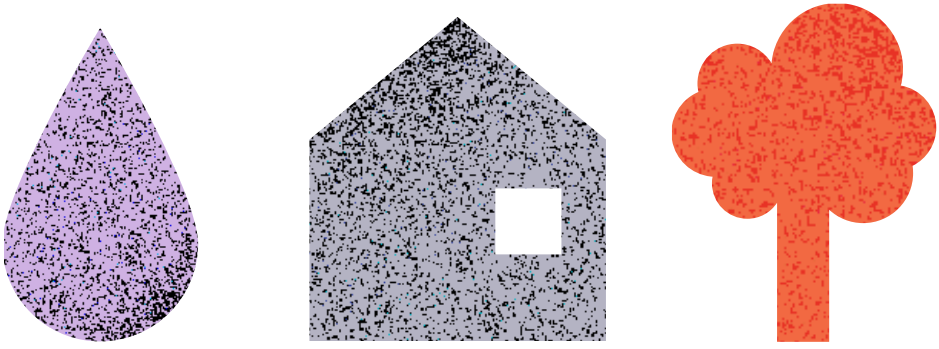
EQUALITY INSIGHTS

Implemented by IWDA INTERNATIONAL WOMEN'S DEVELOPMENT AGENCY

# Equality Insights Rapid

## EXAMINING WATER, SHELTER AND ENVIRONMENT IN THE CONTEXT OF THE TONGAN VOLCANIC ERUPTION

JUNE 2023



## ACKNOWLEDGEMENTS

We are grateful to the participants who contributed their time to this survey.

This project was undertaken in collaboration with, and made possible by, the team at the Tonga Statistics Department (TSD) and staff at the Ministry of Internal Affairs, Women's Affairs and Gender Equality Division (MIA/WAGED) in Tonga. For full acknowledgements and further information see *Equality Insights Rapid:* Report, Tonga Survey 2022.[i]

This brief was developed from work undertaken by Rebecca Roebuck from Social Impax.

Any errors or limitations in the work are the sole responsibility of the *Equality Insights* team at the International Women's Development Agency (IWDA).

The current *Equality Insights* program is a partnership between IWDA and the Australian Government through the Department of Foreign Affairs and Trade (DFAT). We extend particular thanks to the Australian High Commission in Tonga, and to the Gender Equality Branch in Canberra.

Australian Aid

Tonga Statistics Department


i Carroll, M., Greaves, A., Crawford, J., Pradela, J., 2023. Equality Insights Rapid: Report, Tonga Survey 2022, Melbourne: International Women's Development Agency

# Contents

82%

OF INDIVIDUALS IMPACTED BY NATURAL HAZARDS.

86%

OF HOUSEHOLDS REPORTED THAT AIR POLLUTION (AIR THAT SMELLS BAD OR MAKES YOUR EYES OR THROAT STING) HAS BEEN A SIGNIFICANT PROBLEM AT OR NEAR THEIR HOME IN THE LAST 12 MONTHS.

75%

OF HOUSEHOLDS IDENTIFIED THAT WATER POLLUTION HAS BEEN A SIGNIFICANT PROBLEM AT OR NEAR THEIR HOME.

WATER POLLUTION IS WATER THAT SMELLS, MAKES YOU SICK WHEN YOU DRINK IT, OR ITCHY WHEN YOU WASH IN IT, AS WELL AS OPEN DRAINS WITH SEWAGE, OR POOLS OF WATER WHERE MOSQUITOS OR OTHER DISEASE CARRYING INSECTS BREED.

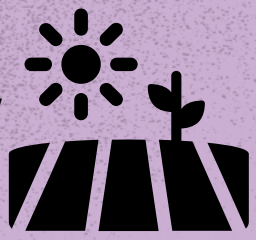
A SIGNIFICANT PROBLEM WITH SOIL POLLUTION WAS EXPERIENCED BY 56% OF HOUSEHOLDS AT OR NEAR THEIR HOME.

SOIL POLLUTION CAN REFER TO LARGE AMOUNTS OF RUBBISH OR A WASTE DISPOSAL SITE, STORAGE OR DISPOSAL SITES OF UNSECURED AGRICULTURAL OR INDUSTRIAL CHEMICALS, OR OTHER HAZARDOUS WASTE.

52%

RESPONDENTS EXPERIENCED WATER INSECURITY FOR A PERIOD OF AT LEAST ONE TO TWO MONTHS.

PEOPLE LIVING IN RURAL AREAS REPORTED ISSUES WITH WATER SECURITY OVER LONGER PERIODS OF TIME.



PEOPLE WITH A DISABILITY AND PEOPLE LIVING IN RURAL AREAS WERE MORE LIKELY TO REPORT BEING SEVERELY IMPACTED BY NATURAL HAZARDS THAN THE TOTAL POPULATION.

87%

REPORTED THEIR RESIDENCES PROTECTED THEM ALL OF THE TIME OR MOST OF THE TIME FROM OUTSIDE ELEMENTS.

## BACKGROUND

The Hunga Tonga-Hunga Ha'apai volcano eruption in January 2022 caused immediate and lasting impacts across Tonga. In the context of this significant event, the focus of this research brief examines the Water, Shelter and Environment dimensions of the *Equality Insights* survey implemented in Tonga between May-June 2022. While the survey was conducted within four months of the eruption and tsunami, the majority of questions presented asked respondents to recall information for the past 12 months, and therefore may reflect other considerations beyond the impacts of the volcanic eruption. However, the results provide important insights on the experiences of households and individuals which may support ongoing recovery and future disaster preparedness planning.

A key objective of this research brief is to explore how the results for the four dimensions of Water, Sanitation, Shelter, and Environment interrelate, as well as the distribution of dimensions across key demographic areas of interest (age, gender, disability, and location).

Results pointed to significant levels of air and water pollution as well as water insecurity. Given the timing of the survey, it is likely at least some of these findings relate to the impacts of the volcanic eruption. While the population as a whole reported being affected by natural hazards (83% of respondents reported adverse impacts from a natural hazard in the past 12 months), delving below the aggregate to look at specific cohorts gives an indication of where ongoing efforts to respond and repair can address those most vulnerable, and inform future efforts for preparedness.

## SURVEY METHODOLOGY

*Equality Insights* is IWDA's flagship program, which has a focus on individual-level, gender-sensitive measurement of multidimensional poverty and inequality influenced by various social, economic and environmental factors and contexts. This poverty and inequality measure was implemented in Tonga in 2022 using *Equality Insights Rapid* - a new, shorter, phone-based survey that measures deprivation across 15 dimensions of life. All adults in a sampled household are surveyed individually, with a complimentary household survey used to identify all eligible household members and collect information on a limited number of questions where circumstances are reasonably similar for all household members.

A representative, multi-stage cluster sampling approach was utilised to gather survey responses from across Tonga. Five strata were identified following the Tongan Statistics Department formal census designations. Responses were gathered from people residing in Tongatapu, Vava'u, Ha'apai, and Eua. Niuas was excluded based on its remote location and limited population size.

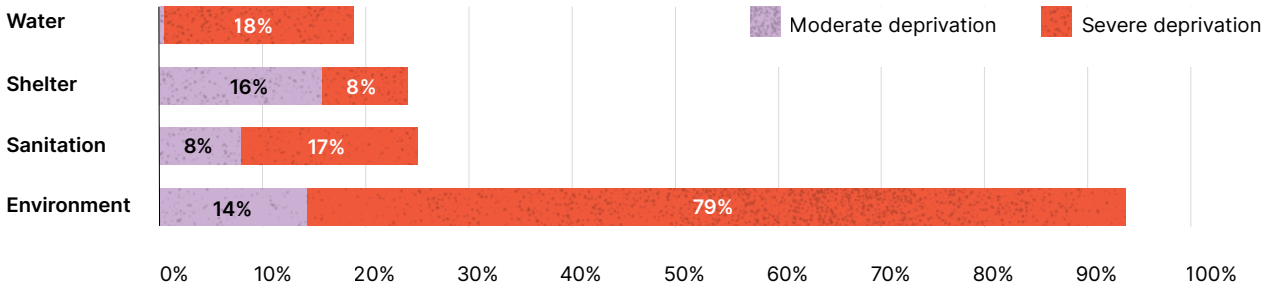
Data collection took place over seven weeks from early May 2022 to 30 June 2022. Survey instruments, study design, findings and results were shared and contextualised with the Tonga Statistics Department (TSD).

The final dataset included 6,703 individuals from 2,551 households. Results presented in this report are weighted to be representative of population levels.

# Overview

*Equality Insights Rapid* measures deprivation across 15 dimensions, or areas of life. This brief focuses on findings from four dimensions: Environment, Sanitation, Shelter, and Water.[ii] Environment deprivation was common, with 94 percent of individuals meeting the threshold for moderate or severe deprivation. Deprivation in other dimensions was less common, with between 18 percent and 25 percent of individuals meeting the threshold for deprivation in each dimension.

*Figure 1. Proportion of people experiencing deprivation across key dimensions*




Looking at individual items within these dimensions provides further insight into the drivers of deprivation, and how individuals within different groups may be impacted differently.

ii For details on how levels of deprivation are classified see Equality Insights Rapid: Report, Tonga Survey 2022

# Impact of natural hazards

Natural hazards are extreme events that occur naturally and include events such as cyclones, earthquakes, volcanic eruptions, tsunamis, and floods among others. Tonga is susceptible to many of these natural hazards.

The survey findings reflect the reality that natural hazards considerably impacted the Tongan population in the 12 months prior to June 2022. In the context of the Hunga Tonga-Hunga Ha'apai volcano eruption and subsequent tsunami in January 2022, this is unsurprising. However, with Tonga's susceptibility to such natural hazards, a further examination of the findings can provide useful information for future planning.

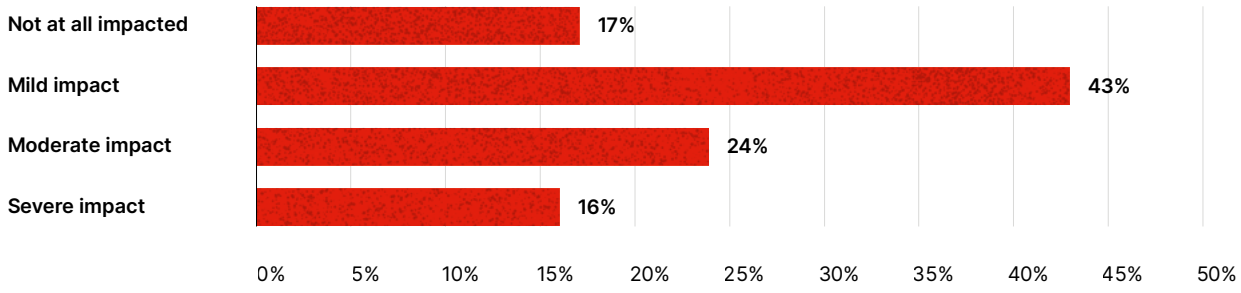
## IMPACT ON DAILY LIVES

In total, 82 percent of the individuals surveyed in Tonga reported that their daily activities had been impacted by natural hazards in the past 12 months.[iii]

Overall, 40 percent of respondents reported being either severely (16%) or moderately impacted (24%) by these hazards (Figure 2). Forty-three percent reported being impacted only to a mild extent.

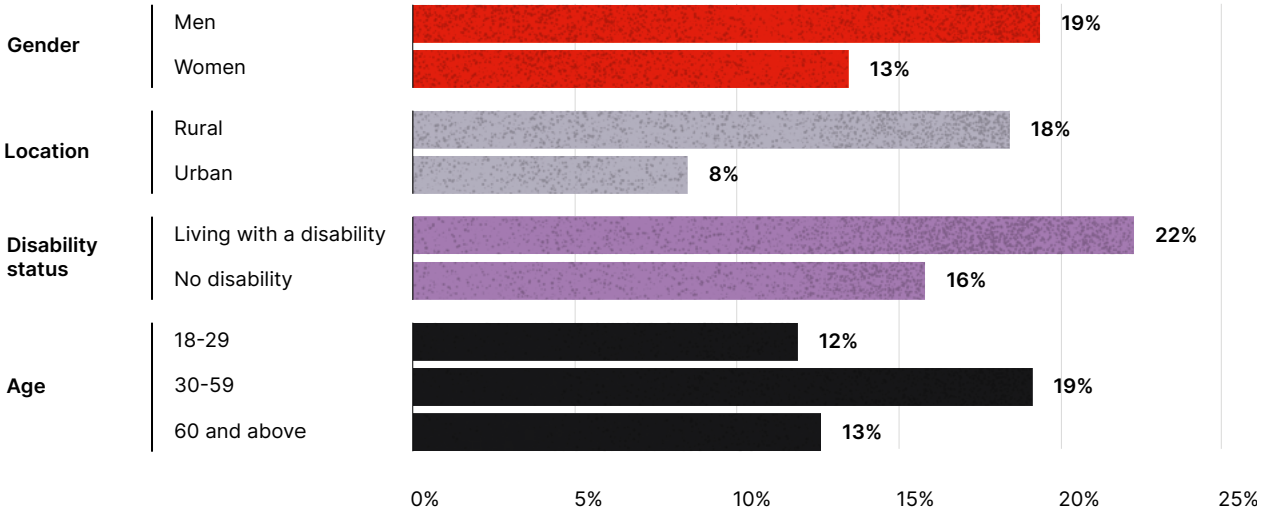
Some demographic groups were more likely to report being severely impacted in their daily lives (see Figure 3). This included people with a disability[iv] (22%), people living in rural areas (18%) and men (19%). Further breakdown of those living in rural areas showed people from 'Eua and Ha'apai were more likely to report being severely impacted (30% and 32% respectively) than those from rural Tongatapu (19%) or Vava'u (1%).

*Figure 2. Proportion of individuals experiencing impact from natural hazards (by extent of impact)*




iii There seems to be a geographic variation in the experience of impact by individuals.
iv Disability is defined using the six-item Washington Group Short Set of Disability Questions[1]

*Figure 3. Proportion of individuals within demographic groups who reported their daily lives were severely impacted by natural hazards*




## IMPACT ON PLACES WHERE PEOPLE LIVE

In relation to their residences, more than half (59%) of Tongan households reported experiencing a harmful impact on their property from natural hazards in the past year. For many households, the impact was mild (47%) or moderate (10%). Only 1.85 percent reported a severe impact on their property. When asked about air, water or soil pollution at or near their home, however, a high percentage of respondents highlighted significant problems in the past 12 months (see Figure 4).[v]

Most household respondents (86%) reported that air pollution (air that smells bad or makes your eyes or throat sting) has been a significant problem at or near their home in the last 12 months. Seventy-five percent of household respondents also identified that water pollution has been a significant problem at or near their home (including water that smells, makes you sick when you drink it, or itchy when you wash in it; open drains with sewage; or pools of water where mosquitos or other disease carrying insects breed). More than half of the households (56%) reported a significant problem with soil pollution in the past 12 months at or near their home (such as large amounts of rubbish or a waste disposal site; storage or disposal sites of unsecured agricultural or industrial chemicals, or other hazardous waste).

There was little difference between gender or age group in experience of pollution. However, a higher frequency of respondents from rural areas, compared to urban locations, identified a significant problem in the past 12 months with pollution impacts, and especially water pollution (see Figure 4). Results by island group show that while experiences of air pollution were relatively consistent across the Kingdom, water pollution was more commonly experienced by households in ‘Eua (85%), rural Tongatapu (84%) and Ha’apai (79%). Experience of soil pollution showed the greatest variation by island group, ranging from 81% of households in ‘Eua and 65% of households in rural Tongatapu to only 19% of those in Vava’u.

A small number of households (2.2%) reported having relocated since November 2021.[vi] Households that relocated in the past 12 months were more likely to have experienced impacts of natural hazards (see Figure 5). Seventy-two percent of those moving had experienced impacts from nature hazards compared to 58 percent of those that did not relocate. Thirty-two percent of those that relocated also experienced severe or moderate impacts, rather than 12% among those who had not relocated.

v It is not evident from the survey if this level of pollution was a change and/or if related to the volcanic eruption. The reported problems may be due to other pollution causes.

vi This question was included primarily for administrative reasons, and was designed to determine whether households had relocated since the census data that was the basis of the sampling frame were collected. Reason for relocation was not asked.

*Figure 4. Proportion of households that experienced a significant problem with pollution in past 12 months by type of pollution and location*

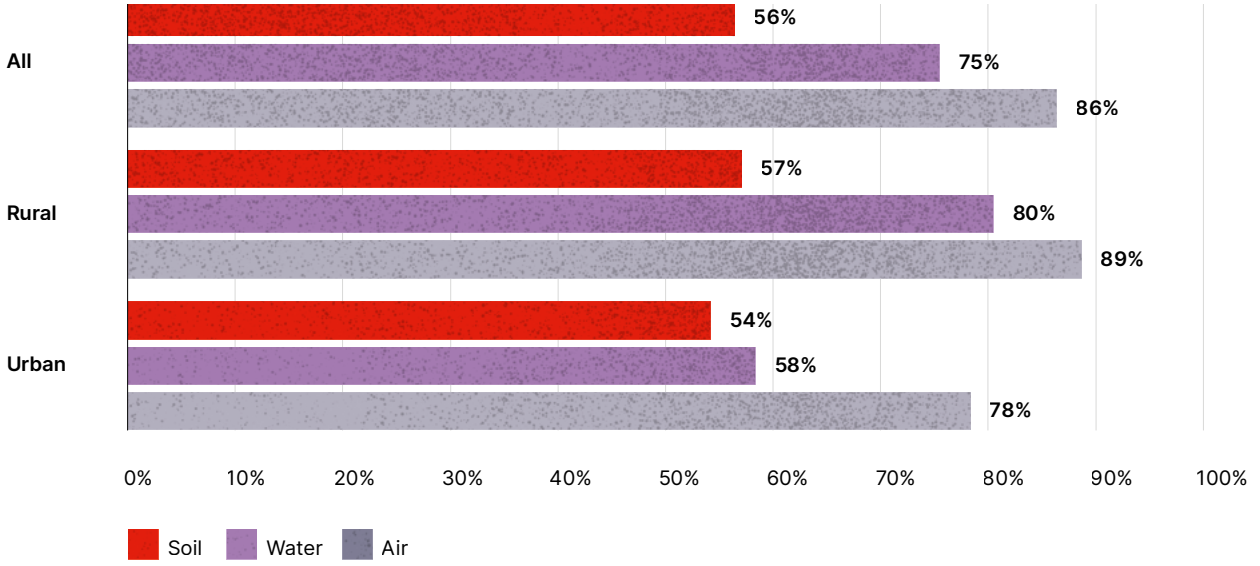



*Figure 5. Extent of impact from natural hazards in past 12 months, by relocation status (proportion of households)*

# Water insecurity

While most households in Tonga had access to at least basic level drinking water sources, a large proportion of the population reported issues with water security in the previous 12 months. This included worrying about water, not having enough water to drink as they would like, and daily activities being interrupted due to water issues.

## DRINKING WATER SERVICES AND TONGAN HOUSEHOLDS

The Joint Monitoring Programme (JMP) for Water Supply, Sanitation and Hygiene Ladder is a way to assess people's access to drinking water services. The JMP ladder is used by the World Health Organisation (WHO) and UNICEF to report on country, regional and global estimates of progress on drinking water, sanitation, and hygiene.[2]

Assessment of the survey findings against the JMP Ladder classification one (water) shows that most Tongan households (98%) had access to at least basic-level water sources.[vii] This overall pattern is constant across gender, location, age groups, and people with a disability.

More specifically, most households (78%) in Tonga reported using a rain water tank as their main source of drinking water, with a further 17 percent reporting bottled water as their main source of drinking water. A slightly higher proportion of households reporting severe impacts from natural hazards reported using bottled water as their main source of drinking water (22% compared to 17% of other households), which may reflect emergency measures implemented following the eruption.



vii In a short and remotely administered survey it will not be possible to accurately assess whether the drinking water source is "free from faecal and priority chemical contamination" as is required to assign a designation of 'safely managed'.

## INDIVIDUAL WATER INSECURITY EXPERIENCES

The survey also allowed for assessment against a four-item version of the Individual Water Insecurity Experiences Scale (IWISE-4).[3] The IWISE-4 scale requires survey respondents to report the total number of months they experienced issues in the past year in relation to:

- **Worry** – in how many months did you worry you would not have enough water for all your household needs?
- **Hands** – in how many months have you had to go without washing your hands after dirty activities (e.g., defecating or changing diapers, cleaning animal dung) because of problems with water?
- **Plan** – in how many months have you had to change schedules or plans due to problems with your water situation? For example, activities that may have been interrupted include caring for others, doing household chores, agricultural work, income-generating activities, and sleeping, among others.
- **Drink** - in how many months has there not been as much water to drink as you would like?

Assessing the survey results against the IWISE-4 scale (Figure 6) shows that during the past 12 months, a large portion of the population reported experiencing issues in one or two months to:

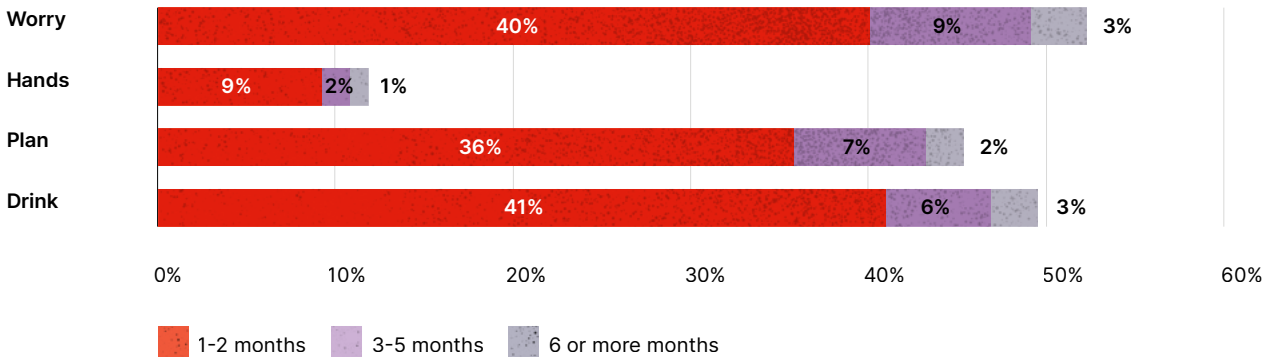
- **Worry**: about water (40%);
- **Plan**: daily activities being interrupted due to water (36%); and
- **Drink**: not having as much water to drink as they would like (41%).

The high proportion of respondents reporting impacts only in one or two months may point towards short-term disruptions following the volcanic eruption. Hand washing remained a less significant concern throughout the period, with 88 percent of the population reporting that they were never unable to wash their hands after dirty activities.

## VULNERABLE POPULATION GROUPS AND WATER INSECURITY

There were no significant differences evident between the water insecurity experiences of men and women when gender-disaggregated results were compared. There was similarly minor variation reported in experiences of other marginalised population groups. However, rural survey respondents were more likely than urban respondents to report experiencing issues with water for three to five months, rather than one to two months or never (for example, 7% of individuals from rural area reported concerns related to drink in three to five months, compared to 1% of individuals in urban areas).

*Figure 6. IWISE-4 Assessment: Frequency of experiencing issues (proportion of individuals)*



# Household protection from elements

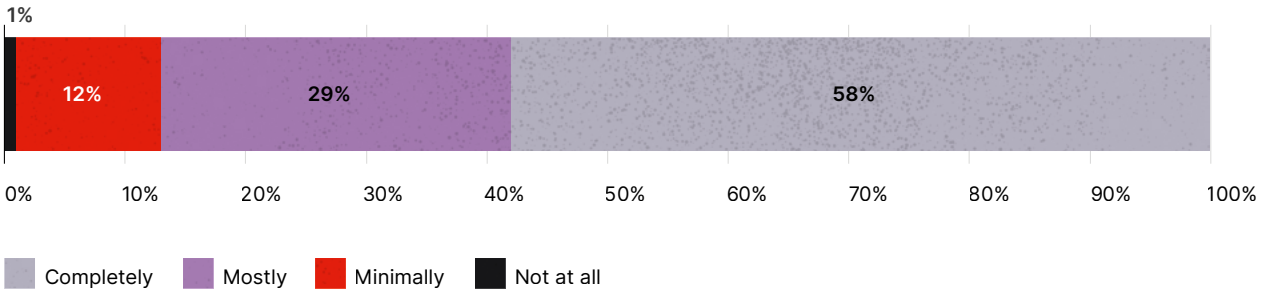
The survey findings revealed that most respondents lived in residential structures that offered protection from the elements in the past 12 months.

## EXTENT OF PROTECTION FROM THE ELEMENTS

The majority (87%) of households considered their normal residence protected them either completely (59%) or mostly (29%) from outside elements (including rain, wind, dust, and cold). However, 12 percent reported that their normal residence protected them from outside elements only to a limited extent, with another one percent reporting that they were not protected at all (see Figure 7).

Households in rural locations were slightly more likely to report minimal or no levels of protection (16% compared 8% in urban areas). Households that reported being less than completely protected from the elements were also more likely to report experiencing impacts from natural hazards (52% of households with complete protection reported no impacts of natural hazards compared to 25% households that were less than completely protected).[viii]

*Figure 7. Percentage of households responding to the question: to what extent has the home in which you normally reside protected you from the outside elements, including rain, wind, dust and cold?*




viii The design of survey questions does not allow for exploration of causal links between impacts of natural hazards and extent of protection from elements.

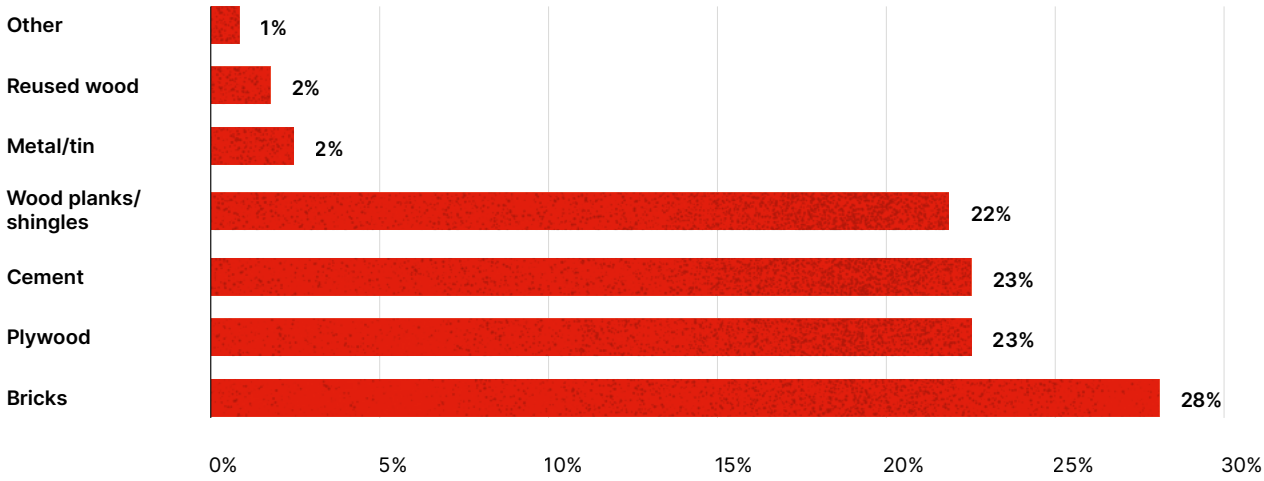
## TYPE OF HOMES THAT WERE NOT OFFERING PROTECTION FROM THE ELEMENTS

Typically, people reported that the physical roof and floor structures of their normal household residences were constructed from sturdy materials, such as

- Metal or tin roof (99% of households); and with
- Vinyl (69%) or ceramic tile (27%) flooring.

There was variation, however, in the materials used for exterior walls (see Figure 8). Brick was the most frequently used material for exterior walls (28%), with other materials like cement (23%), plywood (22%) and wood planks/shingles (22%) also common. Households that reported that their residences were made from wood rather than bricks or cement were also more likely to report that their residences offered minimal or no protection from the elements.

*Figure 8. Proportion of households responding to the question: What is the main material of the exterior walls of the home in which you usually reside?*



# Toilet facilities by location

Survey findings revealed that while most households had at least basic sanitation facilities, households that reported being severely impacted by natural hazards were more likely to have limited facilities.

## TOILET FACILITIES AND TONGAN HOUSEHOLDS

The most common type of toilet facility in households was a flush toilet or pour flush toilet with a closed drain (83%). A further six percent of households reported a pit latrine with a seat, slab or platform, while 11 percent reported having a flush toilet that flushed into an open drain. Fewer than one percent of households reported using pit latrines without a seat or slab, composting toilets, or having no toilet facilities respectively as their main toilet facility.

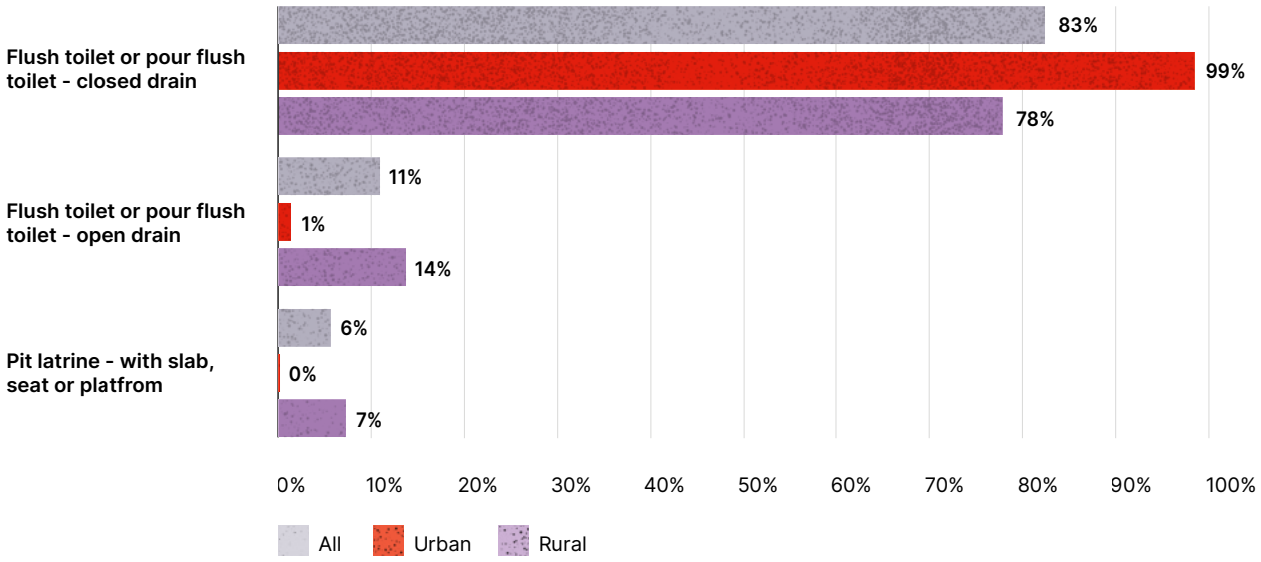
While facilities that flush into open drains or pit latrines were less common than flush toilets with closed drains, they were more likely to be reported by rural households than urban households (see Figure 9). Further breakdown of those living in rural areas showed households in 'Eua and rural Tongatapu were more likely to use flush toilets with open drains (both 18% of households in both island groups) while pit latrines with and without slabs or seats were more common in Ha'apai and Vava'u.

A majority of households (71%) had toilet facility located in their own dwelling, with 28 percent located in their own yard. Only three percent of households reported sharing toilet facilities with others who were not members of the household.

Assessment of the survey findings against the JMP Ladder classification two (sanitation)[4] shows most Tongan households (86%) had access to at least basic sanitation facilities[ix], while two percent had limited facilities and 11 percent reported unimproved facilities. Households that reported serve impacts from natural hazards were more likely to have toilet facilities other than flush toilet with closed drains (29% compared to 17% of households with no impact). Flush toilets were also less common in residences reported to provide limited or no protection from the elements.

ix Similar to the Water dimension, it is not be possible to accurately differentiate between sanitation facilities classified as 'basic' or 'safely managed'

*Figure 9. Type of toilet facilities reported, overall and by location (proportion of households)*



# Reflections

## SIGNIFICANT IMPACTS OF NATURAL HAZARDS

The 2022 *Equality Insights* survey conducted in Tonga shows that most of the population experienced negative impacts from natural hazards in the 12 months preceding the survey. This finding is not surprising given the context of the Hunga Tonga-Hunga Ha'apai volcano eruption that occurred in January 2022.

The severity and extent of impacts from natural hazards that were reported by survey respondents included:

- Impacts on daily lives (for 83% of respondents)
- Impacts on household properties (with 59% households reporting harmful impacts)
- High levels of air pollution (86%), water pollution (75%) and soil pollution (56%) at or near the homes of household respondents

There was also concern reported about access to water, with 52 percent of respondents worrying about water during the past 12 months and 50 percent reporting not having as much water as they would like to drink.

## VULNERABLE COMMUNITY MEMBERS

While patterns were consistent across demographic groups, reflective of a significant natural hazard event like the volcanic eruption that impacted across the country, there were some notable vulnerable populations.

| Population | Observations |
|---|---|
| **Rural locations** | People living in rural areas were more likely to report their daily lives had been severely impacted by natural hazards in the past 12 months. They reported issues with water security for longer periods of time compared to people residing in urban areas. Soil pollution impacts were more commonly reported by respondents living in rural areas. |
| **People with a disability** | People with a disability were more likely than the overall population to report being severely impacted by natural hazards in their daily lives. |
| **Gender** | Men were more likely than women to have been severely impacted in their daily lives by natural hazards. |
| **Shelter types** | Respondents experiencing their shelters as offering lower protection levels from the elements commonly had wooden external walls and lived in rural areas. These households were also more likely to have limited or unimproved toilet facilities. |

# Policy implications and opportunities for further research

The survey findings suggest there are opportunities for further research as well as policy implications in relation to natural hazard emergency preparedness.

Recommendations, for relevant agencies and stakeholders, include to:

- Consider the extent to which people with a disability are included in disaster risk reduction, planning and mitigation activities;
- Examine how emergency relief water can be stockpiled and distributed (accounting for remoteness and characteristics of vulnerability) to reduce the time people experience water insecurity following a disaster;
- Investigate further the types of soil pollution experienced in rural locations to understand what steps can be taken to remediate (response) or mitigate (preparedness);
- Consider the extent to which disaster preparedness plans are tailored to different building, water and sanitation standards across Tonga;
- Assess whether a 'build back better' approach can be targeted to those with shelter offering the least protection to improve residential structures that have experienced significant damage; and
- Continue to ensure widespread access to non-water-based sanitation materials to maintain and grow the number of people reporting positively on their ability to wash hands after dirty activities.

## REFERENCES


1 Washington Group on Disability Statistics. WG Short Set on Functioning (WG-SS). 2021. Available from: https:// www.washingtongroup-disability.com/question-sets/ wg-short-set-on-functioning-wg-ss/

2 WHO/UNICEF JMP. Drinking Water. WHO/ UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP). 2021 Available from: https://washdata.org/monitoring/ drinking-water

3 HWISE Research Coordination Network. HWISE Scale Questionnaire. Available from: https://arch. library.northwestern.edu/concern/generic_works/ kk91fk74c

4 WHO/UNICEF JMP. Sanitation. WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP). Available from: https://washdata.org/monitoring/ sanitation

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