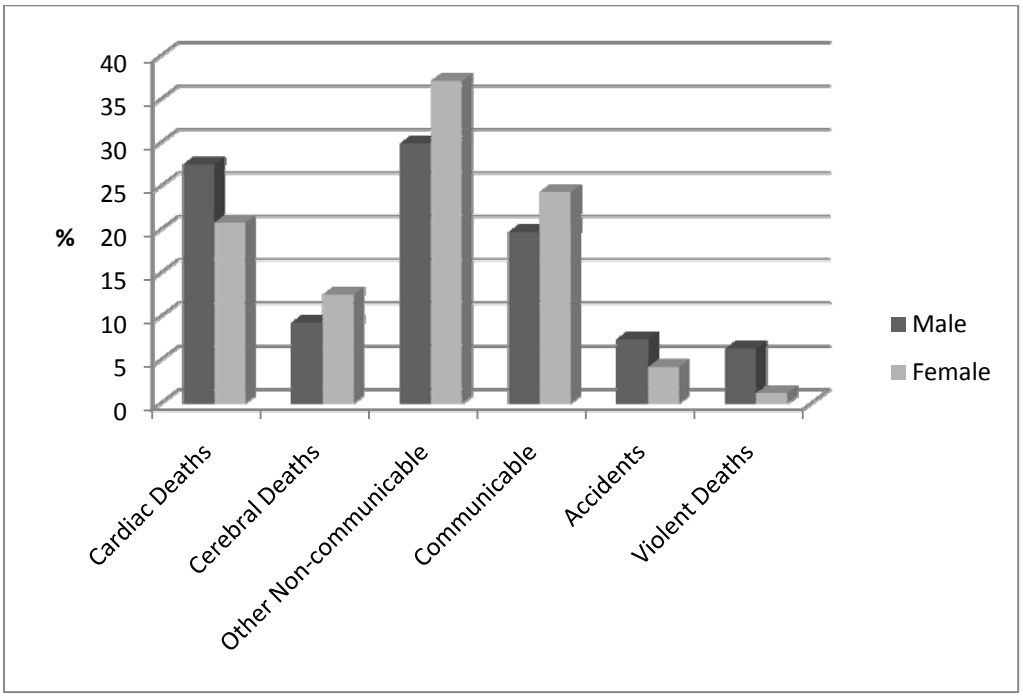

Figure 6.1: Compressed cause of death codes by sex in LA/TB families.

6.2 Orphans' Cause of Death

Compressed COD frequencies (Figure 6.2) by orphan status were analysed in pair-wise comparisons. The non-orphans' COD was comparable with the single orphan group (P=0.99, df 5). The COD for non-orphan and single orphans, however, was statistically significantly different compared to both the illegitimate group (P<0.001, df 5) and the double orphan group (P=0.01, df 5). The illegitimate group was strikingly different with the deaths almost divided equally between communicable diseases and other non-communicable diseases. Tuberculosis made up 30% of the communicable deaths in this group as did the gastro-intestinal infections. The largest sub-group of the non-communicable deaths were made up of deaths from cancers. The double orphans had a much higher percentage of violent deaths with a 13% suicide rate well in excess of the 2.5% suicide rate across the LA/TB families as a whole.

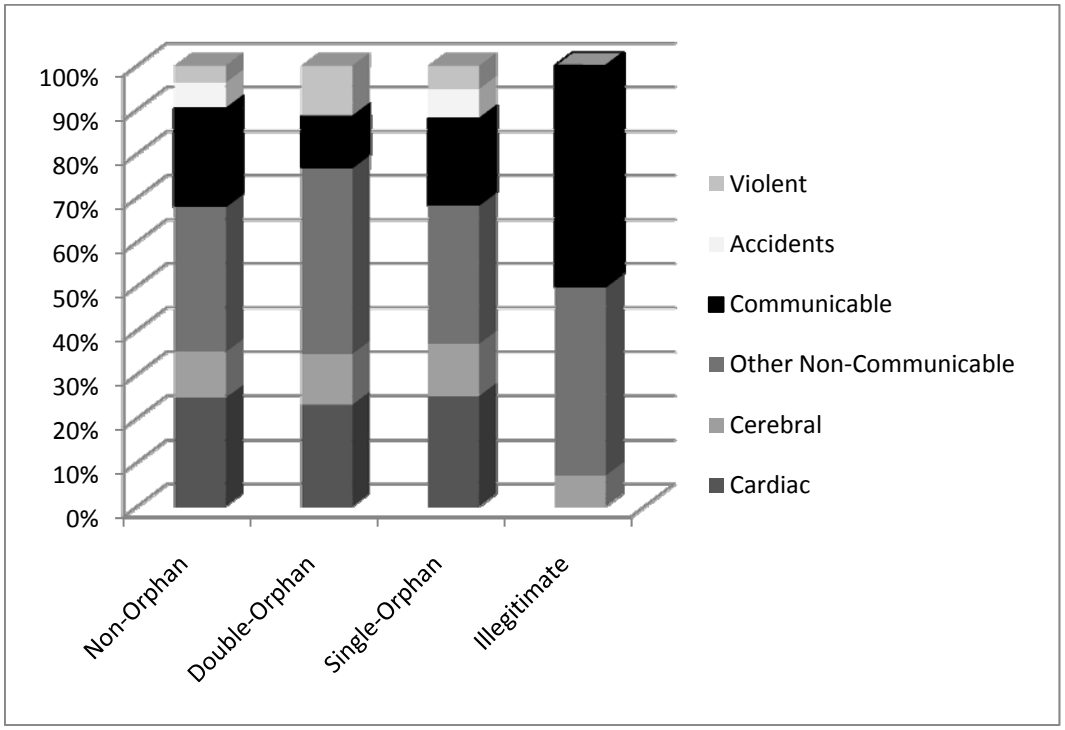

Figure 6.2: Cause of death by orphan status

The illegitimate group was also distinctly different to the double orphan group (P<0.001, df 5). The illegitimate group experienced no deaths from violence, either from suicide, murder or war deaths; the opposite to that seen with the double orphan group. The double orphans had no deaths from communicable diseases while this made up the bulk of the deaths for the

illegitimate group. The large number (34.6%) of double orphans in this population immigrated after the age of 15 years which may be responsible for the lower numbers seen in the communicable deaths but does not explain the differences seen in violent deaths, especially the high suicide rate. Double orphans also had higher numbers of deaths from other non-communicable causes and were in the majority (60%) from cancers.

6.2.1 Cause of Death in Orphan Groups by Gender

COD in both sexes was then addressed in the orphaned groups to assess if there were any differences which may indicate differential care or outcomes depending on gender status (Figures 6.3 & 6.4).

The males followed the same COD patterns between orphan groups as the combined sexes (Section 6.2). Non-orphans were significantly different to the double orphans ($P<0.001$, df 5) with the male double orphans' suicide rate at 13.3% and the illegitimate men ($P<0.001$, df 5) having a 60% likelihood of dying from a communicable disease. However, there were no significant differences seen between the male non-orphans and male single orphan groups in COD ($P=0.98$, df 5). Again the male single orphans showed significant differences in COD to both the male illegitimate group ($P<0.001$, df 5) and the male double orphans ($P<0.001$, df 5).

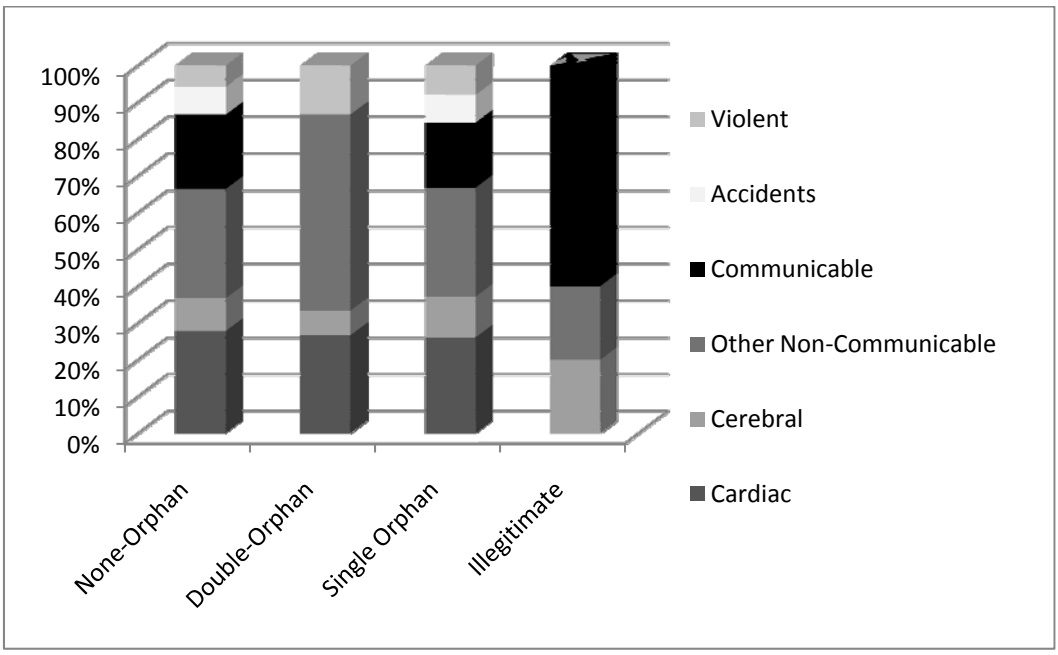

Figure 6.3: Cause of death of males by orphan status

The female orphan groups, however, did not follow the combined orphan group differences with only the illegitimate children showing significant differences in cause of death (double orphans, $P<0.001$, df 5; non-orphans & single orphans ($P<0.001$, df 5 for both). The female

illegitimate children had a 56% death rate from non-communicable disease and 44% of deaths from communicable diseases. There were no accidental or violent deaths in the female illegitimate children.

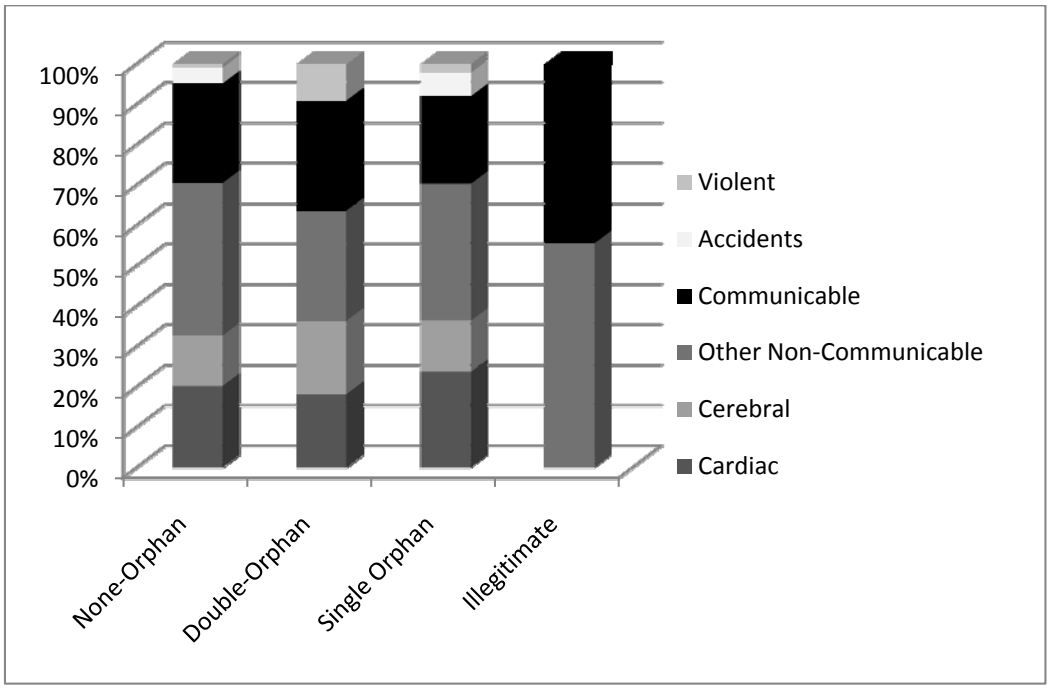

Figure 6.4: Cause of death in females by orphan status

A pair-wise comparison between sexes in each orphan category was undertaken. There were differences between the male and female double orphans ($P<0.001$, df 5) and the illegitimate male and females ($P<0.001$, df 5). The female double orphans died more frequently from both communicable diseases and cerebral vascular accidents, with male double orphans having more deaths from both cancers and suicides.

6.2.2 Cause of Death by Parental Loss

COD by parental loss was examined to investigate any differential seen in the outcomes for the children depending on which parent had been lost (Figure 6.5). Differences in COD may not however show up until orphans are divided up further into age at orphaning categories.

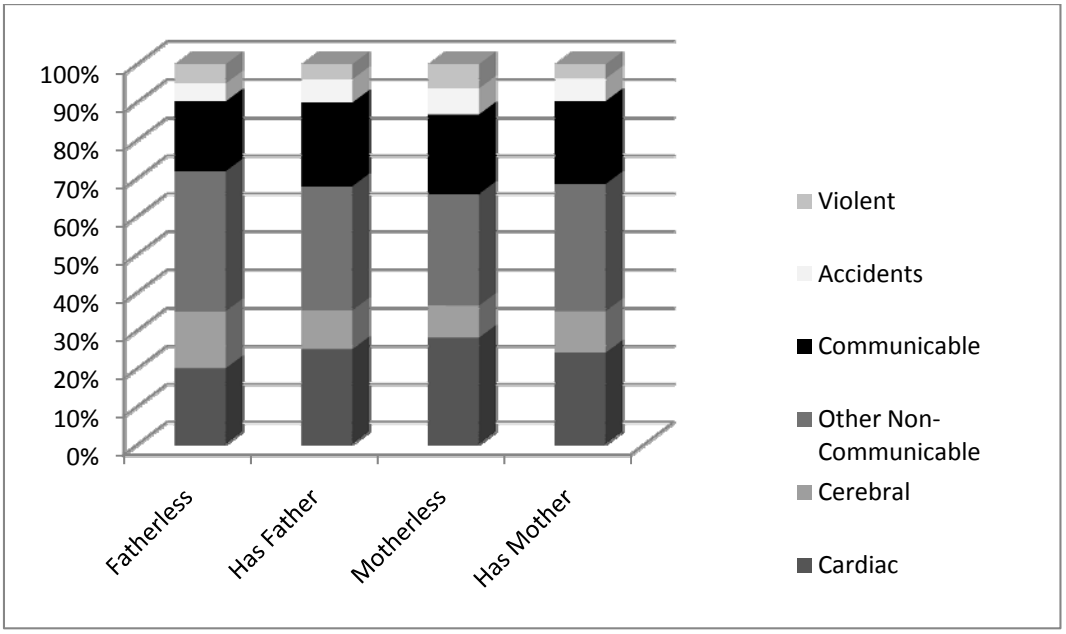

Figure 6.5: Cause of death by parental loss

There was no significant difference found between the cause of death for children who lost their father before 15 years of age and those who still had fathers (P=0.80, df 5) (Figure 6.5). This was the same for those with or without mothers (P=0.90, df 5) (Figure 6.5). When comparing the fatherless and motherless children COD there were no noticeable differences seen between any COD categories (P=0.45, df 5).

6.2.3 Cause of Death by Age at Parental Loss

The fatherless and motherless groups have then been divided by age at orphaning categories to examine possible differences in cause of death depending on when they became orphans The largest concerns with this analysis was the small number of individuals in some cells and for this reason deaths under the age of 15 years were not analysed separately in these categories as many cells contained less than three individuals.

When cause of death is examined by age at father and mother loss, quite marked differences are apparent (Figures 6.6 & 6.7).

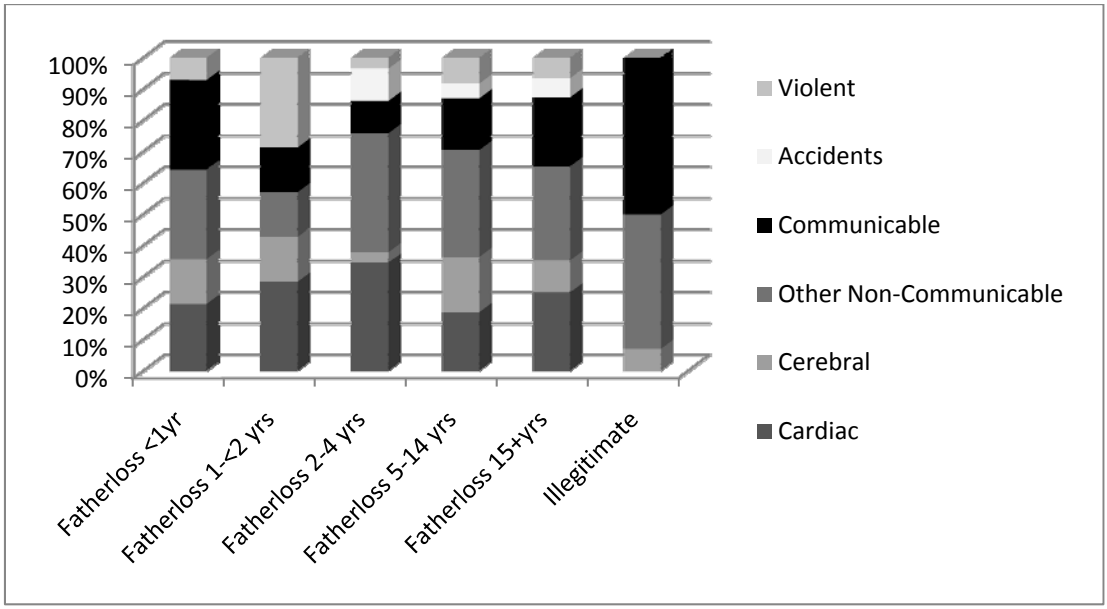

Figure 6.6: Cause of death by age at father loss.

The age at father loss groups show the greatest variation in cause of death frequencies. The illegitimate and under one year fatherless groups had a large percentage of deaths due to communicable disease, while accidental deaths were more common if the father had died when the child was between two and five years of age (Figure 6.6). Those children who lost their fathers after five years of age had the same distribution of cause of death as the group who still had fathers at 15 years of age (P=0.513, df 5) (Table 6.3). The 1-<2 years age group was significantly different to all other age at father loss groups (P< 0.005, df 1 in all pair-wise comparisons) with a high number of violent deaths (28.6%) however this group consisted of only seven individuals, the smallest of all the age at father loss groups.

Table 6.3: P-values of pair wise comparisons by age at father loss.

Age at Father Loss	<1 yr	1-<2 yrs	2-4 yrs	5-14 yrs	15+ yrs	Illegitimate
<1 yr	-	**P<0.005**	**P<0.005**	P=0.07	P=0.11	**P<0.005**
1-<2 yrs	**P<0.005**	-	**P<0.005**	**P<0.005**	**P<0.005**	**P<0.005**
2-4 yrs	**P<0.005**	**P<0.005**	-	**P=0.003**	P=0.059	**P<0.005**
5-14 yrs	P=0.07	**P<0.005**	**P=0.003**	-	P=0.513	**P<0.005**
15+ yrs	P=0.11	**P<0.005**	P=0.059	P=0.513	-	**P<0.005**
Illegitimate	**P<0.005**	**P<0.005**	**P<0.005**	**P<0.005**	**P<0.005**	-

Note: Significant P-values appear in bold.

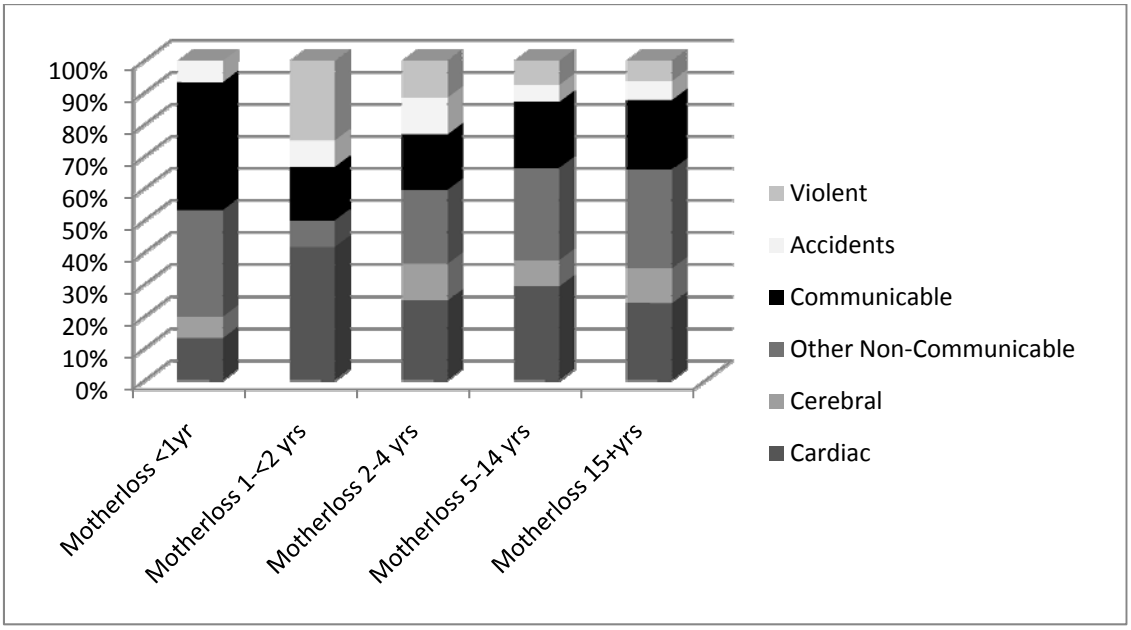

Figure 6.7: Cause of death by age at mother loss

There is more similarity in cause of death between children who lost their mother after the age of two years. Those who lost their mothers under the age of one year experienced a much higher frequency of death from communicable deaths (40%) than all other groups (Figure 6.7). As 65% of those who lost their mothers less than one year of age died before they were two years old, their subsequent cause of death reflects this young age at death. Pair-wise comparisons can be seen in Table 6.4 with statistically significant differences apart from the older age at orphaning category and the non-orphans (P=0.909, df 1).

Table 6.4: P-values of pair wise comparisons by age at mother loss.

Age at Mother Loss	<1 yr	1-<2yrs	2-4 yrs	5-14 yrs	15+ yrs
<1 yr	**-**	**P<0.005**	**P<0.005**	**P=0.002**	**P=0.020**
1-<2 yrs	**P<0.005**	**-**	**P=0.001**	**P=0.001**	**P<0.005**
2-4 yrs	**P<0.005**	**P=0.001**	-	P=0.555	P=0.497
5-14 yrs	**P=0.002**	**P=0.001**	P=0.555	-	P=0.909
15+ yrs	**P=0.020**	**P<0.005**	P=0.497	P=0.909	-

Note: Significant P-values appear in bold.

6.2.4 Comparisons between Parental Loss in Age of Orphaning Categories

Comparisons between the motherless and fatherless orphans in each age at orphaning group were also undertaken with significant differences found in the three under five year

categories, while those children who lost either parent after the age of five show the same distribution of cause of death (Table 6.5).

Table 6.5: Pair-wise comparisons of motherless & fatherless orphans by age at orphaning categories.

Age at Orphaning	Mother Loss <1 yr	Mother Loss 1-<2yrs	Mother Loss 2-4 yrs	Mother Loss 5-14 yrs	Mother Loss 15+ yrs
Father Loss <1 yr	**P=0.001**	-	-	-	-
Father Loss 1-<2 yrs	-	**P<0.005**	-	-	-
Father Loss 2-4 yrs	-	-	**P=0.046**	-	-
Father Loss 5-14 yrs	-	-	-	P=0.213	-
Father Loss 15+ yrs	-	-	-	-	P=O.999

Note: Significant P-values appear in bold.

The infants who lost their fathers under the age of one year had the same cause of death frequencies to that of the non-orphans while the under one year motherless orphans show a much higher likelihood of death from communicable diseases (Figure 6.8).

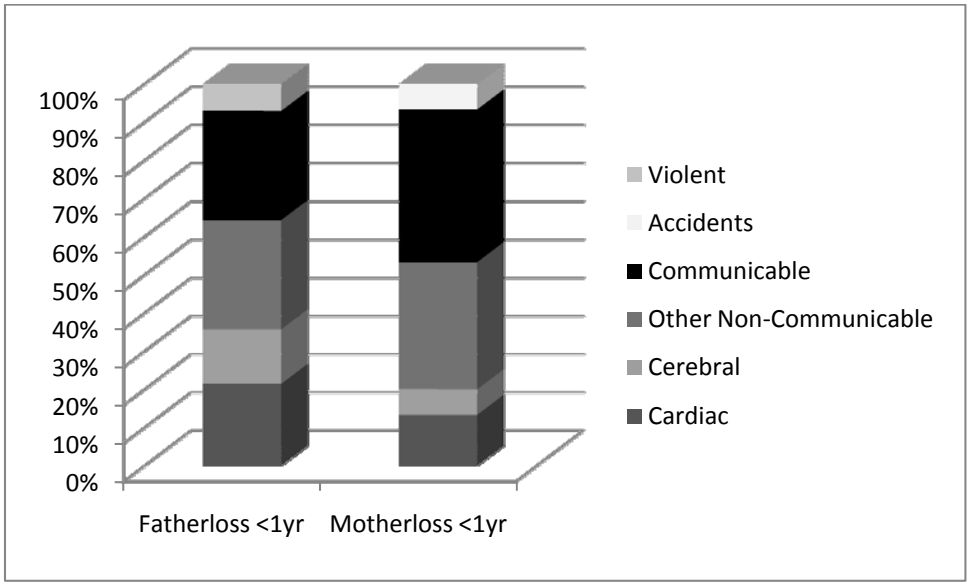

Figure 6.8: Cause of death of motherless and fatherless persons when orphaned less one year of age.

The children orphaned between one and two years of age had much higher levels of violent deaths if they had lost their fathers (28.6% versus 18.7% for motherless orphans) and cerebral diseases but much lower frequencies of deaths from cardiac disease (Figure 6.9).

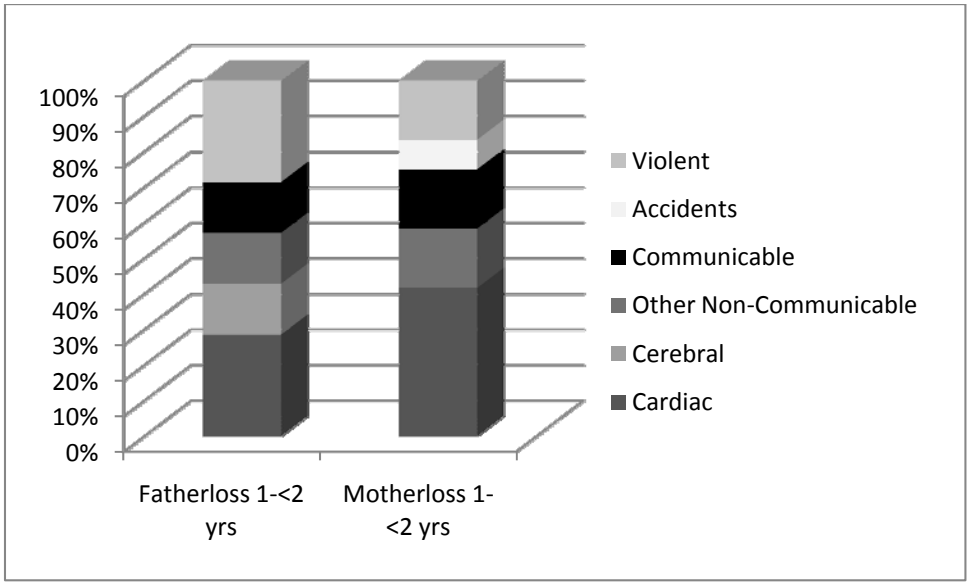

Figure 6.9: Cause of death of motherless and fatherless persons when orphaned between one to two years of age.

The fatherless orphans who were orphaned between two and five years of age show a much higher frequency of deaths from non-communicable diseases such as cancers compared to those who had lost their mothers and had lower levels of death from communicable causes (Figure 6.10).

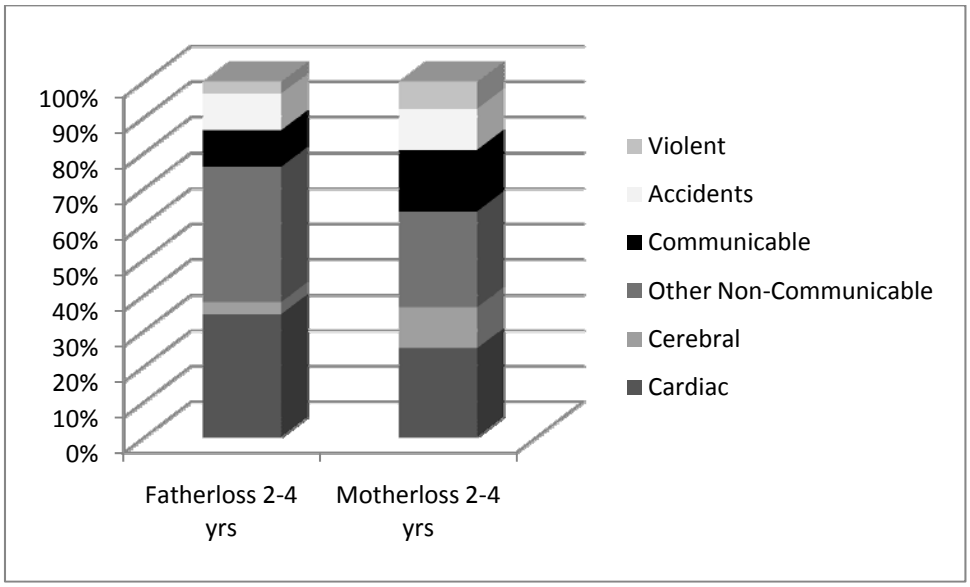

Figure 6.10: Cause of death comparisons between motherless and fatherless persons when orphaned between two and less than five years of age.

6.3 Under 15 Years Cause of Death

Those children who did not survive to 15 years of age died most frequently (57.1%) from communicable diseases (Table 6.6 & Figure 6.11). Greater numbers of female children died of these communicable diseases: 62.1% compared to the male children at 51.8%. Male children were almost twice as likely to die from accidental deaths (9.5%) however than the female children (5.5%). These differences in COD categories between male and female childhood deaths were statistically significant (P=0.035, df 1). Deaths from cardiac, cerebral and violent deaths frequencies were as expected were much lower in childhood that those seen in the adult cause of death rates (Table 6.6).

Table 6.6: Under 15 years cause of death by gender

<15 yrs Cause of Death Categories	Male %	Female %	Total %
Cardiac	0.7	2.1	1.4
Cerebral	2.2	1.4	1.8
Other Non-communicable	35.8	28.3	31.9
Communicable	51.8	62.1	57.1
Accidents	9.5	5.5	7.4
Violent	0	0.7	0.4

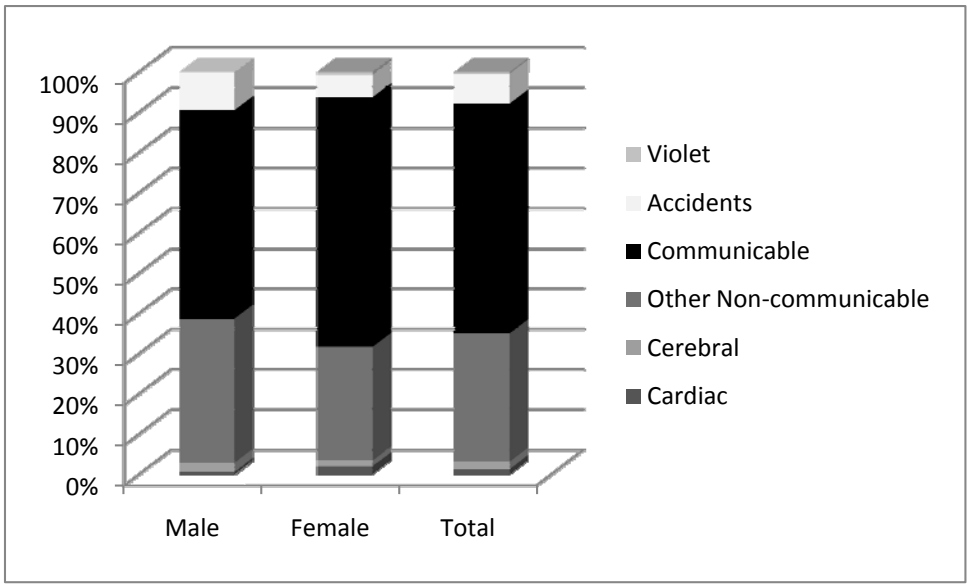

Figure 6.11: Under 15 years cause of death by gender.

6.3.1 Childhood Cause of Death by Orphan Status

Analysis of childhood deaths in the LA/TB families by orphan status has been restricted to comparisons between single orphans and non-orphans totals and by gender as only one female double orphan and three female illegitimate children died before the age of 15 years (Table 6.7). No children in these categories died from violent deaths.

Table 6.7: Under 15 years cause of death by orphan status and gender.

	Males		**Females**	
<15 yrs COD	Single Orphans	Non-Orphans	Single Orphans	Non-Orphans
Cardiac	0	0.8	6.7	1.6
Cerebral	0	2.3	0	1.6
Other Non-communicable	25	36.4	20	28.6
Communicable	37.5	52.7	66.7	62.7
Accidents	37.5	7.8	6.7	5.6

Pair-wise comparisons in COD between the male single orphans and the non-orphans were statistically significant (P<0.005, df 1), with very high accidental deaths rates seen in the orphaned group of children but fewer dying from communicable diseases (Figure 6.12). Although the differences seen between the COD between female single orphans and non-orphans were smaller than those seen in the male childhood deaths with higher cardiac deaths and slightly more deaths from communicable diseases than the non-orphans, these were statistically significant (P=0.011, df 1).

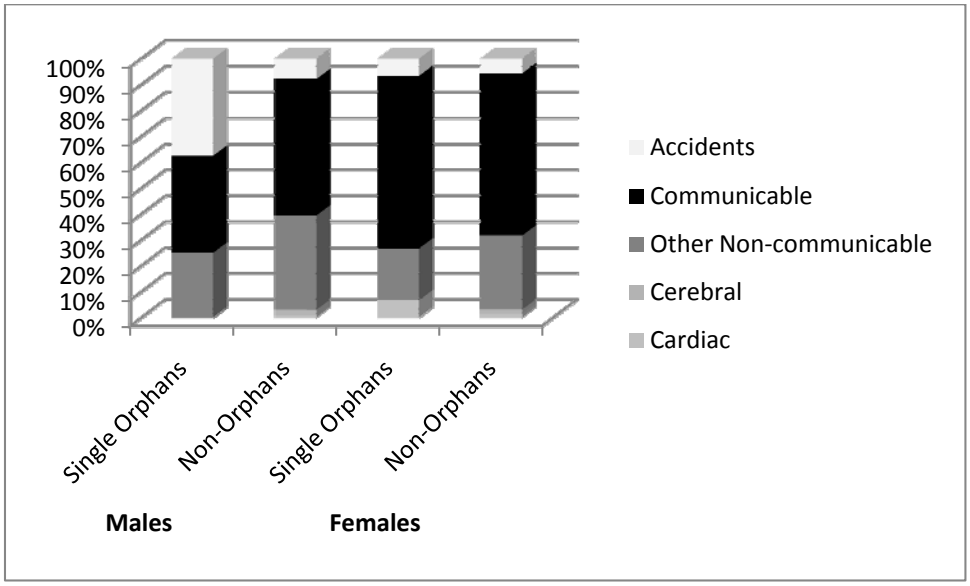

Figure 6.12: Under 15 yrs cause of death by orphan status and gender.

The increased number of fatal accidental deaths seen in the male single orphans may suggest less attention or care by the remaining parent or caregiver. The higher levels of deaths from communicable diseases in the female single orphans is expected in the LA/TB families as more female orphans died under the age of two years of age in this study. Both respiratory and gastrointestinal infections accounted for 40% of these communicable disease deaths in the female single orphans, while the male single orphans had a 25% death rate from these same diseases.

Some European studies would suggest higher numbers of deaths from communicable diseases especially in motherless orphans (van Poppel 2000). The mother's absence is thought to reduce nursing and medical attention usually received by the orphaned children when they are ill and they are therefore more likely to have recurrent infections, complications and therefore increased risk of death. In the LA/TB families the motherless orphans who died as children did so from communicable diseases in 43.3% of cases. In comparison the fatherless orphans did so in 37.5% of cases but this difference was not statistically significant (P=0.40, df 1).

6.4 Adult Causes of Death

Adult cause of death in the LA/TB families are viewed against the total deaths COD by sex (Table 6.8). As expected there are more deaths in the cardiac, cerebral and other non-communicable categories consistent with increasing age at death. Along with this age differential fewer people died from communicable diseases, while accidents and violent deaths are comparable.

Table 6.8: Adult cause of death by sex

	Deaths Over 15 Yrs %		All Deaths LA/TB Families %	
Cause of Death	**Males**	**Females**	**Male**	**Female**
Cardiac	30.5	23.9	27.5	20.8
Cerebral	10.1	14.3	9.3	12.5
Other Non-communicable	29.3	38.6	29.9	37.1
Communicable	16.1	18	19.7	24.3
Accidents	7.1	3.9	7.4	4.2
Violent	7	1.3	9.2	1.9

6.4.1 Adult Cause of Death by Parental Loss

To investigate possible differences in COD between orphans who had lost either their fathers or mothers, deaths were divided into parent loss categories by sex. Male percentages are

displayed in Figure 6.13 and show a very similar COD distribution in all four categories. The pair-wise comparison between the male fatherless and motherless individuals was not statistically significant (P=0.57, df 5).

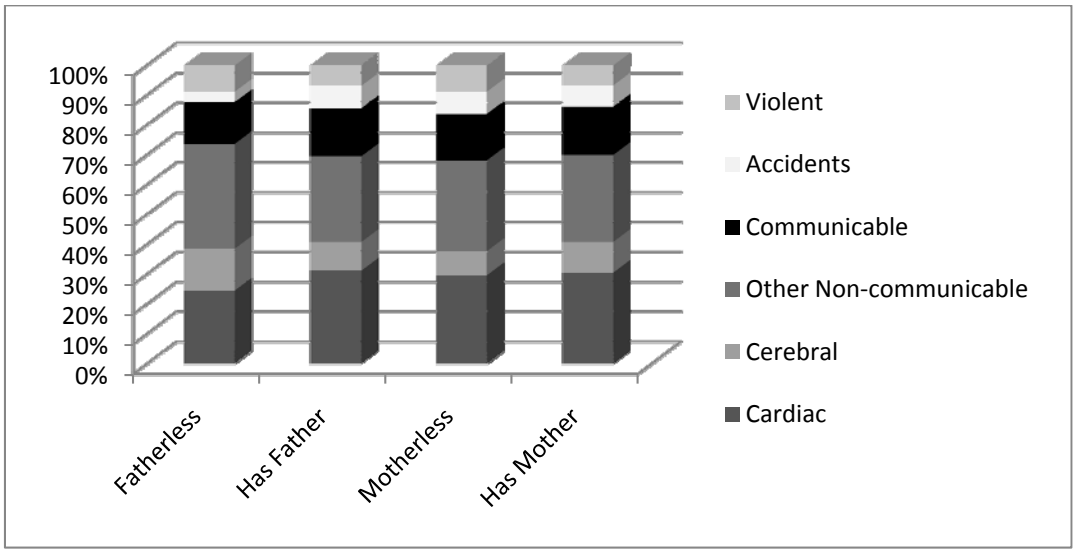

Figure 6.13: Male adult cause of death by type of parental loss.

Pair-wise comparisons between those who were fatherless and those persons who still had fathers was also not statistically significant (P=0.53, df 5). Similarly no statistical significance was found between the male motherless persons and those with mothers (P=0.93, df 5).

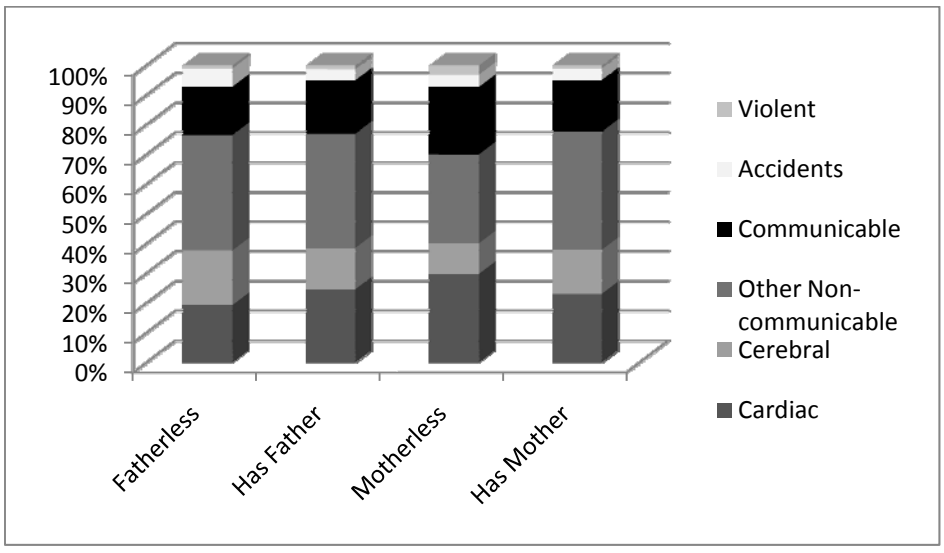

Figure 6.14: Female adult cause of death by type of parental loss.

Female pair-wise comparisons in the parental loss categories were also found not to be statistically significance (P=0.15-0.43, df 5) (Figure 6.14).

6.4.2 Adult Cause of Death by Orphan Status

As with the total number of deaths, COD by orphan status indicates marked differences between both the double orphaned groups and the illegitimate persons. The male double orphans again show a very high suicide rate of 13.3% and deaths from other non-communicable diseases (53.3%), 33.3% which were cancer deaths (Figure 6.15). The illegitimate males had very high levels of deaths from communicable deaths compared with all other orphan categories. The single orphans and non-orphaned male individuals had almost identical distribution in COD categories (Table 6.9).

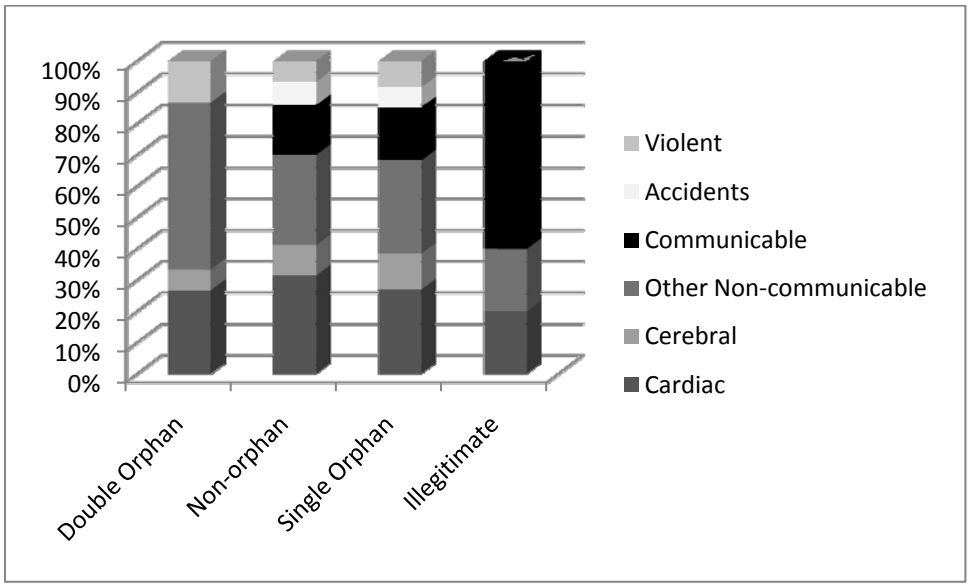

Figure 6.15: Male adult cause of death by orphan status

Table 6.9: Male pair-wise comparisons by orphan status.

Male Orphan Status	Double Orphan	Non-Orphan	Single Orphan	Illegitimate
Double Orphan	-	**P<0.005**	**P<0.005**	**P<0.005**
Non-Orphan	**P<0.005**	-	P=0.98	**P<0.005**
Single Orphan	**P<0.005**	P=0.98	-	**P<0.005**
Illegitimate	**P<0.005**	**P<0.005**	**P<0.005**	-

Note: Significant results appear in bold.

The female pair-wise comparisons between orphan groups shows the single orphans and non-orphans have the same distribution of COD categories (P=0.93, df 5) as seen with the males (Figure 6.16 & Table 6.10). The female double orphans however show no statistical

significant differences in COD categories with the female non-orphaned group despite experiencing no accidental deaths (P=0.07, df 5). The illegitimate individuals show different COD to orphan groups with deaths divided equally between communicable and non-communicable deaths (Table 6.10). The non-communicable deaths consisted of 66.6% deaths from cancers and the communicable diseases were equally divided between tuberculosis, respiratory and renal infections.

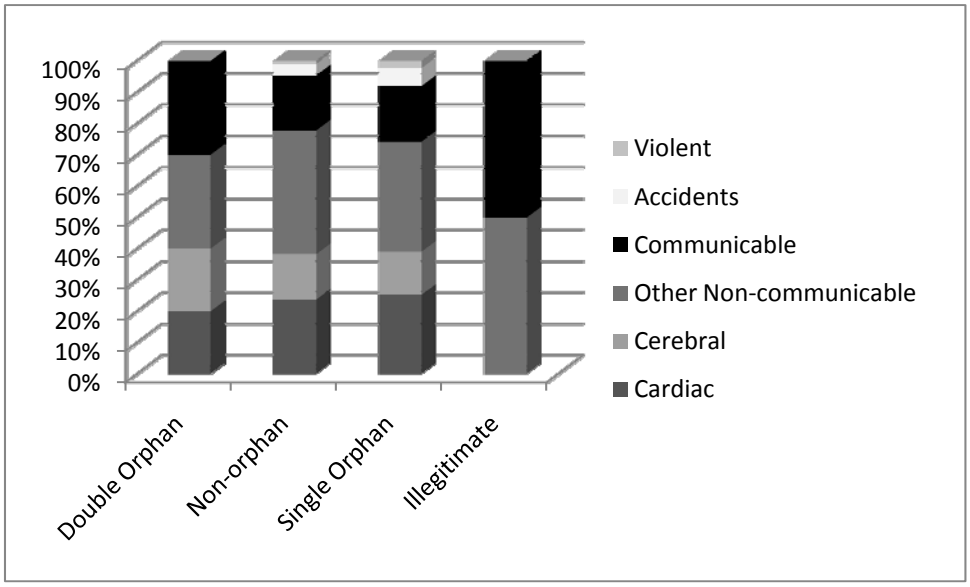

Figure 6.16: Female adult cause of death by orphan status.

Table 6.10: Female pair-wise comparisons by orphan status.

Female Orphan Status	Double Orphan	Non-Orphan	Single Orphan	Illegitimate
Double Orphan	-	P=0.067	**P<0.005**	**P<0.005**
Non-Orphan	P=0.067	-	P=0.93	**P<0.005**
Single Orphan	**P<0.005**	P=0.93	-	**P<0.005**
Illegitimate	**P<0.005**	**P<0.005**	**P<0.005**	-

Note: Significant results appear in bold.

6.4.3 Adult Cause of Death by Age at Father Loss

Cause of death in age at father loss categories have been analysed by sex with the exception of the group who lost their father between birth and two. Each of these cells are represented by less than six individuals.

The male 5-<15 yrs age at father loss individuals had similar COD frequencies to the non-orphan group (P=0.13, df 1), with only slightly more deaths from communicable diseases

(Figure 6.17). Larger differences are seen between both the male older (5-15 yrs when lost) orphans and non-orphans with those who lost their fathers between 2-<5 yrs, with higher frequencies of death from accidental and cardiac diseases in the younger orphan group. These differences are statistically significant (P<0.005, df 1, P=0.034, df 1 respectively).

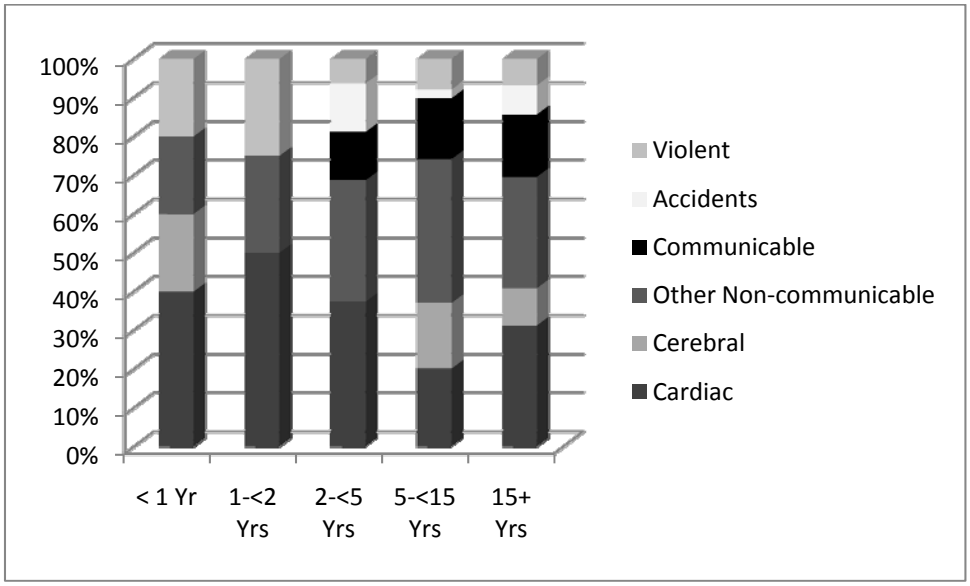

Figure 6.17: Male adult cause of death by age at loss of father.

The only statistically significant differences observed in the female age at father loss categories was between the 2-<5 yrs and 5-<15 yrs groups (P=0.017, df 1) (Figure 6.18). The two main differences between these groups were the much higher rate of cardiac deaths (30.8% versus 17.9%) in the 2-<5 yr orphaned group, as well as the much smaller number of deaths from communicable diseases in this group of orphans (7.7% versus 16.7%). As seen with the male fatherless orphans in the 5-<15 yrs group and the non-orphans COD frequencies are very similar (P=0.75, df 1).

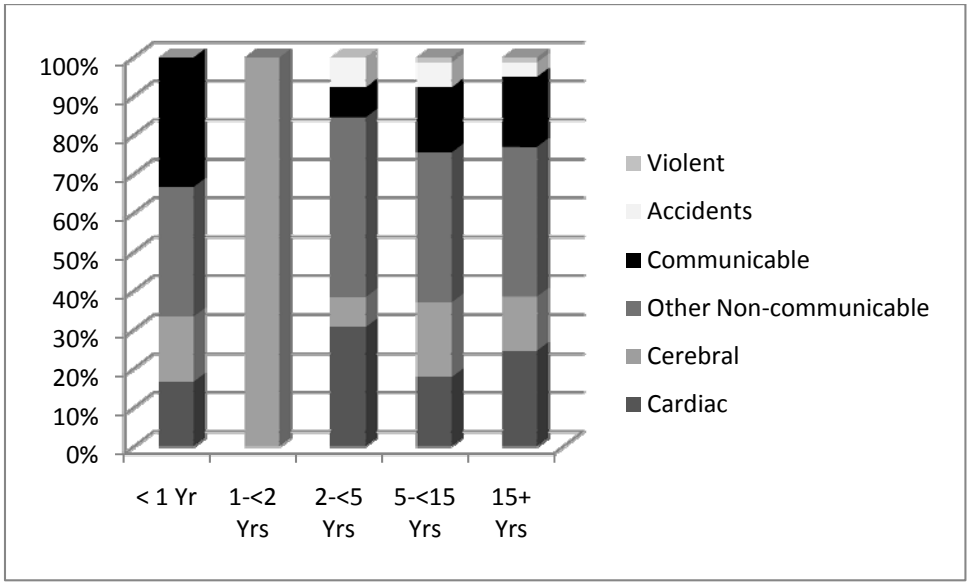

Figure 6.18: Female adult cause of death by age at loss of father.

6.4.4 Adult Cause of Death by Age at Mother Loss

Cause of death has been examined by age at mother loss to assess potential differences between groups. These data have again been divided into male and female categories (Figure 6.19 & 6.20). All results for pair-wise comparisons for categories less than two years at age at mother loss have been disregarded as each of these cells is represented by less than six individuals.

Despite fewer males in the 2-<5 yrs at mother loss catergory dying from communicable diseases and having more deaths from accidents there were no statistical differences with either the 5-<15 yrs and 15+ yr categories (P=0.08, df 1 & P=0.18, df 1 respectively). The men who lost their mothers between 5-<15 yrs and those who still had mothers alive at 15 years had almost identical COD (P=0.98, df 1) (Figure 6.19).

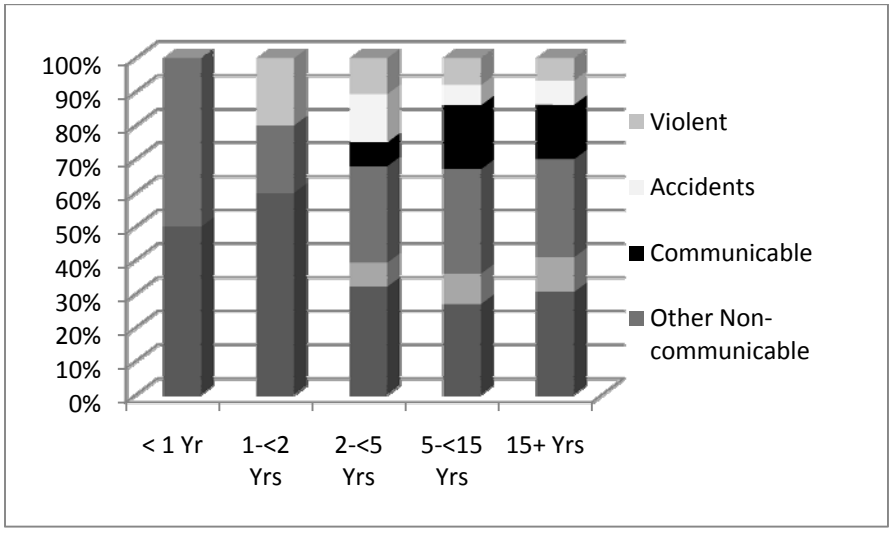

Figure 6.19: Male adult cause of death by age at loss of mother.

However the female orphans who had lost their mothers between 2 and 5 yrs did have a significantly different COD to the 5 to 15 yrs category (P=0.024, df 1), with 30% of deaths from communicable diseases compared to 19% in the older motherless orphans (Figure 6.20). They also had half the percentage of cardiac deaths (17.4% versus 34.8%) but had similar accidental (3% versus 4%) and violent deaths (3% versus 4%) to those of the older motherless orphans. Surprisingly the 2-<5 yr at mother loss category had very similar COD to the non-orphaned group of individuals (P=0.09, df 1). The differences seen between the older motherless orphans and the non-orphans were also not statistically significant (P=0.24, df 1), despite more deaths from cardiac diseases (35% versus 23%) and half the number of deaths from cerebral diseases.

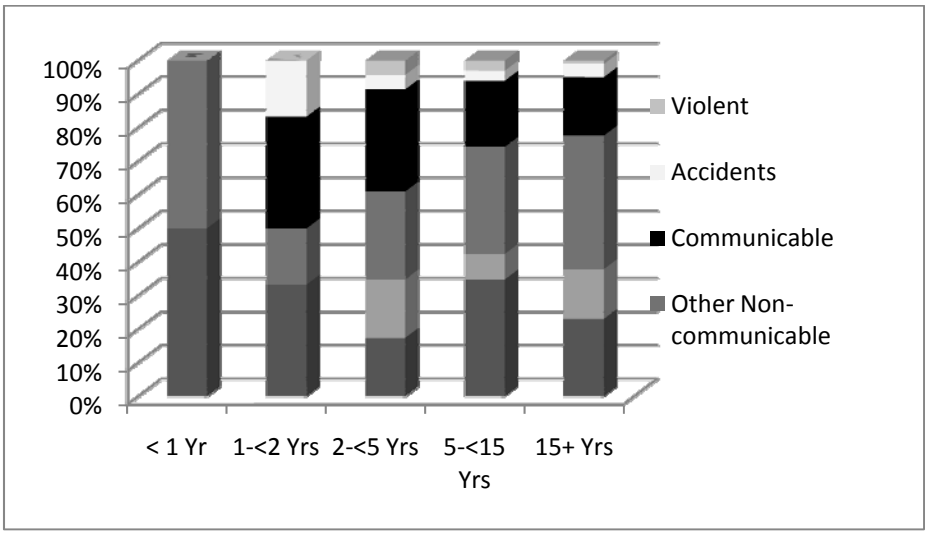

Figure 6.20: Female adult cause of death by age at loss of mother.

6.5 Other effects of orphaning

Rates of marriage between orphan groups and whether they had issue were investigated to see if any future family differences were apparent. Only those persons who lived beyond 15 years of age were included in the analysis and age at orphaning categories were not used as numbers in cells would be too small for significant comparisons to be made.

6.5.1 Marriage & Parenting Rates in Orphan Groups

There was no statistical difference found between any orphan group and the non-orphans in terms of marriage rates despite the illegitimate persons appearing least likely to marry with almost one in five persons remaining single (P=0.474, df 1) (Table 6.11). Higher numbers of double orphans (27.27%) did not have children than in the non-orphan group (22.32%) which was statistically significant (P<0.001, df 1), as was the difference with illegitimate persons (22.22%) (P<0.001, df 1).

Table 6.11: Adults in LA/TB families who were single or if married had no issue

Over 15 yrs of age	Single %	No Issue %
Illegitimate	18.18	22.22
Double Orphans	12.00	**27.27**
Motherless Single Orphans	12.20	25.56
Fatherless Single Orphans	10.81	23.03
Non-Orphans	11.31	22.32

Note: Statistically significant figures appear in bold.

When these orphan status categories viewed by sex (Table 6.12 & Appendix 7) there are differences between the males and females in all groupings. Overall there was no statistical significance seen, however, in the number of single individuals when analysed by sex (P=0.59, df 4) and when each orphan category was compared pair-wise by sex no statistical difference was found between any of the male or female categories in marriage rates (P=0.29 to 0.99, df 1).

Table 6.12: Adults in LA/TB families by sex who were single or if married had no issue

Over 15 yrs of age	Sex	Single %	No Issue %
Illegitimate	Male	20.0	25.0
	Female	16.7	20.0
Double Orphans	Male	13.3	23.0
	Female	10.0	33.3
Motherless, Single Orphans	Male	16.8	33.3
	Female	5.8	15.9
Fatherless, Single Orphans	Male	10.6	25.6
	Female	13.1	19.5
Non-Orphans	Male	13.8	24.7
	Female	8.5	19.2

There were however some interesting comparisons to be made between groups. The fatherless females were the only group of women who had lower rates of marriage (86.9%) than their male equivalents, in contrast particularly to the motherless females who had the highest marriage rate at 94.2%. This may suggest daughters of widows may be less likely to marry compared to their brothers, in contrast to the situation in motherless households. The difference between the female motherless and fatherless orphans marriage rates however did not reach statistical significance (P=0.078, df 1). Illegitimate males were almost twice as likely to remain single (20%) as the fatherless males (10.6%), this being the largest difference between any male category. This result was found to almost reach statistical significance (P=0.06, df 1). The largest difference in marriage rates found in the female categories was that between the illegitimate females (83.3%) and the motherless single orphans who had a very high marriage rate of 94.2%. This difference was found to be statistically significant (P=0.014, df 1).

Marriage rates among the illegitimate individuals, both male and female, show significant variation from the other orphan groups.

6.5.2 Parenting Rates by Orphan Group

The differences in parenting rates between married males and females overall were also not statistically significant despite much higher numbers (25.6%) of married males not having children compared with the married females at 19% (P=0.09, df 4; Table 6.12).

The pair-wise comparisons within the male and female orphan categories also show no significant differences in the number of persons having children between sexes (P=0.06-0.99, df 1). When various cells are examined such as the pair-wise comparison between motherless

male single orphans and non-orphan males the difference approaches significance with one in three motherless men not having children (P=0.06, df 1). The largest difference observed among females was between the double orphans (33.3% did not have children) compared with the motherless orphans at 15.9 %. This was statistically significant (P=0.004, df 1).

When analysed collectively, the double orphan category had very significant numbers of persons without issue compared to both the non-orphans and the illegitimate group of individuals who had a high parenting rate. This significant difference was mostly due to the female double orphans.

6.5.3 Marriage and parenting rates with or without step-parents

Marriage rates were then analysed within orphaned and non-orphan groupings to assess any effects made by acquiring step-parents. Orphans had a slightly higher likelihood of remaining single (12%) than the non-orphans (11.3%) (Table 6.13) and orphans with step-parents were slightly more likely to remain single compared to those without. These small differences were not statistically significant (P=0.78, df 1; P=0.53, df 1).

Table 6.13: Persons married or single LA/TB families

	All Persons Over 15 yrs	Married	Single	Single
Children with parents alive	1664	1456	188	11.3%
Children with parental loss	445	392	53	12.0%
With Step-parent	126	109	17	13.5%
No Step-parent	319	283	36	11.3%

Married people were analysed in terms of having children, with 22.3% of the non-orphans having no children while orphans had a slightly lower rate of 20.7 % (Table 6.14). This small difference was not statistically significant (P=0.59, df 1). A similar difference is seen between orphans with step-parents and those orphans without step-parents having children (Table 6.14). Again this small difference was not statistically significant (P=0.61, df 1).

Table 6.14: Persons with/without issue in LA/TB families

	All Persons Married	With Issue	No Issue	% No Issue
Children with parents alive	1474	1145	329	22.3
Children with parental loss	455	329	94	20.7
With step-parents	126	98	28	22.2
No Step-parent	329	263	66	20.1

It would appear orphaning, when examined in the largest subset, does not display any effects on either marriage rates or on having children in the LA/TB families. Whether or not an orphan acquired a step-parent also does not affect marriage or parenting rates in these families.

6.6 Conclusions

This chapter has explored how orphaning or illegitimacy may have affected persons in other ways such as cause of death or future family structure beyond just increased risks of childhood death or premature adult deaths.

COD frequencies were found to be slightly different between the sexes as expected, with more cardiac, violent and accidental deaths in males. These differences in COD overall between the sexes however were not statistically significant.

Single orphans showed no significant differences in COD compared with non-orphans, while both the illegitimate and double orphaned groups had marked differences. The male double orphans experienced more violent deaths especially suicide along with a large number of deaths from cancers. Psychological consequences associated with losing both parents may account for these causes of death with possibly higher rates of both stress and/or depression seen in these individuals. The illegitimate persons had higher levels of death from communicable and cardiac diseases. Tuberculosis made up a high percentage of these communicable deaths which may have reflected both lower socio-economic or overcrowded living conditions brought about by their birth status. Differences were seen between sexes in COD when analysed by orphan status. However this may be accounted for in the majority by the differences in violent and accidental deaths within these categories.

There were no overall effects on the COD when considering which parent was lost. However, when these categories were divided by the age of orphaning marked differences were found. Most of these differences affected those orphaned before the age of five years, particularly those who lost their fathers.

Not only did orphans who lost their parents at early ages show differences in the COD compared with the older orphans and non-orphaned groups but statistically significant differences were seen depending on whether the orphan had lost their mother or father. Fatherless orphans had a much higher levels of violent and accidental deaths while those who lost their mothers at any early age had a higher number of deaths from infectious diseases.

Deaths among children also showed differences in COD between single orphans and non-orphans. Single orphans had higher levels of accidental deaths compared with the non-orphaned group and a higher frequency of deaths from communicable diseases was observed among female single orphans.

Adult COD frequencies showed no differences between the motherless, fatherless or non-orphaned groups but a marked differences were seen with the double orphans and illegitimate groups. The double orphans again showed their high level of violent deaths, while the illegitimate group again showed a high number of deaths from communicable diseases.

The differences in COD are much clearer when examined in age at orphaning categories among adults and sub-adults. It would appear that most differences seen in the COD of orphans only affects those who were orphaned before five years of age and varies a little both by gender and depending on which parent was lost.

Marriage rates were found to be consistent across the orphan and non-orphaned groups but were lower in the illegitimate group. Double orphans, however, were more likely not to have children compared to the non-orphaned group. Whether or not an orphan acquired a step-parent made no differences in either marriage rates or in those who had children.

Overall, the results do suggest that some aspects of orphaning and illegitimacy did have significant effects on why people died as well as how they constructed their own families.

Chapter 7: Discussion and Conclusions

7.0 Discussion

7.1 Orphaning and Illegitimacy Rates

Despite my expectations that orphaning rates in NZ might be lower than those seen in Europe given a higher life expectancy orphaning was still common. Almost one in five children orphaned before they were 15 years of age, a higher number than I had expected prior to this study. This finding may have been due to the higher mortality rates seen in younger adults in NZ in the 19th century particularly from accidental deaths in males in the new colony (Pool et al. 2007) and the continuing risks for women in childbirth thus leaving children without parents at younger ages.

In direct contrast with orphaning rates, illegitimacy was rare in direct contrast with Europe in the 19th century. Illegitimacy rates were much lower in NZ most importantly due to the low numbers of females in NZ which led to high marriage rates. In all likelihood most single woman in NZ who conceived out of wedlock quickly married reducing the number of illegitimate children born in the colony. Two of the illegitimate children had actually been born in England before their mothers had married and emigrated to NZ. There was only 14 illegitimate children in my study for analysis. This caused difficulty because of the small number of individuals in reaching statistical significance on occasions.

Despite this problem with illegitimate persons they produced some very interesting results and showed the worst life chances both in childhood and through to adult life. It would therefore appear that the Victorian views towards single unmarried woman and their illegitimate offspring still held sway in the NZ colony. Many of the initial colonial settlements were founded by religious establishments, so these centres undoubtedly followed religious doctrines of the time which frowned upon sex before marriage and the results of such activity similar to those seen in South Africa in the 19th century (Malherbe 2007).

7.2 Increased Risks of Child Mortality for Orphans and Illegitimate Children

In the LA/TB families, orphaning did increase the risks of premature deaths over those children who had parents alive throughout childhood. These risks were even greater for the illegitimate children in my thesis population with 21.4% dying less than 15 years of age. This

excess risk associated with orphaning and illegitimacy is comparable to European studies. For example, Andersson et al.'s (1996) study of parishes in Sweden showed illegitimacy to be the second biggest risk factor for childhood death. Only the motherless infants (orphaned when less than one year of age) had a higher risk factor of childhood death (Figure 7.1).

Table 7.1: Survival of children losing their father or mother as infants aged 1-4 years and aged 5-9 years, in relation to those children having their parents alive at ages 1, 5 and 10 years in the parishes of Skön, Ljustorp and Selånger, county of Sundsvall, 1800-99 (from Andersson et al. 1996:983) compared with the LA/TB families.

Variable	Swedish Children	% Dead before the Age of 15 years	LA/TB Children	%Dead before the Age of 15 years
At Birth	21311	7175 (33.7%)	2371	282 (11.9%)
Motherless before 1 yr	-	-	**16**	**11 (68.8%)**
Stepmother before 15 yrs	-	-	6	1 (16.7%)
No Stepmother before 15yrs	-	-	**10**	**10 (100%)**
Fatherless before 1 yr	-	-	28	3
Stepfather before 15 yrs	-	-	**13**	**0 (0%)**
No Stepfather before 15 yrs	-	-	**15**	**3 (20%)**
At the Age of 1 year				
Children with parents alive	18900	4807 (25%)	2120	52 (2.5%)
Motherless 1-4 yrs	**136**	**81 (60%)**	63	3 (4.8%)
Stepmother before 15 yrs	20	3 (15%)	**31**	**0 (0%)**
No Stepmother before 15 yrs	**113**	**78 (69%)**	**32**	**3 (9.4%)**
Fatherless 1-4 yrs	**67**	**20 (30%)**	**35**	**4 (11.4%)**
Stepfather before 15 yrs	**11**	**0 (0%)**	**19**	**0 (0%)**
No stepfather before 15 yrs	**55**	**20 (36%)**	**16**	**4 (25%)**
At the Age of 5 years				
Children with parents alive	13862	1685 (12%)	1989	46 (2.3%)
Motherless 5-9 yrs	320	29 (12%)	90	1 (1.1%)
Stepmother before 15 yrs	**94**	**5 (5%)**	**35**	**0 (0%)**
No Stepmother before 15 yrs	226	24 (11%)	55	1 (1.8%)
Fatherless 5-9 yrs	**346**	**29 (8%)**	80	2 (2.5%)
Stepfather before 15 yrs	**52**	**0 (0%)**	**20**	**0 (0%)**
No stepfather before 15 yrs	293	29 (10%)	60	2 (3.3%)

At the Age of 10 years				
Children with parents alive	9973	495 (5%)	1938	15 (0.8%)
Motherless 10-14 yrs	333	13 (4%)	**80**	**4 (5%)**
Stepmother before 15 yrs	**180**	**0 (0%)**	**17**	**3 (17.7%)**
No Stepmother before 15 yrs	267	13 (5%)	63	1 (1.6%)
Fatherless 10-14 yrs	438	16 (4%)	90	2 (2.2%)
Stepfather before 15 yrs	**34**	**0 (0%)**	**2**	**1 (50%)**
No stepfather before 15 yrs	400	16 (4%)	90	1 (1.1%)

Note: Significant values appear in bold.

The similarities shown between the NZ and Swedish finds for both the illegitimate and motherless infants would imply similar stresses placed upon these two groups of children regardless of the country the children had been born into. The illegitimate children are born to single mothers with less family, community or church support resulting in poorer economic conditions with subsequent higher risks of child mortality (Malherbe 2007; van Poppel 2000). The very young motherless infants despite their country of birth face the same immediate lack of breast milk, protection from infections and nurturing from their mothers which left them extremely vulnerable. My study shows a very high risk of childhood death in the babies aged less than one week old when their mothers died. This rate is much lower however when compared with the Swedish figures from Andersson et al.'s 1996 study which only had 1.6% of these babies surviving to five years of age. Of significance from the Swedish population from the Andersson et al.'s study (1996) is the overall difference in the number of children dying under the age of 15 years of age. Andersson et al.'s infant mortality (0-1yr) was 9.42% of live births and the child mortality (0-15yrs) was 23.4%. NZ at the end of the 19th century had one of the lowest child mortality rates in the western world a fact which my thesis data supports. Despite this very low level of childhood death seen in NZ orphans and illegitimate children still show excess risk due to parental loss compared to the non-orphaned children although dying at lower frequencies than their European counterparts.

In particular the age at orphaning was the most significant factor in producing this increased risk. This was greatest for those children who lost their mothers in the first year of life with 65% of these children dead before the age of two years. Like the European studies children who lost their fathers before two years of age also had higher risks of childhood death (Andersson et al. 1996; van Poppel 2000). Undoubtedly this age at orphaning produced the

greatest increased risk of child mortality because of disrupted access to vital needs in particular their mothers' breast milk providing not only nourishment but protection from infectious diseases particularly diarrhoeal illnesses (Pool and Cheung 2002; van Poppel 2000). The majority of cause of death in these orphaned infants in this thesis supports this argument. It must also be taken into account in this study that a much higher percentage of those orphaned infants who died were females, which may suggest fewer resources and care given may have been provided by caregivers to the very young female orphans compared to those resources allocated to the orphaned males.

After the age of two years however the increased risk for orphaned children is no longer apparent with similar childhood survivorship to the non-orphaned group. These children were well past the age of weaning and care from other adults provided all their basic biological needs. In fact those orphaned between two and five years of age appear to have better life prospects than even the non-orphaned group. They may have benefitted from having fewer future siblings but were orphaned before they were old enough to suffer any psychological effects of parent loss (Beekink et al. 1999; van Poppel 2000). With less rivalry for parental care and a higher percentage of household resources orphans may have been better equipped to survive childhood than non-orphans and therefore had better survivorship outcomes overall.

There was a significant difference in the impact of losing a mother and a father but again this varied by age. Motherless orphans had the highest risks of childhood death at 8% compared to those children who lost their fathers (3%). As seen in Europe in the 19th century women in NZ would have had almost complete responsibility for child care and domestic duties. Therefore maternal loss would have lead to higher nutritional deficiencies; greater numbers of accidental injuries and less care during illness for the orphaned children (Beekink et al. 1999). The increased risk was greatest in the infant motherless group but was also statistically significantly greater among those children who lost their mothers between 10-14 years of age. This increased risk in particular appears to relate to children in this age group acquiring step-mothers. This is in complete contrast to the situation seen in the Swedish parishes that Andersson et al. (1996) studied and will be discussed below. All children who acquired step-mothers survived in the Swedish study compared to the 17% who perished before 15 years of age in my study.

The highest risk of childhood mortality when a father was lost however was found in the one-two year age at orphaning group with no increase in risk seen in the older age at orphaning groups. The Swedish study however continued to show statistically significant increased risk of mortality in those who became fatherless from 5-10 years of age. The authors however felt these levels were not as high as expected which they attributed to the generally poor socio-economic conditions seen in these parishes under study in the 19th century (Andersson et al. 1996) and the high risk of child mortality in all children whether orphaned or not. This may also explain why no such increased risk was found in my study in children orphaned over the age of five years; due to the better living conditions, access to fresh food and water found in NZ at the time (King 2003; Pool and Cheung 2002). Indeed this lack of increased risk in the older orphaned groups may be due more to the high number of orphans who acquired step-parents in this study and care received from their extended families and communities.

Not only was there a differential in survivorship between orphans and non-orphans, there was a large difference seen between female and male orphans. Female orphans did less well in both infancy and childhood; and had a lower median age at death. This difference would suggest female orphans were less well cared for than the males. This may reflect not only a difference among orphans but the greater value placed upon male children (& adults) in general in the 19th century in NZ. It is suggested that more rural situations in Europe favoured male children (Andersson et al. 1996; Klasen 1998) also and as a large percentage of the fathers' occupations in the LA/TB families were centred around farming this may well explain the bias against female orphans. It would also appear however that this gender bias was seen in the less than two years at age of orphaning group. Children as this age had less ability for self determination with continued extreme dependence on adults for their every day needs, therefore less adult supervision and care would lead to higher mortality levels in this age group (Daly and Wilson 1995). Any gender bias would be more likely to occur in this age group of orphans as adult caregivers have control over the household resources and there allocation.

Excess female mortality is known to occur in many contemporary countries particularly in the South and East Asian countries but also in historic European situations, especially in rural communities (Klasen 1998). It is thought that this bias occurs when the household is considered the important locus for survival rather than the individuals. Therefore resource allocation within the household to achieve the best outcome for the family as a whole was the priority at the expense of the individual. Therefore the gender which is perceived as the most

valuable for the family's future well being would be afforded a greater percentage of the house hold resources (Klasen 1998). Further research would be needed to see if this gender bias in this study was greater in the families with multiple children at the time of parent loss compared to only child orphaning situations.

Unfortunately this apparent gender bias found in mortality risk in this study was unable to be compared with Andersson et al.'s study of Swedish parishes as their orphaning information is not divided by gender. Their overall child mortality figures did however show the expected higher risk for males as was the case in NZ population statistics (New Zealand Government 1892; Pool and Cheung 2002).

7.3 Amelioration of Risk by Step-parents

The role of step-parents in ameliorating this risk was significant. Remarriage following the death of a spouse was very high in the LA/TB families. Orphans were more likely to acquire step-mothers (39.8%) than step-fathers (23.7%). Comparable figures from Sweden in Andersson et al.' Study (1996) had a much lower rate for gaining step-mothers (15%) and step-fathers which was slightly higher at 16%. Unfortunately no other studies apart from Andersson et al. (1996) give any indication of orphan numbers, age at orphaning or step-parenting rates for further comparisons. High remarriage rates in NZ may have been due to the younger age of those losing their spouses or a perceived greater need to remarry for the sake of both children and household needs but any definitive information on these possibilities was unable to be sourced. Certainly the age at marriage was much lower in NZ than that seen in Europe in the 19th century particularly in females (New Zealand Government 1892; Pool et al. 2007). Despite lower numbers of single females available in the new NZ colony greater numbers of men remarried after they were widowed than females in the LA/TB families. Lower rates of remarriage were also found in the Waipu community of NZ in women who were classed as beyond reproductive age (approximately 40 years of age), while men were free to remarry at any age and continue to produce offspring with their new wife (Molloy 1986) this may also having been the case in the LA/TB families.

The increased risk of early death for both orphans and illegitimate children could be amended by acquiring step-parents before 10 years of age but could be negative when acquired during adolescence in the thesis population (Figure 7.1). Contemporary studies suggest negative outcomes both in morbidity and mortality from family violence is increased (Daly and Wilson 1996) with step-parental obligations seemingly unattractive especially in the case of

some step-fathers. However, in the LA/TB families' step-fathers always appeared to be extremely beneficial to the orphaned children with reduced risks of mortality in all age at orphaning groupings, with the benefits of marriage and having children of their own outweighing any possible attached obligations. The Swedish study by Andersson et al. (1996) also always found the acquisition of step-fathers but also step-mothers beneficial for all orphans regardless of which age they had been orphaned. Possible reasons for this difference may have been the greater risk of childhood death due to adverse socio-economic conditions seen in Sweden during the rapidly industrialising 19th century and the acquisition of a step-parent may have greatly improved this situation while in NZ these financial pressures were less unmasking underlying increased risk of gaining a step-mother. Certainly a large percentage of step-mothers in my study either already had children of their own from previous marriages or soon gave birth to half-siblings to the orphaned children. Possible extreme differential care towards genetically related children and against step-children causing late childhood deaths in these children.

7.4 Other Effects of Orphaning

Contemporary studies suggest orphans and illegitimate children experience different cause of death to children in two parent households both as children and adults (Hayward and Gorman 2004; Nyamukapa et al. 2008; Weitoft et al. 2003). Higher levels of accidental and violent deaths including suicides; with increased use of drugs and alcohol were more commonly seen in one or no parent households. The majority of individuals either suffering from or dying of these causes had high levels of psychological impairment manifested in anxiety and depressive illnesses (Hayward and Gorman 2004; Nyamukapa et al. 2008; Weitoft et al. 2003) In this study it was possible to analyse the impact of family structure on cause of death, this information was unavailable from the historical studies on orphans and illegitimate children from Europe. This is most dramatically seen in the double orphaned group with 13.6% suicide rates, seven times higher than the non-orphaned group. This finding is consistent with contemporary figures in the suicide rate (10%) found for double-orphans in Africa as a result of the AIDS pandemic (Unicef 2003). Even the single orphans had three times the suicide rate of non-orphans in my study while the illegitimate children showed extremely low levels of violent death, with no suicides or war deaths in adulthood. They did however have much higher rates of death from contagious diseases, one third dying from tuberculosis and another third from gastro-intestinal infections. This would suggest a lower socio-economic level for the illegitimate individuals and possible chronic ill health made the

risk of violent and accidental death lower than in other orphan groups. With the median age of death at 42 years illegitimate individuals died much earlier than most adults and were therefore less likely to succumb to the diseases of old age such as ischemic heart disease, stroke or cancers.

These suicide findings may suggest a much higher level of stress in both the double orphans and single orphan groups. Higher levels of cancers are seen in individuals who experience high levels of stress (Sobhani et al. 2010) which was also seen in the double orphans and an increased suicide rate is associated with both psychological problems and family stress (Beautrais 2003). Single orphans in this study apart from the higher suicide rate had very similar cause of death frequencies to non-orphaned individuals in all age at orphaning categories suggesting less stress and psychological effects from parental loss than those children who had lost both parents during childhood. With the large percentage of single orphans acquiring step-parents as children in this study, the stress and anxieties associated with orphaning may well have ameliorated not only the risk of early death but also reduced the risk of dying from stress related conditions.

One aim of this thesis was to examine if, apart from mortality, whether the effects of orphaning may also been seen through to the next generation. This was examined both through marriage rates and whether the children had any issue. Illegitimate persons had the lowest marriage rates in my population, possibly due to poor health and low socio-economic status. For example amongst the Waipu community those adults who remained unmarried under the age of 40 years had very high levels dying from tubercular disease (Molloy 1986), a condition that the illegitimate group of individuals in this study suffered from at high levels.

Married male motherless single orphans had the highest likelihood of not having children in this study, while married fatherless children whether male or female matched their non-orphan counterparts in numbers having issue. It is uncertain why this may be the case and no studies could be found concerned such differential results in parenting rates. Possibly older male motherless orphans took over their father's role in the household including looking after their mothers, earning a living for the family and taking over the fathering of younger siblings. Maybe the added pressures of having children of his own was felt to be too much or possible later marriages to older women may have precluded issue of their own. Further study into this aspect would have to be undertaken to clarify these parenting rate differences.

7.5 Conclusion

In evolutionary terms humans have offset the risk of orphaning in two major ways. Firstly human infants are weaned at a much younger age than other Great Apes reducing dependency on their mother's breast milk and enabling others to care for the orphaned child (Hrdy 2008). Secondly human sociality has created family groups where the biological father contributes to his own offspring both socially and economically. Furthermore family groups are larger than just the nuclear family of today; grandparents, older siblings, extended family such as aunts, uncles and cousins all contribute to the family wellbeing and alloparenting of children whether the parents are present or not. It would also appear in this study and other historical studies that contrary to prevailing ideas of 'Cinderella and the wicked step-mother' (Daly and Wilson 1995) step-parents provide significant advantage to orphaned children. Thus for both widows and widowers remarriage to provide substitute mothers or fathers for their offspring was seen as a priority. In the historic situation however it was often relatives who became step-parents and this is probably quite different to the situation seen today and requires further research. This evolutionary interplay between parental loss (especially age at loss), family structure, parental roles in child care, subsequent risks of child mortality and the resultant life chances are key concepts in understanding the effects of sociality in humans and maximising survival to adulthood.

Although not addressed in any depth in this thesis the neighbours and wider community also provided support for orphans including religious and educational facilities and from the late 19th century in NZ provided monetary support for these children. This may account for the very good survival prospects for orphans in this study compared to those seen in Europe.

Yet despite humans having superior orphan outcomes to the other Great Apes, children orphaned before two years of age still show significant increased risk of dying as a child. Studies of historic demographic data from Europe and my study confirm that this risk remains even in low infant mortality situations such as those found in NZ in the late 19th century. Furthermore these risks continue through childhood into adulthood with double orphaned children more likely to experience violent deaths and stress related illnesses such as cancers, while illegitimate persons were more likely to die from communicable illnesses.

These lessons are particularly pertinent today in developing nations where the frequency of parental deaths especially from AIDS are leaving millions of single and double orphans at increased risk of early death. The effects of orphaning continue further than child mortality

and will be reflected in morbidity levels, psychological wellbeing, education and socio-economic factors throughout the lifetime of these children.

The issues surrounding illegitimate individuals and orphans may also extend into single parent and reconstituted families of today. What historic research of this nature allows is for the full costs of parental loss and orphaning to be examined but, at the same time, the comparison between NZ and Europe shows that context matters.

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Appendix 1: Family Group Sheet (Family Tree Maker)

Family Group Sheet

Arthur Waghorn Husband:

16 October 1814 Born: Eynsford, Kent, England in:

17 May 1842 Married: West Ham, London, Essex, England in:

5 November 1900 Died: Christchurch, NZ in:

Henry Waghorn Father:

Ann Smith Mother:

Louisa Dale Wife:

15 September 1816 Born: Dartford, Kent, England in:

24 January 1896 Died: Little Akaloa, Banks Peninsula, NZ in:

James Dale Father:

Mary Adlin Mother:

CHILDREN

1 **Mary Ann Waghorn** Name:

19 February 1843 Born: Rotherhide, London, England in:

3 June 1917 Died: Takanini, South Auckland, NZ in:

27 October 1862 Married: in: Chapel School, Little Akaloa, Banks Peninsula, NZ

John Hunter Spouse:

F

2 **David Waghorn** Name:

June 1844 Born: Dartford, Kent, England in:

September 1849 Died: Gravesend, Kent, England in:

M

3 **Arthur Thomas** Waghorn Name:

June 1846 Born: North Aylesford, Kent, England in:

September 1849 Died: Gravesend, Kent, England in:

M

4 **Louisa Waghorn** Name:

7 July 1848 Born: Gravesend, Kent, England in:

4 April 1875 Died: Christchurch, NZ in:

F

5 **Elizabeth Dale Waghorn** Name:

17 September 1850 Born: Aboard the "Randolph", Bay of Biscay in:

24 November 1937 Died: Lincoln, Christchurch, NZ in:

21 August 1877 Married: in: Chapel School, Little Akaloa, Banks Peninsula, NZ

Ethelbert Thomas Howell Spouse:

F

6 **Arthur Waghorn** Name:

1 October 1852 Born: Little Akaloa, Banks Peninsula, NZ in:

13 September 1932 Died: Akaroa, Banks Peninsula, NZ in:

8 September 1874 Married: in: Little Akaloa, Banks Peninsula, NZ

Margaret Jane Cooke Spouse:

M

7 **Moiselle Waghorn** Name:

13 June 1854 Born: Little Akaloa, Banks Peninsula, NZ in:

13 March 1930 Died: Christchurch, NZ in:

23 April 1879 Married: in: Church of St John the Evangelist, Ferry Rd, Christchurch, NZ

John Shadrach Priest Spouse:

F

8 **David Waghorn** Name:

21 August 1856 Born: Little Akaloa, Banks Peninsula, NZ in:

23 April 1932 Died: Christchurch, NZ in:

18 October 1892 Married: in: St Matthew's, St Alban's, Christchurch, NZ

Kate Maria Wharton Spouse:

M

9 **Luke Waghorn** Name:

29 March 1858 Born: Little Akaloa, Banks Peninsula, NZ in:

18 November 1942 Died: Akaroa, Banks Peninsula, NZ in:

14 August 1889 Married: in: At the Home of George & Agnes Craw, Chorlton, Little Akaloa, Banks Peninsula, NZ Sarah Craw Spouse:

M

10 **Emily Waghorn** Name:

23 October 1859 Born: Little Akaloa, Banks Peninsula, NZ in:

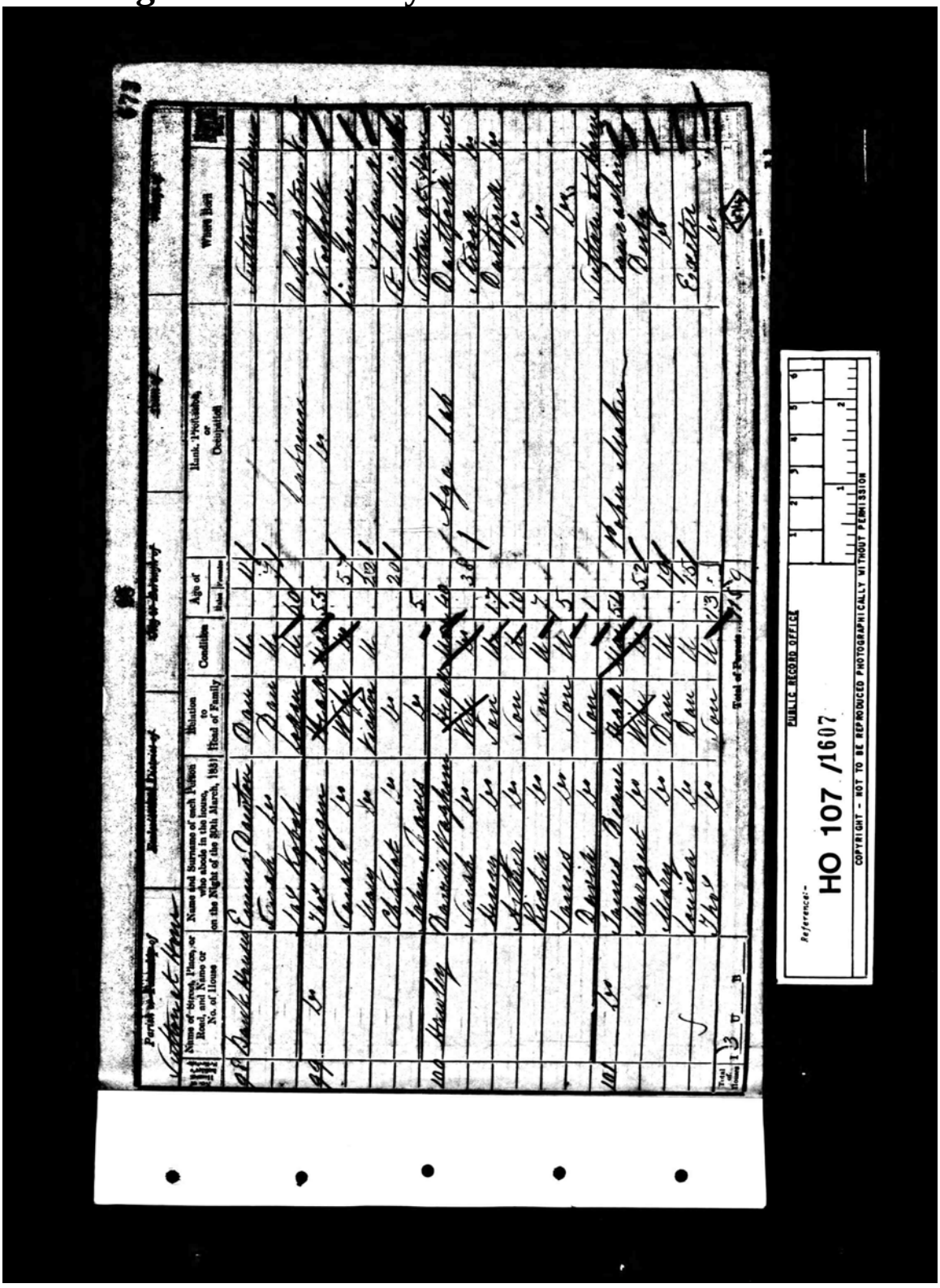
5 September 1954 Died: Christchurch, NZ in:

8 July 1885 Married: in: At the Residence of Rev. Hugh H S Hamilton, Duvauchelles Bay, Banks Peninsula, NZ

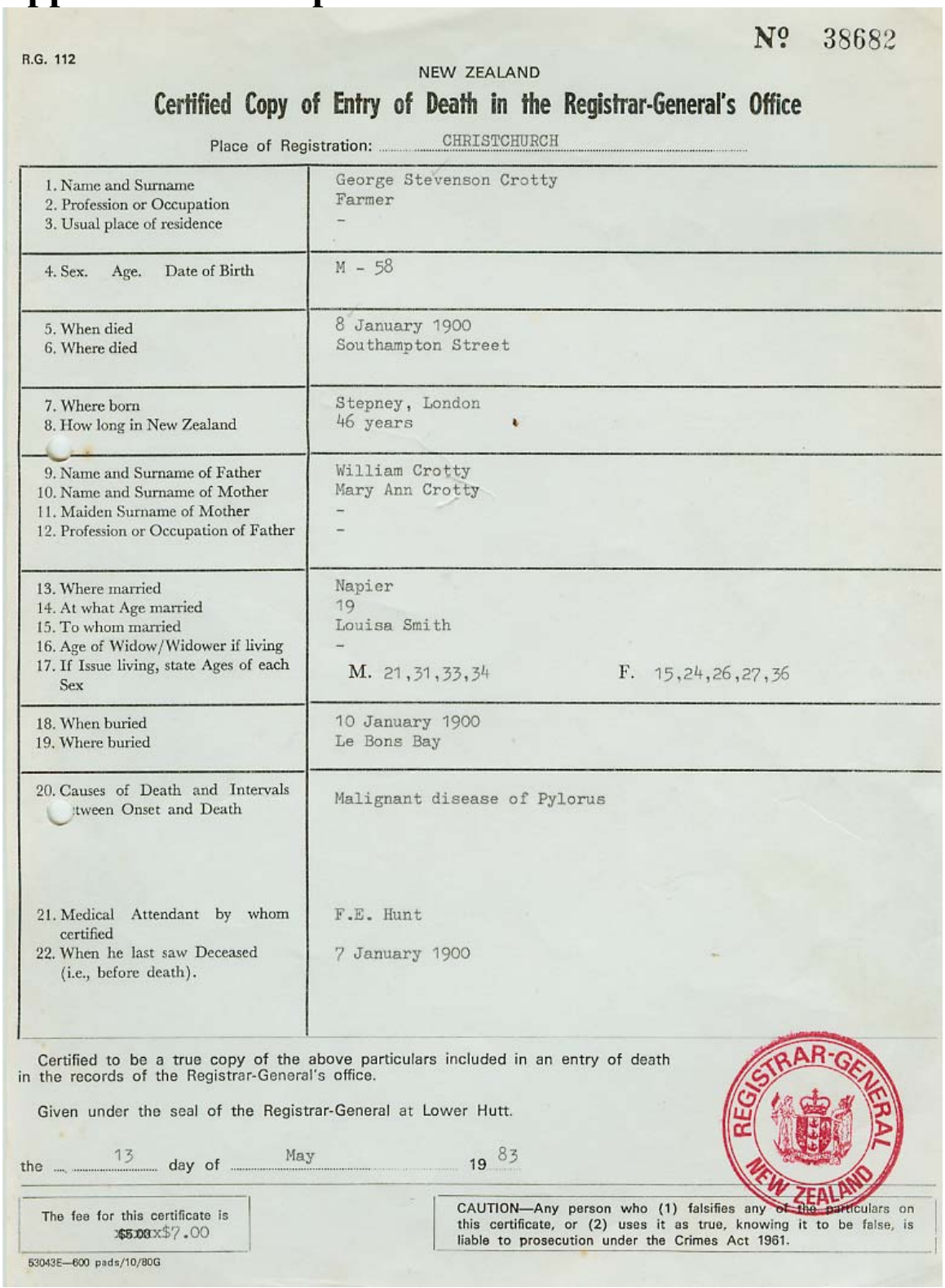
William John Craw Spouse:

F

Appendix 2: Example of 1851 Census Forms for David Waghorn and family



Appendix 3: Example of NZ Death Certificate



R.G. 112

Nº 38682

NEW ZEALAND

Certified Copy of Entry of Death in the Registrar-General's Office

Place of Registration: CHRISTCHURCH

1. Name and Surname 2. Profession or Occupation 3. Usual place of residence	George Stevenson Crotty Farmer -
4. Sex. Age. Date of Birth	M - 58
5. When died 6. Where died	8 January 1900 Southampton Street
7. Where born 8. How long in New Zealand	Stepney, London 46 years
9. Name and Surname of Father 10. Name and Surname of Mother 11. Maiden Surname of Mother 12. Profession or Occupation of Father	William Crotty Mary Ann Crotty - -
13. Where married 14. At what Age married 15. To whom married 16. Age of Widow/Widower if living 17. If Issue living, state Ages of each Sex	Napier 19 Louisa Smith - M. 21,31,33,34 F. 15,24,26,27,36
18. When buried 19. Where buried	10 January 1900 Le Bons Bay
20. Causes of Death and Intervals between Onset and Death	Malignant disease of Pylorus
21. Medical Attendant by whom certified 22. When he last saw Deceased (i.e., before death).	F.E. Hunt 7 January 1900

Certified to be a true copy of the above particulars included in an entry of death in the records of the Registrar-General's office.

Given under the seal of the Registrar-General at Lower Hutt.

the 13 day of May 19 83

REGISTRAR-GENERAL NEW ZEALAND

The fee for this certificate is ~~$5.00~~ x$7.00

CAUTION—Any person who (1) falsifies any of the particulars on this certificate, or (2) uses it as true, knowing it to be false, is liable to prosecution under the Crimes Act 1961.

53043E—600 pads/10/80G

Appendix 4: Example of NZ Marriage Certificate

R.G. 118

NEW ZEALAND

Certified Copy of Entry of Marriage No 9716

in the Registrar-General's Office

Number	107	
When married	30 DECEMBER 1887	
Where married	REGISTRAR'S OFFICE, CHRISTCHURCH	
	BRIDEGROOM	BRIDE
Name and surname	GEORGE STEPHENSON CROTTY	LOUISA KNOWLES
Age	46	44
Profession or occupation	FARMER	-
Conjugal status (bachelor, spinster, widower, widow, or divorced)	BACHELOR	WIDOW 19 JULY 1887
Birthplace	LONDON, ENGLAND	WELLINGTON
Usual residence (in full)	LE BONS BAY	LE BONS BAY
Name and surname of father	GEORGE STEPHENSON CROTTY	WILLIAM MEIN SMITH
Profession or occupation of father	MARINER	FARMER
Name and surname of mother	MARY ANN CROTTY	LOUISA BASGRAVE SMITH
Maiden surname of mother	MEADEN	WALLACE

Certified to be a true copy of the above particulars included in a marriage entry in the records of the Registrar-General's Office.

Given under the seal of the Registrar-General at Lower Hutt,

this 7 day of MARCH 1983

REGISTRAR-GENERAL NEW ZEALAND

The fee for this certificate is ~~$5~~ $7

CAUTION—Any person who (1) falsifies any of the particulars on this certificate, or (2) uses it as true, knowing it to be false, is liable to prosecution under the Crimes Act 1961.

62336/G—100 pads/3/81

Appendix 5: Cause of death codes

ALLERGY ASPYXIA- Allergic reaction causing death.
AORTA- Aortic disease e.g. aneurysm.
BP-Hypertensive disease not further categorised.
CARD- Cardiac disease not further categorised.
CARD ARRHYTHMIA- Cardiac disease primarily arrhythmia e.g. Atrial fibrillation.
CARD DEGEN- Cardiac degeneration not further defined.
CARD DRUG- Cardiac death due to drugs.
CARD FAIL- Cardiac Failure.
CARD ISCH- Cardiac ischemia e.g. heart attack, myocardial infarct or thrombosis.
CARD VALV- Cardiac valvular disease
CERE- Cerebral disease causing death not further defined.
CERE HAEM- Cerebral haemorrhage.
CERE THROM- Cerebral thrombosis.
CONGEN- Death due to congenital abnormality.
CONGEN CARD- Congenital cardiac disease.
CONGEN HYDROCEPH- Congenital hydrocephalus.
CONGEN TR21- Congenital genetic disorder e.g. Down's syndrome.
CONVULSION- Convulsions, mechanism of death not further defined.
ENDO- All endocrine disorders combined e.g. diabetes and thyroid disorders.
ENDO ADRENAL- Endocrine disorder of adrenal gland.
ENDO DM- Endocrine disorder, diabetes mellitus when stated as primary cause of death.
ENDO DM GANGRENE- Endocrine disorder, diabetes mellitus with secondary gangrene infection causing death.
ENDO THYROID-Endocrine disorder of thyroid causing death e.g. thyrotoxicosis.
FTT- Failure to thrive, usually seen in infants less than 1 year of age.
GI- Gastrointestinal disorder leading to death not otherwise defined.
GI CHOLE- Gastrointestinal disorder of the gallbladder.
GI HAEM- Gastrointestinal haemorrhage causing death.
GI HAEM ULCER- Gastrointestinal haemorrhage from peptic ulcer.
GI ULCER- Peptic ulcer causing death e.g. perforation.
GI OBST- Gastrointestinal obstruction e.g. hernia.
GI PANCREATITIS- Pancreatitis.
GI STOMACH- Gastrointestinal disease of the stomach e.g. gastritis.
GI THROAT ULCER- Throat ulceration causing death.
GI THROM- Gastrointestinal vascular thrombosis.
HAEM PA- Haematological disorder e.g. pernicious anaemia (Vitamin B12 deficiency).
INFECT- Infection causing death not otherwise specified (excluding respiratory, TB & flu).
INFECT BONE- Infection of bone.
INFECT CARD- Cardiac Infection e.g. endocarditis.
INFECT CERE- Meningitis infection.
INFECT DIARRHOEA- Infective diarrhoea.
INFECT DIPHTHERIA- Diphtheria infection.
INFECT FEVER- Fever not otherwise specified.
INFECT FLU- Influenzal infection.
INFECT GANGRENE- Gangrene infection (excluding those with known diabetes).
INFECT GI- Gastrointestinal infection e.g. gastroenteritis or appendicitis.
INFECT HAEM- Septicaemia.

INFECT HYDATID- Hydatid infection.
INFECT MALARIA- Malarial infection.
INFECT MEASLES- English Measles (morbilli) infection.
INFECT MOUTH- Infected mouth not otherwise specified.
INFECT MS- Infection of the musculo-skeletal system e.g. psoas abscess.
INFECT PELVIS- Infection of the pelvic organs or region.
INFECT POLIO- Poliomyelitis infection.
INFECT RENAL- Infection of the renal tract e.g. pyelonephritis.
INFECT RESP- Lower respiratory infection e.g. pneumonia (non-influenzal).
INFECT RESP COPD- Lower respiratory infection with chronic obstructive pulmonary disease (COPD).
INFECT SCARLET- Scarlet fever infection (streptococcus pyogenes infection)
INFECT SCARLET MAT MISC- Scarlet fever infection with miscarriage.
INFECT SKIN- Skin infections e.g. multiple boils or bed sores.
INFECT STD- Sexually transmitted disease e.g. syphilis.
INFECT TETANUS- Tetanus infection.
INFECT THROAT- Throat infections not otherwise specified.
INFECT TYPHOID- Typhoid fever infection.
INFECT URTI- Upper respiratory tract infections.
INFECT WAR- Deaths caused by infections or sickness in soldiers during war years.
INFECT WHOOP- Whooping cough (pertussis) infection.
INFECT WORMS- Intestinal worm infection.
LIVER FAIL- Liver failure not further specified.
MAT- Maternal death (all causes).
MAT CARD- Maternal death from cardiac complications.
MAT CERE HAEM- Maternal death from cerebral haemorrhage.
MAT ECLAM- Maternal death from eclampsia or toxaemia of pregnancy.
MAT ECT- Maternal death from ectopic gestation.
MAT ENDO- Maternal death from endocrine disorders e.g. acute thyrotoxicosis.
MAT HAEM- Maternal death from haemorrhage e.g. post-partum haemorrhage.
MAT INFECT- Maternal death from infection e.g. parametritis.
MAT LAB- Maternal death from complications in labour.
MAT MISC- Maternal death following miscarriage (excluding ectopics).
MAT RENAL- Maternal death from renal complications e.g. acute renal failure.
MS- Musculoskeletal (all causes).
MS MUSCULAR- Musculoskeletal disorder causing death e.g. muscular dystrophy.
MS RA- Muscular skeletal disorder causing death e.g. rheumatoid arthritis.
NEOP- Neoplastic (cancer) condition causing death not otherwise specified.
NEOP BLADDER- Primary bladder cancer.
NEOP BONE- Primary cancers of the bone.
NEOP BREAST-Primary breast cancer.
NEOP CERE- Primary cerebral cancers.
NEOP CERVIX- Primary cervical cancer.
NEOP COLON- Primary cancer of the colon (bowel).
NEOP EAR- Primary cancer of the ear not otherwise categorised.
NEOP GALLBLADDER- Primary cancer of the gallbladder.
NEOP HAEM- Primary haematological cancer e.g. leukaemia.
NEOP HAND- Primary cancer of the hand not otherwise categorised.
NEOP LARYNX- Primary cancer of the larynx.
NEOP LIVER- Primary cancer of the liver.

NEOP LUNG- Primary lung cancer.
NEOP MOUTH- Primary cancer of the mouth not otherwise categorised.
NEOP NASAL- Primary cancer of the nasal region not otherwise categorised.
NEOP OESOPHAGUS- Primary cancer of the oesophagus.
NEOP OVARY- Primary ovarian cancer.
NEOP PANCREAS- Primary pancreatic cancer.
NEOP PENIS- Primary penile cancer.
NEOP PHARYNX- Primary cancer of the pharynx.
NEOP PROSTATE- Primary prostatic cancer.
NEOP RENAL- Primary cancer of the kidney.
NEOP SALIVARY- Primary cancer of salivary gland
NEOP SARCOMA- Primary sarcomas (multiple locations).
NEOP SKIN- Primary skin cancers e.g. malignant melanoma.
NEOP STOMACH- Primary cancer of the stomach.
NEOP TESTIS- Primary cancer of the testis.
NEOP THYROID- Primary thyroid cancers.
NEOP TONGUE- Primary cancer of the tongue.
NEOP UTERUS- Primary cancer of the body of the uterus (excludes cervical cancers).
NEURO- Neurological disorder e.g. Parkinson's disease.
NEURO MUSCULAR- Neurological disorders affecting muscles.
NEURO SCLEROSIS- Neurological disorders e.g. multiple sclerosis.
OAGE- Old age when no other specific cause of death is specified.
OP ANAESTH – Died under anaesthetic during operation.
OP CARD- Died from cardiac complications during operation.
OP COMP- Died from complications during operation
OP HAEM- Died from haemorrhage during or shortly after operation.
OP INFECT- Died from infection shortly following operation.
OP PE- Died from pulmonary emboli following operation.
OP RENAL- Died from renal failure following operation.
OTHER- other non-specific cause of death e.g. not certified or natural causes.
PREM- Died due to prematurity.
PSYCH – Died from psychiatric disorder.
PVD- Died from peripheral vascular disease.
PVD GANGRENE- Died from peripheral vascular disease with gangrene infection.
RENAL- Died from renal disease not otherwise specified.
RENAL CALCULUS- Died from renal calculus complications.
RENAL FAIL- Died from renal failure.
RENAL NEPH- Died from nephritis not otherwise specified.
RENAL PROST- Died from renal disease secondary to prostatic conditions e.g. benign prostatic hypertrophy.
RESP- Died from respiratory condition not otherwise specified.
RESP ASTHMA- Died from asthma.
RESP COPD- Died from COPD e.g. emphysema.
RESP CROUP- Died from acute croup.
RESP PE- Died from acute pulmonary embolism.
SB- Stillbirth.
TB- Died from tubercular disease not otherwise specified.
TB ABDO- Tubercular disease of the abdomen.
TB CERE-Tubercular meningitis.
TB PUL- Pulmonary tuberculosis.

TB PUL BONE- Tuberculosis of the lung and bone.
TB PUL CERE- Tuberculosis of the lung and brain.
TB PUL GI -Tuberculosis of the lung and abdomen.
TB PUL INFECT TYPHOID- Pulmonary tuberculosis and typhoid fever.
TB RENAL- Tuberculosis of the kidneys.
TB RENAL CERE- Tuberculosis of the kidneys and brain.
TB INFECT WHOOP- Tuberculosis and whooping cough infection.
VIOL ACC – Violent accidental death not otherwise specified.
VIOL ACC #NOF– Violent accidental death following fractures neck of femur (#NOF).
VIOL ACC BIKE– Violent accidental death from bicycle crash.
VIOL ACC BURNS– Violent accidental death from burns, scalds or in house fires.
VIOL ACC CHOKED– Violent accidental death from choking.
VIOL ACC CRUSH– Violent accidental death from crushing injuries.
VIOL ACC DROWN– Violent accidental death from drowning.
VIOL ACC ELECT– Violent accidental death from electrocution.
VIOL ACC FALL– Violent accidental death from falls.
VIOL ACC GAS– Violent accidental death from gas inhalation.
VIOL ACC GUN– Violent accidental death from gunshot injuries.
VIOL ACC HAEM– Violent accidental death from haemorrhage.
VIOL ACC HORSE– Violent accidental death involving horses.
VIOL ACC INFECT– Violent accidents with secondary infections causing death.
VIOL ACC OCC- Violent death, occupational accident e.g. crushed by bulldozer.
VIOL ACC PLANE- Violent accidental death in plane crash.
VIOL ACC POISON- Violent accidental death from poisoning.
VIOL ACC RTA– Violent accidental death in road traffic accident (RTA).
VIOL ACC TRAIN– Violent accidental death involving trains.
VIOL ACC WAR– Violent accidental death of soldiers in 1st & 2nd World Wars.
VIOL MURD- Violent death by murder.
VIOL SUICIDE- Violent death by suicide not otherwise specified.
VIOL SUICIDE DROWN- Violent death, suicide by drowning.
VIOL SUICIDE GAS- Violent death, suicide by gas inhalation.
VIOL SUICIDE GUN- Violent death, suicide from gunshot injuries.
VIOL SUICIDE HAEM- Violent death, suicide from haemorrhage e.g. throat cutting.
VIOL SUICIDE HANG- Violent death, suicide by hanging.
VIOL SUICIDE POISON- Violent death, suicide from ingestion of poison or drug overdose.
VIOL WAR- Soldiers killed in action or died of wounds during the 1st & 2nd World Wars.

Appendix 6: Age Sex Distribution Table

Table: Age/Sex distribution of the Little Akaloa/Tolaga Bay Families vs. NZ Population 1891, 1900 & 1911.

Age Groups	Proportion % of Males						Proportion % of Females					
	1891	1891	1901	1901	1911	1911	1891	1891	1901	1901	1911	1911
	NZ	LA/TB	NZ	LA/TB	NZ	LA/TB	NZ	LA/TB	NZ	LA/TB	NZ	LA/TB
<5 yrs	12.72	17.40	10.93	11.04	11.29	4.74	13.95	14.81	11.59	8.93	12.16	4.65
5-<10yrs	13.09	16.67	10.68	12.04	10.15	6.61	14.51	14.81	11.57	10.25	10.96	6.65
10-<15yrs	12.27	15.29	10.62	13.43	8.75	9.77	13.74	17.85	11.49	11.86	9.46	7.98
15-<20yrs	9.82	11.53	10.47	12.84	8.43	10.78	11.12	14.65	11.56	11.71	9.18	9.44
20-<25yrs	8.53	9.65	10.16	12.34	9.36	12.28	10.16	11.78	11.45	14.93	9.68	10.77
25-<30yrs	7.14	9.77	8.71	9.45	10.30	11.91	7.62	9.93	9.07	12.15	9.98	11.17
30-<35yrs	6.63	6.02	7.32	7.56	9.30	10.98	6.10	6.40	7.44	9.66	8.97	13.43
35-<40yrs	6.18	4.76	5.99	7.46	7.43	8.28	5.15	3.88	5.79	7.61	7.02	10.63
40-<45yrs	5.34	2.39	5.32	4.69	5.87	6.79	4.58	1.68	4.73	5.27	5.73	8.11
45-<50yrs	5.13	2.26	4.72	3.68	4.56	6.79	4.03	1.18	3.82	3.07	4.35	6.91
50-<55yrs	5.05	1.63	3.80	1.79	3.82	4.09	3.38	0.84	3.27	1.32	3.48	4.79
55-<60yrs	3.29	1.63	3.38	1.49	3.14	3.35	2.10	1.01	2.72	1.04	2.65	2.26
60-<65yrs	2.31	0.75	3.16	0.60	2.41	1.40	1.52	0.67	2.19	0.59	2.15	1.21
65-<70yrs	1.18	0.25	2.51	1.09	2.06	0.93	0.87	0.34	1.65	0.73	1.83	0.67
70-<75yrs	0.75	0.00	1.32	0.50	1.64	0.47	0.64	0.00	0.88	0.73	1.27	0.40
75-<80yrs	0.36	0.00	0.56	0.00	0.98	0.74	0.32	0.17	0.46	0.15	0.69	0.40
80+ yrs	0.21	0.00	0.35	0.00	0.51	0.09	0.21	0.00	0.32	0.00	0.44	0.53
Totals	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Note: NZ figures are from NZ Official Year Book 1912:127.

Appendix 7: Percentage of persons single and with no issue by orphan status & sex

Persons Over 15 yrs of age	Sex	Total	Single	%	Total Married	No Issue	%
Illegitimate	Total	11	2	18.18	9	2	22.22
	Male	5	1	20.00	4	1	25.00
	Female	6	1	16.66	5	1	20.00
Double Orphans	Total	25	3	12.00	22	6	27.27
	Male	15	2	13.33	13	3	23.00
	Female	10	1	10.00	9	3	33.33
Motherless, Single Orphan	Total	206	25	12.14	181	46	25.41
	Male	119	20	16.81	99	33	33.33
	Female	87	5	5.75	82	13	15.85
Fatherless, Single Orphan	Total	188	20	10.64	168	38	22.62
	Male	99	13	13.13	86	22	25.58
	Female	89	7	7.87	82	16	19.51
Non-Orphans	Total	1662	188	11.31	1474	329	22.32
	Male	989	136	13.75	853	211	24.73
	Female	673	57	8.47	616	118	19.15

Appendix 8: Other Sources of Genealogical Information

Akaroa Museum, Genealogy and Family History section

Ancestry, http://www.ancestry.com

Auckland Central Library, Genealogy and Family History section

Births, Deaths & Marriages online, https://www.bdmonline.dia.govt.nz

Cemetery Links-Online Database,
http://www.clanfraser.org.nz/genealogy/cemeterylinks.html

Christchurch Central Library, Genealogy and Family History section

Commonwealth War Graves Commission, http://www.cwgc.org

Cora Num Website for genealogists, http://www.coraweb.com.au/nzsites.htm

Family Search, http://www.familysearch.org

FreeBDM, http://www.freebmd.org.uk

GenCircles, http://www.gencircles.com

Gisborne District Council, http://www.gdc.govt.nz/burial-cremation-records

Kiwicelts, http://kiwicelts.com

NZ Society of Genealogists, NZ Marriages 1836-1956 CD

NZ Society of Genealogists, NZ Burial Locator CD

NZ Society of Genealogists, Waimakariri Grave Records CD

Okains Bay Museum, Genealogy and Family History section

Papers Past, http://paperspast.natlib.govt.nz/cgi-bin/paperspast

Scotland's People, http://www.scotlandspeople.gov.uk/content/help/index.aspx?r=554&1353

Takapuna Public Library, Genealogy and Whakapapa Section

1911 English Census, http://www.1911census.co.uk