Psychometric Evaluation of Resilience and Disaster Impact

Case studies in Afghanistan and Vanuatu

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ABSTRACT

Psychometric evaluation of individual quality of life allows for rapid, sector-agnostic assessment of disaster impact and community resilience. This information can be used to identify at-risk subgroups for targeted interventions, monitor the effectiveness of specific aid interventions over time, determine the appropriate phase of disaster response or recovery relative for recipients, and identify the current needs of disaster victims. A psychometric assessment approach is a critical complement to technical assessments, which are by nature limited in their ability to utilise human factors to capture an accurate picture of suffering or resilience. This thesis develops the theory underlying the psychometric assessment approach and examines in detail the methodology and results of applying this approach to post-disaster communities in villages in Afghanistan after severe flooding and Vanuatu after a Category 5 tropical cyclone. The studies show the progress of recovery at the time of assessment and identify specific marginalised subgroups disproportionately affected by the respective disasters. Recommendations to inform further humanitarian action in both regions are also developed.

DEDICATION

But if anyone has the world's goods and sees his brother in need, yet closes his heart against him, how does God's love abide in him? Little children, let us not love in word or talk but in deed and in truth.

1 John 3:17-18

PREFACE AND ACKNOWLEDGEMENTS

Responding to disasters presents a unique and ever-evolving challenge, or 'wicked problem,' that rapidly changes in response to a variety of factors and does not tamely and predictably respond to conventional problem-solving approaches. As a result, single-facet views of disaster situations—for example, from only technical or design perspectives—rarely provide sufficient information for overcoming the obstacles raised by disaster situations.

While disaster impacts and the effectiveness of humanitarian response are often measured in technical terms (houses built, units of food provided, etc.), the ultimate goal of disaster management is defined in human outcomes: lives saved, health preserved, security and safety restored. When these aspects of disaster evaluation are considered together, it is clear that the most effective methods of assessment will provide a holistic view of the situation in human terms, while being applicable to a variety of sociocultural contexts and rapidly administrable in unfavourable field conditions. The method of disaster evaluation described in this thesis, utilising psychometric measures of well-being as a proxy indicator for impact and resilience, achieves exactly that.

This work builds in large part on previous research by Regan Potangaroa and Suzanne Wilkinson, who have piloted the use of the DASS-42 survey for disaster assessment in a variety of situations. Data collected by Dr Potangaroa and UNHCR underlies all of the third chapter.

This work would not have been possible without the guidance of Professor Potangaroa and Florence Leong, or the backing of Professor Suzanne Wilkinson and Dr Alice Chang-Richards of the University of Auckland Centre for Disaster Resilience, Recovery, and Reconstruction.

The author would like to thank Robert Early and Miriam Meyerhoff for translation and validation of the DASS survey to Bislama, and Vavao Fetui and Dr. Ross Clarke for their introductions to the translators.

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Finally, a special thank you to Christine Ellis for her invaluable and continued support.

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1 GENERAL INTRODUCTION AND PURPOSE

1.1 *Disaster prevalence and vulnerability*

Catastrophic events are increasingly common, due to climate change and the instability of modern geopolitics: in the past two decades, more than 42 million life years were lost in the face of an ever-rising incidence of ever-larger disasters triggered by natural hazards, and 42 active conflicts in 2015 to date have claimed 180,000 lives and created more than 12 million new refugees (International Institute for Strategic Studies 2015; UNISDR 2015). The 2.7 billion people directly affected by disasters highlights the global scope of the challenge that disasters pose for human quality of life.

While the frequency and magnitude of hazard events is largely uncontrollable, hazards do not precipitate disasters unless human populations or built assets are vulnerable to them. There are several dimensions of vulnerability that are endemic to modern society.

One of these key aspects of vulnerability is the geographic location of large settlements, which are often constructed in poor soil conditions on coasts and near river mouths, with higher inherent seismic and flood risk (Kameda 2000). Climate change can also increase the hazard exposure of previously established sites, while relocating populations and built environments is often not economically feasible (Hardenbrook 2005). As built environments and infrastructure topologies must follow the geography of their users, poor settlement location constrains low-risk land use planning and compounds human vulnerability to hazards by exposing not only people, but the lifelines we depend on as well. This issue is particularly prevalent in small developing island nations in the tropics, where urban development concentrates people and settlements on coastal fringes exposed to floods and cyclones. However, geographic vulnerability is an issue even in wealthy countries: storm surge scenarios in Australia reveal that “critical infrastructure and community lifelines are particularly concentrated in the most hazardous zones” (King 2005). Given the almost untenable cost of relocating entire cities, this aspect of vulnerability is relatively immutable.

An important extension of geographic vulnerability is multi-hazard interaction. Shock events, such as earthquakes, can increase system vulnerability to secondary hazards; for example, when earthquakes in the Tohoku region of Japan collapsed tsunami protection barriers, increasing flood risk to nearby infrastructure, and tectonic subsidence led to tidal flooding in the same region (Tang & Werner 2009). China provides an apt illustration of multi-hazard geographic exposure. China is variously exposed to the consequences of floods, droughts, typhoons, snowstorms, landslides, forest fires, and earthquakes (Ye 2014). Intersections of the regional and seasonal characteristics of various hazards yields highly concentrated probabilities for multi-hazard shocks in precisely the regions where both population physical infrastructure is most densely clustered, especially along the coast.

Another important aspect of modern disaster vulnerability is infrastructure interdependence and clustering. Infrastructure lifelines typically share physical, cyber, geographic, and logical dependencies (Chou & Tseng 2010). For example, pumping stations in a water network might rely on telecommunications infrastructure for monitoring and control, power infrastructure to enable function, and transport infrastructure for servicing. In addition, lifelines often share customer groups, further increasing physical clustering of network topologies.

As a result of clustering and interdependency, the common characteristics of lifeline systems can lead to a catastrophic failure pattern in response to shock events: the cascade failure of critical infrastructure, which has been frequently demonstrated across disaster events (Chou & Tseng 2010; Oh et al. 2013). A problematic aspect of cascade failure in lifelines is unpredictability (Boin & Mcconnell 2007); phased maintenance and replacement of critical infrastructure, infrastructure planning, and design are naturally done asynchronously over time, which can lead to gaps or interdependencies that are invisible to system managers and engineers. These are then dramatically exposed with unexpected companion system failures during disasters.

When lifeline vulnerabilities are combined with the almost dependence of dense urban populations on infrastructure systems to meet basic needs, the result is a colossal increase in disaster potential. The combination of geographic and infrastructure vulnerability with multi-hazard interactions creates an unavoidable exposure to disasters in modern societies. While robust and adaptable design in the built environment, safe-to-fail buildings and lifelines, and a number of other technical/physical mitigation measures can reduce the inherent risk of disasters, many hazards simply cannot be cost-effectively mitigated through engineered solutions. This is especially true for large, infrequent events, such as 1-in-100-year tsunamis.

1.2 *Resilience and human outcomes*

Given the power and magnitude of extreme hazard events, it is clear that technical solutions cannot completely mitigate the possibility or impact of disasters. While and engineering for built environment resistance to physical damage traditional risk management practices are often adequate for anticipate or coping with smaller-scale emergencies or crises, large-scale catastrophes and disasters on the scale of the 2015 earthquake in Nepal or the 2011 tsunami in Japan are not practically predictable or subject to complete mitigation through design. Consequentially, resilience is a critical consideration for disaster risk reduction.

Resilience in practice must be viewed in the context of human outcomes: in times of crisis, the services that the built environment provides to users (power for hospitals, clean water for individuals, transportation modes for emergency responders), and not the physical buildings or systems themselves, are critical. Communities display resilience when people and families are able

to ‘bounce back’ (or forward) from a disaster, which is supported, but not guaranteed, by the continued function of physical infrastructure after a hazard event.

Although ‘resilience’ is a fluid concept that is described differently across disciplines, resilience in the built environment can be considered “the capability of a system to maintain its functions and structure in the face of internal and external change and to degrade gracefully when it must” (Allenby & Fink 2005), while individual psychosocial resilience is “relatively stable, healthy levels of psychological and physiological functioning” (Bonanno et al. 2007). From these definitions, capacities of resilient communities can be logically deduced: the ability to absorb or resist shocks and stresses, and the ability to adapt to events that cannot be absorbed or resisted, in a way that enables individual and community thriving—whether social, economic, physiological, or psychological in nature.

Resilience can also be viewed across several dimensions, which can be ultimately be classified along continuums of ‘hard’ and ‘soft’ resilience measures. A common theme is the balance between protection and adaptation—the primary capabilities that underlie any concept of resilience (Scalingi 2007). Designing infrastructure and buildings for protection (focusing on absorptive or resistive system capacities) should be a priority, and determines the point at which adaptive capacity becomes necessary. However, overdesign in favour of protection can increase failure consequences even as it increases the failure threshold, highlighting the limitations of a focus on only ‘engineered’ resilience that relies on physical systems and emphasising the criticality of developing resilience through human factors (Chang 2003).

The importance of resilience to disaster risk reduction will only increase, due to the inevitability of events that exceed the limits of preventative design. The current trends of population concentration around pre-existing urban centres, many critically exposed to multiple hazards in coastal regions, guarantees that resilience will remain not only a design and planning imperative, but a critical consideration for the longevity, sustainability, and even basic survivability of many cities (Patel & Burke 2009). As urban and economic growth continue, increasing concentrations of people, economic assets, and built infrastructure will also increase the impact of hazards and the consequences of disasters. The resilience of ‘too big to fail’ infrastructure, such as nuclear power plants, can also have global consequences—as demonstrated by the fallout from the Fukushima nuclear reactor failure in 2011.

The broader context of urban resilience, concerning not just the built environment but community functions as a whole, extends beyond structural engineering and asset management. Resilient outcomes, such as reduced economic damage and preservation of life, depend in large part upon nonphysical structures, especially organisations and communities (Paton & Johnston 2006). Nonphysical infrastructure, in the form of communications patterns, informal assistance networks,

and response organisations, is both as critical and as destructible as built infrastructure. Due to the inherently vulnerable nature of physical assets, which cannot be designed in an economical fashion to withstand the unthinkable, 'black swan'-type events that will inevitably strike urban centres to devastating effect, the most durable form of resilience is not engineered or built. Communal ties, social capital, and organisational characteristics—all 'human factors'—are the most durable, and most important, factors in urban resilience. Ties, bonds within social groups, and links, bonds between social groups, have been demonstrated to be one of the most useful proxy measurements for the success of community resilience programs (Walsh 2007). The social capital of an individual or family unit has been proven to be the most important predictor of an individual's mental and economic resilience (Carpenter 2014). The criticality of psychosocial resilience factors is not even mediated by group deterioration due to death or physical separation caused by disasters: people with larger support groups and more advantageous pre-hazard psychological states will be more resilient to the 'second trauma' of grief or separation.

1.3 *Disaster measurements*

While social capital is a strong predictor of resilience, perhaps the best measure of post-event wellbeing, or realised resilience, is the psychological state of an individual or community. Due to the previously mentioned need to contextualise resilience in terms of human outcomes, material indicators represent an incomplete picture of the post-disaster state of communities. For example, people provided with shelter may have a house but not a home, and people may have food but not be mentally and emotionally able to care for themselves or resume normal life. And although the physical impact of disasters is shocking, the psychological impact may be pervasive, enduring, and ultimately more damaging. Psychological measures of well-being bypass these limitations and develop a more complete view of the actual impact a disaster has had in human terms on quality of life.

Psychological methods of post-disaster measurement and evaluation are especially salient because a key consequence of any disaster is psychological trauma. Traumatic stress symptoms can steal the joy from a victim's daily life—precipitating anxiety and anxiety, haunting victims with flashbacks and nightmares, and straining and destroying the sustaining social ties on which human beings rely. The experiences that lead to 'psychological casualties' of trauma are identified by three main characteristics: suddenness, lack of controllability, and extreme negative valence (Carlson & Dalenberg 2000). And what is more sudden than the unexpected earthquake that levels a city? What is more uncontrollable than the 30-meter wall of water than roars across the ocean to crush an entire island? What occasions more horror and aversion than the sterile, unfeeling bombs and bullets that slaughter anyone caught in their path?

The very nature of disasters and large-scale catastrophic events, whether arising from natural or man-made hazards, leads to trauma—not just of the individual, but of entire communities, cities, and even nations. The risk of traumatisation and other harmful mental effects is increased by the fact that in practice, disasters are not a single traumatic event, but rather a series of them: first the hazard, then every loss or nearly unendurable hardship that follows.

Disaster trauma afflicts not only direct victims, but even distant bystanders and hardened first responders. It viciously attacks quality of life and leads to negative outcomes in multiple dimensions—from family functioning to physiological effects, or even long-term socioeconomic outcomes (McFarlane 1987; Weems et al. 2010). As a result, psychometrics (quantitative measures of the psychological state of individuals) are perhaps the most illuminating unified measure of disaster impact (and subsequently, post-event resilience). Psychometrics transcend individual physical dimensions, from food to shelter to medical care, capture intangible effects, and frame the impact directly in human terms. These quality-of-life characteristics also make psychological evaluation the most effective method for identifying the most-affected individuals or families for humanitarian interventions.

2 PSYCHOMETRIC METHODS FOR MEASURING RESILIENCE

This thesis utilises case studies in Afghanistan and Vanuatu to review the use of psychometric data to evaluate the severity and extent of disaster impacts and to measure community resilience. The use of such information for targeting and selecting humanitarian interventions is also examined.

The evaluation method employed for the research described herein utilises the Depression, Anxiety, and Stress Scale 42-Item (DASS-42) psychometric assessment tool, combined with demographic data and indicators of needs and livelihood concerns, to measure disaster impact and community resilience.

2.1 *The DASS-42 survey*

The DASS-42 survey asks respondents to rate the frequency with which they experience certain physical and psychological phenomena (e.g. shortness of breath, irritation) on a Likert scale of 0-3, in order to measure current levels of depression, anxiety, and stress. The DASS-42 was selected because:

- The tool has been widely used to measure psychological well-being in a variety of contexts (including past disasters as a resilience indicator), and is supported by a large volume of published research (Antony et al. 1998; Potangaroa et al. 2015; Santosa et al. 2014).
- The survey's phenomenological nature (see **Error! Reference source not found.**) makes it largely trans-cultural, and suitable for most contexts if properly translated; there is extensive literature on its cross-cultural validity (Oei et al, Norton et al, Kira et al).
- The survey design also avoids creating expectations of specific aid amongst the surveyed population (Potangaroa et al. 2015).
- The DASS severity index for interpreting scores (on a scale, from least to worst, of normal, mild, moderate, severe, extremely severe) is effective for indicating the relative seriousness of the measured psychological states, regardless of cultural context and, critically for post-disaster assessment, without the need for baseline data.
- The DASS is robust and designed to be administrable by nonprofessional staff (Lovibond & Lovibond 1996). It can be effectively conducted in approximately 15 minutes by a practiced administrator (Potangaroa et al. 2015).

The employed approach also extends the DASS-42 to include additional information commonly used post-disaster to identify the relative vulnerability of population subsets, including information on age, household size, disabilities, pregnant and lactating mothers, infants in the household, and female or under-18 heads of household. Combining the DASS psychometric data and demographic information allows for the effective identification of the most vulnerable households.

Comparative data from other post-disaster communities in different geographic and cultural contexts is available, as the DASS has been used to quantify post-disaster resilience in Indonesia, Pakistan, China, Haiti, New Zealand, and the Philippines (Potangaroa et al. 2015).

The extension also includes self-reported rankings of primary concerns for households before and after the disaster (a simple 1-3 prioritisation of the top three concerns out of food, temperature security, health, debt/finances, shelter/housing, job/income, aging, and clothing), which can be used to identify specific needs, combined with the pyschometric and demographic data to identify vulnerable groups, or used to draw conclusions about the impact of the disaster on the community's needs.

2.2 *Linking the DASS-42 to the disaster lifecycle*

Linking the DASS-42 to the Disaster Life Continuum model creates a useful indicator for the appropriate timing of aid and development (Emergency Management Australia 2003). Anxiety-dominant populations are more future-focused and exhibit a readiness for longer-term interventions, such as permanent shelter and livelihoods solutions.

This link between personal temporal orientation and psychological dimensions of stress, depression, and anxiety is well-established in the fields of psychology and psychotherapy (Barber et al. 1990; Clark & Beck 2011; Holman & Silver 1998; Yapko 2013). By critically examining the time dimensions of the various phases of disaster intervention and recovery, we can confidently link the DASS dimensions to the appropriate phase of disaster recovery for a disaster victim's psychological state. These relationships between time horizons and emotional affect enable operational use of the DASS-42 (or similar psychometric data) for not only establishing a relative hierarchy of need for targeting humanitarian interventions, but also for determining which class of interventions communities or individuals are prepared to participate in.

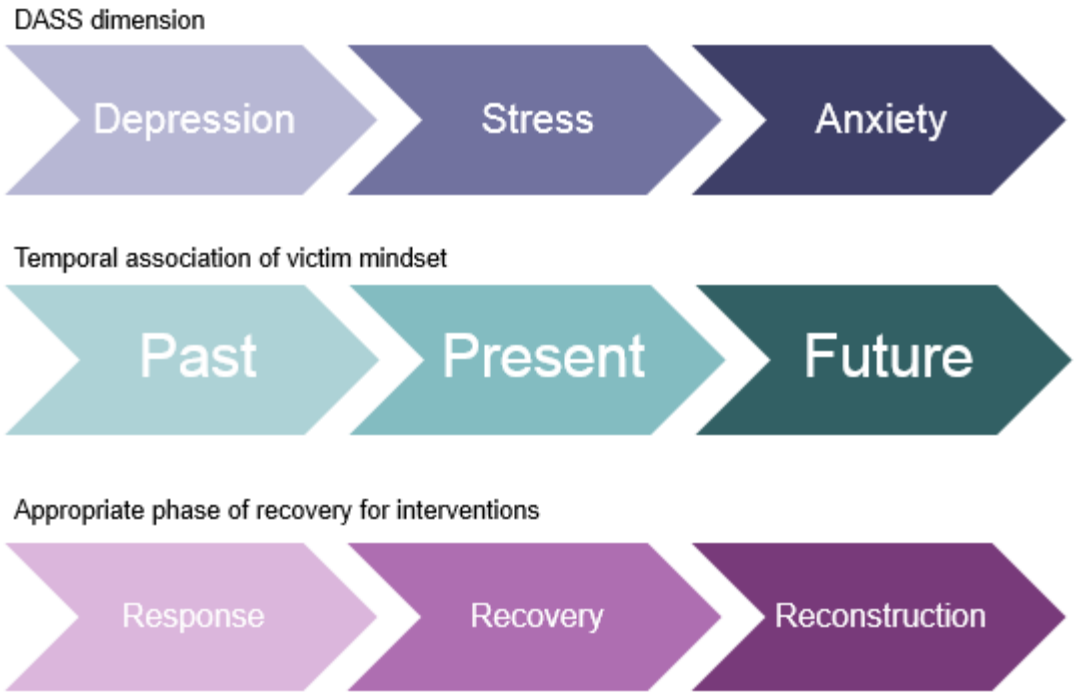

Figure 2-1. Relationship of psychometric dimensions to disaster recovery phases.

There are immense gains in operational efficiency to be made through this approach by reducing the total cost and time of disaster response and recovery, primarily by by using psychometric data to identify anxiety-dominant communities early after a disaster, who are prepared to engage in longer-term reconstruction efforts with minimal transition in recovery beyond what is necessary. For example, this approach can be used to identify when communities can proceed directly to permanent housing initiatives.

2.3 *Uses of the psychometric evaluation approach*

The information generated by combining psychometric and demographic data collected through individual assessments can be utilised to identify:

- Relative need and pre- or post-disaster vulnerability,
- Both the primary concerns and demographic attributes of target communities,
- The readiness of communities for medium- and long-term interventions,
- The effectiveness of aid and development interventions (when multiple assessments are performed over time),
- The current quality of life of a population, and
- Measures of demonstrated or predicted resilience.

A key advantage of using a psychometric assessment approach is that it quantifies the combined human impacts of all technical factors in a post-disaster situation, closing a critical awareness gap.

3 CASE STUDY: UNHCR SHELTER AID RECIPIENTS IN AFGHANISTAN

3.1 *Abstract*

Psychometric assessments of villagers who received UNHCR shelter aid in Afghanistan following severe flooding and landslides in 2014 demonstrate that while a majority of the studied population has recovered to normal levels of quality of life, a significant portion are still severely affected. In most regions, with one notable exception, women were significantly more affected by the disasters. Disaster impact is found to be correlated with certain at-risk subgroups by geographic region, larger household size, number of children in a household under the age of five, and for households with three or more disabled persons. The study also finds that the anxiety-dominant psychological state of the population indicates the suitability of long-term recovery interventions. This chapter examines the assessment method and resulting data in detail and recommends that future humanitarian action in Afghanistan target the identified at-risk groups, and that further assessment of ongoing needs be conducted to enable action to address remaining gaps in recovery.

3.2 *Context*

Afghanistan is a mountainous Islamic country, ravaged by ongoing conflict, with a population of approximately 30 million people (UNData 2015). Its arid to semiarid climate yields hot summers and brutally cold winters, especially for villages in the more elevated central and northeastern regions. Natural hazards common to Afghanistan include earthquakes, flooding, and avalanches.

The security situation in Afghanistan is volatile, due to ongoing insurgency threats that, in mid-2014, affected 30 of the country's 34 provinces and restricted humanitarian access while displacing 683,000 people (UNHCR 2015). The officially recognized government, established in 2004, has struggled to maintain authority (BBC 2015). Over 20 percent of Afghanistan's population is made up of returnees from previous displacements (UNHCR 2015). Refugees from conflicts and disasters in other countries, such as Pakistan, also represent a significant presence.

Afghanistan places 175th out of 187 countries on the UNDP Humanitarian Development Index, a composite ranking of key indicators for population quality of life, due to low life expectancy, income per capita, and expected years of schooling, despite significant gains in these categories since the 1980s (UNDP 2013). Afghanistan is also ranked second-to-last on measures of gender inequality, with only 5.8 percent of women achieving a secondary or higher level of education.

In April 2014, flash flooding and landslides devastated northern Afghanistan, affecting 125,000 people and killing 650. In the second half of 2014, UNHCR led a response to restore shelter to approximately 1,000 critically affected families before the onset of winter.

3.3 *Objective*

As this research programme was conducted after the primary shelter response, its main purposes were operational:

- To identify of most-affected or most-vulnerable subgroups, in order to prioritise follow-up evaluation and intervention.
- To assess villagers' post-intervention needs, to indicate aid still needed.
- To determine the effectiveness of the studied shelter response in meeting disaster victims' needs, by evaluating their post-intervention quality of life and resilience after the UN shelter response.

Additionally, there were several future-facing objectives with implications for other disaster response efforts:

- Identification of factors that influence quality of life and resilience in the studied context and similar situations.
- Demonstration of the operational usefulness of the studied approach (measuring resilience and quality of life using psychometric data), and refining the approach to localisation, administration, analysis, and interpretation of results.

3.4 *Methods and approach*

After completion of the shelter programme, the DASS-42 survey, extended with demographic factors, was utilised to gather quality of life information. UNHCR partnered with local Afghan officials to collect psychometric data from a sample of 444 individuals in the Gardiz, Herat, Mazar, and Kabul regions. Only those living in households which had received shelters from the UNHCR response were surveyed.

The extended DASS-42 survey forms were translated into Dari or Pashto, as appropriate to the regional dialect. The data was aggregated and scored according to the DASS-42 guidelines (Lovibond & Lovibond 1996). Data was collected in November and December 2014.

Table 3-1. Dates of assessment, by region. All assessment took place in 2014.

Region	Gardiz	Herat	Mazar	Kabul
Start of survey period	13 Nov	19 Nov	23 Nov	23 Nov
End of survey period	3 Dec	12 Dec	29 Nov	26 Nov

3.5 *Demographics*

As the results of the survey were influenced significantly by region and other demographic factors, an understanding of these factors is an important preliminary step in analysing the results. It is crucial to note that while the demographic data accurately describes the individuals surveyed, it is not proportionally representative of household demographics for the entire population of the surveyed region (for example, a household with five respondents would have had a larger effect on the demographic distribution than a household where only person responds).

The Mazar region represented a majority of the respondents, due to the concentration of the shelter response in the region.

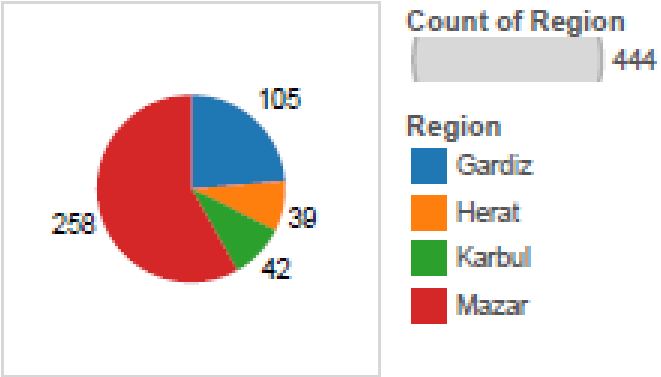

Figure 3-1. Regional characteristics of surveyed villagers.

The majority of respondents were male, possibly because of strong cultural biases in some regions against female interaction with strangers or in favor of men representing the household. There was no link between the gender of respondents in each region and the prevalence of female-headed households; in Gardiz, where females were most represented, only 1.9% of of households were headed by women, compared to 8.4% of households in Mazar and 31% in Karbul.

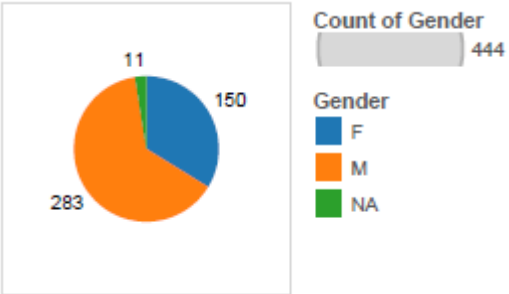

Figure 3-2. Gender characteristics of surveyed shelter recipients.

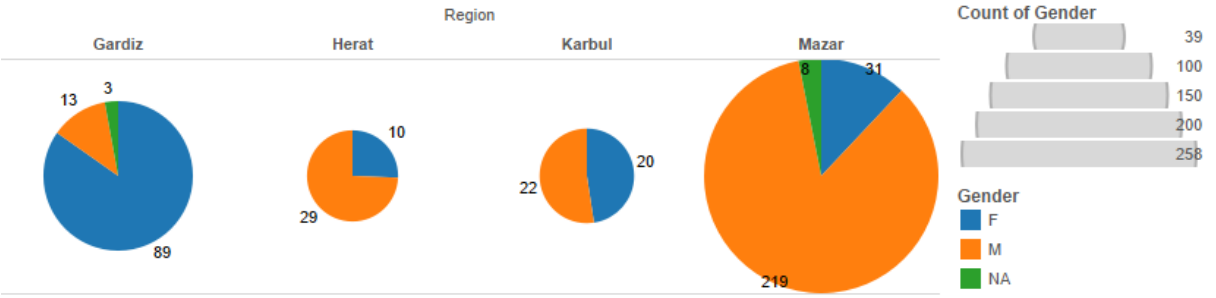

Figure 3-3. Gender characteristics by region.

The number of households headed by people below the age of 18 was negligible, although a minor but significant number of families were headed by women.

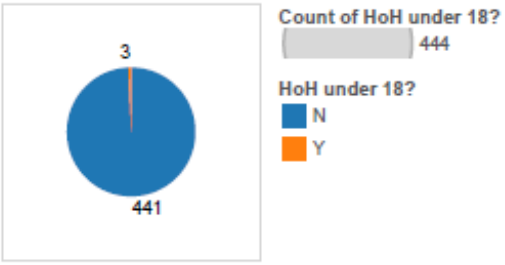

Figure 3-4. Proportion of respondents living in a household headed by someone under 18.

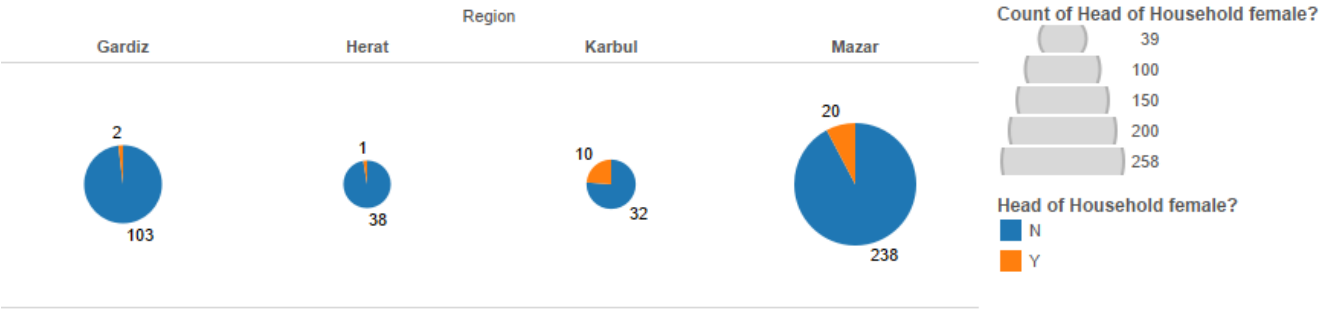

Figure 3-5. Head of household proportions by region.

The surveyed population had a median age of 45. Herat had a significantly younger age distribution, while Karbul's was older. However, this indicates merely the age of the respondents, and not the age distribution of the households and villages. Local mores that led to elders handling the surveys or restricted younger people from responding may have influenced the geographic differences to some degree.

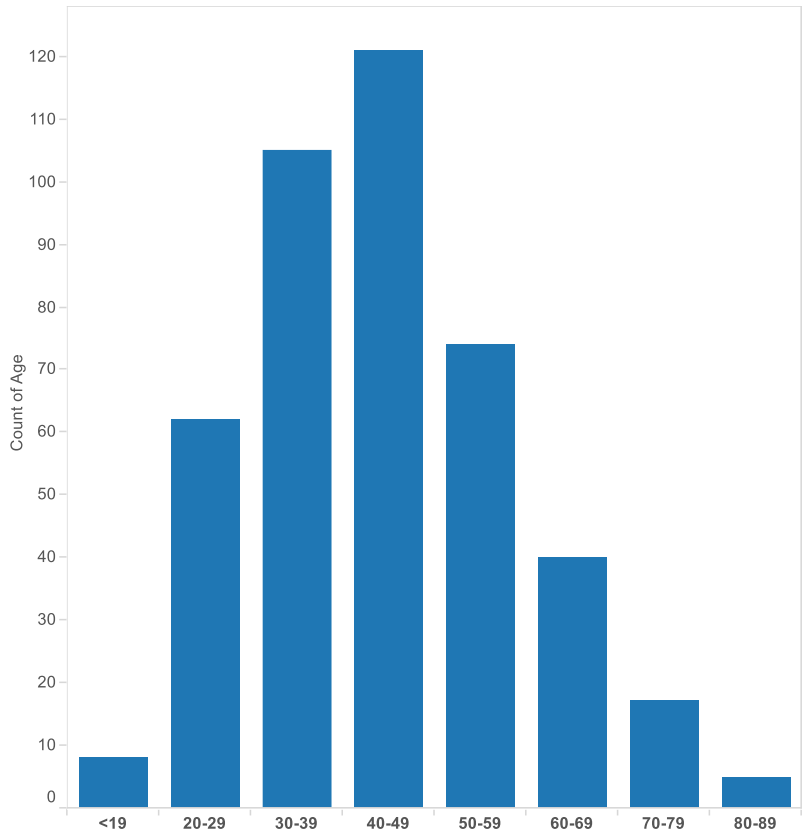

Figure 3-6. Age distribution of shelter recipients.

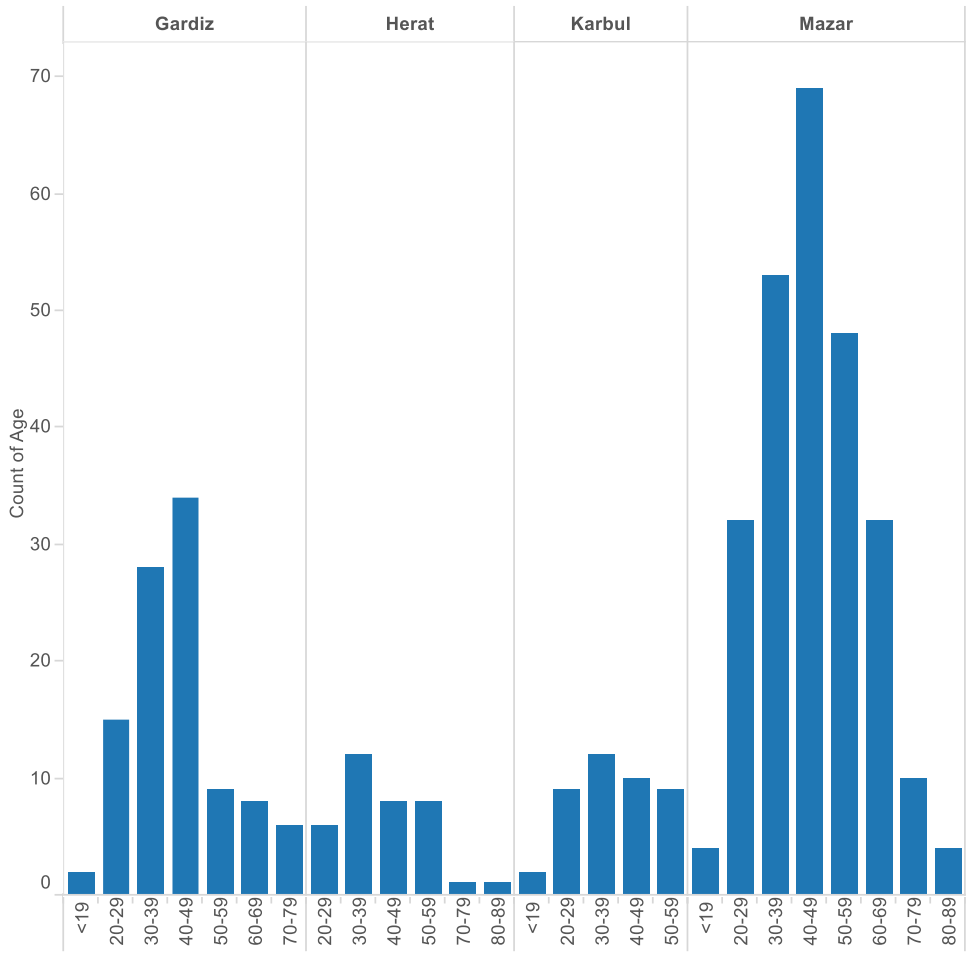

Figure 3-7. Age distribution by region.

The majority of respondents lived in households with at least one child under the age of five.

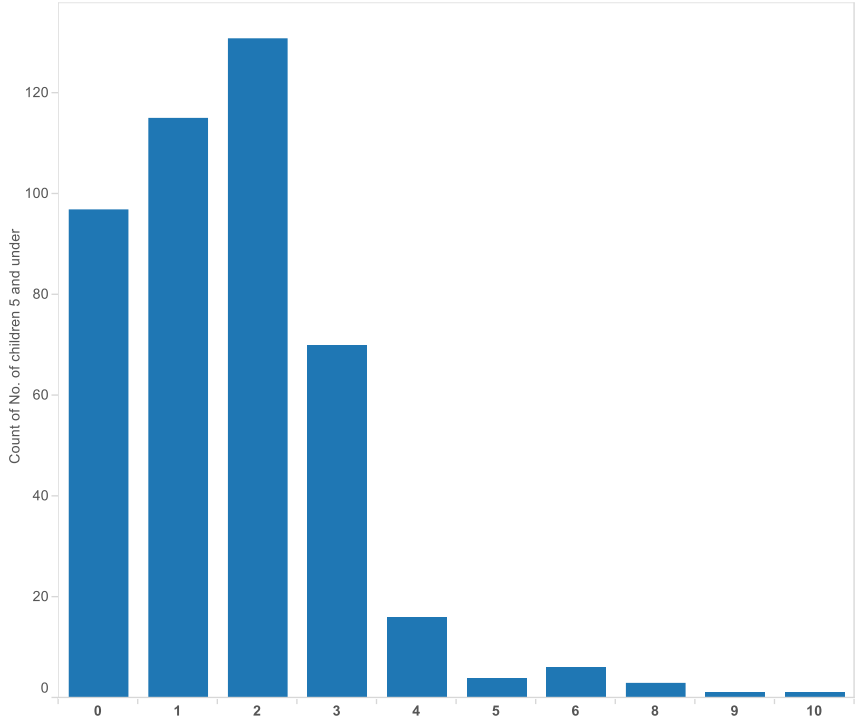

Figure 3-8. Count of respondents with a certain number of children under age 5 in their household.

The median number of children under five in the respondents' families was two, although the Herat region was a notable exception. Twelve percent of respondents lived in households with pregnant or nursing mothers (one populous home had five pregnant or lactating mothers).

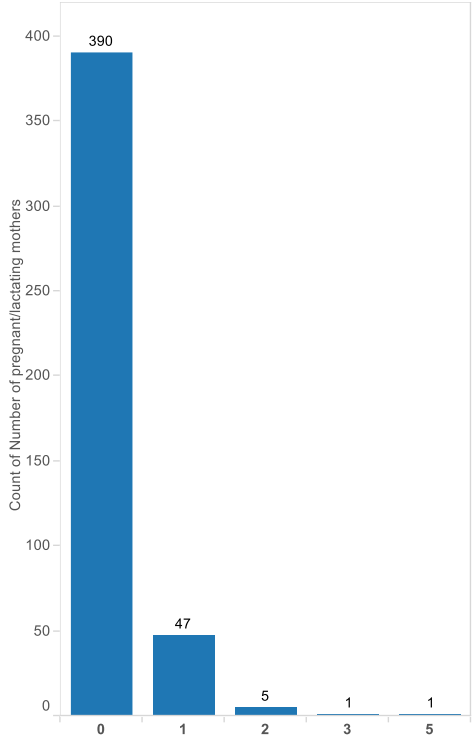

Figure 3-9. Count of respondents with certain numbers of pregnant or lactating mothers living in their household.

More than a fourth of respondents were living in households with at least one person with a mental or physical disability. However, the burden of care for the disabled borne by these households was likely not consistent, as all disabilities, regardless of severity or nature, resulted in the same indication.

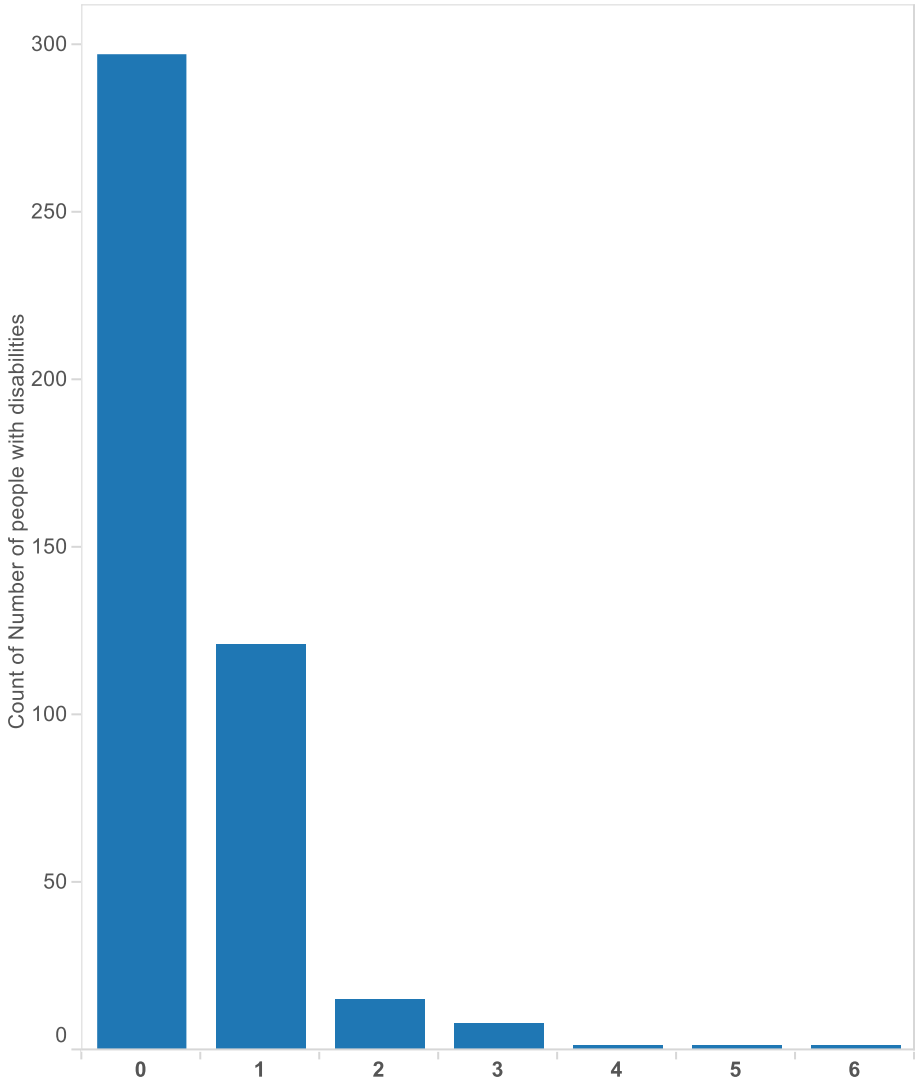

Figure 3-10. Count of respondents by number of people with disabilities living in the household.

The median reported household size was seven, although Herat proved to be an exception. This smaller household size was also reflected in Herat's smaller average number of children.

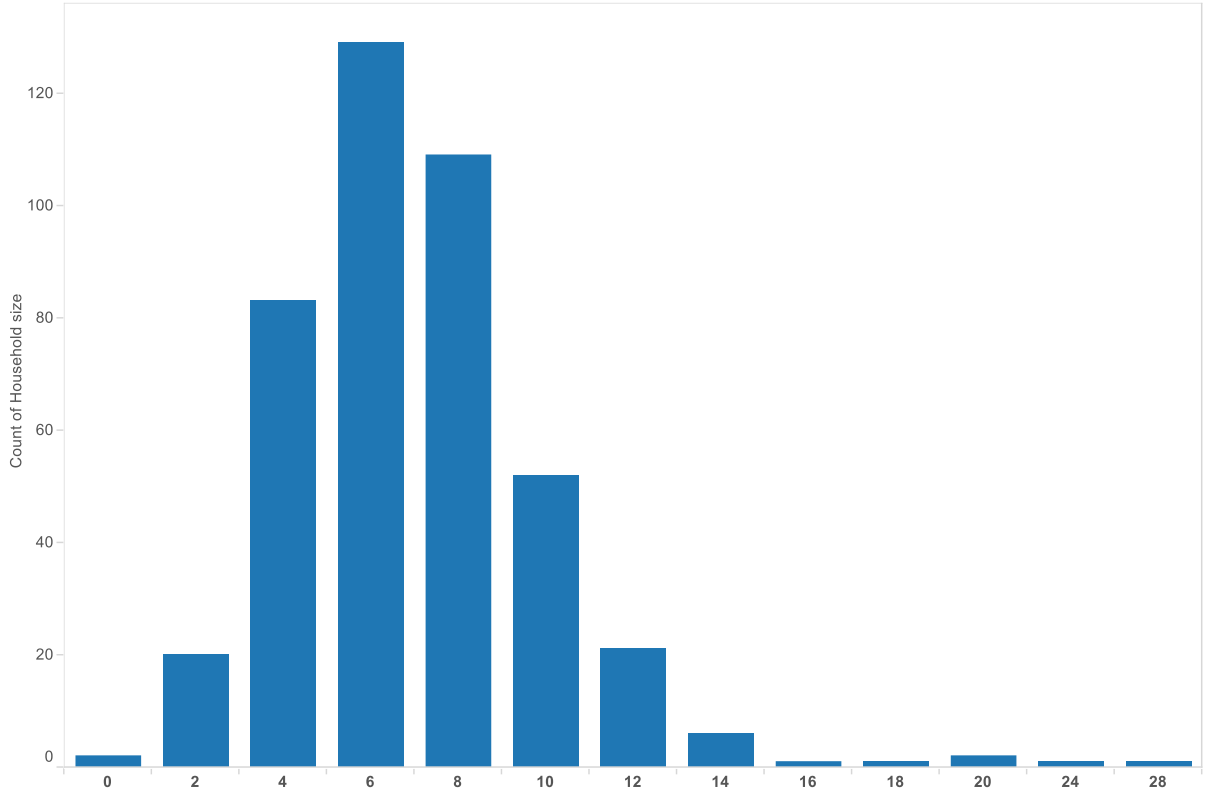

Figure 3-11. Distribution of household size.

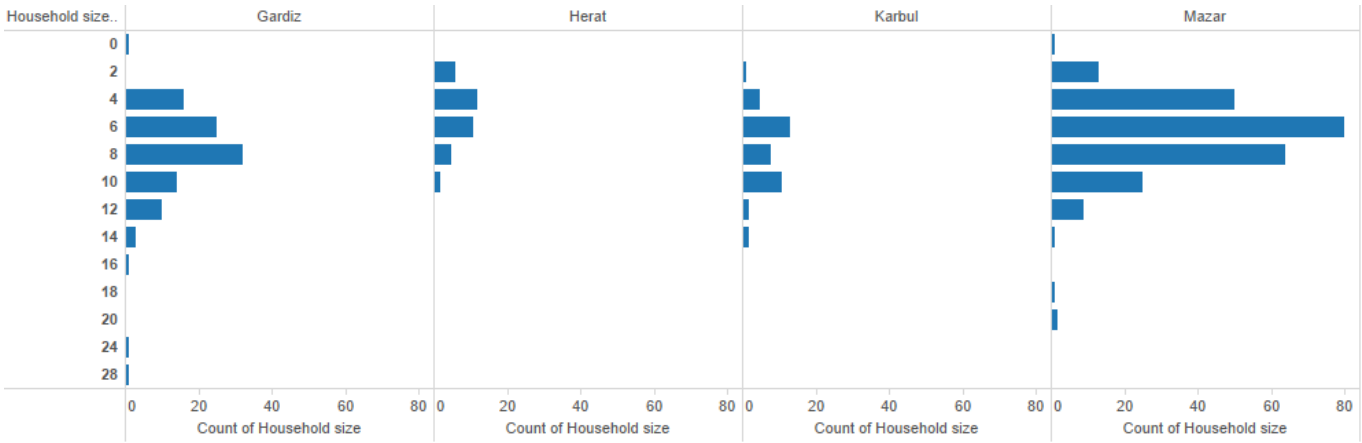

Figure 3-12. Distribution of household size by region.

3.6 *Results and discussion*

Median severity indicators for all three DASS dimensions for the surveyed sample were mild or moderate, with the mode being a normal severity. When considering that the sample was biased towards more-affected survivors (due to a needs-based distribution strategy for the shelter programme, which selected families with the most severely damaged or destroyed homes), these low-severity responses imply extremely resilient communities, especially when compared to other post-disaster populations surveyed using the same method (Potangaroa et al. 2015). This is consistent with research regarding the impact of community cohesion and social capital on disaster recovery and the close-knit nature of social life in rural Islamic villages such as those surveyed (Carpenter 2014; Cutter

et al. 2014; Ungar 2008). Alternative explanations for the low reported severity of psychological symptoms may include (relatively) mild hazard events, with a proportionately low number of fatalities compared to some disasters; more responsive or extensive external aid than that experienced by other disaster-affected communities; culturally influenced respondent under-reporting of subjective symptoms; or the relatively long period of time that passed since the flooding, which may have allowed for more complete recovery.

Depression scores, representative of past-oriented symptoms, were the lowest of the three dimensions. This is representative of resilient communities, which are present- or future-oriented, seeking solutions to current and future problems by navigating to critical resources. However, it is critical to note the high number of severe or extremely severe scores (26% of respondents). This indicates that a significant proportion of the population may be 'stuck', both psychologically and practically, at very early stages of recovery. While the community as a whole may be only mildly affected by depression symptoms, the consequences have been—and remain—severe for many.

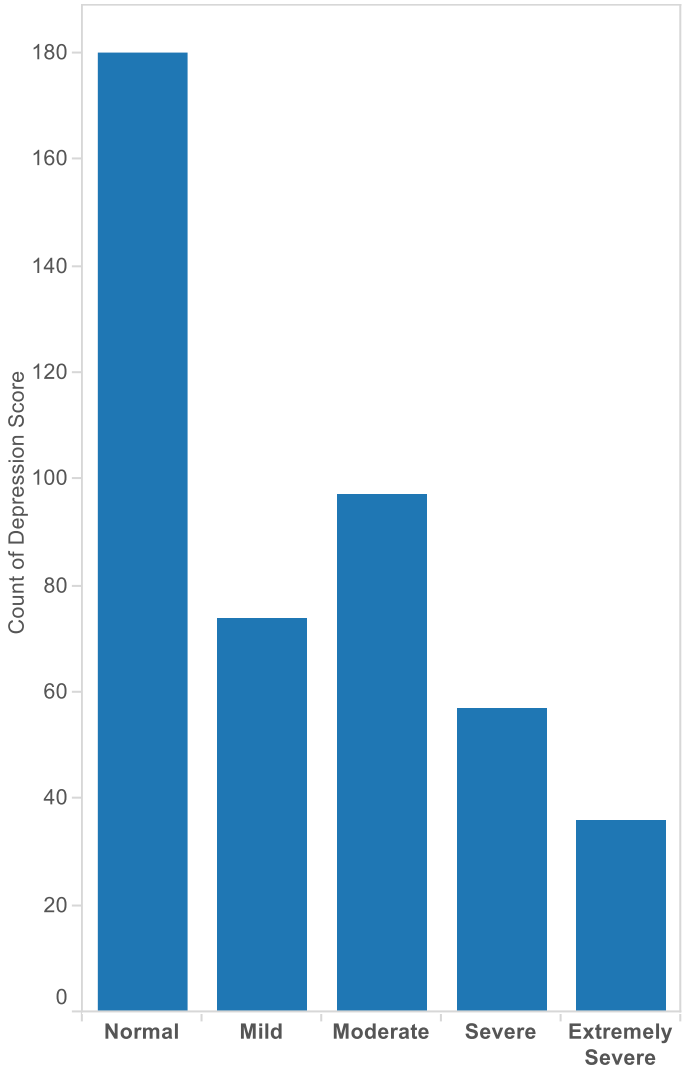

Figure 3-13. Distribution of measured depression severity, all respondents.

Median stress levels were slightly higher than depression levels, but a much smaller proportion of respondents were experiencing severe or extremely severe symptoms (13%) than with depression.

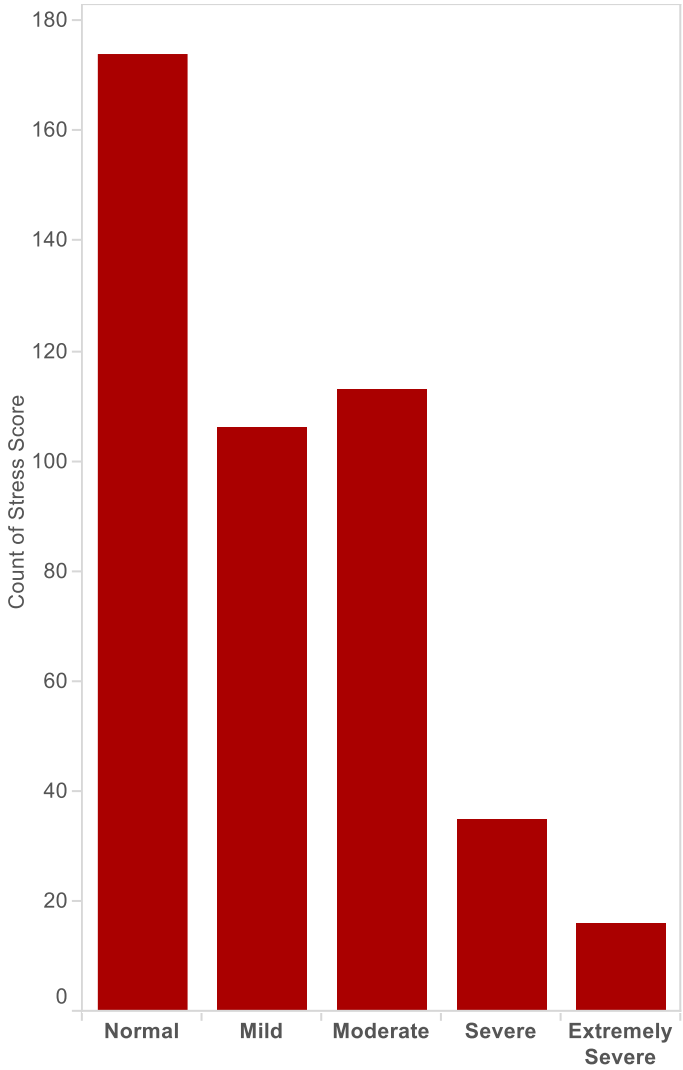

Figure 3-14. Distribution of measured stress severity, all respondents.

Anxiety was the most dominant affect for respondents: although the modal response indicates normal levels of anxiety, 59% of respondents reported severe or extremely severe anxiety. While this is negatively impacting quality of life for a large portion of the population, and implies an incomplete recovery at the time of the assessment, it also indicates that the permanent (long-term oriented) shelter response was appropriate for the future-oriented mindset of the disaster victims, and that the communities are prepared for further long-term reconstruction to complete the recovery process.

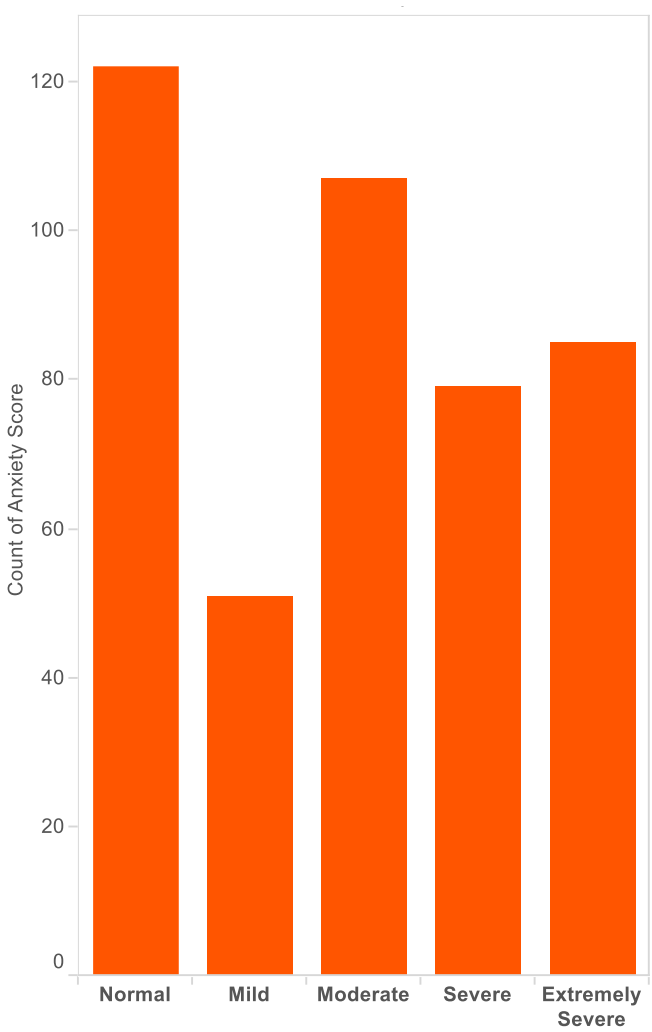

Figure 3-15. Distribution of anxiety severity, all respondents.

Regardless of the mediating factors which may have contributed to the low severity of negative quality of life indicators, the surveyed sample as a whole, with several notable outlier exceptions, appear to have recovered from the initial disaster. However, despite the apparent success of the overall response, the extremely severe symptoms still experienced by some marginalised groups is having an untenable impact on the quality of life of some victims.

The most notable disparity is geographic. The Karbul and Mazar regions, Karbul in particular, demonstrated disproportionately high indicators of depression and anxiety, while Herat appears to have been the least-affected (or most-recovered) province.

Table 3-2. Median DASS results by region.

	Region					
	Gardiz	Herat	Karbul	Mazar	Overall	Overall Score
Depression	9.00	7.00	16.50	13.00	12.00	Mild
Anxiety	10.00	5.00	16.00	13.00	12.00	Moderate
Stress	17.23	8.00	17.00	17.00	16.58	Mild

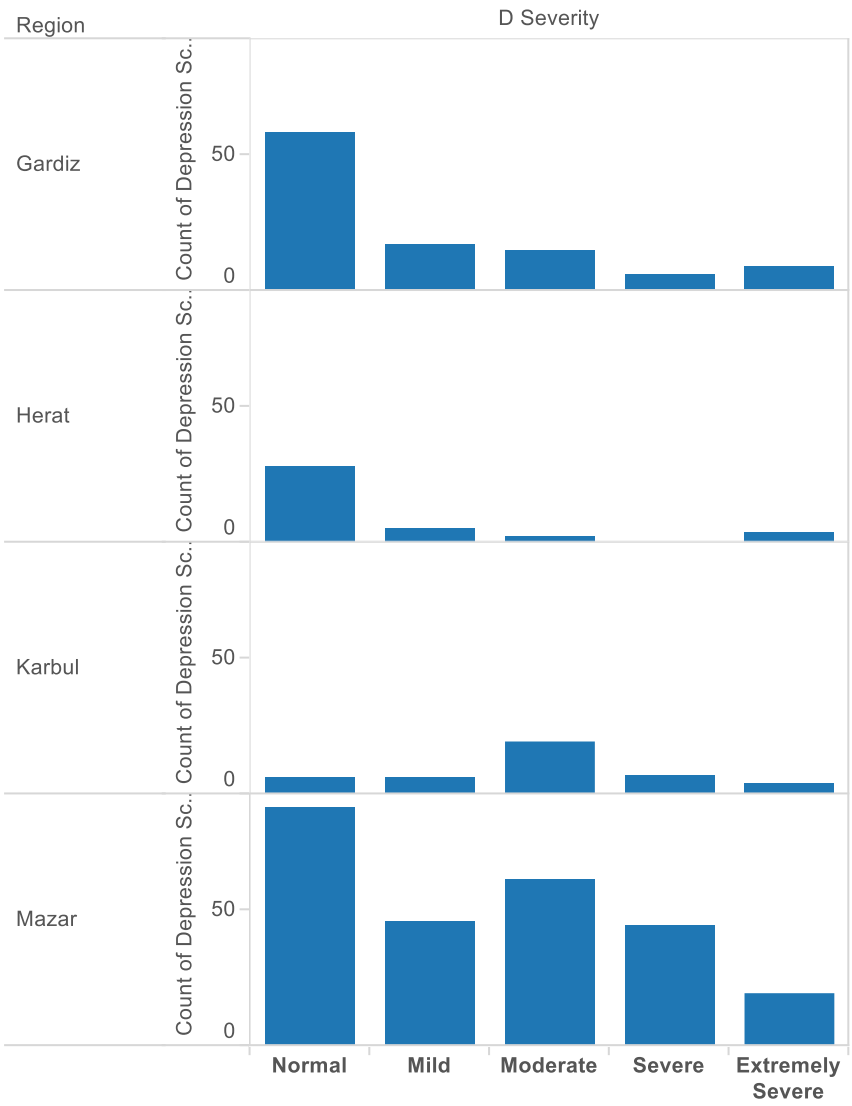

Figure 3-16. Frequency of measured depression severity by region.

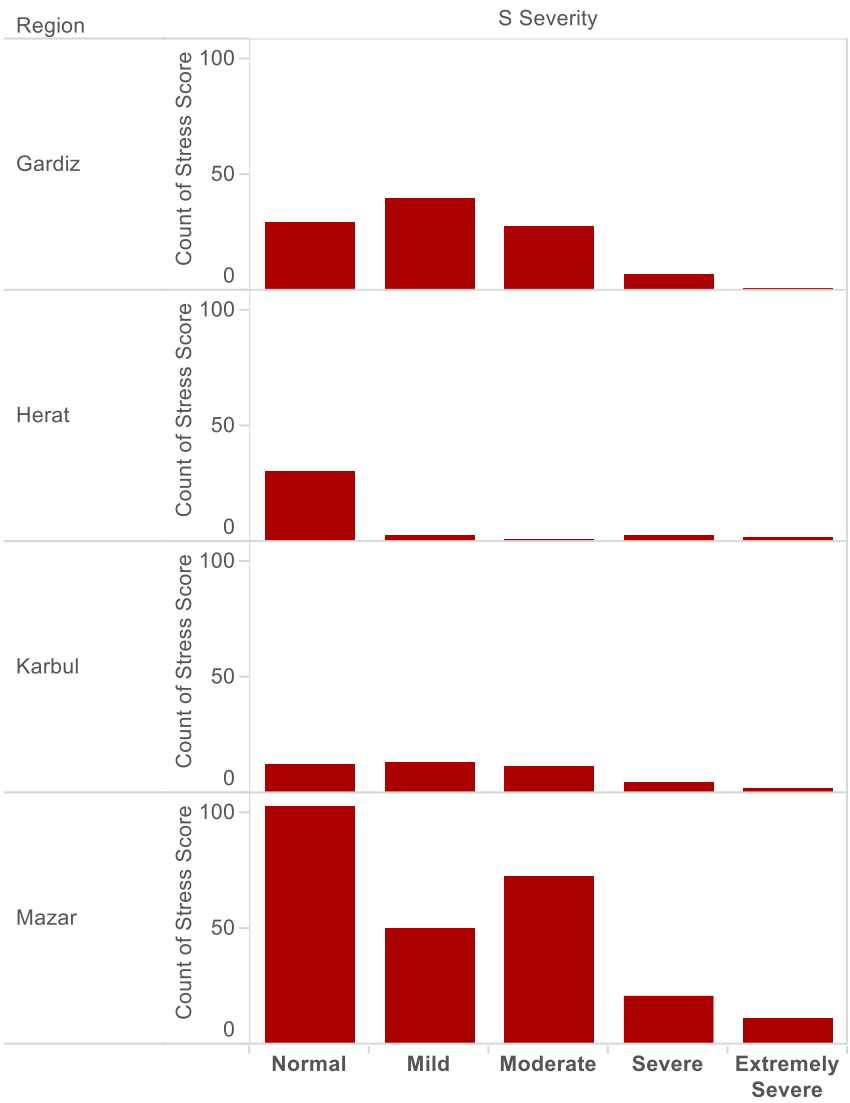

Figure 3-17. Frequency of measured stress severity by region.

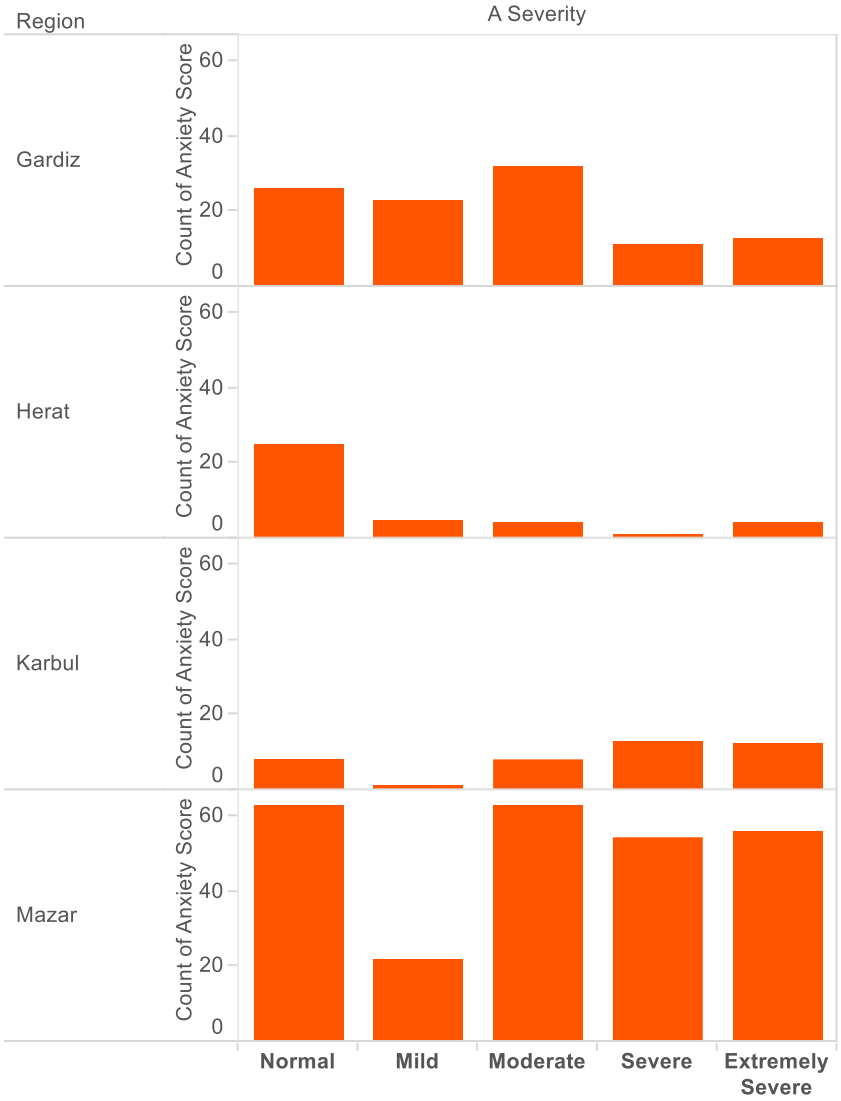

Figure 3-18. Frequency of measured anxiety severity by region.

The disparity between regions—Karbul being most affected, and Herat being least affected—may be explained by regional variation in: the quality of the shelter response, the resilience of the affected communities, or the severity of flooding and landslide hazards. Other factors, such as relative economic development in the region or disparate pre-disaster quality of life, may also have had an impact. Further investigation of the underlying causes is necessary, but the Karbul region's relatively high number of children per household (1 above the overall median of 2) and Herat's relatively low number of children per household (2 below the median) suggests that family size and number of young children increases post-disaster depression and anxiety, and may slow psychological recovery (see Table 3-3).

Table 3-3. Number of children per respondent household, by region.

Region	Avg. No. of children 5 and under	Median No. of children 5 and under
Gardiz	1.88	2
Herat	0.80	0
Karbul	3.14	3
Mazar	1.51	2

Indeed, the number of children under the age of five in a respondents' households shows a strong positive linear relationship to depression (coefficient: 1.19, $r^2 = 0.71$, $p = 0.002$), a moderate positive linear relationship with anxiety (coefficient: 0.89, $r^2 = 0.42$, $p = 0.04$), and no statistically significant relationship to stress. This link is logical, as the greater the number of young dependents in a household, the more negative psychological symptoms caregivers will experience due to the pressure of trying to provide for their families after a disaster (Nye et al. 1970); the only surprising result is the lack of a significant relationship between the number of young children and stress ($p = 0.37$).

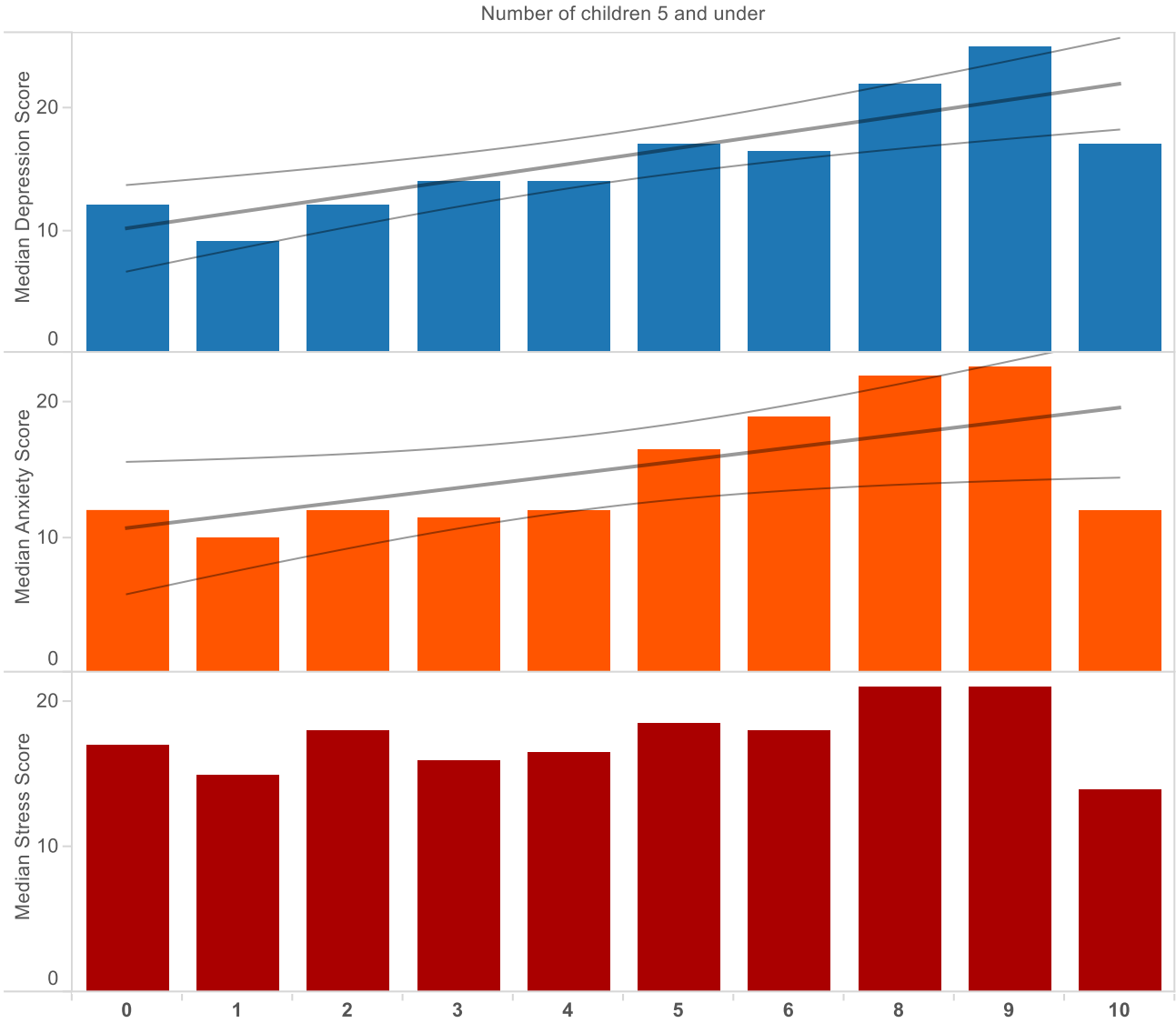

Figure 3-19. Median severity score for (top to bottom) depression, anxiety, and stress, by number of children under age 5 in respondent household. Best-fit trend line (with confidence interval) indicated for relationship of number of children under 5 to depression and anxiety.

A related factor, household size, was even more strongly correlated with psychometric measures of quality of life. All three DASS dimensions demonstrated a positive linear relationship: depression (coefficient: 0.80, $r^2 = 0.80$, $p < 0.0001$), anxiety (coefficient: 0.75, $r^2 = 0.64$, $p = 0.0005$), and stress (coefficient: 0.54, $r^2 = 0.62$, $p = 0.0007$). Once again, depression is the factor most highly correlated with additional dependents.

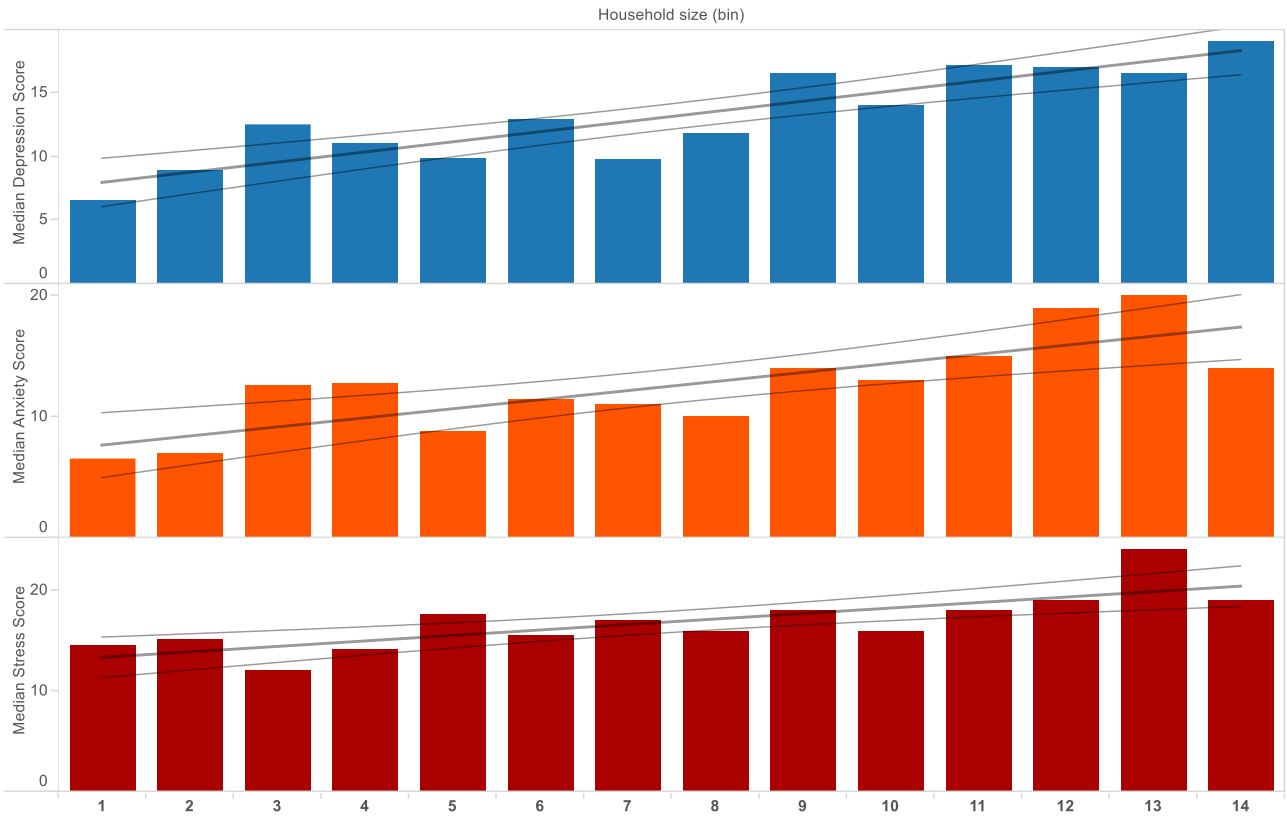

Figure 3-20. Median severity score for (top to bottom) depression, anxiety, and stress, by respondent household size. Best-fit trend line indicated for relationship between household size and each dimension.

Importantly, the relationship between either household size or number of young children and any of the DASS dimensions is much stronger for female respondents than for men. This suggests that women, as the primary caretakers in Afghan society (and traditionally so in most societies globally), assume the majority of the additional burden of multiple dependents.

When the sample is examined collectively without adjusting for any additional demographic factors, men and women appeared to be affected equally, displaying mild depression and stress with moderate anxiety (see Table 3-4). This was a surprising result, given Afghanistan's tarnished record on gender equality.

Table 3-4. DASS scores by gender and region.

		Region					
Gender		Gardiz	Herat	Karbul	Mazar	Overall	Overall Score
M	Depression	15.00	6.00	15.50	13.00	12.00	Mild
	Anxiety	16.00	4.31	13.00	13.00	12.00	Moderate
	Stress	18.00	7.00	16.00	17.00	15.00	Mild
F	Depression	8.00	10.00	18.00	16.33	12.00	Mild
	Anxiety	9.00	8.58	17.50	13.00	11.00	Moderate
	Stress	17.00	16.50	18.00	18.00	17.12	Mild
Overall	Depression	9.00	7.00	16.50	13.00	12.00	Mild
	Anxiety	10.00	5.00	16.00	13.00	12.00	Moderate
	Stress	17.12	8.00	17.00	17.00	16.00	Mild

Additionally, the overall population means for each of the psychological indicators also did not appear to be different across genders at a statistically significant level.

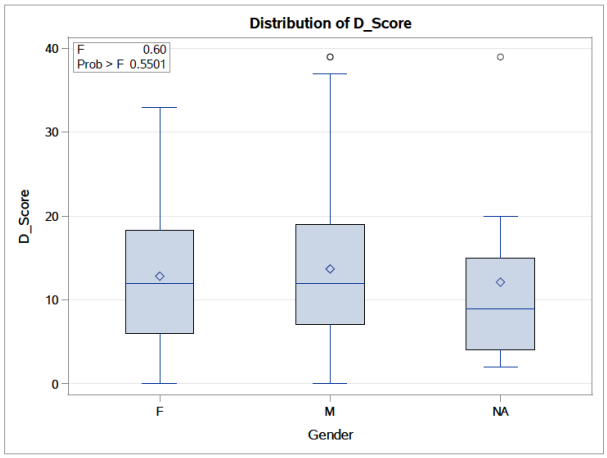

Figure 3-21. Plot of depression scores by gender.

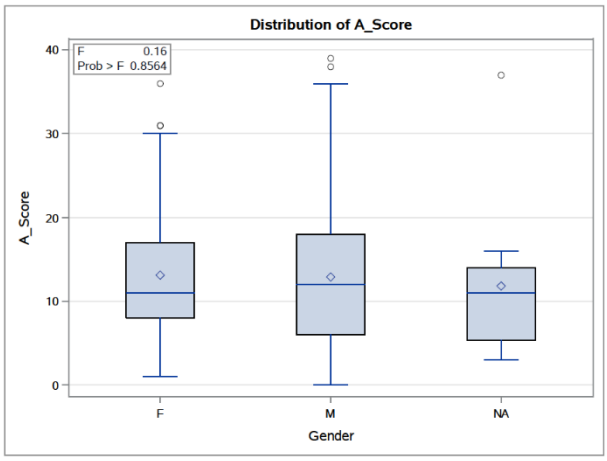

Figure 3-22. Plot of anxiety scores by gender.

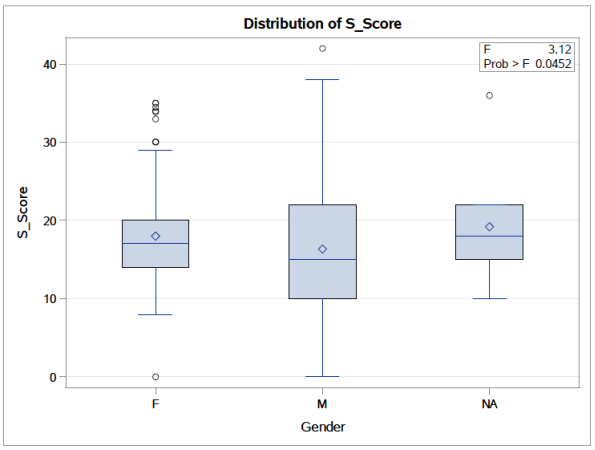

Figure 3-23. Plot of stress scores by gender.

However, when excluding the Gardiz region, women are shown to have reported significantly greater psychological symptoms than men, which is consistent with previous research on post-disaster populations (Enarson et al. 2007; Neumayer & Plümper 2007; Potangaroa et al. 2015).

Table 3-5. DASS scores by gender and region, Gardiz excluded.

		Region					
Gender		Herat	Karbul	Mazar	Overall	Overall Score	n
M	Depression	6.00	15.50	13.00	12.00	Mild	270
	Anxiety	4.31	13.00	13.00	12.00	Moderate	
	Stress	7.00	16.00	17.00	15.00	Mild	
F	Depression	10.00	18.00	16.33	17.00	Moderate	61
	Anxiety	8.58	17.50	13.00	16.00	Severe	
	Stress	16.50	18.00	18.00	18.00	Mild	
Overall	Depression	7.00	16.50	13.00	13.00	Mild	331
	Anxiety	5.00	16.00	13.00	12.00	Moderate	
	Stress	8.00	17.00	17.00	16.00	Mild	

It is significant that the only region where women experienced fewer negative psychological symptoms than men was also the only region where women greatly outnumbered men (84% of respondents in Gardiz were women), and that this demographic shift did not lead to equal psychological outcomes, but instead led to men being more affected. Different social and cultural patterns, due to the higher representation of women in the region, may explain the shift. It is possible that patriarchal Afghan and Islamic cultural norms—with men often carrying the ultimate responsibility as head of household—when combined with the low proportion of men to women in families, are placing more pressure on relatively fewer men. If this is the case, then the observed reversal in the usual gender disparity may in fact be due simply to increased burdens for men, rather than social or cultural adjustments leading to reduced burdens for women.

However, even if increased burdens on males is the main driver of the inequality reversal, household size is a poor predictor of these burdens and their subsequent impact on quality of life. For male respondents living in Gardiz, the best-fit relationship between household size and any of the psychometric dimensions is a moderate linear relationship only significant at $p < 0.1$ (coefficient: 0.42, $r^2 = 0.23$) (a very weak but statistically significant linear relationship, with a coefficient of 0.08, $r^2 = 0.047$, $p = 0.0002$, does emerge between depression and household size when examining the data for male respondents in all regions).

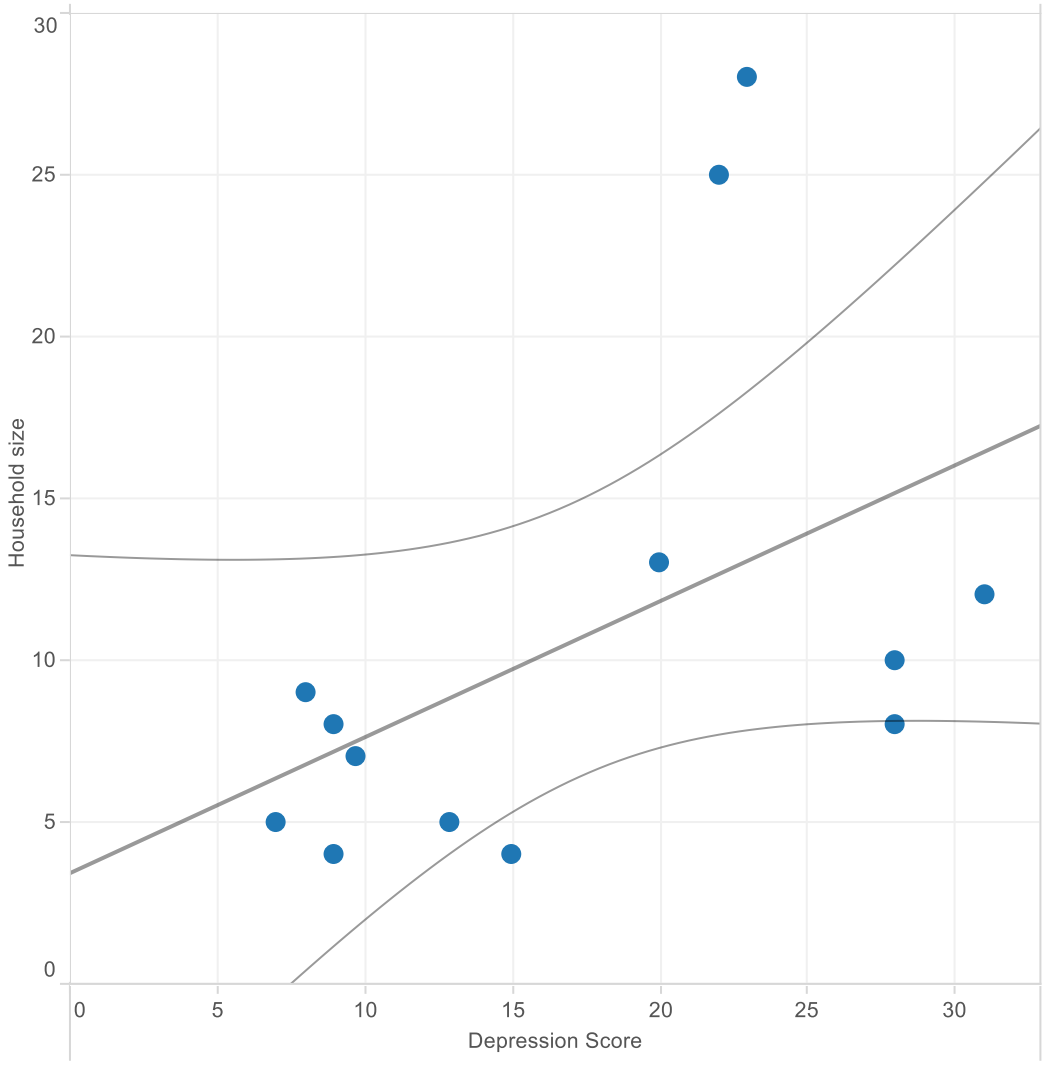

Figure 3-24. Plot of depression score versus household size, for male respondents in Gardiz.

When examining other gender-influenced demographic factors, the data showed only a mild (but consistent) increase in measures of depression, anxiety, and stress for households headed by women, which is an expected outcome in a society where women are restricted from many important social and economic roles and transactions. There was no statistically significant relationship between the number of pregnant and lactating mothers and any quality of life indicators. However, this could be due to the prioritisation of pregnant and nursing women's nutritional and healthcare needs that characterises many disaster responses (both in communal support and external aid dimensions).

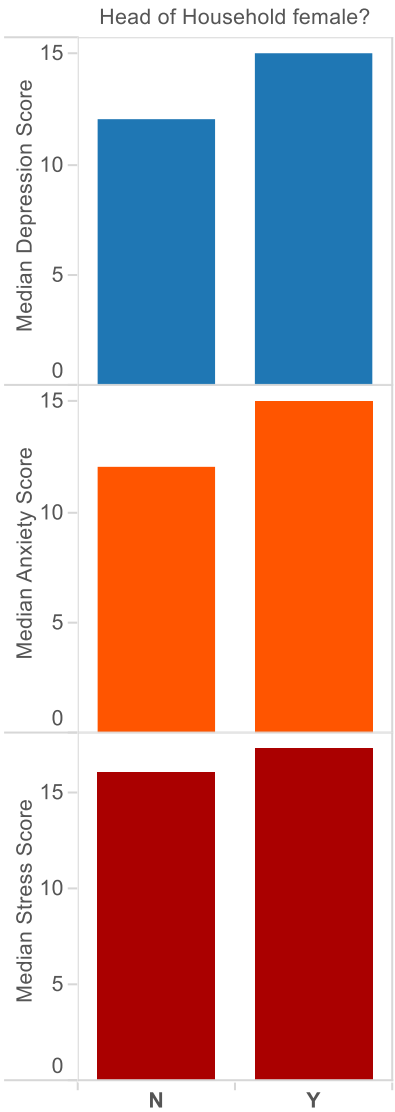

Figure 3-25. Median DASS scores for respondents living in female-headed households ('Y') and male-headed households ('N').

The data also reveals no consistent relationship between age and quality of life. Contrary to expectation, and the findings of past research on other communities, older respondents did not report consistently higher levels of depression, anxiety, or stress, with the exception of a single outlier in the Herat region (Phifer 1990; Phifer & Norris 1989; Potangaroa et al. 2015). Even though Afghanistan has been regularly censured by international organisations as one of the least hospitable countries in the world for the elderly, age was a poor predictor of the quality of life impact of flooding (HelpAge International 2015).

Table 3-6. Median DASS scores by age bracket and region. Respondents who did not indicate age are excluded.

		Region						
Age Group	Dimension	Gardiz	Herat	Karbul	Mazar	Overall	Overall Score	n
10-19	Depression	4.50		8.00	18.50	8.00	Normal	8
	Anxiety	8.00		9.50	11.50	8.00	Mild	
	Stress	18.50		7.50	24.50	17.50	Mild	
20-29	Depression	12.00	3.50	17.00	10.00	10.00	Mild	62
	Anxiety	14.00	1.58	18.00	13.00	12.92	Moderate	
	Stress	18.00	6.50	17.00	18.00	18.00	Mild	
30-39	Depression	8.00	7.00	16.00	13.00	11.85	Mild	105
	Anxiety	9.00	5.00	17.50	12.00	11.00	Moderate	
	Stress	15.54	7.00	16.50	20.00	16.00	Mild	
40-49	Depression	9.00	7.81	17.50	15.00	12.00	Mild	121
	Anxiety	10.00	4.19	15.50	12.00	11.00	Moderate	
	Stress	17.00	9.35	19.00	17.00	17.00	Mild	
50-59	Depression	6.00	7.00	17.00	13.50	13.00	Mild	74
	Anxiety	8.00	9.50	14.00	14.00	13.00	Moderate	
	Stress	17.00	10.50	16.00	18.00	17.00	Mild	
60-69	Depression	17.00			14.00	14.00	Moderate	40
	Anxiety	17.00			14.00	14.00	Moderate	
	Stress	21.50			13.00	14.50	Normal	
70-79	Depression	18.50	5.83		12.50	11.00	Mild	17
	Anxiety	16.50	2.15		13.00	10.00	Moderate	
	Stress	24.00	5.00		13.50	15.00	Mild	
80-89	Depression		14.00		11.38	12.00	Mild	5
	Anxiety		18.31		15.50	16.00	Severe	
	Stress		26.00		15.50	20.00	Moderate	
Overall	Depression	9.00	7.00	16.50	13.00	12.00	Mild	432
	Anxiety	10.00	5.00	16.00	13.00	12.00	Moderate	
	Stress	17.23	8.00	17.00	17.00	16.08	Mild	

The number of people with disabilities in a respondent's household did not show a statistically significant correlation to any psychological indicators until the $p < 0.15$ significance level. However, respondents reporting a higher number of disabled persons did have elevated median levels of depression, anxiety, and stress. Only 11 respondents (2.47%) reported having 3 or more disabled people in their homes. When combined with the significant disparity in quality of life when compared to households with 2 or fewer disabled members, this strongly indicates a tipping point for quality of life impacts that has led to the marginalisation of a small subset of families. Unfortunately, there is a critical paucity of information on the specific type and nature of the disabilities each family unit is dealing with, so further conclusions cannot be drawn.

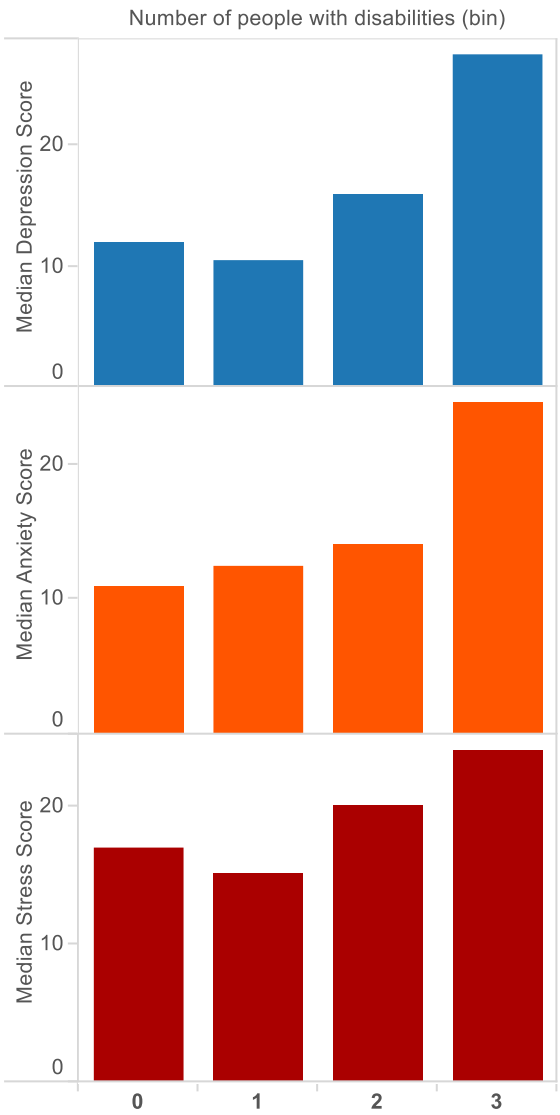

Figure 3-26. Median DASS scores by number of disabled people in respondents' households.

3.7 *Recommendations*

From the analysis of the extended DASS-42 quality of life data described above, several recommendations for future humanitarian operations in Afghanistan have been developed.

Assess critical needs outstanding and continue long-term interventions

The large proportion of the surveyed population still experiencing severe or extremely severe depression (26%), stress (13%), and anxiety (59%), even after the provision of permanent shelter, shows that recovery and reconstruction are far from complete. Further assessment should be undertaken to identify the remaining critical needs of these communities, especially in Karbul, and followed up with specific interventions to address the resource gaps identified. Even if the only aid provided is assistance in directing the communities to navigate to resources themselves, further action is necessary, either from within the affected groups or through external assistance. The anxiety-

dominant (future-oriented) aspect of the surveyed regions indicates that long-term, reconstruction-focused interventions are most suitable.

Target interventions for disadvantaged groups

Disadvantaged groups which were disproportionately affected by the disasters (or recovered slower) will need to receive an increased level of attention. Where possible, the specific causes leading to marginalisation of each subgroup, whether social, economic, or practical, should be addressed. The at-risk subgroups identified include:

- Residents of Karbul
- Large households
- Families with children under 5 years of age
- Women in all regions except for Gardiz
- Men in Gardiz
- Families with 3 or more disabled people in a single household

3.8 *Conclusion*

The assessment met its initial operational objective of identifying the most-vulnerable subgroups and gauging the current quality of life for shelter recipients. However, due to a lack of access to comparative or historical data, the effectiveness of the shelter response cannot be fully evaluated, although it appears to have been effective due to the relatively low median severity of psychological symptoms observed. Additionally, the provision of a permanent shelter solution has been validated by the anxiety-dominant aspect of the recipient population.

However, the significant portion of respondents still experiencing severe or extremely severe psychological symptoms indicates that recovery is incomplete and that further interventions, likely targeting other areas such as food security or finances, are necessary. Unfortunately, inconsistent administration of some of the survey extensions, due to complex field conditions such as multiple translations and cross-regional coordination, makes identification of these critical areas from the current data infeasible.

The academic objective of identifying factors that influence resilience and post-disaster quality of life was also met. The assessments show that while age was not a significant determinant of disaster impact, results were highly differentiated by geographic region, with Karbul being the most affected and Herat being the least affected. Larger households, households with three or more disabled persons, and households with more children under the age of five were also at increased risk of

adverse outcomes. Women were more affected in every region, except for Gardiz, where the gender discrepancy was reversed and men suffered from more severe psychological outcomes.

The operational usefulness of the extended psychometric approach was also clearly demonstrated, generating actionable recommendations for follow-up assessments of disaster victims' needs due to the clearly incomplete recovery, and for the targeted prioritisation of the identified marginalised subgroups in future aid programmes. This assessment approach can be repeated in the same context, with more standardised administration practices, to gain a clear picture of the effectiveness of future aid and the evolving recovery of these communities over time.

4 CASE STUDY: SURVIVORS OF TROPICAL CYCLONE PAM IN VANUATU

4.1 *Abstract*

Psychometric assessments of the current residents of the village of Laonkarai on Efate in Vanuatu reveal that although the villagers demonstrated a resilient response to Tropical Cyclone Pam, women were undoubtedly more affected by the disaster. The study also finds that food and income security remain key concerns for the villagers. This chapter explores in detail the assessment methods, resulting data, and recommendations for future humanitarian actions in the area.

4.2 *Context*

Highly vulnerable to multiple natural hazards, including earthquakes, volcanoes, and cyclones, Vanuatu is regarded as the most disaster-prone country in the South Pacific(UNICEF 2005), ranked first in Birkmann's disaster risk index (Birkmann et al. 2011; UNICEF 2005). Most local villages contain traditional buildings with special designs to withstand the extreme winds of tropical cyclones, a seasonal threat.

The population of Vanuatu is geographically divided—the archipelago contains 83 islands and only 279,400 people (Vanuatu National Statistics Office 2015). This geographic division makes culture and customs hard to generalise across the country; even language is highly localised, with more than 100 different dialects (Lynch 2001). In more remote regions, chiefs have more control over daily life than the national or regional governments, and local *kastom* and tradition carry more significance than law (UNICEF 2005). The population of Vanuatu is predominantly Christian.

Vanuatu has few social services and many informal settlements. Access to lifeline services such as running water and power is highly variable, even within regions, and dependent more on geography than individual or community resources (Vanuatu National Statistics Office 2010).

Almost 50% of ni-Vanuatu household expenditure is on food (Abbott 2008). Food price spikes are the most prevalent type of shock event to affect households in Vanuatu (Feeny et al. 2013).

The national average household size is 4.9, and children under 15 account for 40% of the population (Vanuatu National Statistics Office 2010). Access to secondary and tertiary education is uneven.

In March 2015, Tropical Cyclone Pam swept across Vanuatu, affecting 158,000 people on 23 islands, especially the more heavily populated Efate and Tanna. In June and July 2015, near the beginning of the transition from response to early recovery, our research team conducted a pilot observation of the small village of Laonkarai on northern Efate, with the goal of developing a localised Resilient Villages framework and identifying the needs of the affected population.

4.3 *Objective*

This research was conducted to support the development of a broadly applicable approach for enhancing resilience in small communities in developing island nations throughout the Pacific, the Resilient Villages Approach. Well-being was identified as both a core component and key 'lever' to enable community resilience, and can also influence social cohesion, another core component of the framework. In addition, objectively measuring well-being enables the effective identification of those most affected by disasters, as well as providing a proxy for measuring post-disaster resilience.

Gathering this individual- and household-specific information is critical for measuring resilience and targeting aid, as covariate shocks that affect entire communities or regions (e.g. disasters) are often exacerbated or enhanced by idiosyncratic shocks that affect individuals or families (e.g. job loss, family deaths). For many of the affected, a natural disaster is not a single event, but merely the initiating cause of an ongoing series of traumatic events.

The goal of this research effort was to establish the operational effectiveness of using a psychometric approach to evaluating disaster impact and resilience in the Vanuatu context, by

- Gauging the resilience of the affected villagers,
- Determining the most-affected subgroups,
- Evaluating their readiness for recovery and reconstruction interventions, and
- Assessing their current and ongoing needs.

Figure 4-1. Graffiti in Port Vila, Efate after Tropical Cyclone Pam.

4.4 *Methods and approach*

The extended DASS-42 was utilised to assess quality of life as a proxy measure for disaster impact and resilience. The DASS was translated to Bislama and validated by two separate linguists.

Validation was necessary to prevent minor errors, ensure that the few DASS questions that are idiomatic in nature were translated to appropriate local equivalents, and to review the survey for cultural fit (for example, debt and temperature security/heat are of less functional importance to ni-Vanuatu villagers than villagers in other countries).

The standard method for administering the survey as a post-disaster assessment tool is to do so in an interview style with individual respondents (not as family units or couples), after a training pilot to standardise the approach. The standard time for a trained administrator to deliver the survey is approximately 15 minutes (Potangaroa et al. 2015).

In this instance, time constraints (due to the requirement for a translator for verbal interviews) forced the team to use an abbreviated approach at the Laonkarai village: after several interviews conducted with single respondents, the remaining adults in the village completed the surveys individually by hand. The less-private, self-administered method may have affected the small-scale consistency of results, but does not invalidate the usefulness of the overall psychological indicators and demographic/concerns data.

Assessment was conducted on June 26, 2015 for 14 adults from Laonkarai village (all of those present in the community at the time over the age of 18). Possible obfuscating factors include: the mixed method of interviews and individual completion, the nonprivate setting for some respondents, and the inability of some respondents to readily distinguish between the mid ranges of the Likert scale when the DASS was verbally administered (conservative tiebreakers were used where this situation was recognised – choosing the lower of the two possibilities).

4.5 *Results & Analysis*

The median household size for the Laonkarai village was 5 people, with one child under 5. The median age of respondents (adults over 18) was 45. Ten of the fourteen respondents were female, and one of the men was not a permanent resident of the village. The 30-year-old visitor was the only adult male present younger than 54. Based on conversation with the villagers, the absence of younger adult men appeared to be due largely to absent fathers and husbands who had left the village to find employment in other regions or countries.

Overall, this community is highly resilient when compared to other post-disaster communities using the DASS results, which is consistent with the subjective observations of the research team. Women were more affected by Cyclone Pam—each indicator of psychological distress is one to two scales of severity higher for women when compared to scores for men (see Table 4-1. **DASS results by gender.**Table 4-1), which indicates an unusually disparate effect across genders, as previous post-disaster communities assessed using this method have only shown a gender divide of one degree of severity (Potangaroa et al. 2015). This may be heavily influenced by Vanuatu's chronic record of

gender inequality, with 60% of ni-Vanuatu women experiencing physical or sexual violence in 2011—one of the highest prevalence rates in the world—and 32% reporting that they did not choose their husband (CARE 2015). Additionally, several women and the visiting man reported severe or extremely severe depression, anxiety, and stress.

Table 4-1. DASS results by gender.

	Depression	Anxiety	Stress	n
Male	5.5 Normal	7.5 Normal	8 Normal	4
Female	11.5 Mild	13.5 Moderate	22.5 Moderate	10
Total	9 Normal	13 Moderate	18.5 Mild	14

Surprisingly, younger respondents were more affected than older villagers, especially two of the young women who were functioning as heads of household. Older members of the community, however, were not as affected (see Table 4-2).

Table 4-2. DASS results by age.

	Depression	Anxiety	Stress	n
Under 30	17 Moderate	20 Extremely Severe	31 Severe	3
30-39	21 Severe	13 Moderate	17 Mild	3
40-49	6 Normal	10.5 Moderate	10 Normal	2
50+	7.5 Normal	10.5 Moderate	15 Mild	6

The evidence of a forward-facing mindset, observed by the research team in the villagers' eagerness to make long-term plans for the future, matches the future-focused psychological state indicated by their consistently anxiety-dominant DASS results. The village is clearly already ready for long-term interventions that require high levels of participation.

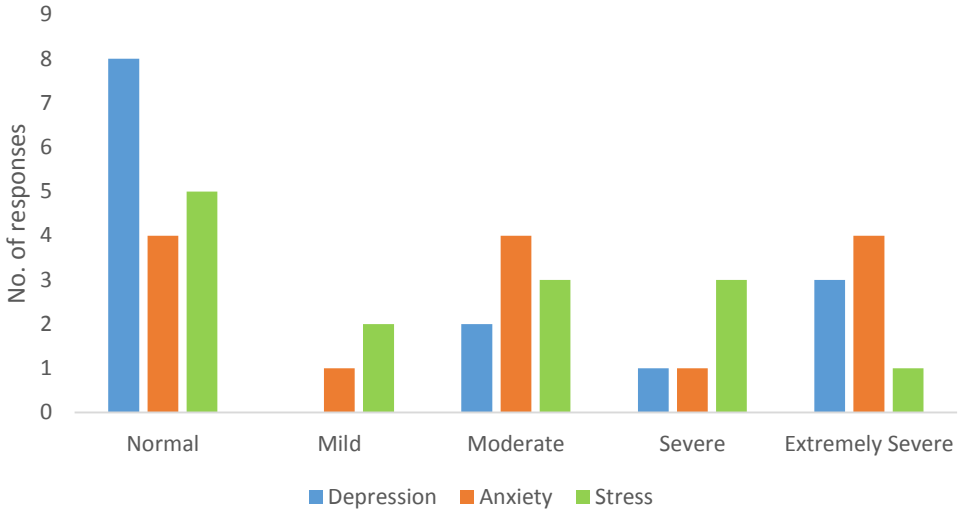

Figure 4-2. Frequency of severity indicators for DASS dimensions, all respondents.

Respondents reported a significant increase in needs and concerns after the cyclone, especially regarding food security (see Fig. 4). Housing was previously a top concern for aspirational reasons; before the cyclone, villagers wanted to upgrade their current functional shelters to more Western designs (concrete block construction and metal roofing, as opposed to traditional timber with banana leaf roofing).

However, despite their location (on Efate, near the capital, with directly adjoining transport access via the coastal road), the villagers are concerned about food supplies in the future. Financial concerns were also largely fuelled by the perception of food insecurity. The destruction of local traditional fruit crops by the cyclone, combined with country-wide agricultural devastation due to Pam and an oncoming dry season, will only increase pressure on the villagers' ability to procure food. Locals stated that they do not expect their agricultural capacity to fully recover for at least 3 years (based on historical regrowth patterns for leaf-stripped crop trees), even given optimal conditions.

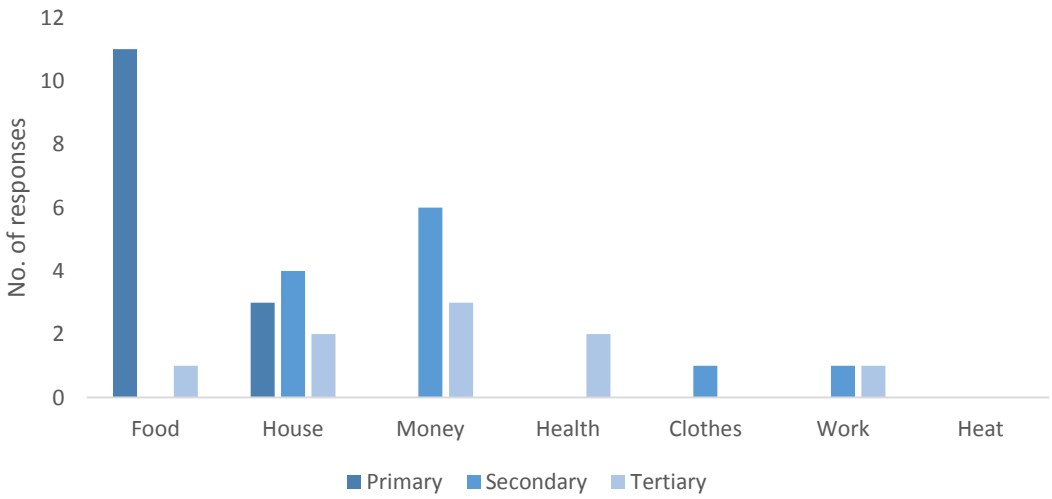

Figure 4-3. Self-indicated needs and concerns of villagers after Cyclone Pam.

The research team also observed that money and jobs/income were critical concerns for the villagers; reliable income sources with the potential for growth were not identified by any of the villagers, and most families appeared to be relying on remittance from male family members working abroad or in other regions.

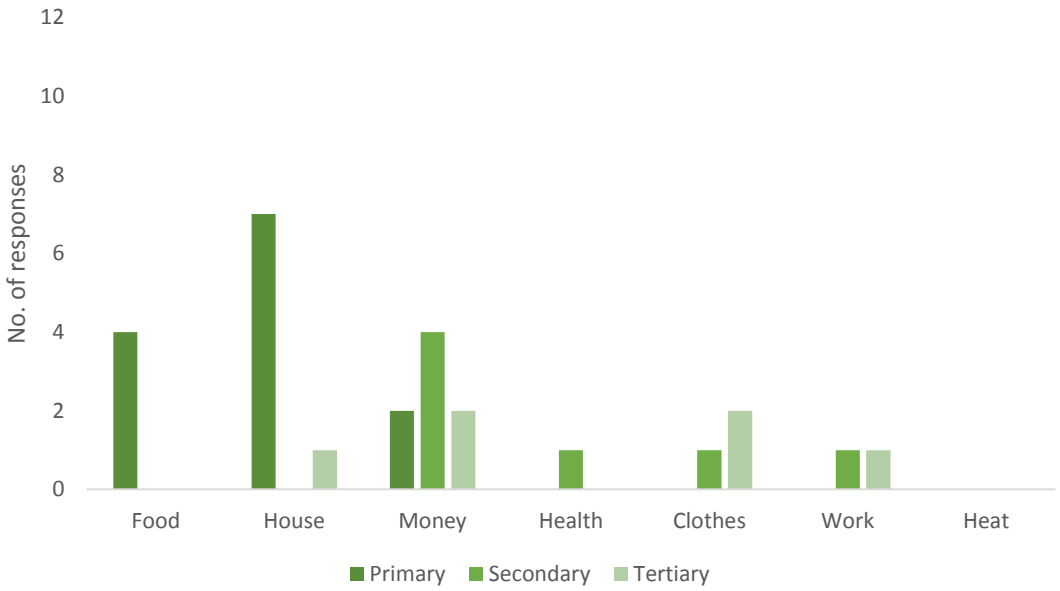

Figure 4-4. Self-indicated needs and concerns of villagers before Cyclone Pam. Some villagers reported no concerns before the cyclone.

Figure 4-5. The windswept remains of a nearby village on northern Efate.

Two mild physical disabilities identified did not seem to significantly affect household well-being. The only significant demographic factors with female heads and households with higher numbers of

young children, both of which were correlated with slightly higher indicators for depression (see Tables 4-3 & 4-4).

Table 4-3. DASS Results by head of household gender.

	Depression	Anxiety	Stress	n
Male Head of Household	7.5 Normal	11 Moderate	19 Moderate	10
Female Head of Household	11.5 Mild	13 Moderate	18.5 Mild	4

Table 4-4. DASS Results by number of young children.

# Children Under 5	Depression	Anxiety	Stress	n
0	9.5 Normal	10 Moderate	20 Moderate	4
1	7.5 Normal	11 Moderate	17.5 Mild	6
2	15 Moderate	16 Severe	18.5 Mild	4

Two households—one headed by a woman widowed in the month previous, and one whose eldest female was bedridden with terminal cancer—leapt out as experiencing the most material hardship and psychological distress, both by observation and by measurement.

It should be noted that while aggregate measurements of psychological wellbeing for the village at large were below expected for a community in the response and early recovery phases following a disaster, 28% of the villagers surveyed scored ‘severe’ or ‘extremely severe’ on multiple indicators. Despite Laonkarai’s impressive resilience, there is still a long road to recovery: in a clinical setting, a respondent with such high indicators would likely be referred for extensive psychiatric evaluation and possible treatment.

4.6 *Discussion*

The psychological wellbeing of individuals is a critical component of the community’s resilience. Mentally healthy households with future-facing perspectives will be more likely to seek and negotiate

for resources, and better equipped to do so. Psychological wellbeing will also affect the likelihood of villages to build on aid they receive after a disaster.

Several key observations may be useful to account for when examining the post-Pam humanitarian operating context in Vanuatu. The first of these is the significant cultural division among men and women that was evident in ni-Vanuatu daily life in the regions observed by the team. Men and women sat separately in churches and were rarely seen walking together, the large outdoor kitchen used by the community was a women's area, men moved out of the village to seek work while the women stayed with the children, and the local culture of kava bars appeared to be male-dominated. This highly differentiated aspect of ni-Vanuatu work and culture may account in part for the uneven psychological effect across genders measured by the DASS.

It is also important to note that even though Laonkarai village was not as severely affected by Cyclone Pam as it could have been (with intact homes and no deaths), they are now highly vulnerable to a secondary-onset disaster, such as an extended drought or another cyclone, and will be for some time. Food security will continue to be a concern for years to come unless income or agricultural capacity increase significantly.

Additionally, it was apparent to the team that secondary education access is critically lacking for many ni-Vanuatu, as has been noted by organisations operating in the area; up to 50% of ni-Vanuatu children may not have access to secondary education (UNICEF 2005). Uneven education access limits future obtainment of stable and higher-paying employment, leading to lower wellbeing, and exacerbating disaster impacts such as food insecurity.

A final observation of particular importance to humanitarian operations in Vanuatu is the difference between urban and rural coping responses, especially in regards to food scarcity. Urban and semi-urban settlements have greater access to critical services, but may also be more vulnerable to food supply shocks. The most prevalent coping response to a food shock in Vanuatu and the Solomon Islands is sourcing more food from gardens (Feeny et al. 2013). This unevenly affects rural and urban communities: the average ni-Van household produced 58% of their own food consumption as of 2010, but urban dwellers produce drastically less (Vanuatu National Statistics Office 2010). Additionally, rural dwellers after a disaster will prioritise feeding their own families before bringing food to market. As a result, disaster management plans and resilient community planning need to account for different food security strategies, which are of utmost importance in a geographically fragmented and isolated nation like Vanuatu.

4.7 *Operational recommendations*

Several key recommendations for enhancing future community resilience, and for effective recovery and reconstruction, are identified below.

Prioritise aid to female-headed families with young children

Women, female-headed households, and homes with children under 5 years of age were demonstrably more affected by Cyclone Pam, and remain the most vulnerable. Early recovery interventions should prioritise these vulnerable subsets of the population. It is also important to distinguish that households nominally headed by men are functionally female headed if the men are working in other regions or nations.

Focus on food security and income interventions

Livelihood restoration, one of the key priorities for early recovery identified in the Tropical Cyclone Pam Humanitarian Action Plan, is extremely crucial for the continued recovery and future resilience of Laonkarai and similar villages (Vanuatu Country Team 2015). Concerns regarding steady income have forced family units to split and continues to be a source of stress and vulnerability for families. Income uncertainty also influences both the perception and reality of food security for villages—another priority, especially with the oncoming dry season.

While migrant working schemes disrupt family units, earlier research has shown that the least vulnerable South Pacific households are those with working members who can provide remittance (Feeny et al. 2013). Since these workers are not co-located, their ability to work is not disrupted by local disasters. While this perceived reduction in vulnerability must be carefully balanced against the social costs of temporarily divided family units, and the resilience reduction due to absent community members, the migration of male heads of household to seek work is already a common pattern in Vanuatu and the Pacific. Improving access to and income through programmes such as New Zealand's Regional Seasonal Employer scheme may increase resilience for some communities.

Monitor aspirational building for design safety

The Vanuatu Shelter Cluster reported that traditional ni-Van cyclone shelters withstood Pam very well. However, the research team, as well as humanitarian actors in the area, observed that in many villages, people often did not prefer to build or rebuild with traditional materials and designs—they often aimed to build houses with metal roofing and concrete blocks. However, when houses are constructed in this fashion without proper consideration to design and construction technique, they can be highly vulnerable to cyclones and dangerous to occupants (as demonstrated during Pam).

Engage three key tiers of civil leadership: chiefs, regional government, and the NDMO

Any interventions to aid in recovery or increase future resilience on a village/community level must engage the local chiefs, who often carry more practical authority than national and regional

governments. Additionally, the regional government cannot be bypassed or overlooked in a nation so geographically divided, and any resilience initiatives should be designed to fit well with the National Disaster Management Office's operations. Of particular use are the Community Disaster Centres that served as hubs for providing shelter and coordinating information and aid after Cyclone Pam.

Consider the cultural appropriateness of interventions

Although cultural considerations are a common refrain in aid and development, in Vanuatu there were many anecdotal observations of inappropriate interventions. Of special note were poorly designed or poorly constructed housing using Western styles or materials, and the provisions of culturally inappropriate food aid.

4.8 *Conclusion*

While the ni-Vanuatu people appear to be highly resilient, women appear to have been more significantly affected by Tropical Cyclone Pam than men. There are also several key vulnerabilities, notably food and income security, that need to be addressed. In order to close these resilience gaps, and enable the ni-Vanuatu people to withstand future disasters, as well as to more fully develop the Resilient Villages framework in the Vanuatu context, pilot interventions should be tested in various regions, and more extensive data should be gathered from a variety of sites.

The study met the initial objectives of gauging disaster impact and resilience for affected villagers, determining vulnerable subgroups, evaluating their readiness for long-term interventions, and assessing critical needs. However, the limited scope of the assessment prevents the development of accurate conclusions about island- or nation-level trends after Cyclone Pam. Now that the psychometric evaluation approach has been validated and demonstrated in the Vanuatu context, it should be applied on a broader scale to enhance the quality of humanitarian aid for the ni-Van people.

Figure 4-6. A boat washed ashore by Cyclone Pam in Port Vila Harbour.

5 LESSONS LEARNED: CONSIDERATIONS FOR FUTURE ASSESSMENT

Several considerations for future implementations of this assessment method for humanitarian operations and academic contexts were identified during the course of the study.

5.1 *Need for control group when assessing aid recipients*

Some elements of the research approach, influenced by field practicalities, limit the scope of conclusions that can be drawn from the data. In Afghanistan, only recipients of shelter aid from UNHCR were assessed, with a resultant bias and accompanying blind spots in the data available. Without also surveying community members who did not receive aid, disparities in outcomes, especially for disaster victims who almost but not quite qualified for aid, cannot be examined.

5.2 *Need for baseline data*

Although the operating context of humanitarian aid, especially in disaster situations, precludes the opportunity for establishing pre-event baseline data, pre-intervention baselines should be established. This will allow for more accurate measurement of the effectiveness of the interventions conducted (such as the shelter response in this study). As the extended psychometric survey method used in this study is most useful in identifying at-risk subgroups and the appropriate timeline for aid, assessments should be conducted prior to delivering aid. This will enable a more targeted, effective response in the short-term, while yielding valuable information on the effectiveness of various approaches in each disaster situation, which can be used to optimise future responses. The quality of life assessment method examined here will yield even more operationally useful data if re-administered to the same populations in a longitudinal format to monitor changing conditions over time after the provision of relief or the onset of follow-on events (such as the El Nino drought in Vanuatu following Tropical Cyclone Pam).

5.3 *Need for consistent training on administration for assessors*

An important element of the extended survey is the brief-format indication of self-identified needs. Unfortunately, in Afghanistan, this data was not gathered in a consistent format even within regions, and was subsequently not useable for the research informing this study. In Vanuatu, the entire survey was administered unevenly—some surveys via interviews, others by respondents privately filling survey forms, and others by respondents filling forms in a group format. It was clear to the author that some people in the group format were concerned that others might be looking at their responses, which undoubtedly influenced their response choices.

Future assessments following this format will need to involve short-term pilot assessments in the same region, even if only on a micro scale. This will allow for the identification of any ambiguities in instructions for the assessment team that could lead to data corruption. Consistency in assessment practices will be even more critical when several assessments will be conducted over time to monitor the progress of recovery or measure the effectiveness of interventions.

5.4 *Potential for streamlined data collection*

Future implementations of this assessment method could utilise the DASS-21 survey, a short-form psychometric assessment designed to yield results with similar clinical utility (Mitchell et al. 2008). This would either reduce the manpower and time required for assessments of the same size, or allow for more thorough assessment of each community. Additionally, data collection could be conducted digitally through mobile devices, using open-source survey platforms designed for field use (such as KoboToolbox). Digital data collection, while not appropriate for all field conditions, would allow for the quick aggregation of data for immediate analysis for operational use, and help to reduce data input/transcription errors.

6 CONCLUSION

The operational use of the extended DASS-42 psychometric assessment to measure resilience and disaster impact via quality of life indicators has been validated both in past research and in the case studies analysed in this thesis (Potangaroa et al. 2015; Santosa et al. 2014). In addition to resilience and impact, these indicators can be used to identify marginalised subgroups, analyse the suitability and effectiveness of aid interventions, and compare post-disaster quality of life and resilience regardless of region, culture, or hazard.

A recurring theme in this and other studies is that women are almost universally more affected by disasters, with some small exceptions. In a majority of cultural and geographic contexts, women in general, and not just pregnant or single mothers, should be considered an at-risk subgroup for purposes of assessment and aid targeting. The fact that these impact gaps exist in so many cultural contexts indicates that greater net community resilience can be achieved in many situations through disaster risk reduction initiatives that target women and reduced their disparate vulnerability.

Future research utilising the extended DASS-42 should focus on longitudinal studies to analyse the evolution of disaster recovery in communities over time, and to quantify in human-impact terms the effectiveness of interventions in specific situations. The lessons learned in the many studies conducted using this assessment tool in Afghanistan, Vanuatu, and other post-disaster contexts could also be distilled into an operational guide for maximising the benefit of its use in humanitarian operations. The assessment method should also be refined to develop a more granular approach to identifying people with disabilities and allow for the study of resilience and disaster impacts in regards to specific disabilities, rather than grouping all types and severities of mental and physical impairments under a single indicator.

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