Social vulnerability to the impacts of climate-related hazards in Aotearoa New Zealand

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Climate Change Commission – He Pou a Rangi

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Executive summary

Climate change is likely to have a range of adverse impacts on New Zealand. These impacts include sudden-onset disasters such as floods, extreme storms, and wildfires, as well as heatwaves, droughts, poorer air and water quality, and an increasing risk of mosquito-borne disease. Not everyone will be equally affected by these negative impacts of climate change, and the most vulnerable populations will be disproportionately affected. The term 'social vulnerability' refers to population groups who may be vulnerable to negative impacts of a hazard event on their health and wellbeing, due to pre-existing conditions, socio-demographic characteristics and circumstances. Understanding which populations are vulnerable to climate-related hazards, and where, provides critical evidence to inform decision-making and climate change adaptation and disaster risk reduction activities.

This report describes the dimensions, extent and distribution of social vulnerability to climate-related hazards in New Zealand, through New Zealand's first suite of social vulnerability indicators for climate-related hazards, for 2018. These indicators were developed initially for flooding, but are relevant for a range of climate-related hazards. No single indicator will give a full picture of social vulnerability, but people experiencing specific and/or multiple dimensions of vulnerability may be more likely to experience adverse impacts from climate-related hazards.

This report presents results for individual social vulnerability indicators, including changes over time, maps by territorial authority, and differences by key population groups where possible. The social vulnerability indicators mostly draw on 2013 and 2018 Census data, and cover the following key dimensions:

- **Population**: population, ethnic groups, people living in rural areas, occupation
- **Susceptibility**: children, older adults, people with existing chronic health and/or mental health conditions, people with disabilities, pregnant women
- **Lack of resilience (capacity to prepare, cope, and recover)**: having enough money to cope with losses; social connectedness; awareness and skills to face hazards; safe, secure and healthy housing; enough food and water to cope with shortage; decision-making and participation.

At a glance

The indicators suggest the following recent changes from 2013 to 2018:

- **Increases in the following measures**: population size, older adult population, households with an older adult living alone, ethnic diversity, people who do not speak English, households living in rental housing, crowded households, healthcare and social assistance workers, people experiencing psychological distress.

- **Decreases in the following measures**: primary industry workers, households with no motor vehicle, households with no access to the internet, households with no access to a mobile phone.

- **Similar rates in the following measures**: people not in the labour force, people who were unemployed, people who are severely housing deprived, household emergency preparedness.

Key findings

- **Population increase:** The New Zealand population is increasing in size, with about half of the population living in major urban areas in 2018. Almost one third of all New Zealand households were in Auckland in 2018. About 16% of the population lived in rural areas in 2018.

- **Ageing population:** The New Zealand population is ageing. In 2018, about 15% of the population were aged 65+ years, and this percentage is projected to increase to almost 30% by 2073. About one in ten households (10.7%) had an older adult living alone in 2018.

- **Children:** About one in five New Zealanders (19.6%) were aged 0–14 years in 2018, a slight decrease since 2013. Almost one in three households (29.5%) had at least one child aged 0–14 years in 2018, while 12.8% of households had a young child (aged 0–4 years).

- **Increasing ethnic diversity:** New Zealand is becoming more ethnically diverse, with increases in most ethnic groups since 2013. In 2018, 16.5% of the population were Māori, 15.1% were Asian, 8.1% were Pacific peoples, and 1.5% were Middle Eastern/Latin American/African. About 3.2% of the New Zealand usually resident population had arrived in the past two years in 2018, and 2.5% of the population did not speak English.

- **Substantial health and disability impacts:** People with chronic health conditions, mental illness and/or disability are more susceptible to the negative impacts of climate-related hazards. In 2013, about one in four New Zealanders (24%) had a disability, which included 14% of the population who had a physical disability. Chronic diseases and disability were much more common in older age groups. The prevalence of psychological distress and anxiety/depression symptoms increased significantly from 2012/13 to 2022/23. In 2021–23, one in three adults aged 15+ years (34.8%) had mild or greater anxiety and/or depression symptoms in the past two weeks, according to the New Zealand Health Survey.

- **Financial resources:** Having enough money to cope with crises and losses is an important aspect of resilience, as it enables people to prepare for, cope with, and recover from hazard events. In 2018, about 4% of the population aged 15+ years were unemployed, and 31.3% were not in the labour force, which may affect their capacity to recover financially after a hazard event. Some population groups were disproportionately living in areas of high socioeconomic deprivation (NZDep2018 deciles 9 and 10), including children, Māori, and Pacific peoples.

- **Poor housing quality**: Many New Zealanders' vulnerability is increased by living in poor quality and/or insufficient housing. In 2018, about 35% of households lived in a rented dwelling, while 21.5% of dwellings were damp always or sometimes, and 16.9% of dwellings were mouldy always or sometimes. Additionally, 10.8% of people lived in crowded households, and about 41,700 New Zealanders experienced severe housing deprivation (ie homelessness or living in temporary shelters or severely crowded accommodation). These metrics have generally not improved since 2013.

- **Increased access to a car, mobile phone and internet:** Most New Zealand households now have access to a motor vehicle, mobile phone, and internet, which gives some measure of resilience. The percentage of households without these

resources has substantially decreased over time. In 2018, 6.6% of households had no motor vehicle, while 8.1% of households had no access to a mobile phone, and 13.9% of households had no access to the internet.

- **Relatively low household emergency preparedness:** In 2021, only one in five people (20.8%) reported that their household had enough food and water for three days and a household emergency plan. Most people (83.0%) lived in households with enough food for three days, while 46.9% had enough water for three days, and 30.9% had a household emergency plan. Food insecurity affected a substantial proportion of the child population in 2022/23, with one in five children (21.3%) living in households that ran out of food often or sometimes.

- **Decision-making and participation**: Decision-making and participation, as well as good leadership and inclusiveness, are important for resilience. Voting participation is one measure of local participation in decision-making. In 2022, about 40.9% of eligible residential voters participated in the local body elections, a decrease since previous local body elections.

- **Occupation:** Primary industry workers are more vulnerable to the impacts of climate change as they rely on natural resources for their livelihood. In 2018, 5.9% of employed people aged 15+ years worked in primary industries (agriculture, forestry and fisheries), a decrease since 2013 (6.5%).

- **High priority population groups:** The statistics in this report highlight some key population groups who experienced substantial and/or multiple vulnerabilities. These population groups included: children, older adults, disabled people, people with chronic health conditions and/or mental illness, people living in more deprived areas, people living in rental housing, Māori, Pacific peoples, ethnic minorities, single parents, and people living in rural areas. These groups generally align with those identified by the Intergovernmental Panel on Climate Change (IPCC) and international social vulnerability studies.

- **Large inequities in vulnerability for Māori and Pacific peoples:** In particular, Māori and Pacific peoples were disproportionately represented in the social vulnerability indicators. These ethnic groups experienced large inequities, particularly in living in socioeconomically more deprived areas (according to the NZDep2018) and living in poor quality housing. These ethnic groups bring many strengths, capacities and resilience to climate-related hazards, particularly through strong social connections and cultural values. However, many people of these ethnic groups experience vulnerability at the individual and household level, which may impact their overall resilience.

- **Geographic distribution of social vulnerability:** Population vulnerability levels can differ substantially by the geographic area in which people live. Disaster risk is a function of hazard, exposure, and vulnerability, and therefore it is important to understand social vulnerability in hazard zones and/or where people are exposed to hazards. This report highlights that some territorial authorities have higher levels of vulnerability, due to socioeconomic deprivation, having an older population, poor quality housing, and other factors. Social vulnerability indicator data is available by territorial authority and small areas (Statistical Area 2, SA2) to inform more detailed vulnerability assessments for local areas.

In summary, these indicators provide valuable information about the social vulnerability of the New Zealand population to climate-related hazards, and show the multi-dimensionality of

social vulnerability. Understanding vulnerabilities in the population can inform emergency planning and preparedness, response and recovery activities, as well as risk reduction activities such as infrastructure upgrades, land use planning, and adaptation actions. These indicators cover individual- and household-level vulnerability, but may not necessarily reflect all aspects of community-level resilience, such as access to services, infrastructure, and community networks. While the results of this report are for 2018, much of the information is still relevant, and provides a baseline for understanding social vulnerability to climate-related hazards in New Zealand. The 2023 Census results will enable monitoring of further changes and patterns in social vulnerability to the adverse effects of climate change on the New Zealand population, when 2023 Census data are released in the future.

1 Introduction

1.1 Purpose of this document

In March 2024, Environmental Health Intelligence NZ (EHINZ) was contracted by the Climate Change Commission to report on national social vulnerability to climate-related hazards, to inform monitoring of the National Adaptation Plan.

Our national report on social vulnerability describes the dimensions, extent and distribution of social vulnerability to climate-related hazards in New Zealand, through a set of existing social vulnerability indicators (SVIs). This document tracks these social vulnerability indicators over time and provides data at the national level and the territorial authority level.

The Climate Change Commission required the report to cover the following key sections:

- detailed results for every social vulnerability indicator, including changes over time since at least 2013, and results by territorial authority
- a summary and synthesis of indicators
- description of methods
- discussion and limitations.

This report provides important information to support an understanding of the specific needs of communities, people and households, and to help identify where additional action may be needed in future.

1.2 Social vulnerability to climate-related hazards

Some population groups are more vulnerable to the impacts of climate-related hazards

Climate change is likely to have a range of negative impacts on New Zealand, including more hot days, and increasing frequency and intensity of extreme weather events. Climate-related hazards include sudden-onset disasters such as floods, extreme storms, and wildfires, as well as other hazard events such as heatwaves and drought. These hazards can affect people through direct exposure (for example, living in a flood hazard zone), as well as indirect exposure (for example, disruptions to critical infrastructure, such as transportation networks, power supplies, water supplies, and telecommunications). Further hazards related to climate change include impacts on drinking water quality, air pollution, and mosquito-borne diseases. People may be exposed to these hazards, with the risk of negative impacts on their health and wellbeing.

The Intergovernmental Panel on Climate Change (IPCC) has noted that not everyone will be equally affected by the impacts of climate change, and that the most vulnerable populations and systems will be disproportionately affected (IPCC, 2022). For example, not everyone in the population is able-bodied, can hear, see, and move themselves, understand the hazard, and carry out what they need to do to prepare or get out of the way of a hazard (Atyia Martin, 2015). Many people may not have the financial means or other resources to adequately prepare for, cope with, recover from and/or adapt to climate-related hazards. Therefore, some people are more vulnerable to the negative impacts of climate-related hazards, due to

their current circumstances, often outside of their control. They may have limited capacity to carry out adaptation and/or resilience actions themselves.

The term 'social vulnerability' refers to population groups who may be vulnerable to adverse impacts of a hazard event on their health and wellbeing, due to pre-existing conditions, socio-demographic characteristics and circumstances.

Understanding vulnerability, and reducing vulnerability, to climate-related hazards is vitally important

Having a good understanding of social vulnerability to climate-related hazards is vitally important from both a climate change adaptation and disaster risk management perspective. "Even a basic understanding of social vulnerability and its drivers can substantively inform future planning" (Wongbusarakum and Loper, 2011, p6).

Reducing vulnerability and strengthening resilience and adaptive capacity to climate-related hazards is an important part of New Zealand's climate change adaptation strategy. New Zealand's National Adaptation Plan states:

> The following goals underpin Aotearoa New Zealand's adaptation strategy:
> • reduce vulnerability to the impacts of climate change
> • enhance adaptive capacity and consider climate change in decisions at all levels
> • strengthen resilience. (Ministry for the Environment, 2022, p13)

Furthermore, New Zealand's National Disaster Resilience Strategy states that "understanding different vulnerabilities is important for reducing risks and ensuring particular needs are met in response and recovery" (MCDEM, 2019).

Addressing social vulnerability likely requires actions at the community, local government, organisational and national levels to ensure equitable outcomes for everybody. Additionally, understanding vulnerabilities can inform adaptation measures, to ensure that existing inequities are not exacerbated (ie maladaptation).

Measuring social vulnerability with indicators

Measuring social vulnerability can help an understanding of the potential for loss, and the vulnerabilities that communities face towards climate-related hazards, to then address these needs to reduce the risk of adverse outcomes. Social vulnerability indicators are used to identify potentially vulnerable populations who are likely to be more affected by a climate-related hazard, and less able to anticipate, cope with, and recover from that hazard.

A number of social vulnerability indicator sets for hazards have been developed for other countries previously (Atyia Martin, 2015, Birkmann et al., 2013, Cutter, 1996, Cutter et al., 2003, Flanagan et al., 2011, Rasch, 2016, Tapsell et al., 2002). In the New Zealand context, Kwok (2016) identified a set of potential social vulnerability indicators for earthquakes, and Khan (2012) compared different approaches for measuring social vulnerability to flooding. Additionally, indicators or indices have been developed for socioeconomic deprivation (NZDep) (Atkinson et al., 2020), social fragmentation (Ivory et al., 2012), resilience (Stevenson et al., 2018), and heat vulnerability for Auckland (Joynt and Golubiewski, 2019). The NZDep has been tested as a vulnerability index for natural hazards in New Zealand (Paton et al., 2006). Additionally, some New Zealand studies have identified theoretical factors relating to social vulnerability, resilience, and social capital using qualitative methods (Kwok et al., 2019, Kwok et al., 2016, Kwok et al., 2018).

The social vulnerability indicators developed by EHINZ in 2019 (Mason et al., 2021, Mason et al., 2019) were the first national set of social vulnerability indicators for flooding published for Aotearoa New Zealand. These indicators filled an important gap for New Zealand, with a particular focus on flooding and providing data at a local level. These indicators identified people who are most at-risk of experiencing adverse impacts on their health and wellbeing during and after a flood. The indicators were implemented using 2013 Census data.

We have since updated these social vulnerability indicators with data from the 2018 Census, which are reported in this report. We have also assessed the indicators as working well for a range of hazards (including climate-related hazards), particularly sudden-onset hazards, as people need similar aspects of resilience.

1.3   Potential uses of this report

Monitoring social vulnerability indicators can be useful for resilience and adaptation

Indicators of social vulnerability can be used to identify potentially vulnerable populations who are likely to be more impacted by a hazard event, and less able to anticipate, cope with, or recover from that event. Understanding vulnerabilities in the population can inform emergency planning and preparedness, response and recovery activities, as well as risk reduction activities such as infrastructure upgrades, land use planning, and adaptation actions.

Monitoring vulnerability over time can show positive (or negative) changes to resilience and susceptible populations, highlight whether vulnerability to climate-related hazards is reducing, and draw attention to issues that are relevant for future actions and programmes. Using maps to visualise the distribution of social vulnerability indicators across the country can highlight geographic areas with more vulnerable populations.

Furthermore, adaptation activities come with the risk of maladaptation, for example activities may exacerbate existing inequities. It is therefore important to be mindful of vulnerable population groups and existing inequities when considering adaptation planning and actions.

Key end users

The Climate Change Commission is responsible for monitoring the National Adaptation Plan. This plan sets out actions to improve adaptation to climate change in New Zealand. Monitoring social vulnerability indicators for New Zealand, both nationally and locally, can inform this plan, by highlighting particular aspects of vulnerability, and geographic regions where people may be more vulnerable to the climate-related hazards that they face.

More broadly, having an understanding of local populations and their specific needs is valuable for disaster risk reduction, vulnerability assessments, climate change adaptation, and planning. The results of this report will be useful for a range of end-users, including:

- Climate Change Commission
- local councils (territorial authority and regional councils)
- Civil Defence & Emergency Management (CDEM) groups
- Ministry of Health, including the Public Health Agency
- Health NZ – Te Whatu Ora
- agencies involved in climate change vulnerability, resilience and adaptation work.

1.4   Scope of this report

This report brings together existing social vulnerability indicator data into a national-level report. The report draws on the indicator data already published. A few additional changes have been included.

- Indicator data have generally been presented for 2018 at the national level, with comparisons since 2013 (and 2006 for some indicators) where possible.

- Indicator data have also been presented as maps by territorial authority (TA), for indicators where 2018 data at the TA level are readily available.

- Additional information has been included for some indicators, where possible and appropriate. This information includes indicator data for different population groups of interest (such as children, older adults, ethnic groups, socioeconomic deprivation, and urban/rural), based on published data from Stats NZ.

- A few additional indicators have been included, which are only available at national (not territorial authority) level, to provide more information about household emergency preparedness and food security.

- Some additional statistics have been included for background information, such as the latest data about the unemployment rate, and health and disability statistics.

- Initial population counts from the 2023 Census were released in late May 2024, and have been briefly mentioned where relevant.

1.5   Report outline

This report has five key parts.

- **Introduction and background information (sections 1–4)**: Information explaining about social vulnerability to climate-related hazards, climate-related hazards and potential impacts, methods, and conceptual frameworks used for this work.

- **Summary of key findings (section 5)**: Synthesis of key findings, including a table of key results, descriptions of main findings by social vulnerability indicator, geographic areas of interest, and results for high-priority population groups.

- **Detailed indicator results (sections 6–16)**: Detailed results for each social vulnerability indicator, including changes over time, distribution by territorial authority, and results for key population groups (where possible).

- **Discussion (section 17):** Discussion of key results and limitations.

- **References and appendices (section 18 and Appendices):** References, and appendices of indicator metadata (Appendix 1), previous social vulnerability indicator studies (Appendix 2), urban/rural categories (Appendix 3), and heatmap of social vulnerability indicator data by territorial authority (Appendix 4).

Further data from the social vulnerability indicators (including at the territorial authority and Statistical Area 2 (SA2) levels) and an online interactive map of the indicators are available on the EHINZ website: https://www.ehinz.ac.nz/social-vulnerability/

2 Understanding social vulnerability to climate-related hazards

This section explains the way that this report approaches the concept of social vulnerability, and describes some key frameworks for understanding how risk, hazards, exposure and vulnerability to climate-related hazards fit together. These frameworks have informed the selection of the social vulnerability indicators presented in this report.

2.1 IPCC framework for climate change

The Intergovernmental Panel on Climate Change (IPCC) AR6 report notes that disaster risk from climate events is a function of hazards (weather and climate events), exposure, and vulnerability (Figure 1) (IPCC, 2012). Hazards are understood as weather and climate events, which are influenced by natural variability and anthropogenic (human-made) climate change. Exposure, vulnerability and disaster risk can be mitigated through disaster risk management and climate change adaptation.

Figure 1: IPCC framework for risk, exposure, vulnerability and hazards
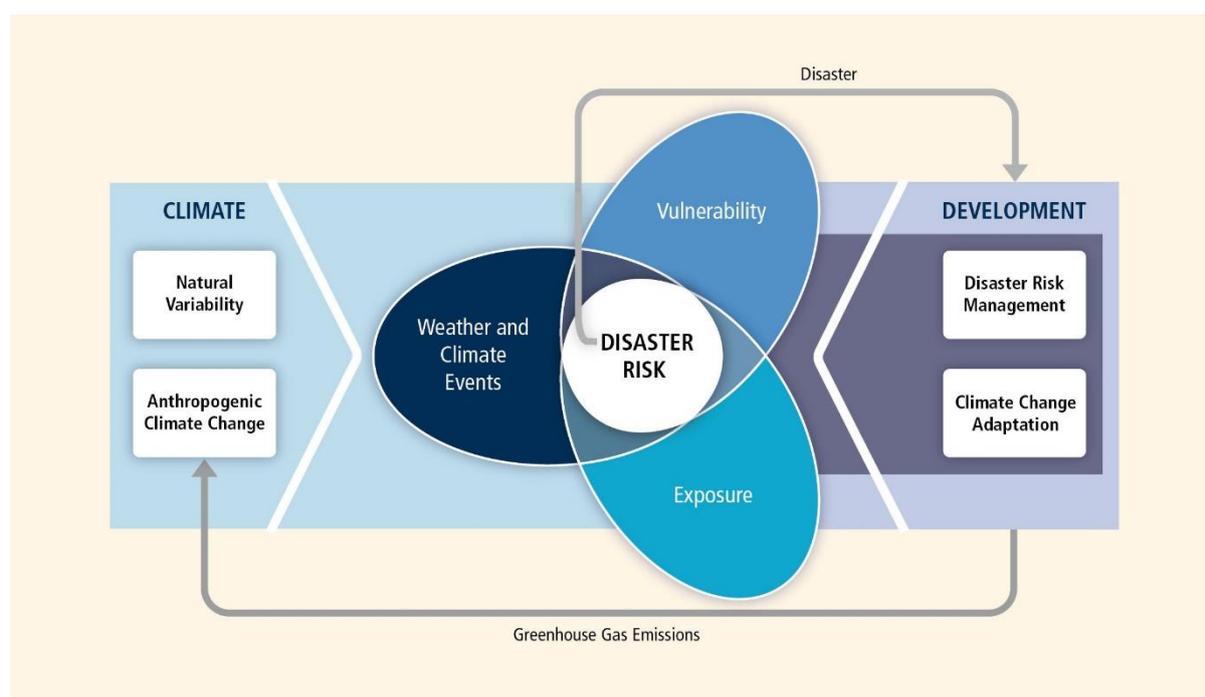
Source: IPCC (2012)

The IPCC uses the following definitions:

> **Risk** is defined as the potential for adverse consequences for human or ecological systems, recognising the diversity of values and objectives associated with such systems.

> **Hazard** is defined as the potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.

> **Exposure** is defined as the presence of people; livelihoods; species or ecosystems; environmental functions, services and resources; infrastructure; or economic, social or cultural assets in places and settings that could be adversely affected.

> **Vulnerability** is defined as the propensity or predisposition to be adversely affected and encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt. (IPCC, 2022)

Disaster risk can be mitigated through **climate change adaptation** and **disaster risk management**. The IPCC defines these as follows.

> **Adaptation** is defined, in human systems, as the process of adjustment to actual or expected climate and its effects in order to moderate harm or take advantage of beneficial opportunities. In natural systems, adaptation is the process of adjustment to actual climate and its effects; human intervention may facilitate this. (IPCC, 2022)

> **Disaster risk management**: Processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, resilience, and sustainable development. (IPCC, 2012)

In New Zealand, disaster risk management is often understood as the '4Rs' (risk reduction, readiness, response, and recovery) in the Civil Defence and Emergency Management (CDEM) sector.

2.2 MOVE framework for climate change and natural hazards

Another commonly-used framework is the MOVE framework (Methods for the Improvement of Vulnerability Assessment in Europe) (Birkmann et al., 2013). The MOVE framework was developed to improve understanding of disaster vulnerability for both natural hazards and climate change. The benefit of this framework is that it works well for sudden-onset events (such as floods or wildfires), which can be understood from both a disaster risk management and climate-related hazards perspective.

Similar to the IPCC framework, the MOVE framework shows risk as resulting from hazards interacting with society. Risk is given as a function of hazard, exposure, and vulnerability.

In the MOVE framework, vulnerability is described further, as being influenced by:

- **Exposure**: being exposed to a hazard (such as flooding)
- **Susceptibility**: being more susceptible or sensitive to the impacts of the hazard
- **Lack of resilience**: relating to the capacity to anticipate, cope and recover.

These concepts are consistent with the IPCC framework and definitions, although the IPCC framework considers exposure to be separate from vulnerability.

Figure 2: MOVE framework for natural hazards and climate change
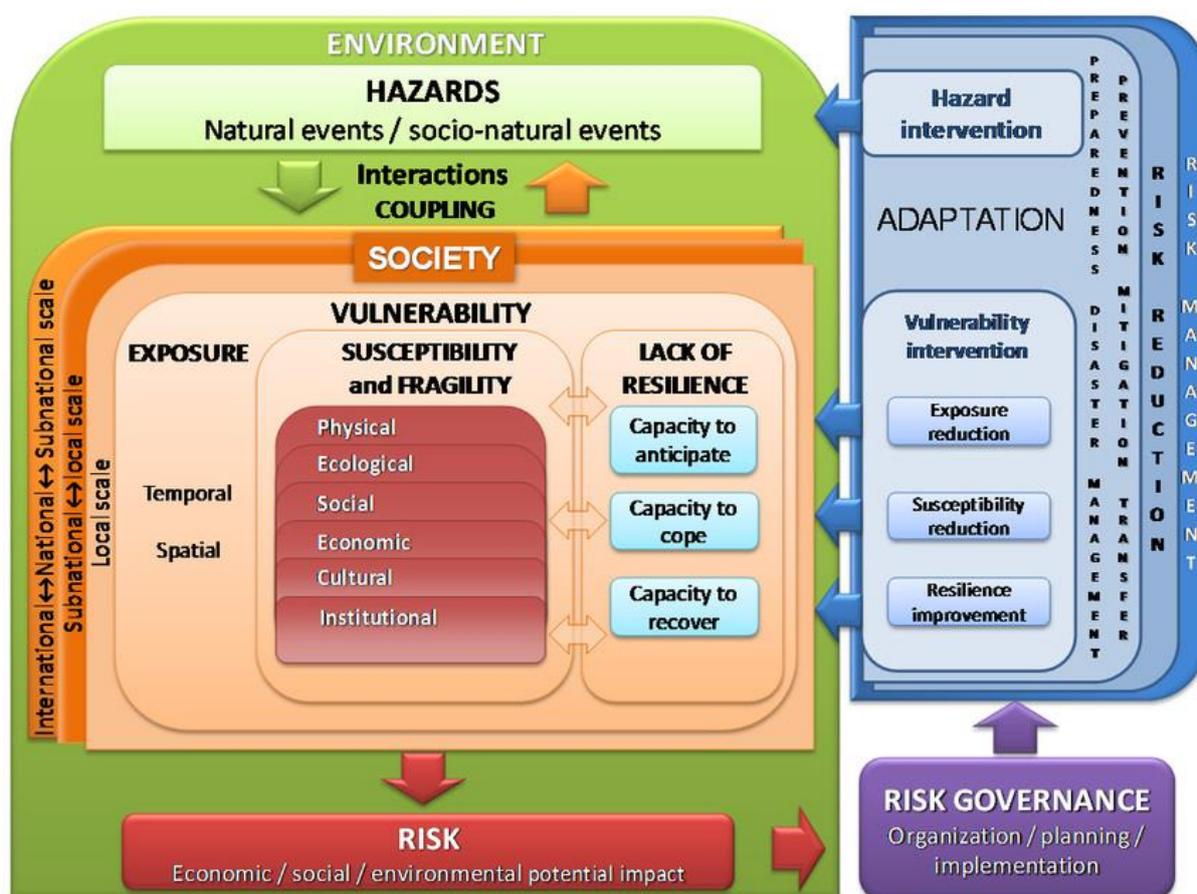
Source: Birkmann et al. (2013)

2.3   Circle of capacities framework for resilience

Resilience can be defined as the capacity to anticipate, cope and recover after a hazard event (Birkmann et al., 2013). Resilience can also include longer-term adaptation, such as the ability to learn and reorganise in anticipation of future changes (Birkmann et al., 2013).

Resilience can happen at a range of levels, including individuals and families/whānau, communities and hapū, cities and districts, and government and national organisations (MCDEM, 2019).

In New Zealand, people need to have resilience - that is, they need to be able to prepare for, cope with, and recover from disasters. The National Disaster Resilience Strategy notes the following:

> Emergency management in New Zealand is still based, first and foremost, on a principle of self-reliance; individuals and communities must be able to care for themselves and each other, as much as possible, when the normal functions of daily life are disrupted. (MCDEM, 2019)

Resilience can be further understood through the Circle of Capacities, which is a model of resilience to disasters, developed by Wisner et al. (2012). The circle of capacities has six main segments, which outline the key aspects of resilience and capacities relating to disasters.

Figure 3: 'Circle of capacities' framework for disaster resilience
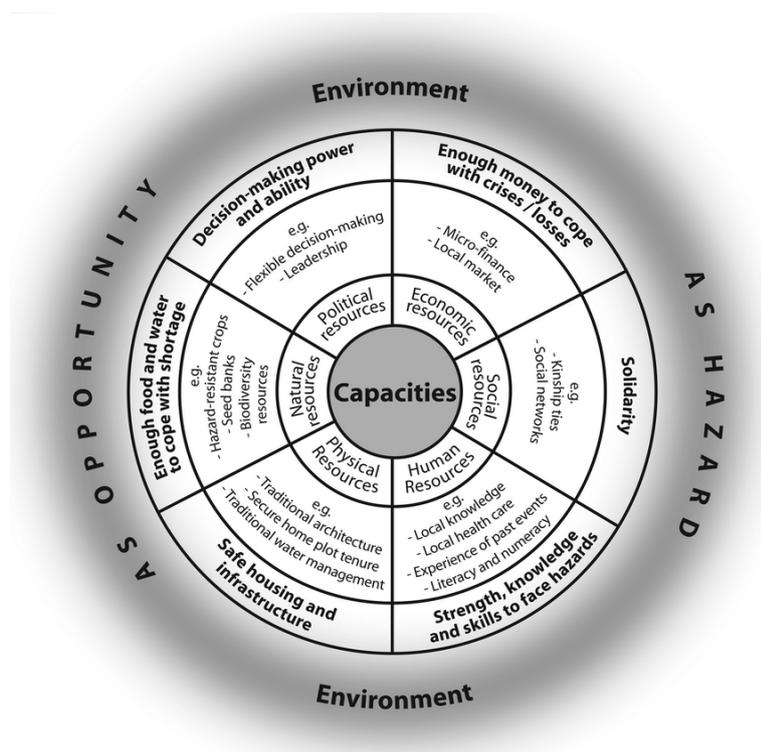
Source: Wisner et al. (2012)

This circle of capacities also corresponds to similar frameworks, eg the four capitals of the New Zealand Living Standards Framework (MCDEM, 2019):

- Natural capital – Enough food and water to cope with shortage
- Social capital – Solidarity; Decision-making power and ability
- Human capital – Strength, knowledge, and skills to face hazards
- Financial / physical capital – Enough money to cope with crises/losses; Safe housing and infrastructure

The relationship between social vulnerability and resilience

It should be noted that social vulnerability is a slightly different concept from resilience (or lack of resilience).

- *Resilience* focuses on communities' ability to 'bounce back' or 'bounce forward' – that is, to prepare for and cope with a hazard event, and be able to recover from it.

- *Social vulnerability* looks more broadly at which population groups are more likely to be vulnerable to the impacts of natural hazards.

Social vulnerability and resilience are not necessarily mutually exclusive concepts – people can be both. People who are socially vulnerable (such as those with a chronic health condition) can also be resilient (such as having enough food and water to cope with shortage).

A strengths-based approach is useful for resilience. People and communities can have immense capacities and capabilities and it is important to recognise and build on these (MCDEM, 2019). Nonetheless, without understanding the vulnerabilities that the population are experiencing, it can be difficult to understand the barriers and how to therefore improve resilience.

In this report, the term 'vulnerable populations' refers to people who have a specific vulnerability, as defined by our conceptual framework and social vulnerability indicators. It should be noted that the term 'vulnerability' does not denote that vulnerability is innate or internal to a person, or represents an overarching attribute of an individual. Rather, we identify vulnerabilities that people may be experiencing, that put them at greater risk of harm to their health and wellbeing for a variety of reasons, including social, political and environmental influences.

2.4   Vulnerability and adaptation to climate-related hazards

Climate change adaptation is important in order to reduce the risk of negative impacts of climate-related hazards in the future. Adaptation includes transforming existing systems, and can also include disaster risk management, early warning systems, and climate services, as well as risk spreading and sharing (IPCC, 2023).

A key part of adaptation to climate change includes reducing vulnerability.

> Adaptation is not just about transforming systems to manage or reduce a specific climate-related hazard (e.g. drought, flood or extreme heat) but more fundamentally is about reducing vulnerability of populations and the systems they depend on through comprehensive climate risk management, including social protection systems. (Birkmann et al., 2021)

According to the MOVE framework (Figure 2), adaptation activities can include:

- **Hazard intervention** (ie actions to reduce hazards)
- **Exposure reduction** (ie reducing people's exposure to hazards)
- **Susceptibility reduction** (ie reducing susceptibility, such as by improving population health and wellbeing)
- **Resilience improvement** (eg improving people's capacity to anticipate, prepare for, cope with and recover from hazards).

This means that the lower the exposure to hazards, and the healthier and more resilient our population, the lower the risk of climate-related hazards. Monitoring measures of susceptibility, resilience, and vulnerability over time can show changes in vulnerability, and inform adaptation activities.

2.5   Vulnerability and resilience occur at different scales

Vulnerability and resilience can occur at different scales, such as individual and household, neighbourhood, subnational and national. Common scales include:

- individual
- household
- neighbourhood and local environment
- community
- sub-national
- national

This is a common theme throughout work on national disaster resilience (MCDEM, 2019), vulnerability to natural hazards (Rufat et al., 2015), and public health (Dahlgren and Whitehead, 1991). Figure 4 gives one such example of how individual and household resilience is nested within other scales, including family, neighbourhood, community and societal resilience.

Figure 4: Resilience framework
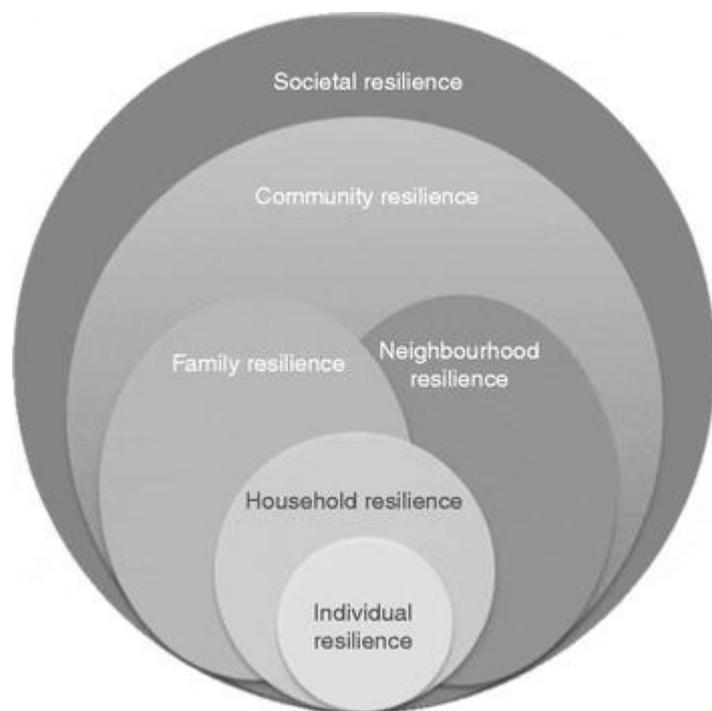
Source: Wild et al. (2013)

This report focuses on vulnerability and resilience at the individual and household level.

3 Climate-related hazards and potential impacts in New Zealand

Understanding social vulnerability to climate-related hazards involves first understanding and identifying the hazards, and the potential impacts they can have on people's health and wellbeing.

Climate change is likely to bring a number of changes to climate and climate-related hazards to New Zealand. These include:

- floods
- drought
- extreme weather events
- extreme heat and heatwaves
- coastal inundation and sea level rise
- wildfires

This section describes the climate-related hazards in New Zealand, and the potential impacts to health and wellbeing.

3.1   Climate-related hazards

Some climate-related hazards are sudden-onset hazards, such as flooding, extreme weather events and wildfires, while others are somewhat longer in time scale, such as heatwaves and droughts. Other indirect hazards include impacts on the environment (water quality, air quality, and mosquito-borne diseases). Over the longer term, climate change is likely to lead to sea-level rise.

This section briefly describes the key climate-related hazards that are likely to affect New Zealand.

Floods and extreme weather events

Flooding is recognised as one of the key risks of climate change in the 21st century in New Zealand (Reisinger et al., 2014). Flooding is currently one of New Zealand's most frequent and costly natural hazards (NIWA, 2015, Royal Society of New Zealand, 2016). On average, a major flood occurs every eight months in New Zealand. The total costs of flooding in New Zealand are estimated to be more than $125 million per year (MCDEM, 2010).

Many of New Zealand's main towns and cities are built on floodplains. An estimated 675,500 people currently live in flood hazard zones in New Zealand (Paulik et al., 2019a). An estimated 411,500 buildings are in flood hazard zones (Paulik et al., 2019a).

Flooding is expected to become more frequent and extreme in the future in New Zealand due to climate change, including more extreme weather events and sea level rise. Flooding may occur throughout New Zealand, but is likely to be worse in areas that are already flood hazard zones, and in coastal inundation zones (Paulik et al., 2019b).

Heatwaves

Heatwaves generally occur when unusually hot weather in a region persists at least two to three consecutive days during the hot period of the year (WMO and WHO (World

Meterological Organization and World Health Organization), 2015). Heatwaves and high heat have the potential to cause illness and death.

Climate change is projected to increase average temperatures and the number of hot days and heatwaves in New Zealand (Ministry for the Environment, 2016, Royal Society of New Zealand, 2016). Heatwaves are therefore likely to have an increasingly large impact on New Zealanders. In particular, the number of hot days (with a temperature of over 25°C) per year is expected to increase 40–100% by 2040, and 40–300% by 2090 (Ministry for the Environment, 2016).

Regions across New Zealand are all likely to be affected, but some worse than others. The top half of the North Island, and coastal Gisborne and Hawke's Bay regions, are expected to have the greatest increase in number of hot days in future (Ministry for the Environment, 2018).

Droughts

Drought is an unusually long period with less than average rain. It can be measured over a season or over several years. Adverse effects of drought include agricultural and primary industry impacts, impacts on food security and water quality and availability, and increased risk of wildfires.

Climate change is likely to lead to droughts occurring more often and being more severe, especially in northern and eastern North Island. The number of dry days is projected to increase in the North Island and in inland South Island (Royal Society of New Zealand, 2016).

Wildfires

Wildfires are unwanted, unplanned and uncontrolled vegetation fires in the natural environment. Fire weather (ie weather conditions that are ideal for the generation of wildfires) is influenced by four key factors: temperature, wind, humidity, and rainfall (FENZ, 2024). Wildfires can lead to injuries and deaths, as well as respiratory issues from smoke inhalation, and property destruction.

Climate change is expected to increase the risk of wildfires in New Zealand, through drier conditions and warmer temperatures (Langer et al., 2021). The highest fire dangers are in areas that are seasonally drought-prone and arid. These areas include Central Otago, inland South Canterbury, northern Marlborough, South Wairarapa and Hawke's Bay (Langer et al., 2021).

Coastal flooding and sea-level rise

Sea level is predicted to rise with climate change. Models suggest sea-level rise in New Zealand of about 0.46–1.05m by 2100 (depending on a low-carbon or high-carbon scenario) (Ministry for the Environment, 2017). In some places in New Zealand, sea level rise may be greater, due to gradual land subsidence. Many buildings, properties, Māori sacred sites, and infrastructure (such as roading, water pipes etc) are at risk from the impacts of sea level rise.

In the shorter term, coastal zones at risk from sea level rise are also at risk of storm surges and coastal flooding (inundation). For example, with a 30cm rise in sea level, the current 1-in-100 year sea level event would be expected to occur once a year (Royal Society of New Zealand, 2016). During extreme weather events, coastal flooding may cause injuries and

deaths, property damage and destruction, isolation, damage to key infrastructure (eg transportation, communications, water supplies, power and gas supplies) and displacement – that is, people needing to move, either temporarily or permanently.

In the longer-term, sea-level rise may lead to isolated communities, displacement, and/or coastal retreat. Longer-term adverse impacts of sea-level rise include isolation, displacement of people and communities, uncertainty, financial implications, and mental health and psychosocial issues – including trauma of leaving familiar surroundings, the breaking of social ties, and the difficulty of resettlement.

Water quality and food safety

Safe drinking water is vital for human health. Climate change may affect the quality of drinking water, through increased floods, droughts and warmer temperatures.

Rainfall and flooding can wash giardia cysts, cryptosporidium cysts and campylobacter bacteria into waterways, where they can contaminate drinking water sources. Drought conditions can lead to a greater cyst concentration in groundwater and surface water sources (Britton et al 2010; Lal et al 2013). These two factors can increase the risk of waterborne diseases, including campylobacteriosis, cryptosporidiosis and giardiasis.

Higher temperatures are linked to an increase in salmonellosis notifications. Salmonellosis can be contracted by eating or drinking food and/or water that has been contaminated by humans or animals with the Salmonella bacteria. An increase of 1°C in monthly average temperatures has been associated with 15% more salmonellosis notifications in that month (Britton et al., 2010).

Outdoor air pollution

Air pollution can affect people's health, especially their heart and lungs – and can even lead to early death. In 2016, human-caused air pollution resulted in over 3,300 deaths in New Zealand, mainly due to nitrogen dioxide (from motor vehicles) and fine particulate matter ($PM_{2.5}$) (from motor vehicles and home heating) (Kuschel et al., 2022).

Climate change may worsen outdoor air quality, for example through (Royal Society of New Zealand Te Aparangi, 2017):

- drought conditions leading to dust and increased particulate matter (PM)
- smoke from wildfires
- warmer temperatures and still conditions
- increased pollens – ie increased quantity, allergen potential and/or spatial distribution of pollens that can cause allergic reactions.

Climate change mitigation could have a positive impact on public health. Shifting away from petrol/diesel vehicles to electric vehicles (EVs) would reduce outdoor air pollution, particularly nitrogen dioxide and $PM_{2.5}$, leading to fewer adverse health impacts from air pollution.

Mosquito-borne diseases (and other vector-borne diseases)

Exotic mosquitoes can spread mosquito-borne viruses (eg dengue fever, chikungunya virus) and parasitic diseases (eg malaria), which are major causes of illness and death globally.

There are currently no mosquitoes in New Zealand capable of carrying mosquito-borne diseases such as malaria.

However, a warmer climate and international travel may allow exotic mosquitoes to spread to new territories. If high-risk exotic mosquitoes were established in New Zealand, it would increase the risk of mosquito-borne disease outbreaks (such as dengue fever, malaria, and Ross River virus) occurring. Extreme weather events (such as floods) can also increase mosquito populations. It is therefore important to continue monitoring mosquito-borne diseases and high-risk insects in New Zealand.

3.2   Regional variation in climate-related hazards

New Zealand climate scientists predict that New Zealand's weather will very likely change, with some regions likely to be more affected by certain hazards (Ministry for the Environment, 2016, Reisinger et al., 2014, Pearce et al., 2011, Clark et al., 2011) (Table 1).

Table 1: Regional variation in climate-related hazards in New Zealand

Predicted change	Regional variation
Temperature	New Zealand will warm between 0.7°C and 1.0°C by 2040, and between 0.7° and 3.0°C by 2090 (relative to 1986–2005). There will be more days with temperatures above 25°C and fewer days with temperatures below 0°C. The top half of the North Island, and coastal Gisborne and Hawke's Bay regions, are expected to have the greatest increase in the number of hot days in future (Ministry for the Environment, 2018).
Rainfall	Rainfall will vary around the country, especially with the seasons. The west and south of New Zealand will experience more annual rainfall, while the north and east will experience less. There will be more extreme daily rainfalls in western New Zealand and in the south of the South Island, increasing the risk of flooding.
Drought	Droughts will occur more often and will be more severe, especially in eastern and northern New Zealand.
Fire danger	There will be an increased fire risk in the east and south of the South Island and the west of the North Island.
Wind	Westerlies over central and southern New Zealand will be stronger. Extreme daily winds will increase in eastern regions, especially in the South Island.

Further information on climate impacts at a regional level is available on the Ministry for the Environment website. The Extreme Climate Index also shows the change in climate at the territorial authority level over the past 50 years (https://www.ehinz.ac.nz/projects/eci/).

3.3   Potential impacts on health and wellbeing from climate-related hazards

Climate-related hazards can have a range of potential negative impacts. One of the key impacts is on human health and wellbeing. Health and wellbeing can broadly be identified as encompassing physical health, mental health, social wellbeing and spiritual wellbeing, from the Māori wellbeing model developed by Sir Mason Durie, Te Whare Tapa Whā (Durie, 1985).

Table 2 presents direct impacts from climate-related hazards in New Zealand, and examples of the potential impacts from these hazards.

Table 2: Climate-related hazards in New Zealand, and potential impacts

Climate-related hazard	Exposure	Examples of potential impacts
Flooding and extreme weather events (intense storms, heavy rainfall, high winds)	Flooding Heavy rainfall Wind damage to trees, properties	Drowning Injury Property damage Mental health Gastrointestinal diseases (eg giardiasis, cryptosporidiosis, salmonellosis) Leptospirosis from contaminated floodwaters Impact on agriculture Damage to key infrastructure (roading, communications, power and gas supplies, water supplies etc) Damage to key locations (eg schools, ECE, healthcare facilities, aged care facilities, marae, urupā) Disruptions to health care services Living in damp housing conditions, which can lead to respiratory impacts
Extreme heat and heatwaves	Heatwaves Higher temperatures Increasing number of hot days Decreasing number of cold days	Heat exhaustion Heat stroke Mortality Reduced time outdoors (eg exercising, working, commuting) and/or greater use of vehicles Increased risk of food safety issues, eg salmonellosis Reduced mortality due to cold
Drought	Extended periods with lack of rain Soil moisture deficit	Agricultural and primary industry impacts Mental health impacts (particularly in rural areas and for people working in primary industries) Water quality Water scarcity Wildfire risk
Fire danger	Wildfires	Deaths Damage to property, housing Damage to infrastructure Air pollution from smoke affecting respiratory and cardiovascular health Damage to key locations (eg schools, ECE, healthcare facilities, aged care facilities, marae, urupā)
Sea level rise and coastal inundation	Sea-level rise, erosion, displacement	Coastal flooding Damage to property, housing, belongings Damage to key infrastructure (eg transportation, communication, water supplies, power and gas supplies) Damage to key locations (eg schools, ECE, healthcare facilities, aged care facilities, marae, urupā) Displacement Loss of livelihoods Loss of food security Mental health impacts

Table 3 presents some of the indirect impacts of climate-related hazards in New Zealand, and examples of the health impacts of these hazards.

Table 3: Indirect impacts from climate-related hazards in New Zealand, and potential health impacts

Topic	Link with climate change	Examples of potential health impacts
Air quality	Drought conditions can increase dust blown and particulate matter (eg PM_{10}) Wildfires can lead to increased particulate matter Heatwaves and air stagnation can increase air pollution levels	Cardiovascular disease Respiratory impacts Premature mortality
Water quality and availability	Drought and low water levels can impact the quality and quantity of drinking water, particularly for populations relying on rainwater tanks (McMichael, 2013) Drought and low water levels can increase the concentration of cryptosporidium cysts in waterways, which heavy rainfall can then flush out (Lal et al., 2013) Higher temperatures can increase the risk of salmonella from food safety issues	Waterborne diseases (giardiasis, cryptosporidiosis, campylobacteriosis) Foodborne diseases (salmonellosis)
Vector-borne disease	Increased risk of mosquito-borne diseases, if certain species of mosquitoes are established in NZ	Mosquito-borne diseases (eg malaria, dengue fever, Ross River virus) Other vector-borne diseases (eg from ticks), eg Lyme disease
Pollens and allergens	Wind can increase pollen dispersal Climate change and higher temperatures may increase amount and allergic potential of pollen (Royal Society of New Zealand Te Aparangi, 2017)	Hayfever Allergic reactions Allergic illnesses, such as asthma
UV exposure	Increased temperatures may increase UV exposure, which may in turn increase the risk of skin cancer if sun protection is not used (The Lancet Oncology, 2023, Watson et al., 2024)	Melanoma Non-melanoma skin cancer

Social vulnerability can then be understood as those people who are at greater risk of experiencing these potential impacts, due to increased exposure, susceptibility, and/or lack of resilience (capacity to prepare for, cope with and/or recover from the hazard).

4 Methods

This section provides information about the methods used in this report, including the process used to develop the indicators originally.

4.1   Overview of social vulnerability work

This report draws on social vulnerability indicators for Aotearoa New Zealand for 2018 (with data added from 2006 and 2013 where possible).

Social vulnerability indicators for flooding

In 2019, we developed a set of social vulnerability indicators for flooding in New Zealand, using a case study of Porirua to test the indicators (Mason et al., 2021, Mason et al., 2019). We partnered with Porirua City Council, Ngāti Toa Rangatira, GNS Science, NIWA and Urban Edge Planning Ltd to complete the project. This research project was funded by the Natural Hazards Research Platform from 2017–2019.

The indicators were developed using a robust indicator development process, using a concept-driven approach, rather than a data-driven approach. The indicator development process included input from key stakeholders throughout the project, including the initial scoping stage, indicator selection process, and implementation stage. In particular, the stakeholder group reviewed the conceptual framework to ensure it worked in the New Zealand context, and reviewed the proposed set of indicators, by assessing how well the indicators worked for the Porirua City Council area. This was invaluable feedback that helped shaped the indicator set, selection criteria, and design and implementation of the indicators. The stakeholder group included representatives from:

- Porirua City Council
- Wellington Region Emergency Management Office (WREMO)
- Regional Public Health (the local public health unit)
- Tū Ora Compass Health Primary Health Organisation
- Capital & Coast District Health Board
- Ngāti Toa Rangatira
- Ministry of Civil Defence & Emergency Management (MCDEM)
- GNS Science
- NIWA.

A set of indicators were developed and implemented, using 2013 Census data, with the main output being indicator data at a local level (census area units, representing about 2000 people each), to inform disaster risk reduction for flooding.

The indicator development process is briefly outlined in sections 4.2, 4.3, and 4.4, and is described fully in the research report (Mason et al., 2019) and journal article (Mason et al., 2021).

Social vulnerability indicators for 2018

The social vulnerability indicators were then updated in mid-2020, using the 2018 Census data when it was released. We repeated the same set of indicators where possible. However, the 2018 Census experienced implementation issues, which resulted in a lower-

than-expected response rate. This led to data quality issues for some indicators, and we excluded some indicators on this basis. Additionally, the 2018 Census included some new topics that were relevant to social vulnerability, which were included in the updated set of indicators.

Additionally, we checked that the indicators and underlying conceptual framework were relevant for a range of hazards, including flooding, coastal inundation, extreme weather events, heatwaves, drought, wildfires, pandemics, earthquakes, volcanoes, tsunami, poor air quality and poor water quality. This work identified that generally the social vulnerability indicators were useful for sudden-onset disasters and hazards, and were relevant for the COVID-19 pandemic. For environmental hazards such as air quality and water quality, the indicators were useful for understanding populations susceptible to health impacts (ie children, older adults, pregnant women, people with pre-existing health conditions).

These changes and considerations are described further in section 4.6.

National report on social vulnerability indicators for climate-related hazards

For this national report on social vulnerability to climate-related hazards, we report on the 2018 social vulnerability indicators at a national level, as well as changes over time (for 2013, and 2006 where possible), and by territorial authority and selected population groups.

We have supplemented the social vulnerability indicators with additional information, to ensure that all dimensions of social vulnerability have useful and relevant national-level information. Additional indicators and information included in this report are described further in section 4.6.

4.2   Indicator development process

In developing the social vulnerability indicators for flooding, we used a robust indicator development process, previously developed for the children's environmental health indicators in Europe (Briggs, 2003), and used as a basis for New Zealand's Environmental Health Indicators (Mason et al., 2018).

This process had three phases: a scoping phase (understanding the issue and user needs), a selection phase (creating a conceptual framework, understanding causal relationships, and identifying and evaluating potential indicators), and a design and implementation phase (Figure 5).

This project included a case study covering the area and population of Porirua City Council, Wellington, to test the social vulnerability indicators for flooding. The case study involved stakeholder engagement and participation, to develop, test, and trial the indicator set and outputs, and identify ways in which the indicators might be used.

Figure 5: Indicator development process used to develop the social vulnerability indicators

SCOPING

Understand the issue

- Develop an understanding of the issue (eg through background literature, key summary literature, expert opinions, previous work on indicators)
- Understand the impact the hazard has on people's health and wellbeing
- Understand who is more likely to be affected

Understand key users and their needs

- Identify key users
- Analyse user information needs
- Review existing data and indicators available
- Review policy context

Finalise the information needs that the indicator(s) will meet

- Identify rationale for indicator development
- Identify the specific purposes and key users of the set of indicators
- Identify any information needs of key users (such as spatial scale)

SELECTION

Identify causal relationships

- Identify known or plausible relationships between the hazard, human health and wellbeing, and factors that make people more vulnerable to these impacts

Create conceptual framework

- Develop or select a conceptual framework for understanding social vulnerability to natural hazards

Identify potential indicators

- Review existing indicators (national and international), expert advice, one-off analyses that can be converted to indicators, and available datasets
- Identify potential indicators to fit the conceptual framework. Proxy indicators may be used for some aspects of the conceptual framework if necessary
- Identify potential point locations that may relate to the conceptual framework
- Ensure indicators fit conceptual framework and reflect casual relationships

Evaluate potential indicators

- Evaluate potential indicators against indicator selection criteria
- Obtain expert and end-user feedback
- Check alignment with other indicators in use and stakeholder needs
- Revise indicator list and obtain further expert feedback if required

DESIGN AND IMPLEMENTATION

Design the indicators and output methods

- Design the technical aspects of the indicator (eg indicator definitions)
- Identify ways of presenting the indicator data to meet the needs of key users

Produce the indicators

- Obtain end-user input into analysis and publication methods
- Analyse the data, and create data tables
- Create data visualisations using data tables
- Obtain expert feedback and peer review
- Publish data tables, data visualisations and metadata for indicators

Source: Mason et al. (2021)

4.3 Conceptual framework for social vulnerability

Developing (or selecting) a conceptual framework is an important part of indicator development, for both understanding the issue of interest, and guiding indicator selection (Advisory Committee on Official Statistics, 2009). No existing conceptual frameworks covered all aspects of social vulnerability that we needed, so we combined three existing frameworks and/or models to create a conceptual framework.

We used the MOVE framework (Birkmann et al., 2013) as the basis for understanding the main three aspects of vulnerability: exposure, susceptibility, and lack of resilience (see section 2.2). This framework is similar to that used for climate change impacts in the US (USGCRP, 2016). We used the circle of capacities model (Wisner et al., 2012) to further explain resilience to disasters (see section 2.3). In this model, resilience covers six key dimensions, including housing, money, food and water, social connectedness, knowledge and skills, and decision-making and leadership. We used the Māori model of health and wellbeing, Te Whare Tapa Whā (Durie, 1985), to allow a broad understanding of health and wellbeing, to include physical, mental, social and spiritual wellbeing.

Together, exposure, susceptibility, and a lack of resilience can increase people's vulnerability to negative impacts of hazard events on health and wellbeing. Figure 6 presents the framework that we developed, showing the main dimensions that were used to guide indicator selection.

Figure 6: Social vulnerability framework and dimensions for Aotearoa New Zealand
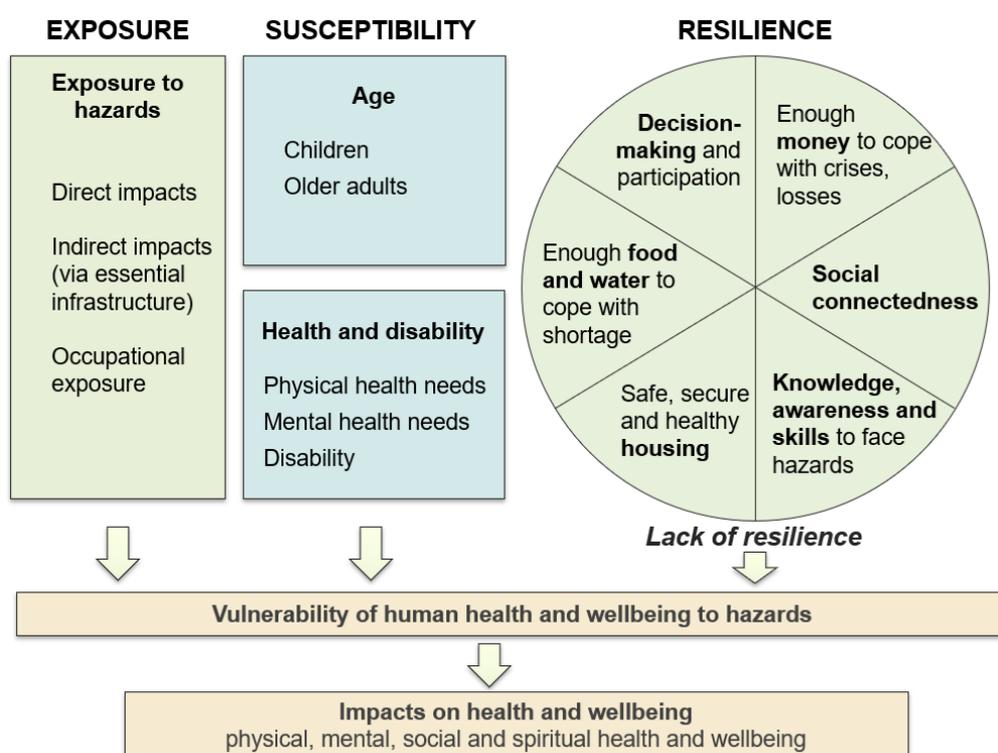
Adapted from Birkmann et al. (2013), Wisner et al. (2012), USGCRP (2016) and Durie (1985).

4.4 Social vulnerability dimensions

Table 4 provides more details about the social vulnerability dimensions used in the conceptual framework.

Table 4: Description of social vulnerability dimensions

Social vulnerability dimension	Description
Exposure	Exposure to hazards can include direct exposure (eg being affected by the hazard), as well as indirect exposure (for example, through loss of critical infrastructure, such as power and gas supplies, water supplies, transportation networks, and telecommunications). The size of the population, and where people live, is vitally important for understanding their exposure to climate-related hazards. Understanding the ethnic and cultural groups in an area can also help with planning and response to hazards. Rural areas may be particularly vulnerable to impacts from climate-related hazards, as well as disruptions to key infrastructure during a hazard event.
Children	Children, particularly young children, are vulnerable to the impacts of climate-related hazards such as floods, storms, wildfires and heatwaves. Children rely on adult caregivers to protect them during a hazard event, and to move them out of harm's way. Children's bodies are still developing and growing, which makes them more susceptible to illness and toxins, as well as extreme heat and other hazards.
Older adults	Older adults can be more vulnerable to climate-related hazards, mainly due to other types of vulnerabilities that become more common in the older ages. For example, older adults tend to be less mobile, and may have physical disabilities, which can make evacuation and clean-up activities more difficult for them. Older adults are more likely to have pre-existing health conditions, which makes them more susceptible to health impacts. Older adults may also have limited social networks and be socially isolated, particularly if they live alone.
Physical health needs	People with chronic health conditions are more susceptible to climate-related hazards, particularly people with ischaemic heart disease, respiratory conditions (such as asthma), and diabetes. People who require essential medications and/or health services are also more vulnerable, as disruptions to people's access may occur if there are power outages, and/or if access to healthcare services is cut off. Pregnant women may be at increased risk during and after a hazard event such as a flood, and face increased risk of premature delivery, underweight infants and infant mortality.
Mental health needs	People with pre-existing mental health issues are more susceptible to the impacts of a hazard event (such as floods and heatwaves). They may have more difficulties in coping with the stress of flooding or hazard events. People with certain mental health conditions and/or taking certain medications can also be more susceptible to the health impacts of heatwaves. Substance misuse can increase after a hazard event as well, due to stress.
Disability	People who are restricted in daily activities by a physical, learning or mental disability are more vulnerable to the impacts of natural hazards. People with a disability may have difficulty evacuating, moving themselves, understanding hazards and/or instructions and/or taking care of themselves. They may also depend on caregivers to help them prepare for a flood, and evacuate if needed.
Enough money to cope with crises, losses	Having the financial resources to cope with crises and losses is an important aspect of resilience – that is, being able to prepare for, cope with and recover from disasters. People without enough money and/or with low income may find it difficult to prepare for or adapt to hazards (such as through emergency preparedness, protection works to reduce the hazard risk), or recover financially from losses after a disaster. Having no access to a motor vehicle may impact on people's ability to evacuate and/or move to safe zones during a hazard event.
Social connectedness	Social connectedness and having the support of other people in an emergency, is an important aspect of resilience. People who are socially isolated may be more vulnerable during and after a hazard event.
Knowledge, awareness and skills to face hazards	Awareness of hazards, and being able to access and understand information about hazards (including about preparedness, adaptation measures, and recovery after a disaster), is important for resilience. Having access to communication devices (such as mobile phone and internet) allows people to access information, and to contact friends, family and others before, during and after a hazard event.

Social vulnerability dimension	Description
Safe, secure and healthy housing	Housing is important for resilience. Many aspects of housing in New Zealand are not currently providing people with safe, secure and healthy housing. Rental housing is often of poorer quality than owner-occupied housing; people living in rented dwellings are also vulnerable to being displaced after a hazard event and potentially becoming homeless. Household crowding increases the risk of infectious diseases. Damp and mouldy housing can affect people's health, and lead to respiratory issues; it can also result from flooding or extreme weather events.
Enough food and water to cope with shortage	Having enough food, water and emergency supplies to cope with an emergency is an important aspect of survival and disaster resilience. Having access to safe drinking water also provides resilience (for example, during heatwaves).
Decision-making and leadership	Decision-making and participation is important for resilience. Good leadership, inclusive planning and decision-making that includes vulnerable groups, and participation by the local community, is important to ensure that people's needs are met.
Occupation	People's occupation can influence their exposure and risk of losses. For example, people working in primary industries are more vulnerable to the impacts of climate-related hazards, as they work outdoors, and many livelihoods will depend on natural resources. People who work in healthcare and social assistance may be more exposed during a hazard event, if they need to work during a disaster

4.5   Indicator selection process and criteria

The indicator selection process is designed to create high quality, relevant and useful indicators, which represent the different aspects of the conceptual framework. For each social vulnerability dimension, a range of indicators were provisionally selected to measure aspects of that dimension, and these provisional indicators (and data sources) were then assessed against the indicator selection criteria.

Indicators were selected based on the strength of causal associations/rationale, availability of data, and evaluation of the indicators against ten key indicator selection criteria (Table 5). We tested proposed indicators using the Porirua case study area, with the stakeholder group, to further refine the indicators. We also worked with stakeholders to identify potential uses for the indicators, which were then also used to inform the final indicator selection.

Table 5: Selection criteria for social vulnerability indicators

Indicator Selection Criteria	Explanation
Data availability	Indicator must have data that can be easily and reliably extracted.
Scientifically valid	Indicator must have an established, scientifically sound link to the issue.
Methodologically sound measurement	Indicator measurement needs to be methodologically sound.
Sensitive	Indicator should respond relatively quickly and noticeably to changes but not show false movements.
Consistent	Indicator should be consistent with those used in other indicator programmes (including internationally) so comparisons can be made.
Comparable	Indicator should be consistent to allow comparisons over time.
Intelligible and easily interpreted	Indicator should be sufficiently simple to be interpreted in practice and be intuitive in the sense that it is obvious what the indicator is measuring.
Able to be disaggregated	Indicator needs to be able to be broken down into as local-level as possible (eg neighbourhood).
Timely	Data needs to be collected and reported regularly and frequently to ensure it is reflecting current and not historical trends.

Public health impact	Indicator needs to relate to an issue of significant public health impact to New Zealand. This health impact may include: affecting a large number of people, a vulnerable population, or Māori health; or having substantial policy relevance.

Source: Mason et al. (2018). Based on the indicator selection criteria published by the Advisory Committee on Official Statistics (2009) and the indicator selection criteria developed and used by the Environmental Health Intelligence NZ team (Mason et al., 2018).

One of the most important criteria for stakeholders was the ability to disaggregate data to a very local level (eg neighbourhood measures such as census area unit or Statistical Area 2, SA2). This meant that the social vulnerability indicators for flooding were generally selected only if they had local-level information available. This ruled out national survey data from the indicator set.

Census data for 2013 was downloaded, and indicators were created at the census area unit (CAU) level. For some indicators without publicly-available Census data (such as households with at least one child), customised datasets were requested from Stats NZ.

4.6   Extending the original list of indicators

Updating indicator list with 2018 Census data

When new Census data for 2018 was published, we reviewed the Census data and the reports and reviews on the quality of the Census data, including from the External Data Quality Panel (EQDP) (2019b, 2019a, 2020). As part of this process, we reviewed the quality of each relevant Census variable, and identified whether the Census variable was of good enough quality to use (particularly at a local level / neighbourhood level). We used the Stats NZ and EQDP assessments, and did not use Census data rated as being of 'poor' or 'very poor' quality. The 2018 Census also included some new topics that were relevant for the social vulnerability dimensions, so these were considered as well.

As a result, the following changes were made between the 2013 and 2018 social vulnerability indicator sets:

- Some indicators were not produced in 2018, due to data quality issues: educational attainment, main mode of transport to work, people new to the neighbourhood (years at residence).

- Some indicators were not produced in 2018, due to having no updated data for 2018: disability prevalence.

- New indicators were considered for 2018 but not included due to poor data quality: activity limitations.

- New indicators were included in 2018: damp dwellings, mouldy dwellings, dwellings without safe running water / electricity / fridge.

Extending indicators to include climate-related hazards

Additionally, work was carried out to assess whether the indicators were suitable for hazards other than flooding. We identified a range of hazards, including pandemics, earthquakes, tsunami, volcanoes, heatwaves, drought, poor air quality and poor drinking water quality.

For each hazard, we identified the potential impacts on health and wellbeing of the hazards, population groups more susceptible to these health impacts, what individuals could do to be resilient to the hazard, and relevant social vulnerability indicators (Table 6).

Table 6: Considerations for identifying social vulnerability to other hazards

Steps for assessing social vulnerability to a hazard	Considerations
1. Exposure to the hazard	• How common is the hazard in New Zealand? • How many people are exposed? • What hazard characteristics can worsen the impacts of the hazard? • What other types of hazards and impacts are likely to occur around the same time? • What are the climate change implications for this hazard? • Who is more exposed to this hazard?
2. Health impacts	• What are the direct health impacts of the hazard? • What are the health impacts from potential disruptions to infrastructure? • What are other health impacts from this hazard? • Who is more susceptible to the health impacts of this hazard?
3. Resilience and adaptation	• What influences people's resilience and adaptation to this hazard? • What can people and/or households do to prepare, cope with, recover from, and adapt to this hazard? • What capacities and/or resources do people need, in order to carry out these actions? • Who is less resilient and/or more vulnerable to the negative impacts of the hazard?
4. Social vulnerability	• How relevant is each existing social vulnerability dimension and/or indicator, in terms of susceptibility, resilience and adaptation to the specific hazard? • What are relevant social vulnerability indicators for the hazard? • What point locations (eg schools, aged care facilities) are relevant for the hazard? • Are more vulnerable people more exposed to the hazard? • Are Māori, marae, sacred sites (eg urupā) and Māori land more exposed to the hazard?

From this process, we identified that the conceptual framework and existing indicator set worked well and were relevant for a range of hazards, particularly sudden-onset hazards. This was confirmed by reviewing previous research on social vulnerability to other hazards, including heatwaves (Joynt and Golubiewski, 2019), wildfires (Davies et al., 2018, Palaiologou et al., 2019), and climate change (Li et al., 2023, USGCRP, 2016).

Sudden-onset hazards generally have the same vulnerable population groups, as resilience activities rely on similar tasks or actions (such as emergency preparedness, evacuation, and recovery). These include natural hazards (such as earthquakes, tsunami, and volcanoes), as well as pandemics. For other more environmental hazards (such as poor water quality and poor air quality), there may be little that individuals can do to improve their resilience or change their exposure, so the main vulnerable groups are generally those that are more susceptible.

It should be noted that the social vulnerability indicators might not be as relevant for gradual hazards (such as longer-term sea level rise), as different actions may be needed, and different factors come into play for vulnerability. These types of hazards may need to be considered separately.

Including additional indicators for this report

We have supplemented the social vulnerability indicators with additional information, to ensure that all dimensions of social vulnerability have useful and relevant national-level information. This additional information is generally only available at the national level (not by territorial authority or neighbourhood (SA2) level), which is why they were not included as part of the main set of social vulnerability indicators. The additional information included for this report includes:

- indicators about household emergency preparedness
- indicators about children living in households with food insecurity
- prevalence of selected chronic diseases, mental health issues, and disability
- number of pregnant women each year
- additional information (eg cross-tabulations by age group, ethnic group, socioeconomic deprivation, urban/rural) for selected indicators where available.

The additional statistics about health and disability status are not part of the social vulnerability indicator set, but provide a high-level picture of the number of people affected in the New Zealand population. We intend to develop specific health and disability indicators in the future, to fill this gap.

4.7 Indicator list for this report

The full list of indicators included in this report is presented in Table 7. Detailed indicator definitions (metadata) are provided in Appendix 1.

Table 7: Social vulnerability indicators in this report, with data source and years presented

Dimension	Indicator	Data source	Years presented
Exposure	Population	Census	2006, 2013, 2018
	Number of households	Census	2006, 2013, 2018
	People living in rural areas	Census	2018
Ethnic group (total response)	Māori	Census	2006, 2013, 2018
	Pacific peoples	Census	2006, 2013, 2018
	Asian	Census	2006, 2013, 2018
	Middle Eastern/ Latin American / African (MELAA)	Census	2006, 2013, 2018
	European/Other	Census	2006, 2013, 2018
Children	Children aged 0–14 years	Census	2006, 2013, 2018
	Children aged 0–4 years	Census	2006, 2013, 2018
	Households with at least one child aged 0–14 years	Census	2013, 2018
	Households with at least one child aged 0–4 years	Census	2013, 2018
Older adults	Older adults aged 65+ years	Census	2006, 2013, 2018
	Older adults aged 75+ years	Census	2006, 2013, 2018
	Older adults aged 85+ years	Census	2006, 2013, 2018
	Households with an older adult living alone	Census	2006, 2013, 2018
Health and disability	*Selected information presented about health status**	NZHS	2012/13–2022/23
	*Selected information presented about disability status**	NZDS	2013
Enough money to cope with crises and losses	Socioeconomic deprivation	NZDep2018	2018
	Unemployed (among 15+ years)	Census	2006, 2013, 2018
	Not in labour force (among 15+ years)	Census	2006, 2013, 2018
	Single parent households (among total households)	Census	2018
	Households with no motor vehicle (among households)	Census	2006, 2013, 2018
Social connectedness	One-person household (among total households stated)	Census	2006, 2013, 2018
	Immigrants arrived in past year (among total population)	Census	2006, 2013, 2018
	Immigrants arrived in past 0-1 years (among total population)	Census	2006, 2013, 2018
Awareness, knowledge and skills to cope with hazards and emergencies	Households with no access to a mobile phone	Census	2006, 2013, 2018
	Households with no access to the internet (among total households stated)	Census	2006, 2013, 2018
	People who don't speak English (among total population)	Census	2006, 2013, 2018
Safe, secure and healthy housing	Living in rented dwelling (among occupied private dwellings)	Census	2006, 2013, 2018
	People living in crowded households (among total population stated)	Census	2006, 2013, 2018
	Crowded households (among total households stated)	Census	2006, 2013, 2018
	Dwelling is damp always or sometimes (among total dwellings stated)	Census	2018
	Dwelling is damp always (ie severe damp) (among total dwellings stated)	Census	2018
	Dwelling is mouldy always or sometimes (among total dwellings stated)	Census	2018
	Dwelling is always mouldy (ie severe mould) (among total dwellings stated)	Census	2018
	People experiencing severe housing deprivation (including homelessness)	Census	2013, 2018
Enough food and water to cope with shortage	People in households with basic emergency preparedness*	GSS	2014, 2021
	People in households with enough food for three days*	GSS	2021
	People in households with enough water for three days*	GSS	2021
	People in households with a household emergency plan*	GSS	2021
	Children in households that run out of food often or sometimes*	NZHS	2012/13–2022/23
	Children in households that use foodbanks or food grants often or sometimes*	NZHS	2012/13–2022/23
	Dwellings with no access to safe running water (among total dwellings stated)	Census	2018
	Dwellings with no access to a fridge (among total dwellings stated)	Census	2018
	Dwellings with no access to electricity (among total dwellings stated)	Census	2018
Decision-making	Voting participation in local body elections	Local body elections	2007, 2010, 2013, 2016, 2019, 2022
Occupational exposure/ vulnerability	Primary industry workers (among 15+ years)	Census	2006, 2013, 2018
	Primary industry workers (among employed 15+ years)	Census	2006, 2013, 2018
	Healthcare and social assistance workers (among 15+ years)	Census	2006, 2013, 2018
	Healthcare and social assistance workers (among employed 15+ years)	Census	2006, 2013, 2018

Note: * = additional indicators included for this report, but no territorial authority data available; Census = New Zealand Census of Populations and Dwellings; NZHS = New Zealand Health Survey; NZDep = New Zealand Index of Deprivation (Atkinson et al., 2020); NZDS = New Zealand Disability Survey; GSS = New Zealand General Social Survey.

4.8   Data sources for indicators

Table 8 presents the main data sources used for this report. The vast majority of indicators used Census data.

Table 8: Data sources for the social vulnerability indicators

Indicator type	Data source	Agency	Year(s)	Description
Main social vulnerability indicators	New Zealand Census of Populations and Dwellings	Stats NZ	2006, 2013, 2018	Used for most indicators; covers individuals, dwellings, and households
	NZDep2018	Wellington School of Medicine, University of Otago	2018	Based on nine Census variables; developed by June Atkinson et al (2020)
	Household crowding	Stats NZ	2013, 2018	Derived from Census variables
	Local body voting	Department of Internal Affairs	2007, 2010, 2013, 2016, 2019, 2022	Voting statistics by territorial authority, from the local body elections.
	Homelessness and severe housing deprivation	Amore et al. (2021), Department of Public Health, University of Otago, Wellington	2013, 2018	Based on Census and other statistics
Additional indicators and measures included for this report	New Zealand General Social Survey	Stats NZ	2021	Household emergency preparedness
	New Zealand Health Survey	Ministry of Health	2012/13, 2022/23	Food insecurity Selected prevalence measures of health status
	New Zealand Disability Survey	Stats NZ	2013	Selected measures of disability
	Maternity Clinical Indicators	Ministry of Health	2022	Selected measures of pregnant women

The main dataset used for the social vulnerability indicators was the New Zealand Census of Population and Dwellings. The benefits of using census data include the coverage of the whole of New Zealand, and data being available to a local level (eg neighbourhood-level such as Statistical Area 2, SA2).

For Census-based indicators, we used published geographic data tables for territorial authorities for this report. These data tables have the past three censuses (ie 2006, 2013, 2018), so we used the same indicator definition for all three years, to produce robust measures of changes over time.

However, the 2018 Census suffered from implementation issues, which resulted in a lower than usual response rate. For some Census variables, Stats NZ had used administrative data used to improve the data quality; other indicators did not have alternate data sources, so had missing data. In many cases, it is likely to have been more vulnerable individuals and households who did not complete Census forms. We have not included indicators with 'poor' data quality. We have provided logical bounds for percentages where missing data was a large factor.

4.9　Results presented

Overview of results presented

This report presents the following results for each social vulnerability indicator, where possible:

- latest results (number and percentage of population/households/dwellings)
- changes over time (where available)
- results by specific population groups (eg age, ethnic group, socioeconomic status, urban/rural)
- map of results by territorial authority.

Data is generally for 2018

This report mainly uses data from 2018, which was the latest available Census data at the time of writing the report. For a few population indicators (eg population counts, age group, ethnic group), the latest Census results for 2023 were released in late May 2024. This was too late for results to be included in graphs and maps, but a note has been included in the text of latest results for the few relevant population indicators.

Changes over time need to be interpreted with caution

Changes over time are presented where possible. We used the recent 2018 Census geographic tables, which have data for Census variables for the past three census years, by different geographies. We used the territorial authority datasets, and recreated the social vulnerability indicators using the 2018 indicator definitions, for the three years 2006, 2013, 2018. For indicators where we had requested customised data, we could only use the data we had available.

Stats NZ states that time series should be interpreted with caution, due to a change in census methodologies, and differences in response rates between census years. For some indicators, Stats NZ used additional data sources (including administrative data, 2013 Census data, and imputation) to fill gaps and improve data quality. This change of methods (where 2006 and 2013 Censuses had missing data, while 2018 did not) may have affected the time series. In particular, the use of 2013 Census data to fill gaps in the 2018 Census may make it harder to detect changes over time.

Other indicators did not have any additional data sources available to fill gaps, so there was more missing data than in previous Censuses. For these indicators, we have generally shown logical bounds (see below).

Measures presented

This report presents indicator data as both counts (to show the burden on the population) and percentages (to show the proportion of the population affected). Percentages are generally calculated using 'total stated' as the denominator, to account for any missing data. Where there is missing data, counts should be treated as a lower bound, and are likely to be higher.

Results by age group, ethnic group, urban/rural, NZDep

For some indicators, results were presented for specific population groups (eg age, ethnic group, socioeconomic deprivation (NZDep2018 decile), urban/rural).

For age group and ethnic group analyses, we only used published Stats NZ information where available, as this was additional work only for this project, and we did not have time to request customised data from Stats NZ. Age group analyses generally focused on the children and older adults, where possible, as these are vulnerable age groups (as identified by the social vulnerability indicators).

Results are provided by ethnic group for some indicators where possible. Generally, total response ethnic groups are used, which is where every person is included in all ethnic groups that they identify with. This is because the Census results are readily and publicly available by these groups. Ideally we would use non-overlapping ethnic groups by using sole European as a comparator ethnic group (McLeod et al., 2023), but sometimes this Census information is not publicly available. Due to time constraints, we have not been able to present sole European in all the appropriate places. Therefore, some comparisons may underestimate the true differences between ethnic groups. Nonetheless, the results by ethnic group provide information on the burden experienced by each ethnic group.

For urban/rural comparisons, we used the IUR (Urban Rural Indicator) (see section 6.9). For comparisons by socioeconomic deprivation, we compared by NZDep2018 decile (see section 10.2). For many of these urban/rural and NZDep comparisons, we calculated percentages by urban/rural category by summing population counts over Statistical Area 2 areas (SA2s) (given that urban/rural status and NZDep can both be assigned at the SA2 level). However, this analysis used numbers that had been randomly rounded to base 3, so the percentages provided in this report are estimates only, as numbers will not be exact.

Logical bounds to reflect potential impact of missing Census data

For some Census variables, Stats NZ used other data (such as administrative data, 2013 Census data, and/or imputation) to fill gaps where data were missing, to improve data quality. However, a number of Census variables had no other available sources of data, so had some missing data.

For social vulnerability indicators based on Census variables with missing data, we took the approach of presenting percentages (using 'total stated' as the denominator) and calculating logical bounds for the percentage. Logical bounds show the maximum and minimum possible values for the percentages (ie worst- and best-case scenarios) when taking into account missing data (Puma et al., 2009). These logical bounds show the range in which the true value of the percentage must lie.

In this report, the indicators with missing data that have national results presented with logical bounds include:

- Households with children
- Households with an older adult living alone
- Households with no motor vehicle
- One-person households
- Households with no access to a mobile phone
- Households with no access to the internet
- People living in crowded households

- Crowded households
- Damp dwellings
- Mouldy dwellings
- Dwellings with no safe drinking water
- Dwellings with no fridge
- Dwellings with no electricity

For Census variables with a large amount of missing data, the indicator was not created.

95% confidence intervals represent uncertainty due to taking a sample

For indicators based on sample surveys, 95% confidence intervals are presented where possible. These 95% confidence intervals represent the range in which we are 95% confident the true value lies. This uncertainty in the estimate is due to only taking a sample of the population, rather than a census.

4.10   Territorial authorities in New Zealand

Figure 7 and Figure 8 show the territorial authorities of New Zealand, which are used in maps in this report.

TA code	TA name (North Island)
01	Far North District
02	Whangarei District
03	Kaipara District
76	Auckland
11	Thames-Coromandel District
12	Hauraki District
13	Waikato District
15	Matamata-Piako District
16	Hamilton City
17	Waipa District
18	Ōtorohanga District
19	South Waikato District
20	Waitomo District
21	Taupō District
22	Western Bay of Plenty District
23	Tauranga City
24	Rotorua District
25	Whakatāne District
26	Kawerau District
27	Ōpōtiki District
28	Gisborne District
29	Wairoa District
30	Hastings District
31	Napier City
32	Central Hawke's Bay District
33	New Plymouth District
34	Stratford District
35	South Taranaki District
36	Ruapehu District
37	Whanganui District
38	Rangitīkei District
39	Manawatu District
40	Palmerston North City
41	Tararua District
42	Horowhenua District
43	Kāpiti Coast District
44	Porirua City
45	Upper Hutt City
46	Lower Hutt City
47	Wellington City
48	Masterton District
49	Carterton District
50	South Wairarapa District

TA code	TA name (South Island and Chathams)
51	Tasman District
52	Nelson City
53	Marlborough District
54	Kaikōura District
55	Buller District
56	Grey District
57	Westland District
58	Hurunui District
59	Waimakariri District
60	Christchurch City
62	Selwyn District
63	Ashburton District
64	Timaru District
65	Mackenzie District
66	Waimate District
68	Waitaki District
69	Central Otago District
70	Queenstown-Lakes District
71	Dunedin City
72	Clutha District
73	Southland District
74	Gore District
75	Invercargill City
67	Chatham Islands Territory

Figure 7: Map of New Zealand territorial authorities, North Island, 2018
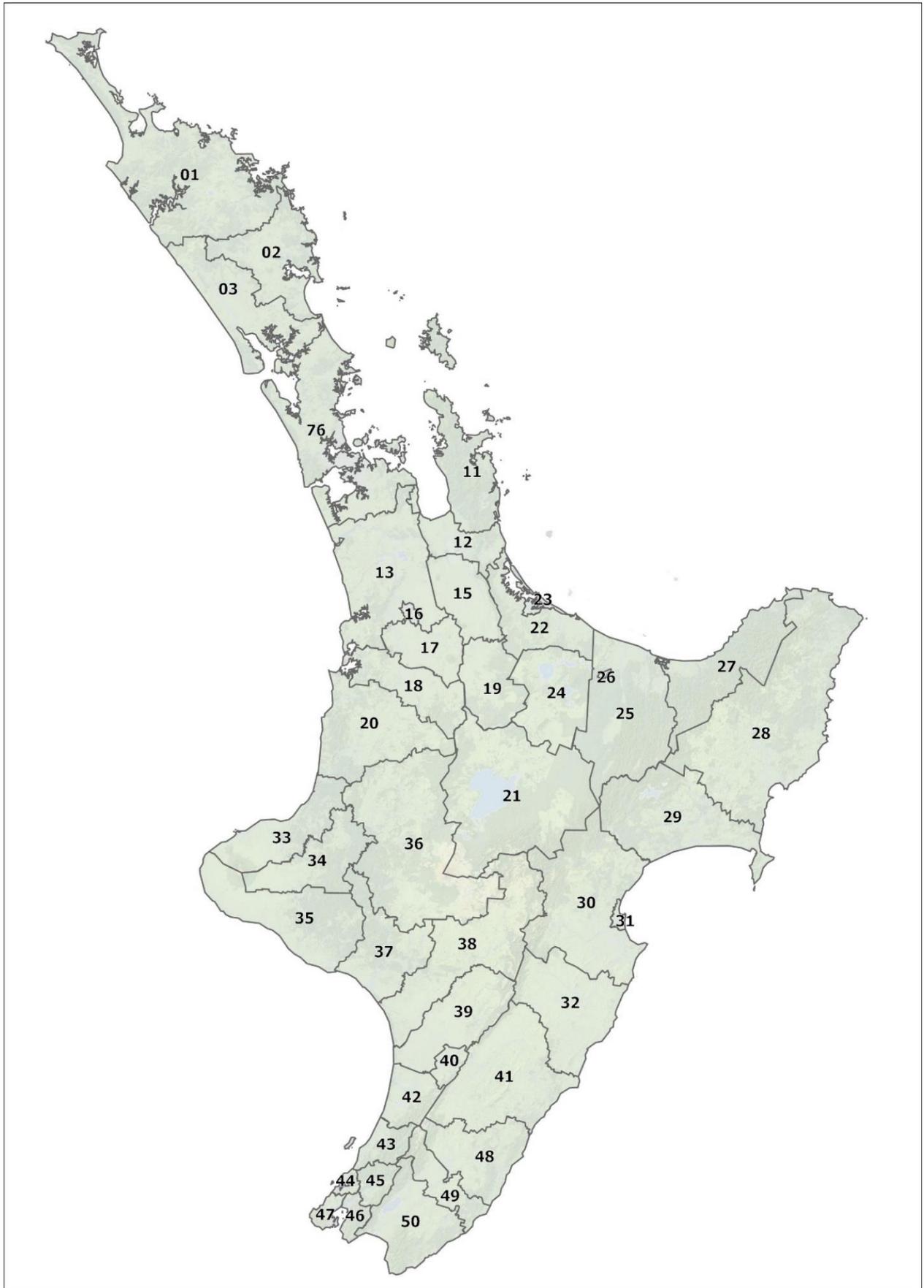
Figure 8: Map of New Zealand territorial authorities, South Island, 2018

5 Summary of key findings

This section summarises key findings of the social vulnerability indicators, to provide an overview of population vulnerability to climate-related hazards in New Zealand.

5.1 Key statistics and changes over time

Census results can be compared over time, to show changes in social vulnerability indicators. Methodological changes for the 2018 Census (ie moving to using additional data sources such as administrative data for some variables, to improve data quality) may have had some impacts on comparisons over time, so changes should be interpreted with caution. Nonetheless, comparisons can suggest changes over time.

From 2013 to 2018, results suggest there have been **increases** in the following measures:

- size of the New Zealand population (close to 5 million people in 2018)
- older adults aged 65+ years (15.2% of the population in 2018)
- households with an older adult living alone (10.7% of all households in 2018)
- ethnic group population for Māori (16.5% of the total population in 2018), Pacific peoples (8.1%), Asian (15.1%), Middle Eastern/Latin American/African (MELAA) (1.5%) ethnic groups
- immigrants who arrived in the past year and/or two years (1.6% and 3.2% of the population respectively in 2018)
- people who do not speak English (2.5% of the population in 2018)
- households living in rental housing (35.5% of households in 2018)
- crowded households (5.7% of households in 2018, with 10.8% of the population living in crowded households in 2018)
- healthcare and social assistance workers (9.5% of employed people aged 15+ years in 2018).

Results suggest there have been **decreases** in the percentages of the following indicators from 2013 to 2018:

- households with no motor vehicle (6.6% of households in 2018)
- households with no access to the internet (13.9% of households in 2018)
- households with no access to a mobile phone (8.1% of households in 2018)
- primary industry workers (5.9% of employed people aged 15+ years in 2018).

There appeared to be **similar levels** of the following indicators from 2013 to 2018:

- people not in the labour force (31.3% of people aged 15+ years in 2018)
- unemployment (4.0% of people aged 15+ years in 2018)
- people who are severely housing deprived (ie homeless or in temporary or shared accommodation) (almost 1% of the population in 2018).

In 2018, the following measures related to poor-quality housing:

- dwellings that are damp sometimes or always (21.5% of dwellings in 2018)
- dwellings that are mouldy sometimes or always (16.9% of dwellings in 2018)
- dwellings with no access to safe running water (3.2% of dwellings in 2018)
- dwellings with no access to a fridge (3.2% of dwellings in 2018)

- dwellings with no access to electricity (1.7% of dwellings in 2018).

Additionally, household emergency preparedness and food insecurity were key issues, as shown by the following measures:

- people in households with basic emergency preparedness (ie enough food and water for three days, and a household emergency plan) (20.8% of people aged 15+ years in 2021)
- people in households with enough food for three days (83.0% of people aged 15+ years in 2021)
- people in households with enough water for three days (46.9% of people aged 15+ years in 2021)
- people with a household emergency plan (30.9% of people aged 15+ years in 2021)
- children in households that run out of food often or sometimes (21.3% of children in 2022/23)
- children in households that use foodbanks or food grants often or sometimes (14.4% of children in 2022/23).

Table 9 provides summary statistics from the social vulnerability indicators, at the national level. This table shows changes over time, from 2013 to 2018.

Table 9: Key statistics from the social vulnerability indicators at the national level, for 2006, 2013, 2018

Dimension	Indicator	Percentage (%)			Number
		2006	2013	2018	2018
Exposure	Population				4,699,755
	Number of households				1,653,792
	People living in rural areas (among total population)			16.3	
Ethnic group (total response)	Māori (among total population)	14.6	14.9	16.5	775,836
	Pacific peoples (among total population)	6.9	7.4	8.1	381,642
	Asian (among total population)	9.2	11.8	15.1	707,598
	Middle Eastern/ Latin American / African (MELAA) (among total population)	0.9	1.2	1.5	70,332
	European/Other (among total population)	67.6	74.0	70.2	3,297,864
Children	Children aged 0–14 years (among total population)	21.5	20.4	19.6	923,403
	Children aged 0–4 years (among total population)	6.8	6.9	6.3	294,921
	Households with at least one child aged 0–14 years (among total households)		29.4	29.5	468,873*
	Households with at least one child aged 0–4 years (among total households)		13.6	12.8	203,979*
Older adults	Older adults aged 65+ years (among total population)	12.3	14.3	15.2	715,167
	Older adults aged 75+ years (among total population)	5.7	6.2	6.4	302,505
	Older adults aged 85+ years (among total population)	1.4	1.7	1.8	84,351
	Households with an older adult living alone (among total households)	9.6	10.4	10.7	170,322
Enough money to cope with crises and losses	Unemployed (among 15+ years)	3.5	4.8	4.0	151,035
	Not in labour force (among 15+ years)	31.5	32.9	31.3	1,180,179
	Single parent households (among total households)			8.6	135,987*
	Households with no motor vehicle (among households)	8.1	7.9	6.6	100,302*
Social connectedness	One-person household (among total households stated)	23.0	23.5	22.7	361,377
	Immigrants arrived in past year (among total population)	1.5	1.2	1.6	73,617

Dimension	Indicator	Percentage (%)			Number
		2006	2013	2018	2018
	Immigrants arrived in past 0-1 years (among total population)	2.7	2.2	3.2	148,002
Awareness, knowledge and skills to cope with hazards and emergencies	Households with no access to a mobile phone (among total households stated)	25.8	16.3	8.1	122,976*
	Households with no access to the internet (among total households stated)	39.5	23.2	13.9	211,722*
	People who don't speak English (among total population)	2.2	2.2	2.5	115,833
Safe, secure and healthy housing	Living in rented dwelling (among occupied private dwellings)	33.1	35.2	35.5	586,131
	People living in crowded households (among total population stated)	10.4	10.1	10.8	431,000*
	Crowded households (among total households stated)	5.2	5.0	5.7	90,170*
	Dwelling is damp always or sometimes (among total dwellings stated)	–	–	21.5	318,891*
	Dwelling is damp always (ie severe damp) (among total dwellings stated)	–	–	3.0	44,520*
	Dwelling is mouldy always or sometimes (among total dwellings stated)	–	–	16.9	252,855*
	Dwelling is always mouldy (ie severe mould) (among total dwellings stated)	–	–	4.3	64,536*
	People experiencing severe housing deprivation (including homelessness)		0.9	0.9	41,724
Enough food and water to cope with shortage	People in households with basic emergency preparedness (2014 and 2021) (95% confidence interval)		22.2 (20.9–23.5)	20.8 (18.9–22.6)	
	People in households with enough food for three days (among people aged 15+ years) (2021) (95% confidence interval)			83.0 (81.4–84.6)	
	People in households with enough water for three days (among people aged 15+ years) (2021) (95% confidence interval)			46.9 (44.6–49.2)	
	People in households with a household emergency plan (among people aged 15+ years) (2021) (95% confidence interval)			30.9 (28.8–33.0)	
	Children in households that run out of food often or sometimes (2012/13 and 2022/23) (95% confidence interval)		24.1 (22.3–25.9)	21.3 (18.9–23.9)	206,000
	Children in households that use foodbanks or food grants often or sometimes (2012/13 and 2022/23) (95% confidence interval)		12.6 (11.2–14.1)	14.4 (12.4–16.7)	139,000
	Dwellings with no access to safe running water (among total dwellings stated)			3.2	48,768*
	Dwellings with no access to a fridge (among total dwellings stated)			3.2	48,471*
	Dwellings with no access to electricity (among total dwellings stated)			1.7	26,226*
Decision-making	Voting participation in local body elections (2007, 2013, 2022)	43.9	43.3	40.9	
Occupational exposure/ vulnerability	Primary industry workers (among 15+ years)	4.3	3.8	3.8	143,139
	Primary industry workers (among employed 15+ years)	6.8	6.5	5.9	143,139
	Healthcare and social assistance workers (among 15+ years)	5.1	5.7	6.1	232,128
	Healthcare and social assistance workers (among employed 15+ years)	8.1	9.6	9.5	232,128

Notes: An asterisk (*) shows that this number should be taken as a lower bound, as there was substantial missing data in the 2018 Census, and therefore the true number may be higher. For indicators based on sample survey data, 95% confidence intervals have been shown; overlapping confidence intervals will generally indicate that a difference is not statistically significant.

Additionally, Table 10 provides summary statistics about health and disability status at the national level, for available time points. These statistics come from survey data (New Zealand Health Survey and New Zealand Disability Survey), so estimates have uncertainty due to being based on a sample of the population.

From 2012/13 to 2022/23, statistically significant increases were seen in the prevalence of medicated asthma in adults, chronic pain, arthritis, and psychological distress (adjusting for age). Significant increases were also seen from 2016/17 to 2021–23 for the prevalence of anxiety symptoms, depression symptoms and combined anxiety/depression symptoms in adults. In 2021–23, about one in three adults (34.8%) had experienced mild or greater anxiety and/or depression symptoms in the previous two weeks.

Table 10: Key statistics about health and disability status for New Zealand

Dimension	Indicator	Prevalence (%) by year			Estimated number of people
		2012/13	2017/18	2022/23	2022/23
Chronic health conditions	Ischaemic heart disease (among 15+ years)	4.8%	4.6%	4.3%	181,000
	Asthma (medicated) (among 15+ years)	10.9%	12.1%	12.3%	515,000
	Asthma (medicated) (among children aged 2–14 years)	14.2%	15.1%	12.4%	104,000
	Diabetes (among 15+ years)	5.8%	5.9%	6.0%	251,000
	Chronic pain (among 15+ years)	17.7%	19.7%	21.3%	894,000
	Arthritis (among 15+ years)	15.2%	17.1%	17.8%	746,000
People taking medication	High blood pressure (diagnosed and currently taking medication) (among 15+ years)	15.9%	16.4%	16.7%	702,000
Mental health and wellbeing	Psychological distress (high or very high according to K10) (among 15+ years)	6.2%	8.6%	11.9%	502,000
			2016/17	2021–23	2021–23
Anxiety and/or depression symptoms	Anxiety symptoms (mild or greater) in the past two weeks (among 15+ years)		18.5%	26.6%	1,113,000
	Depression symptoms (mild or greater) in the past two weeks (among 15+ years)		19.9%	29.0%	1,210,000
	Anxiety and/or depression symptoms (mild or greater) in the past two weeks (among 15+ years)		25.0%	34.8%	1,452,000
		2013			2013
Disability	Overall disability	24%			1,062,000
	Physical disability	14%			632,000
	Hearing disability	9%			380,000
	Vision disability	4%			168,000
	Intellectual disability	2%			89,000
	Psychological or psychiatric impairment	5%			242,000
	Other impairment	8%			358,000

Notes: The health statistics come from the New Zealand Health Survey, and the disability statistics come from the New Zealand Disability Survey. As such, these estimates have uncertainty due to being based on only a sample of the population. Prevalence estimates shown in the table are unadjusted for other variables (such as age). 95% confidence intervals are available for these prevalence estimates. For the health indicators, statistical tests for change were carried out by the Ministry of Health; see pages 121–126 for more information.

5.2   Main findings from social vulnerability indicators

This section describes some key high-level findings from the social vulnerability indicators.

Population

The size of the population, and where people live, is vitally important for understanding their exposure to climate-related hazards. Understanding the ethnic and cultural groups in an area can also help with planning and response to hazards.

- **The New Zealand population continues to grow in size**. In 2018, the population was about 4.7 million people. Recent population estimates show the population had grown to 5 million people in 2023.

- In 2018, there were over **1.6 million households** in New Zealand. Almost 500,000 (30%) of these households were in Auckland.

- **The New Zealand population is becoming more ethnically diverse**, with population increases since 2013 across almost all ethnic groups, including Asian, Pacific, Māori, and Middle Eastern / Latin American / African (MELAA). In 2018, 16.5% of the population were Māori, 15.1% were Asian, 8.1% were Pacific peoples, 1.5% were MELAA and 70.2% were European (total response ethnic groups).

- **Most people live in urban areas**. About half of the population (51.2%) lived in the major urban areas of Auckland, Christchurch, Wellington, Hamilton, Tauranga, Dunedin and Lower Hutt in 2018.

- About 16.3% of the population live in **rural areas**, and 10.0% live in small urban areas (ie towns of less than 10,000 people).

- **A higher percentage of the Māori population live in rural areas** (18.0%) and small urban areas (14.7%) than the national average.

Susceptible population groups

Key population groups who are more susceptible to the negative impacts of climate-related hazards include children, older adults, people with chronic health conditions, people with mental health conditions, people with disabilities, and pregnant women. If these people are exposed to a hazard, they are more likely to experience negative impacts on their health and wellbeing.

- **Children** aged 0–14 years made up about one-fifth of the population (19.6%) in 2018. Almost one-third of households (29.5%) had at least one child aged 0–14 years.

- **Older adults** aged 65+ years made up 15.2% of the population in 2018. This percentage is **projected to almost double** to about 28.2% of the population by 2073.

- In 2018, about one in ten households (10.7%) comprised **an older adult (65+ years) living alone**. This percentage has increased since 2013 (10.4%).

- People with **chronic health conditions** are more susceptible to adverse health impacts from climate-related hazards. These health conditions include ischaemic heart disease (4.3% of adults in 2022/23), asthma (12.3% of adults and 12.4% of children) and diabetes (6.0% of adults).

- Over half of all adults aged 75+ years have at least one chronic health condition, disability, and/or require essential medication (such as blood pressure medication).

- **Poor mental health** can increase vulnerability. The percentage of adults experiencing high levels of psychological distress had increased from 6.2% in 2012/13, to 11.9% in 2022/23. In 2021–23, about 34.8% of adults aged 15+ years had experienced anxiety/depression symptoms (mild or greater) in the previous two weeks, a significant increase since 2016/17 (25.0%).

- **Almost one in four people had a disability** in 2013 (24%, representing 1.062 million people). The most common disability was a physical disability that affects mobility (14%), followed by hearing disability (9%), psychological/psychiatric impairment (5%), vision disability (4%), and intellectual disability (2%).

- **Pregnant women** are more susceptible to adverse health impacts of hazard events. About 60,000 women give birth each year in New Zealand.

Enough money to cope with crises and losses

Having the financial resources to cope with crises and losses is an important aspect of resilience – that is, being able to prepare for, cope with and recover from disasters. People without enough money and/or with low income may find it difficult to prepare for or adapt to hazards (such as through emergency preparedness, protection works to reduce the hazard risk), or to recover financially from losses after a disaster.

- In 2018, about one in three adults were either **unemployed** (4.0%) or **not in the labour force** (31.3%).

- About 8.6% of households were **single parent households** in 2018, which may be more likely to struggle financially to prepare, recover from and adapt to climate-related hazards.

- **There are marked differences in the distribution of socioeconomic deprivation** by ethnic group and region. Māori and Pacific peoples are disproportionately represented in higher deprivation areas, with 43% and 55% respectively living in the 20% most deprived areas. Some geographic areas of New Zealand also have a large proportion of the population living in high deprivation areas. In higher deprivation areas, people may struggle to fully prepare for hazards, to be able to recover after an event, and to afford any adaptation measures. These financial inequities can also flow through to other areas, including housing, and having enough food and water to cope with shortage.

- About 6.6% of households had **no access to a motor vehicle** in 2018.

Social connectedness

Social connectedness and having the support of other people in an emergency, is an important aspect of resilience. People who are socially isolated may be more vulnerable during and after a hazard event. New immigrants and people who are new to the country may not have many social connections and/or know about hazards or what to do after a hazard event.

- About one in five households (22.7%) had only **one person living alone** in 2018. Almost half of these households were older adults aged 65+ years (10.7% of all households).

- In 2018, 3.2% of the usually resident population were **recent immigrants** who had arrived in New Zealand in the last 24 months, and 1.6% had arrived in the past 12 months. These percentages have increased since 2013, reflecting migration patterns.

Awareness, knowledge and skills to cope with hazards and emergencies

Awareness of hazards, and being able to access and understand information about hazards (including about preparedness, adaptation measures, and recovery after a disaster), is important for resilience. Having access to communication devices (such as mobile phone and internet) allows people to access information, and to contact friends, family and others before, during and after a hazard event.

- **In 2018, the majority of households had access to a mobile phone and internet** (92% and 86% respectively). The percentage of households without access to a mobile phone had fallen dramatically from 2006 (25.8%) to 2018 (8.1%), and households without access to the internet had fallen from 2006 (39.5%) to 2018 (13.9%).

- However, **some households did not have access to a mobile phone or the internet, and may be more vulnerable, as they may not be able to access certain information**. Many of those households without a mobile phone or internet are located in more socioeconomically deprived areas, and are therefore also likely to be experiencing financial difficulties and are already vulnerable.

- About 2.5% of the New Zealand population **did not speak English** in 2018, an increase from 2013 (2.2%). These people will be more vulnerable to hazards, if they are not able to access or understand information on hazards, emergency preparedness, and what to do in the event of a disaster.

Safe, secure and healthy housing

Housing is important for resilience. Many aspects of housing in New Zealand are not currently providing people with safe, secure and healthy housing. Rental housing is often of poorer quality than owner-occupied housing; people living in rented dwellings are also vulnerable to being displaced after a hazard event and potentially becoming homeless. Household crowding increases the risk of infectious diseases. Damp and mouldy housing can affect people's health, and lead to respiratory issues; it can also result from flooding or extreme weather events.

- About one in three households live in **rented dwellings** (35.5%) in 2018, an increase since 2006 (33.1%).

- About one in ten people (10.8%) lived in **crowded households** in 2018. Household crowding affected children, Māori and Pacific peoples much more than other groups.

- In 2018, one in five dwellings (21.5%) were **damp** sometimes or all the time, while 16.9% of dwellings had **mould** (at least A4 paper size) sometimes or all of the time.

- In 2018, 41,724 people experienced **severe housing deprivation** in New Zealand. Of these, 3,624 people were without shelter, 7,929 people were in temporary accommodation, and 30,171 people were in severely overcrowded housing. The number of people experiencing severe housing deprivation had risen since 2013 (37,289 people), while the percentage of the population affected was similar in both years (about 0.9% of the population).

- **Māori and Pacific peoples are disproportionately impacted** by poor quality housing and have higher rates across all the housing-related vulnerability measures.

Enough food and water to cope with shortage

Having enough food, water and emergency supplies to cope with an emergency, is an important aspect of survival and disaster resilience. Many households were not fully prepared for emergencies in New Zealand.

- In 2021, one in five people (20.8%) lived in households with **basic emergency preparedness** (that is, having enough food for three days, having enough water for three days, and having a household emergency plan).

- Most people (83.0%) lived in households with **enough food for three days**. However, Pacific peoples were much less likely to report having enough food for three days (63.2%), which may reflect food security issues and/or poverty.

- About half of people (46.9%) lived in households with **enough water for three days**.

- Less than a third of people (30.9%) lived in households with a **household emergency plan**.

- In 2022/23, about one in five (21.3%) children aged 0–14 years lived in **households that run out of food sometimes or often** due to a lack of money. The percentages were much higher among Māori children (35.1%) and Pacific children (39.6%). These households will struggle to have basic household emergency preparedness.

- About 14.4% of children lived in **households that use food banks or food grants** sometimes or often due to lack of money, in 2022/23. Again, Māori children and Pacific children had higher rates (25.6% and 34.0% of Māori and Pacific children respectively).

- In 2018, a small percentage of dwellings **did not have basic amenities**, of having **safe running water** (3.2%), a **fridge** (3.2%) or **electricity** (1.7%).

Decision-making and participation

Decision-making and participation is important for resilience. Good leadership, inclusive planning and decision-making that includes vulnerable groups, and participation by the local community, is important to ensure that people's needs are met. While this dimension of resilience is difficult to measure with quantitative statistics, voting participation can be one measure of local participation.

- In 2022, **residential voter turnout** (the percentage of residents who voted in the local body council elections, among eligible residential voters) was 40.9%. This is relatively low compared with previous local body elections. Some territorial authorities had higher voting participation than others.

Occupation

People's occupation can influence their exposure and risk of losses. People working in primary industries are more vulnerable to the impacts of climate-related hazards, as they work outdoors, and many livelihoods will depend on natural resources. People who work in healthcare and social assistance may be more exposed during a hazard event, if they need to work during a disaster.

- In 2018, 3.8% of the population aged 15+ years were working in agriculture, forestry and fisheries, a decrease from 4.3% in 2006. In 2018, this represented 5.9% of employed people aged 15+ years.

- About 6.1% of the population aged 15+ years worked in healthcare and social assistance in 2018, an increase from 5.1% in 2006. In 2018, this represented 9.5% of employed people aged 15+ years.

5.3   Geographic areas of interest

Population vulnerability levels can differ by geographic area. In particular, disaster risk is a function of hazard, exposures and vulnerability. This means that it is important to understand vulnerabilities within specific exposure zones for hazards, to inform local disaster risk reduction and climate change adaptation activities.

All territorial authorities across New Zealand will have more vulnerable populations, such as children, older adults, people living in more socioeconomically deprived areas, recent immigrants, disabled people, and people with chronic illnesses. However, some parts of New Zealand had higher levels of social vulnerability.

Northland region: The territorial authorities in the Northland region tend to have larger percentages of children and older adults than the national average, and higher percentages of Māori. In this region, there are higher levels of socioeconomic deprivation, unemployment and people not being in the labour force, as well as higher rates of damp and mouldy dwellings, and household crowding. Much of the population live in rural areas, and a relatively large percentage of employed people work in the primary industries.

Auckland City: Auckland City has a large population (about 1.5 million people) and high population density. The population has high ethnic diversity, with relatively large populations in the Māori (12% of the population), Pacific peoples (15.5%) and Asian (28%) ethnic groups. About one third of households have a child aged 0–14 years. There are also high levels of socioeconomic deprivation in some parts of Auckland, as well as high levels of renting and household crowding. The Auckland region has lower levels of household emergency preparedness.

Thames-Coromandel and Hauraki districts: These two districts have a relatively older population, higher rates of older adults living alone and people not being in the labour force, as well as higher rates of households with no internet. The Hauraki district had a higher percentage of employed people working in the primary industries compared with the national average.

Bay of Plenty, Tairāwhiti and Hawke's Bay (particularly Rotorua, Whakatāne, Kawerau, Ōpōtiki, Gisborne, and Wairoa): These districts tend to have a younger population, higher levels of socioeconomic deprivation, and higher levels of renting, household crowding, and damp and mouldy housing. Higher proportions of the population are Māori in these districts, while much of the population live in rural areas, and many people rely on primary industries for their livelihood.

Porirua: Porirua (in the Wellington region) has a higher percentage of children than the national average, and a relatively large proportion of its population living in more socioeconomically deprived areas. There are higher levels of household crowding, and damp and mouldy dwellings. There are higher percentages of Māori and Pacific peoples in this district.

West Coast region (particularly Buller and West Coast): The districts in the West Coast region tend to have older populations, and higher percentages of households having an

older adult living alone, compared with the national averages. Much of the population live in rural areas. There are higher levels of socioeconomic deprivation in Buller and Grey districts, and some dwellings do not have some of the basic amenities such as safe tap water. Some households do not have mobile phones or the internet.

Queenstown: Queenstown district has a relatively large immigrant population, with about 10% of the population having arrived in New Zealand in the previous two years. There are larger Asian (9.9%) and Middle Eastern/Latin American/African populations (4.7%) in Queenstown. About 29% of households had at least one child aged 0–14 years. There were no areas of high socioeconomic deprivation in Queenstown in 2018.

Southland region: The Southland and Gore districts have higher percentages of the population living in rural areas, and a relatively high percentage of the population rely on the primary industries for their livelihood.

Chatham Islands: The Chatham Islands have a small population of almost 700 people. However, this highly isolated and rural community still experience some elements of vulnerability. A relatively high percentage of the population live in more socioeconomically deprived areas, and there are higher rates of renting, one-person households, damp and mouldy dwellings, and dwellings without some of the basic amenities. About 66% of the population are Māori. Primary industries are a large sector of employment on the Chatham Islands.

This list highlights some regions experiencing higher levels of vulnerability, but is by no means exhaustive. **All territorial authorities will have more vulnerable populations** that need to be considered for disaster risk reduction and climate change adaptation planning. In particular, understanding vulnerabilities of local communities and neighbourhoods is critically important in hazard zones (such as flood zones). Appendix 4 provides a heatmap of 2018 social vulnerability indicator data by territorial authority (and links to where to access further data by small areas, SA2s), to provide further evidence for territorial authorities to inform planning.

5.4   Results for high priority population groups

This report provides evidence that some population groups are particularly vulnerable to climate-related hazards, due to experiencing significant and/or multiple vulnerabilities. These groups included:

- children
- older adults
- people with disabilities and/or chronic health conditions
- people living in areas of higher socioeconomic deprivation
- Māori
- Pacific peoples
- people of ethnic minority groups
- people living in rural areas and/or working in primary industries.

These population groups are consistent with those identified by the IPCC, including children, adolescents, elderly, those with underlying health conditions, Indigenous Peoples, ethnic minorities, low-income households, informal settlements, and rural areas with a high reliance on climate-sensitive livelihoods (IPCC, 2023).

These population groups are a high priority to consider for disaster resilience and climate change adaptation work to achieve equitable outcomes. These groups often have specific needs that need to be considered and met, during emergency preparedness, response efforts, recovery after a disaster, and adaptation measures. However, these population groups also have many strengths and resilience (such as strong social connections and networks), much of which are difficult to capture with quantitative individual-level data such as these social vulnerability indicators. With the right resources, support and inclusion in decision-making, the populations in these groups can be just as resilient to climate-related hazards as others.

Children are vulnerable to climate-related hazards

Children are a vulnerable population group to climate-related hazards. About one in five people in the population are aged 0–14 years, and almost a third of households have at least one child in it.

Children need to be looked after during a disaster (such as flood, heatwave, wildfire, extreme storm event), particularly younger children who may need to be carried during evacuation, and who need good supervision. Children depend on others to care for them and protect them; furthermore, many decisions about children and the environment in which they live are outside of their influence. Children are also more susceptible to health impacts from hazard events (for example, from contaminated water, air pollution, infectious diseases), as their bodies are still developing and growing. One in eight children (12.4%) take medication for asthma, and are therefore particularly susceptible to poor air quality (from air pollution, smoke from wildfires), as well as from damp and mouldy housing (which may result from flooding).

Children also disproportionately live in more socioeconomically deprived areas, particularly Māori and Pacific children, where households are less likely to have financial resources to prepare for, cope with and adapt to hazards. About one in five children live in households where food runs out sometimes or often; this will impact on the household's emergency preparedness. Housing issues are also likely to impact on resilience for children. Household crowding, damp and mouldy housing, and homelessness, are issues that are persistent in New Zealand, and affect children (particularly those of Māori and Pacific ethnicity) more than others.

Children are also resilient and can be sources of resilience for their local community. Families with children often have a strong social network in the local areas, based around childcare, schools and children's activities. Children can be important sources of information about hazards, what to do in an emergency, and households emergency preparedness.

Older adults are more vulnerable to climate-related hazards

Older adults remain one of the most vulnerable population groups in terms of climate-related hazards. Older adults tend to have many other existing vulnerabilities, including chronic diseases and disability. A relatively large proportion of older adults have existing chronic health conditions (such as heart disease, diabetes, respiratory conditions) and/or disability that make them more susceptible to the health impacts of heatwaves, floods, and poor air quality (eg from wildfires). This suggests that mobility issues, evacuations, and clean-ups after large storm events and/or floods may be challenging for these population groups. Many older adults also live alone, which can leave them more vulnerable as there is no one else in the household to help or support them in times of need.

Nonetheless, older adults may also have some sources of resilience. Household emergency preparedness rates were generally higher in the older age group. Older adults had lower rates of some social vulnerability indicators, such as household crowding. Older adults may also have a range of skills and knowledge from work and activities throughout their lives. People living in an area for a long time are also more likely to be aware of local hazards than people new to the area.

New Zealand population projections show that the age group 65+ years will increase from about 15% of the population in 2020, to nearly 30% of the population by 2073. Our existing health services are likely to struggle to keep up with the effects of this ageing population. New Zealand will need to foster a healthy ageing population in the future, to face the health challenges from climate change.

People with disabilities and/or chronic health conditions have specific needs that need to be considered

People with disabilities are a high priority group for civil defence and emergency management (CDEM). People with disabilities may have difficulties evacuating, moving out of the way of hazards, accessing and/or understanding information about hazards, emergency directives and recovery. More than one in five New Zealanders had a disability in 2013 (24% of New Zealanders). This included 14% of the population with a physical disability, 9% with a hearing disability, 4% with a vision disability and 5% with a psychological and/or psychiatric impairment. It is vitally important for decision-making and planning to be inclusive of people with disabilities, and to consider the specific needs of disabled people. Providing information and services that are accessible to everyone is also critically important for resilience.

People with chronic health conditions are more susceptible to a number of climate-related hazards, as the hazard may worsen the existing condition. For example, 4.3% of adults (181,000 people) have ischaemic heart disease, which makes them more susceptible to health impacts from floods, heatwaves, and poor air quality (such as from wildfires). About 6.0% of adults (251,000 people) have diabetes, which makes them particularly susceptible to impacts of floods and heatwaves. Furthermore, people requiring insulin may be adversely impacted by disruptions to power supplies. Having good access to health services, including during hazard events, can help improve resilience for people.

People living in areas of higher socioeconomic deprivation are more vulnerable

People living in more socioeconomically deprived areas have higher levels of vulnerability, across most social vulnerability dimensions, particularly housing quality, households not having access to a motor vehicle, mobile phone or internet, and people not speaking English.

These findings suggest that more deprived areas in high hazard zones (such as flood hazard zones) are particularly vulnerable to negative impacts in a hazard event. These areas are a high priority for response and recovery efforts, and for further support in emergency preparedness and in the event of a disaster. In these communities, there may be a neighbourhood effect, where many people do not have enough money, food or water to cope with crises and shortage. Community resilience can help to a large degree; however, communities with a lack of resources, outside help or financial aid will likely particularly struggle to recover after a large hazard event.

Māori have much resilience, but are disproportionately affected by certain vulnerabilities

A key aspect of the Government's long-term climate change adaptation strategy is upholding the principles of Te Tiriti o Waitangi (Ministry for the Environment, 2022). Māori have the right to equitable outcomes (such as health outcomes) under Te Tiriti (Ministry of Health, 2019a).

Māori have much resilience to natural hazards and disasters, including through Te Ao Māori and mātauranga Māori, but Māori also disproportionately experience certain vulnerabilities. Many Māori cultural values and practices provide resilience, including manaakitanga, whanaungatanga, kaitiakitanga, and kōtahitanga (Chen et al., 2021). The strong existing social connections and networks within iwi and hapū, and wider across the motu, mean that there are established networks and leadership. Furthermore, marae have been used in many disasters to provide a place for safe shelter, social connections and support, providing food and water to many people. Many examples from previous disasters (such as the Christchurch earthquake, Port hills fires, Edgecumbe floods) show how marae provide an essential source of resilience to the local community, not only local iwi members, but also the local community and any people that needed assistance (Kenney and Phibbs, 2015, Phibbs et al., 2016).

While there is much resilience at the iwi, hapū and local level for Māori, the social vulnerability indicators show the barriers and vulnerabilities that many Māori experience at the individual and household level. Māori are disproportionately affected by socioeconomic deprivation, financial hardship, poor quality housing, household crowding, homelessness, and food insecurity. This mirrors the experience of other countries, where Indigenous populations are often more vulnerable due to marginalisation and/or structural disadvantage (Johnson et al., 2022, Li et al., 2023). These inequities impact on Māori hauora (health and wellbeing), as well as impacting on vulnerability and resilience to climate-related hazards.

Furthermore, a relatively large proportion of the Māori population live in rural areas and small urban areas in New Zealand. This means that Māori are likely to be more exposed to climate-related hazards, particularly droughts, floods and extreme storm events. Reliance on natural resources means they are more exposed to the impacts of climate-related hazards.

Pacific peoples are disproportionately affected by some social vulnerability factors

Pacific peoples bring strengths and capacities to disaster resilience, including strong kinship, connection, and community networks through family, church and cultural groups (Marlowe et al., 2020). Engaging with Pacific communities and considering their specific needs will be vitally important to improve resilience to climate-related hazards (Marlowe et al., 2020).

Pacific peoples are disproportionately affected by some social vulnerability factors, particularly those relating to financial resources and housing. About 55% of Pacific peoples live in the 20% most socioeconomically deprived areas in the country. Additionally, many Pacific peoples live in housing that is unhealthy or unsuitable; 38.5% of Pacific peoples live in crowded households, while 46% live in damp dwellings and 42% live in mouldy dwellings. Food insecurity also impacts Pacific children substantially, with 40% of Pacific children living in households that runs out of food sometimes or often. These results align with emergency preparedness statistics, which show that Pacific peoples have lower rates of living in a household with three days of emergency food (63%). For individuals and households, it can

be difficult to be resilient when they do not have the financial resources or appropriate housing to enable being prepared for hazards, or to recover from disasters.

Demographically, the Pacific population is very young, with 34% of the Pacific population under 15 years of age (compared to 19.6% of the total population). Pacific peoples also mostly live in major urban areas, so may be more exposed to certain hazards such as heatwaves. People from other Pacific nations may also be adversely affected by climate change, including sea level rise, which may result in displacement and possibly further migration to New Zealand.

People of ethnic minority groups

More broadly, New Zealand is becoming more ethnically diverse. Pacific peoples make up 8.1% of the population, while Asians make up 15.1% and people in the MELAA (Middle Eastern / Latin American / African) ethnic group make up 1.5% of the population. In 2018, about 1.6% of the usually resident population were immigrants who had arrived in New Zealand in the previous year. Furthermore, 2.5% of the population did not speak English in 2018.

These statistics suggest that ethnic minority groups are important to consider for disaster risk management, such as emergency preparedness, and in response and recovery phases. Additionally, there is evidence to suggest that some ethnic minority groups may also experience other vulnerabilities, such as financial and housing vulnerabilities. Inclusive planning, decision-making and emergency management may help to identify the specific needs of ethnic minority groups in the population, to ensure equitable outcomes after a hazard event.

People living in rural areas and/or working in primary industries may be more exposed to climate-related hazards

People living in rural areas and/or working in primary industries may be particularly exposed to climate-related hazards. Often, people in rural areas live in less accessible geographic areas, and they may be susceptible to being isolated in an extreme weather event, due to disruptions to the road network, power supplies, water supplies, and telecommunications. Rural areas may have less access to healthcare services, in general, and during/after a hazard event. Farmers can be particularly impacted by droughts and other climate-related hazards, which can lead to impacts on mental health. Farmers may also tend to livestock during a disaster (such as a flood) as a priority for animal welfare, and rescuing livestock may put people in harm's way.

People living in rural areas also have good resilience in other respects. People living in rural areas were more likely to report that their household had basic emergency preparedness (compared with those in urban areas), with 90% having enough food for three days, 71% having enough water for three days, and 41% having a household emergency plan.

Nonetheless, rural communities that also experience high levels of socioeconomic deprivation may struggle to have the financial resources to afford preparedness, resilience and adaptation measures, as well as being affected by geographic isolation during a hazard event.

Other groups are also likely to be experiencing multiple vulnerabilities

In addition to these groups, a few other population groups emerged as potentially vulnerable, due to multiple vulnerabilities.

Sole parents have dependent children, who rely on them to keep them safe. Without another adult in the household, sole parents carry the burden of responsibility for their children. Furthermore, sole parents can experience financial disadvantage, making it harder to prepare for and recover from hazards. For example, children living in a household with a sole parent were more likely to experience food insecurity issues (running out of food at home and/or using food banks or food grants due to lack of money). Sole parents were also less likely to have basic household emergency preparedness. About 80% of sole parents in New Zealand are females.

Rental housing is often poorer quality housing than owner-occupied housing, including being more likely to be damp and/or mouldy. People who were renting were also less likely to have emergency preparedness, and may experience displacement and/or homelessness after a hazard event.

Minority and/or marginalised groups – any minority population groups without a 'voice at the table' are likely to have their needs overlooked and not addressed; inclusive decision-making can improve resilience. These minority groups may include some population groups that have not been currently included in these social vulnerability indicators (such as the LGBT+ community), but who could potentially be included in further updates to the indicators.

The following sections provide detailed information about each social vulnerability indicator.

6 Population

This section presents detailed results for social vulnerability indicators relating to the population.

6.1 Overview

Where people live influences their exposure to climate-related hazards

Understanding the size of the population and where they live is vitally important for understanding exposure to climate-related hazards. Where people live can affect the hazards they may be exposed to. Climate-related hazards can affect whole regions (such as heatwaves, droughts, extreme weather events, air pollution from wildfires). Hazards can also be more local (such as flood hazard zones, landslips, erosion, wildfires, sea-level rise and coastal inundation). People can also be indirectly affected by hazard events, for example through disruptions to important infrastructure (such as road network, telecommunications, and power and water supplies).

Ethnic groups have strengths, may have diverse needs

Understanding the population, including the ethnic and cultural groups in an area, can help with planning and response to hazards. People of different ethnic and/or cultural groups may have specific needs in a hazard event (such as some people may not speak English well, they may have difficulties accessing information if they do not have a radio, they may have specific cultural or faith-based needs etc) (MCDEM, 2013a).

People in different ethnic and/or cultural groups may have many strengths, including strong community networks and community leadership. Local authorities and civil defence and emergency management (CDEM) can work these groups (often referred to and/or similar to culturally and linguistically diverse (CALD) communities) to include them in preparedness planning. Minority groups not included in emergency planning, preparedness and adaptation will likely be more vulnerable to the impacts of climate-related hazards.

Māori have a range of resilience factors

Māori have a range of resilience factors for natural hazards and disasters (such as floods, wildfires, earthquakes). Iwi/Māori have a special and well-recognised connection to the natural world. Values and mātauranga Māori connect 'people and place' in a way that enhances and adds value to natural hazard decision-making and planning. Aspects of Te Ao Māori that contribute to Māori resilience to natural hazards include existing social structures (such as networks of people across whānau, hapū and iwi), physical structures and assets (such as marae), Māori cultural values and practices, and existing leadership structures (Kenney and Phibbs, 2015, MCDEM, 2019).

New Zealand's National Adaptation Plan recognises the importance of Māori rights and upholding the principles of the Treaty of Waitangi.

> Upholding the principles of Te Tiriti o Waitangi is a central aspect of the Government's long-term adaptation strategy. This means developing adaptation responses in partnership with Māori, elevating te ao Māori and mātauranga Māori in the adaptation process and empowering Māori in adaptation planning for Māori, by Māori. Māori face particular infrastructure challenges in rural and remote areas, and

are vulnerable to road closures, power cuts and impacts on marae and other sites of cultural significance. (Ministry for the Environment, 2022)

Rural areas may be more vulnerable to climate-related hazards

People living in rural areas may be more vulnerable to climate-related hazards, while also being resilient in many ways. Rural populations may be more dispersed geographically, sometimes in less accessible landscapes, which can make them more exposed to hazards (MCDEM, 2019). During and after a hazard event (such as flooding), rural areas are more susceptible to indirect impacts such as being isolated, and disruptions to infrastructure (eg road closures, loss of power and telecommunications, disruption to access to healthcare services). Farmers and other outdoor workers may also be more exposed to hazards such as heatwaves, and may be more impacted by droughts. Rural areas may also experience more difficult access to healthcare services (both before and after a hazard event).

Social vulnerability indicators related to population

Indicators about population groups are useful for understanding the size and diversity of the local population, and also provide baseline population data for interpreting other social vulnerability indicators.

Key indicators in this section include:

- Population size and change
- Number of households
- Māori population
- Pacific peoples population
- Asian population
- Middle Eastern/Latin American/African (MELAA) population
- European population
- People living in rural areas

6.2   Population size and change

Population size, and where people live, is an important aspect of exposure to climate-related hazards. The more people who live in hazard zones, the more people who are potentially vulnerable to the impacts. Some hazards may affect whole regions (such as heatwaves, large storm events, droughts), while other hazards might be more local (such as flood events, coastal inundation and wildfires). Population data provide estimates of the potential number of people exposed to a hazard, and also provide a baseline for understanding and interpreting other social vulnerability indicators.

Furthermore, population growth may impact on exposure and vulnerability. An increase in population may have positive impacts on resilience, through economic development and growth, and increased services such as public transport, reticulated water supplies and good wastewater treatment plants. However, rapid or persistent population growth can put pressure on local infrastructure, communities, housing, the environment and resources.

Indicator definition: New Zealand Census usually resident population.

New Zealand's population continues to grow

In 2018, the New Zealand population was about 4.7 million people, according to the 2018 Census (Figure 9).

Figure 9: New Zealand Census usually resident population, 2006, 2013, 2018
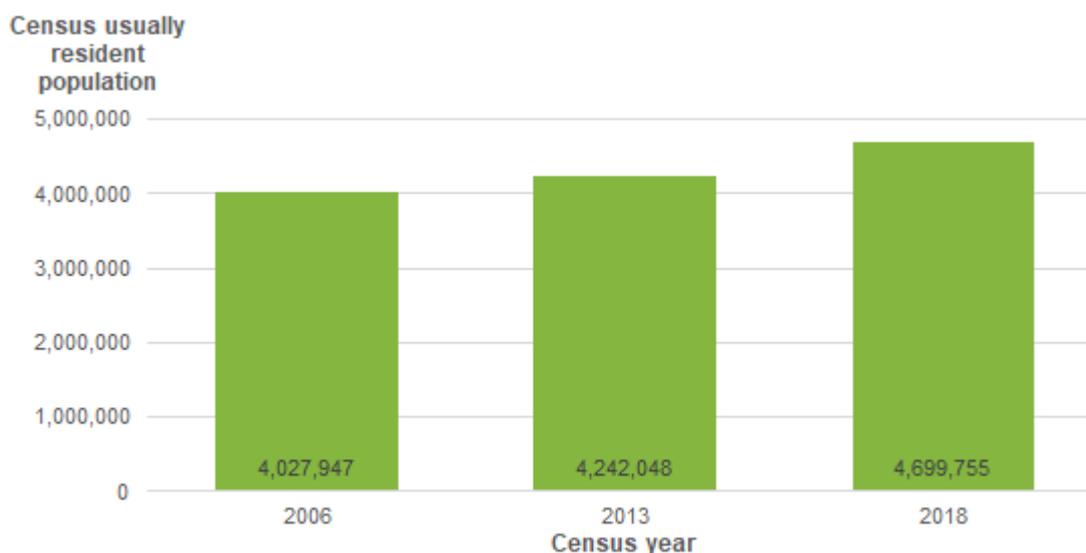
Source: New Zealand Census of Population and Dwellings

New Zealand's population has continued to grow since the 2018 Census. Initial results from the 2023 Census show that the usually resident population was almost 5 million at the time of the 2023 Census (4,993,851 people) (Stats NZ, 2024a).

One in three New Zealanders live in Auckland

As at 2018, Auckland was the largest city in New Zealand, with one in three people (33.4%) living there. The major population centres in New Zealand were:

-    Auckland City (1,571,700 people)

- Christchurch City (369,000 people)
- Wellington City (202,700 people)
- Hamilton City (160,900 people)
- Tauranga City (136,700 people)
- Dunedin City (126,300 people)
- Lower Hutt City (104,500 people).

Overall, 76.5% of the New Zealand population lived on the North Island.

Figure 10: New Zealand Census usually resident population, by territorial authority, 2018

Census Usually Resident Population (2018)

- 663 - 10,575
- 10,576 - 25,557
- 25,558 - 46,296
- 46,297 - 62,250
- 65,251 - 1,571,718
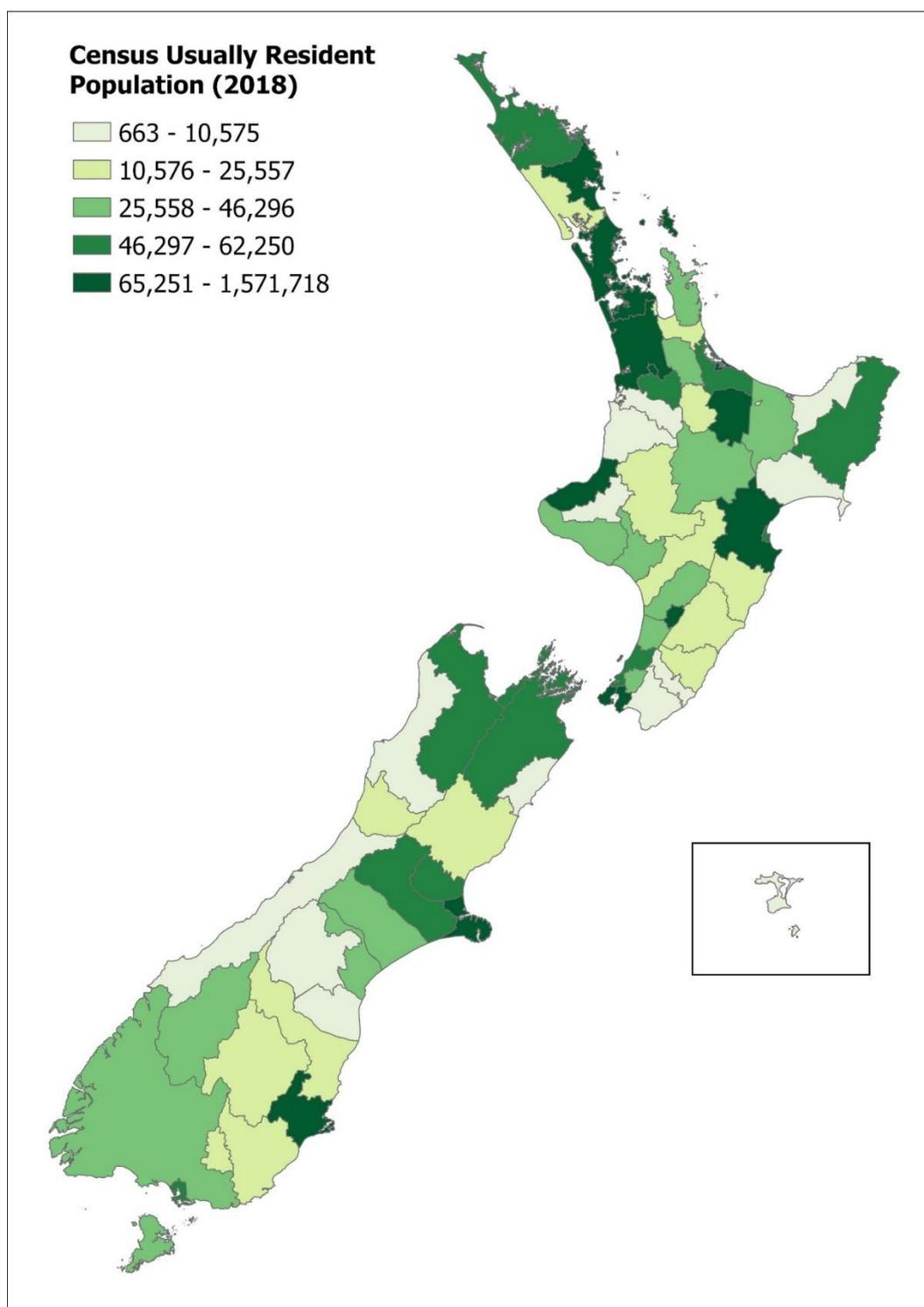
Source: New Zealand Census of Population and Dwellings

Population growth highest in Queenstown-Lakes, Selwyn, Kaipara and Central Otago

The New Zealand population had increased 10.8% in the five years from 2013 to 2018 (up from 4.2 million people to 4.7 million people). This population growth was not evenly spread throughout the country.

Territorial authorities with a large percentage increase in population size in the five-year period from 2013 to 2018 included Queenstown Lakes District (38.7% increase), Selwyn District (35.8% increase), Kaipara District (20.6% increase) and Central Otago District (20.5% increase) (Figure 11). Auckland's population increased 11.0% from 2013 to 2018.

Figure 11: Population change by territorial authority, 2013 to 2018 (% change)
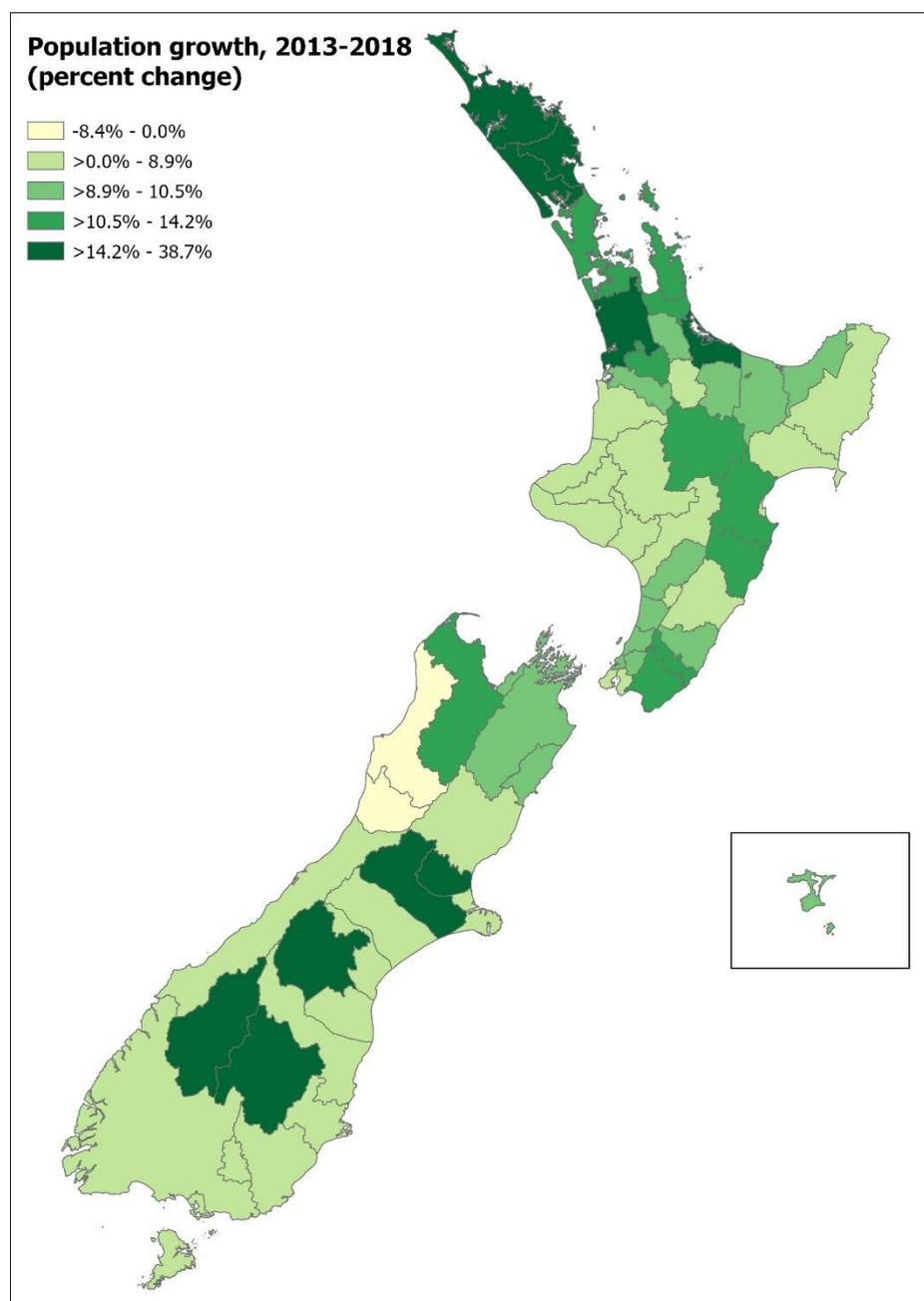
Source: New Zealand Census of Population and Dwellings

Initial results from the 2023 Census show that the usually resident population had increased by 6.3% from 2018 to 2023 (Stats NZ, 2024a).

6.3   Number of households

Knowing the number of households in an area can be helpful for civil defence and emergency management in a disaster. Having a large number of households affected by a disaster may change the way agencies respond to a disaster.

Some aspects of resilience occur at the household level, such as housing quality, access to basic amenities, access to communications (such as internet and mobile phone), and access to transportation (such as a car).

Additionally, households pay rates, which councils use to pay for key local infrastructure. Low populations and numbers of households in a territorial authority can often mean less funding to cover infrastructure upgrades and resilience measures, if funding is not available from other sources.

Indicator definition

This indicator shows the number of households in occupied private dwellings, according to the New Zealand Census of Population and Dwellings.

New Zealand had over 1.6 million households

In 2018, there were about 1,650,000 households in New Zealand (Figure 12). This number had increased 6.7% since 2013.

Figure 12: Number of households in New Zealand, 2006, 2013, 2018
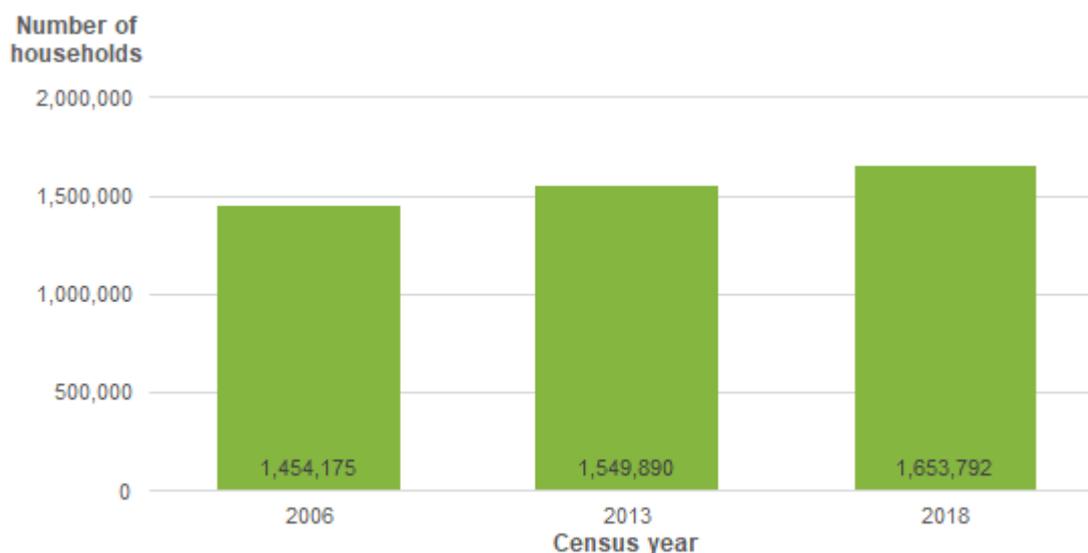
Source: New Zealand Census of Population and Dwellings

Half a million households in Auckland City

In 2018, the territorial authorities with the largest number of households included:

- Auckland City (496,458 households)
- Christchurch City (138,381 households)
- Wellington City (74,841 households)
- Hamilton City (54,858 households)
- Tauranga City (50,442 households)

- Dunedin City (48,336 households)
- Lower Hutt City (37,161 households).

Figure 13: Number of households, by territorial authority, 2018
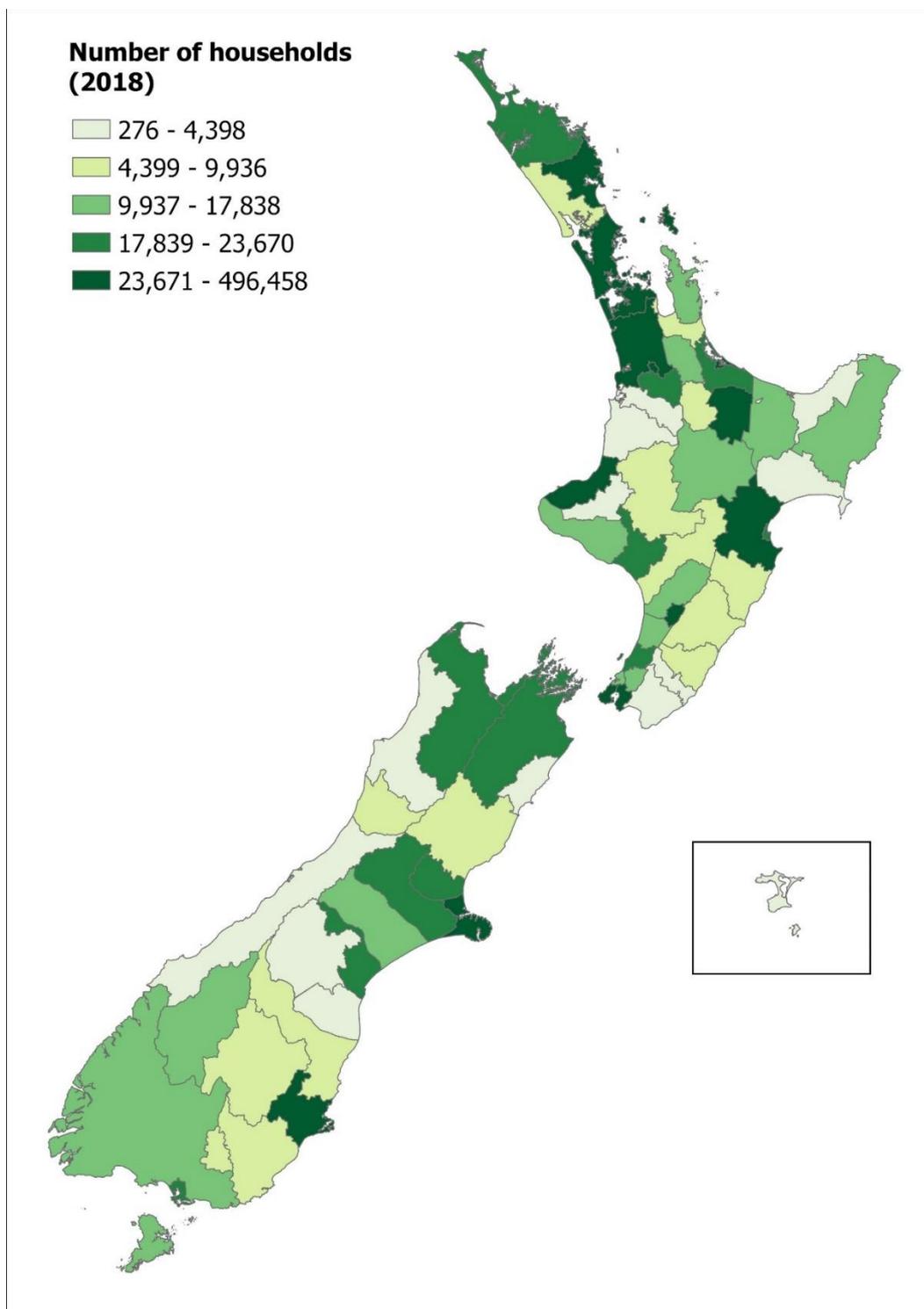
Source: New Zealand Census of Population and Dwellings

6.4   Māori population

Māori are tangata whenua, and have a special and well-recognised connection to the natural word. Values and mātauranga Māori connect 'people and place' in a way that enhances and adds value to natural hazard decision-making and planning. Māori also have the right to equitable outcomes (such as health outcomes) under the Treaty of Waitangi (Ministry of Health, 2019a).

Māori have a range of resilience factors for natural hazards and disasters (such as floods, wildfires, earthquakes), and Māori and iwi have played an important and pivotal role in response efforts after previous disasters, including the Christchurch earthquake (Kenney and Phibbs, 2015). Aspects of Te Ao Māori that contribute to Māori resilience to natural hazards include existing social structures (such as networks of people across whānau, hapū and iwi), physical structures and assets (such as marae), Māori cultural values and practices and existing leadership structures (Kenney and Phibbs, 2015, MCDEM, 2019). Māori also have mātauranga Māori and indigenous knowledge about local hazards.

Indicator definition

Usually resident population who identified with Māori ethnic group (total response).

Māori represent almost 17% of the population

In 2018, there were 775,836 people who identified as Māori in New Zealand, according to the Census (Figure 14). This number had increased from 598,602 in 2013.

Figure 14: Māori population (total response), 2006, 2013, 2018
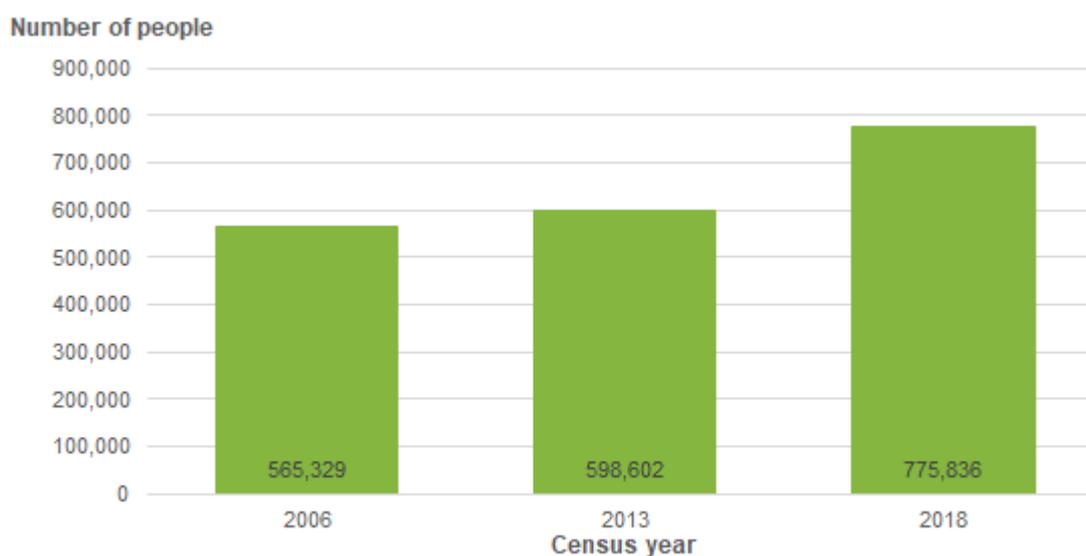
Source: New Zealand Census of Population and Dwellings

In 2018, 16.5% of the population identified as Māori, up from 14.9% in 2013 (Figure 15).

Figure 15: Māori population (as percentage of total population) (total response), 2006, 2013, 2018
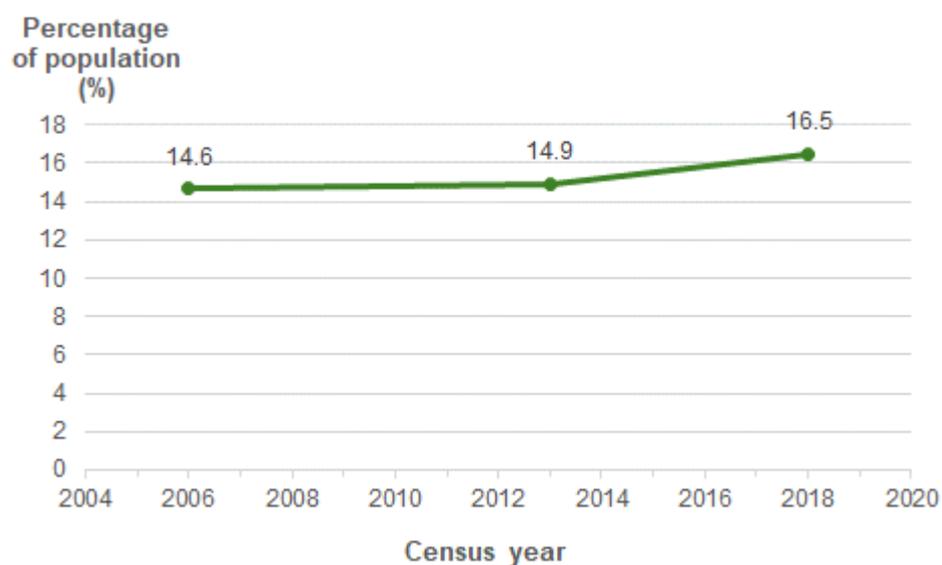
Source: New Zealand Census of Population and Dwellings

The Māori population has grown since the 2018 Census. Initial results from the 2023 Census show that the Māori population was 887,493 people in 2023, about 17.8% of the total population (Stats NZ, 2024a).

Most Māori live in the North Island

The Māori population is concentrated in the upper and central North Island (Figure 16). In 2018, the territorial authorities with the largest Māori populations included:

-   Auckland City (181,194 people)
-   Hamilton City (38,112 people)
-   Christchurch City (36,642 people)
-   Far North District (31,503 people)
-   Rotorua District (28,839 people)
-   Whangarei District (27,336 people)
-   Gisborne District (25,134 people)
-   Tauranga City (24,912 people)
-   Hastings District (22,269 people).

Figure 16: Number of people identifying as Māori, by territorial authority, 2018
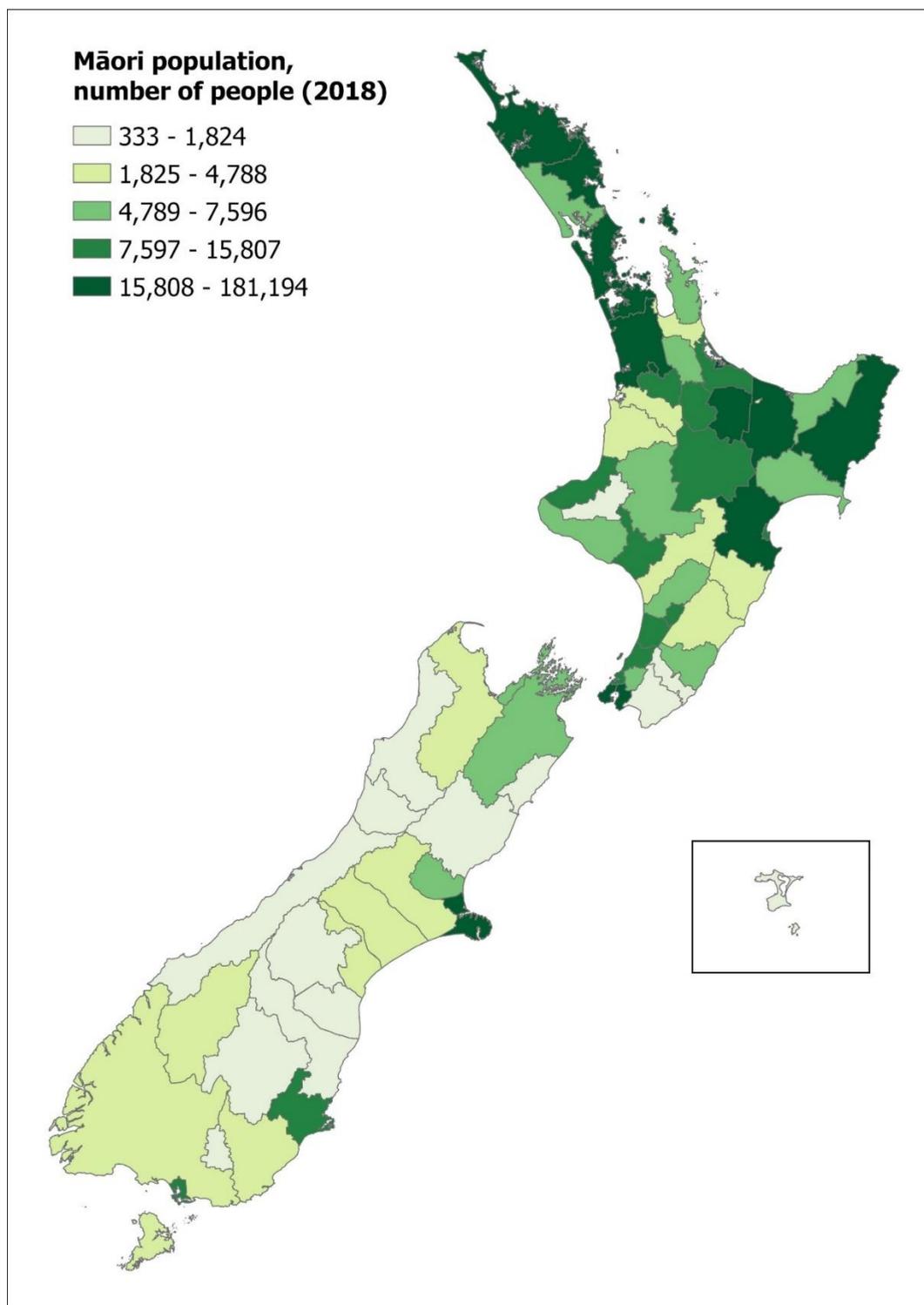
Source: New Zealand Census of Population and Dwellings

In 2018, a large percentage of the population identified as being Māori in the following territorial authorities:

- Chatham Islands Territory (66.1% of the population)
- Wairoa District (65.7%)
- Ōpōtiki District (63.7%)
- Kawerau District (61.7%)
- Gisborne District (52.9%)

- Far North District (48.3%)
- Whakatāne District (46.8%).

Figure 17: Percentage of the population who identified as Māori, by territorial authority, 2018
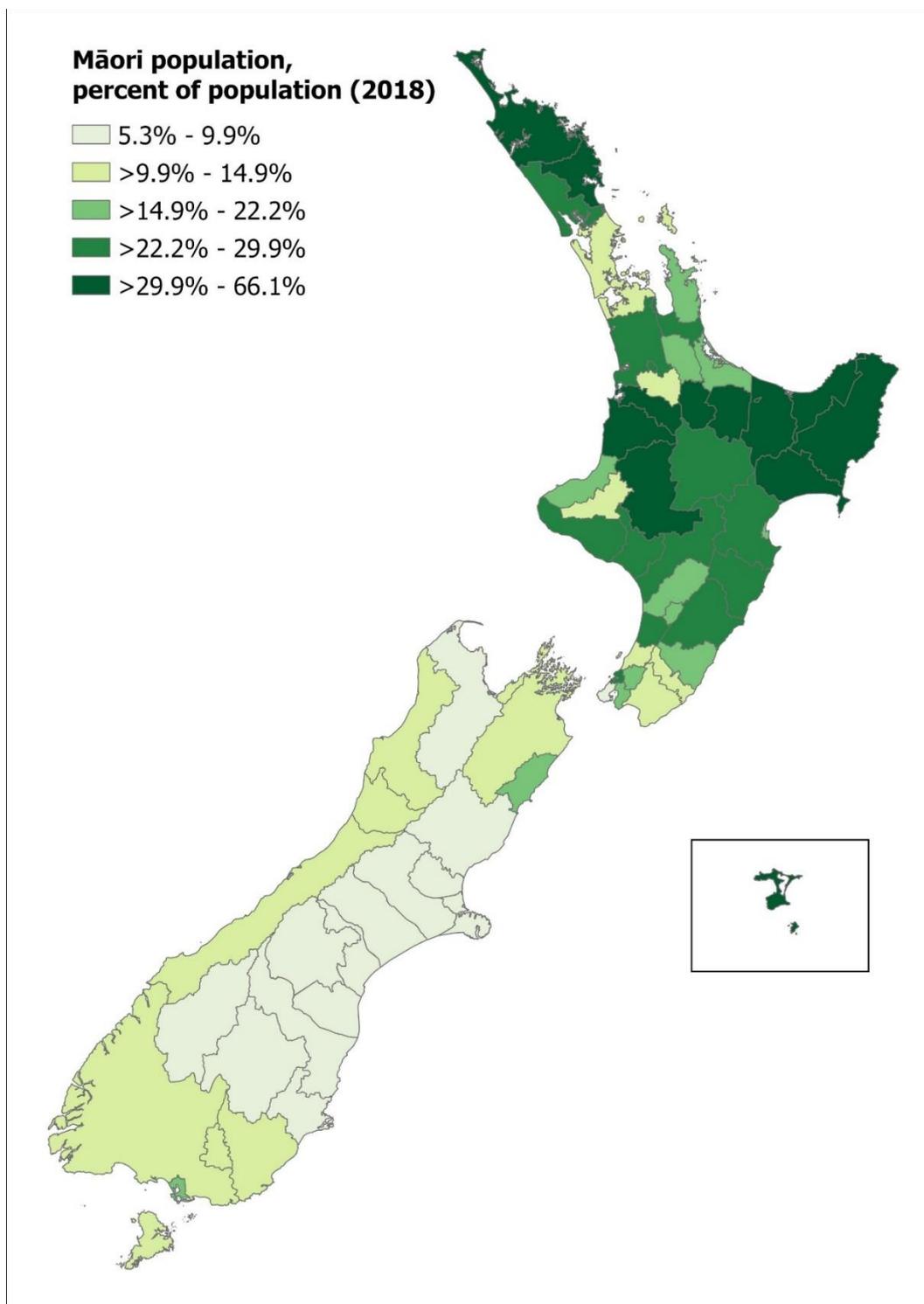
Source: New Zealand Census of Population and Dwellings

6.5   Pacific peoples population

Pacific peoples are an important ethnic group in New Zealand, and have strong cultural values. The broader 'Pacific peoples' ethnic group includes a range of specific ethnicities, including Samoan, Tongan, Cook Islands Māori, Niuean, Fijian, Tokelauan, and other Pacific groups.

Understanding the ethnic diversity of the population can help to tailor services, and meet the needs of the local community through inclusive planning and decision-making. For example, information can be provided in relevant languages for the local population, such as official information about hazards, what to do in a disaster, and how to access help after a disaster. Civil defence and emergency management (CDEM) groups specifically consider the needs of culturally and linguistically diverse (CALD) populations in their emergency management planning (MCDEM, 2013a).

Indicator definition

Usually resident population who identified with one or more Pacific ethnic groups (total response).

Almost 400,000 Pacific peoples in New Zealand in 2018

In 2018, there were 381,642 people who identified as Pacific peoples in New Zealand, up from 295,941 people in 2013 (Figure 18).

Figure 18: Pacific peoples population (total response), 2006, 2013, 2018
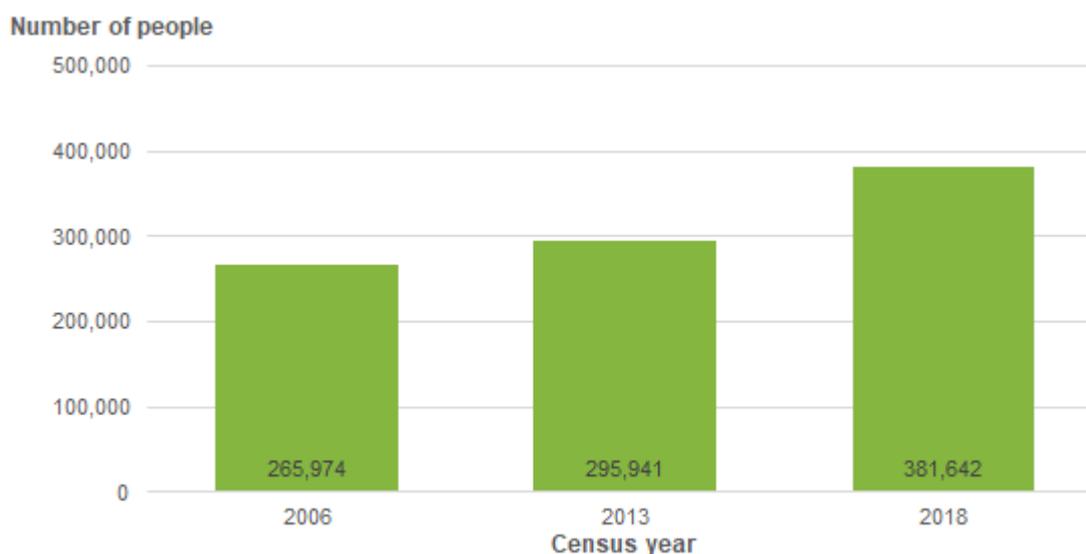
Source: New Zealand Census of Population and Dwellings

Pacific peoples made up about 8.1% of the population in 2018 (Figure 19). The Pacific population has grown in the previous 12 years, from 6.9% of the population in 2006, to 7.4% in 2013, and 8.1% in 2018.

Figure 19: Pacific peoples population (as percentage of total population) (total response ethnic group), 2006, 2013, 2018
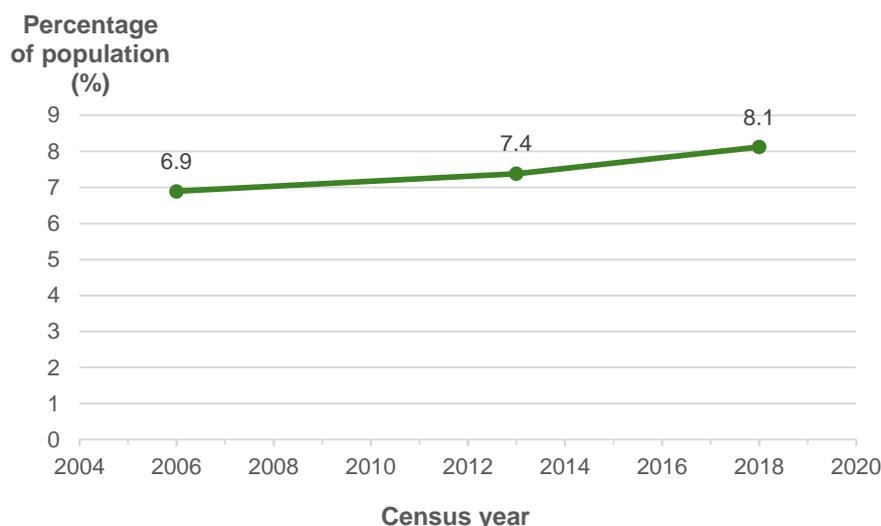
Source: New Zealand Census of Population and Dwellings

Results suggest the Pacific population has grown since the 2018 Census. Initial results from the 2023 Census show that the Pacific population was 442,632 people in 2023, about 8.9% of the total population (Stats NZ, 2024a).

Samoan and Tongan were the largest Pacific ethnic groups in New Zealand

In 2018, the main Pacific ethnic groups in New Zealand included Samoan (182,721 people), Tongan (82,389 people), Cook Islands Māori (80,532 people) and Niuean (30,867 people) (Figure 20).

Figure 20: Pacific population, by detailed ethnic group (total response ethnic group), 2018
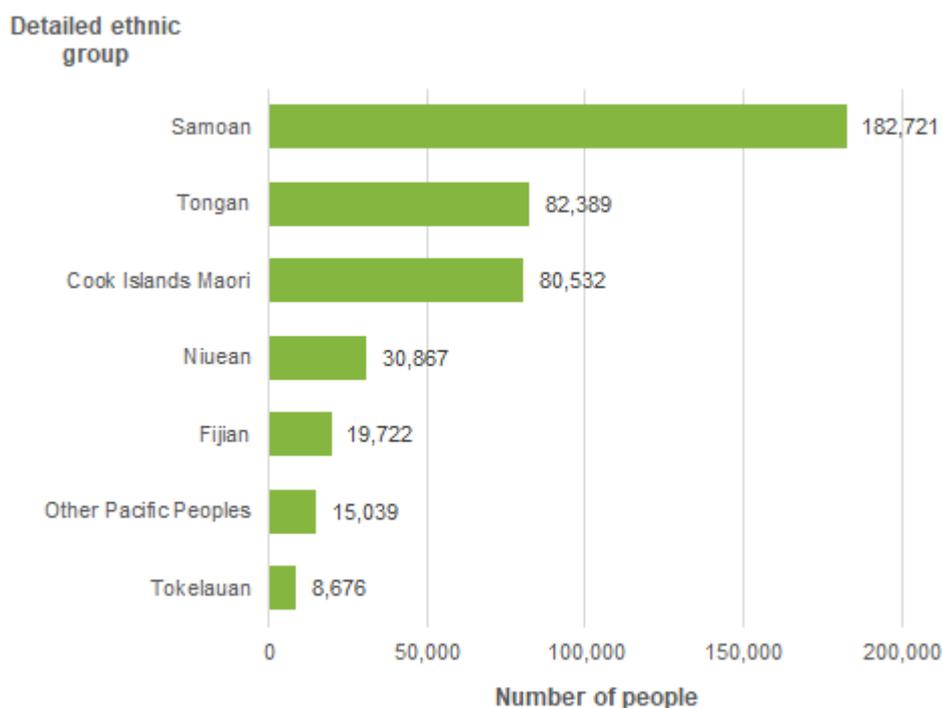
Source: New Zealand Census of Population and Dwellings

Results by territorial authority

The Pacific population in New Zealand is mainly located in major urban areas, particularly:

- Auckland City (243,966 people)
- Porirua City (14,868 people)
- Christchurch City (14,178 people)
- Lower Hutt City (12,003 people)
- Wellington City (10,392 people)
- Hamilton City (9,741 people)
- Hastings District (6,522 people).

Figure 21: Number of people identifying as Pacific peoples, by territorial authority, 2018
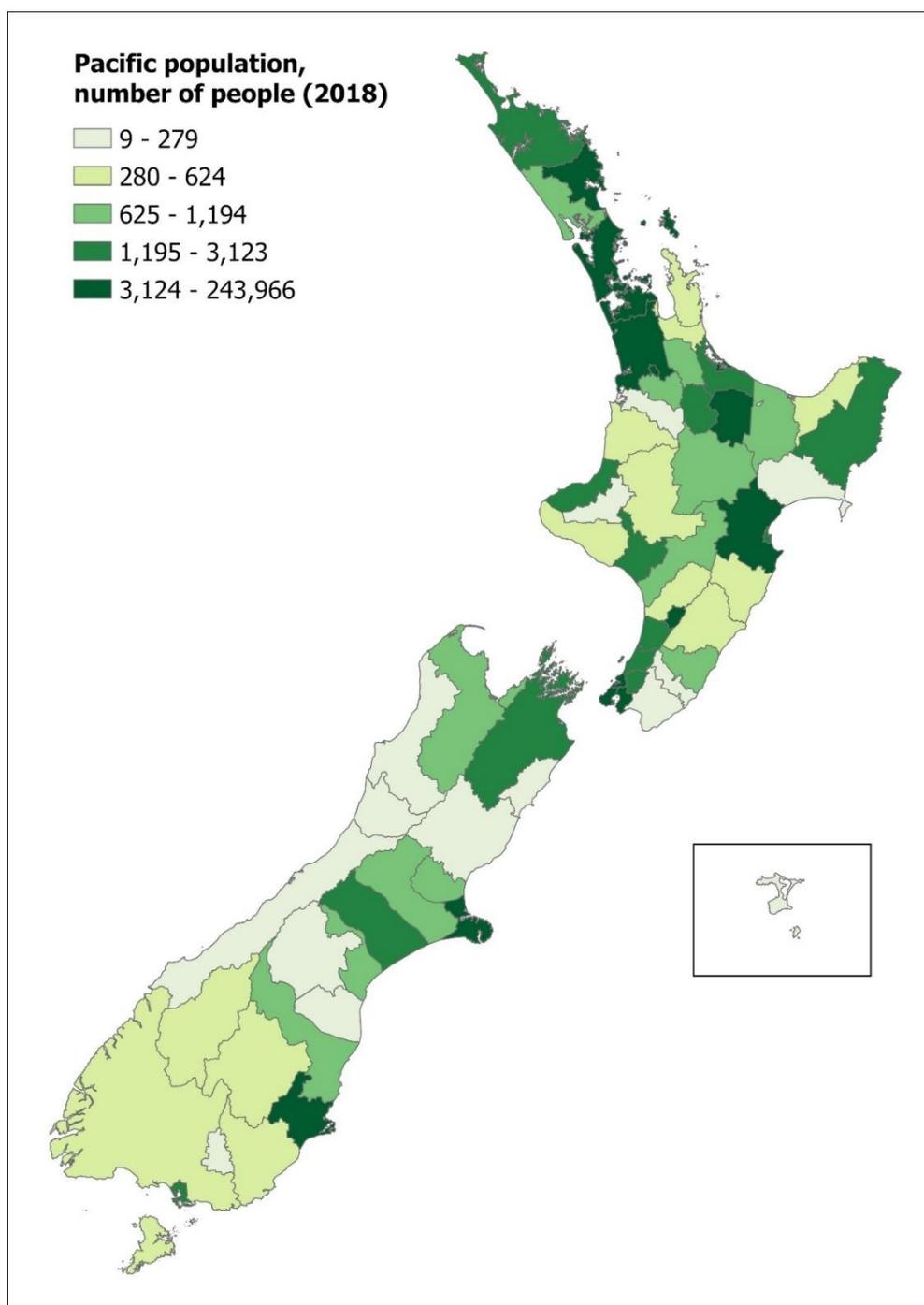
Pacific population, number of people (2018)
- 9 - 279
- 280 - 624
- 625 - 1,194
- 1,195 - 3,123
- 3,124 - 243,966

Source: New Zealand Census of Population and Dwellings

As a percentage of the total population, the Pacific population was largest in the following territorial authorities:

- Porirua City (26.3% of the population)
- Auckland City (15.5%)
- South Waikato District (12.8%)
- Lower Hutt City (11.5%)
- Hastings District (8.0%)
- Hamilton City (6.1%)
- Horowhenua District (5.7%).

Figure 22: Percentage of the population who identified as Pacific, by territorial authority, 2018
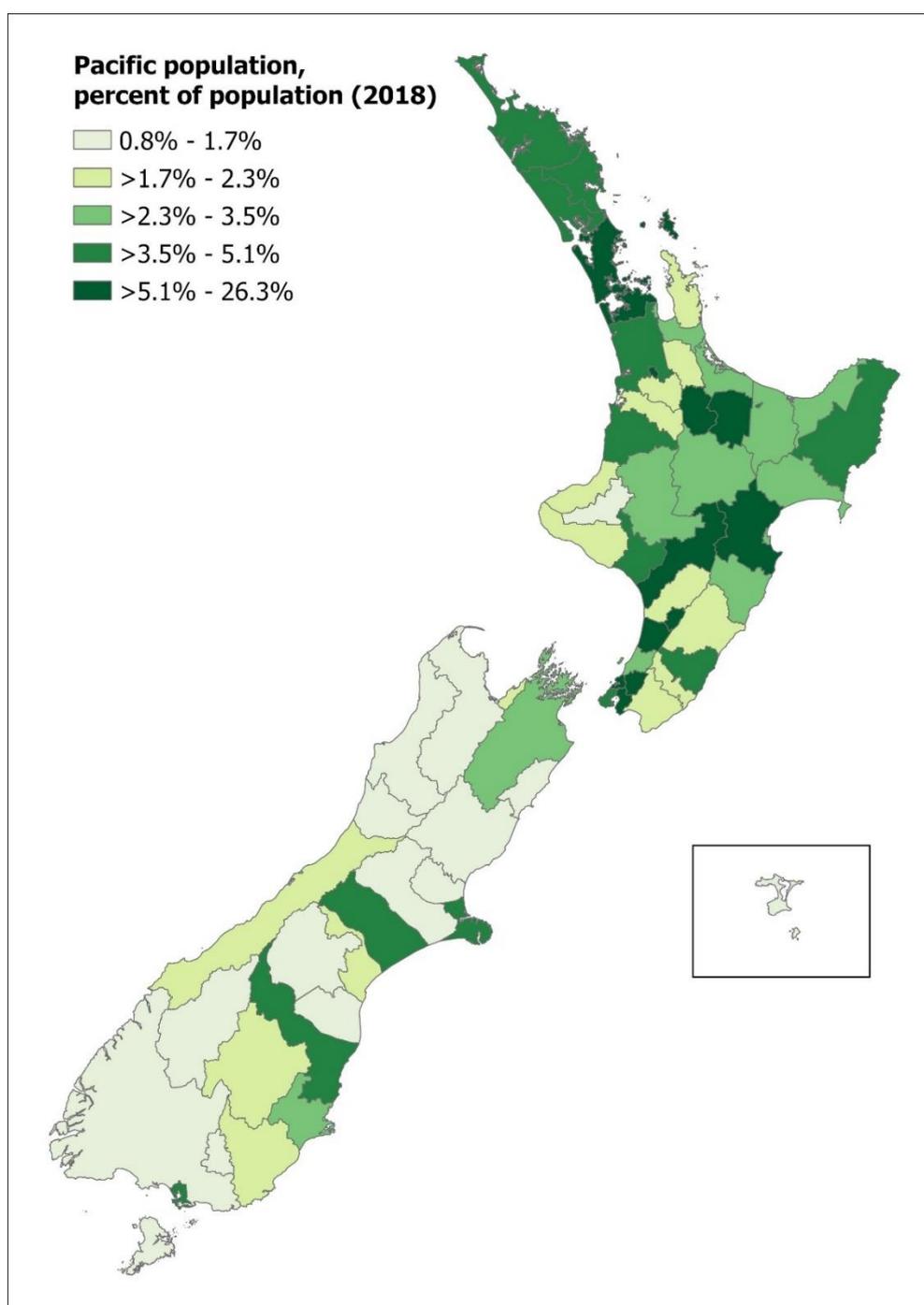
Source: New Zealand Census of Population and Dwellings

6.6   Asian population

The Asian population in New Zealand is diverse, and includes people of a range of different ethnicities, including Chinese, Indian, Filipino, Korean, Japanese, Srik Lankan, Vietnamese, and Cambodian.

It is important to understand the ethnic diversity of the population, to help tailor services and meet the needs of the local community, including providing official information about hazards, what to do in a disaster, and how to access help after a disaster, in relevant languages for the local population. Civil defence and emergency management (CDEM) groups specifically consider the needs of culturally and linguistically diverse (CALD) populations in their emergency management planning (MCDEM, 2013a).

Indicator definition

Usually resident population who identified with one or more Asian ethnic groups (total response).

Asian population had grown to over 700,000 people in 2018

The Asian population in New Zealand was about 707,600 people at the 2018 Census (Figure 23). This number had doubled since 2006 (354,550 people).

Figure 23: Asian population (total response), 2006, 2013, 2018
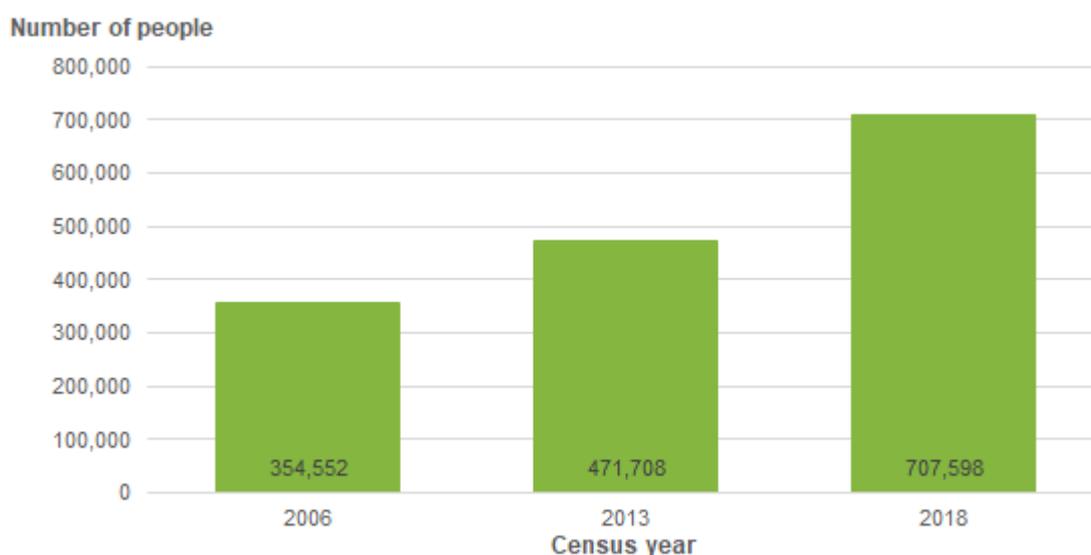
Source: New Zealand Census of Population and Dwellings

In 2018, 15.1% of the population were Asian, up from 9.2% in 2006 (Figure 24).

Figure 24: Asian population (as percentage of total population) (total response ethnic group), 2006, 2013, 2018
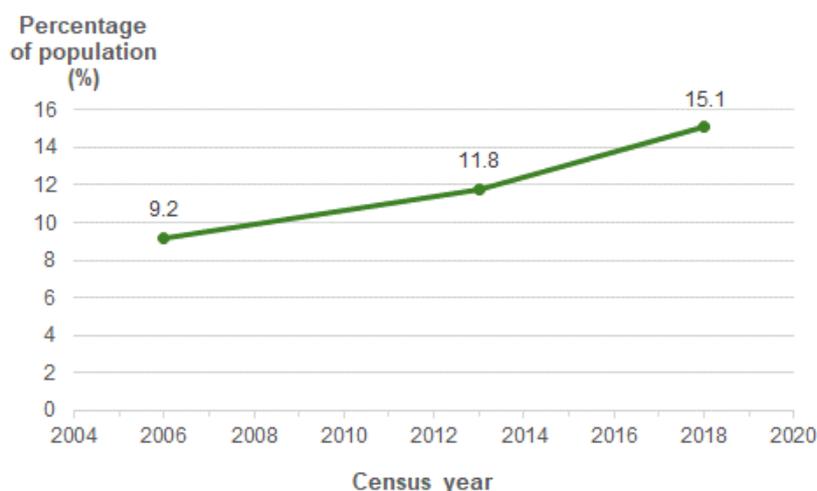
The Asian population has grown since the 2018 Census. Initial results from the 2023 Census show that the Asian population was 861,576 people in 2023, about 17.3% of the total population (Stats NZ, 2024a).

Chinese, Indian and Filipino were the largest Asian ethnic groups in New Zealand

In 2018, the two largest ethnic groups in New Zealand were Chinese (247,770 people) and Indian (239,193 people) (Figure 25). Other larger Asian ethnic groups in New Zealand included Filipino, Korean, Japanese and Sri Lankan.

Figure 25: Asian population, by detailed ethnic group (total response ethnic group), 2018
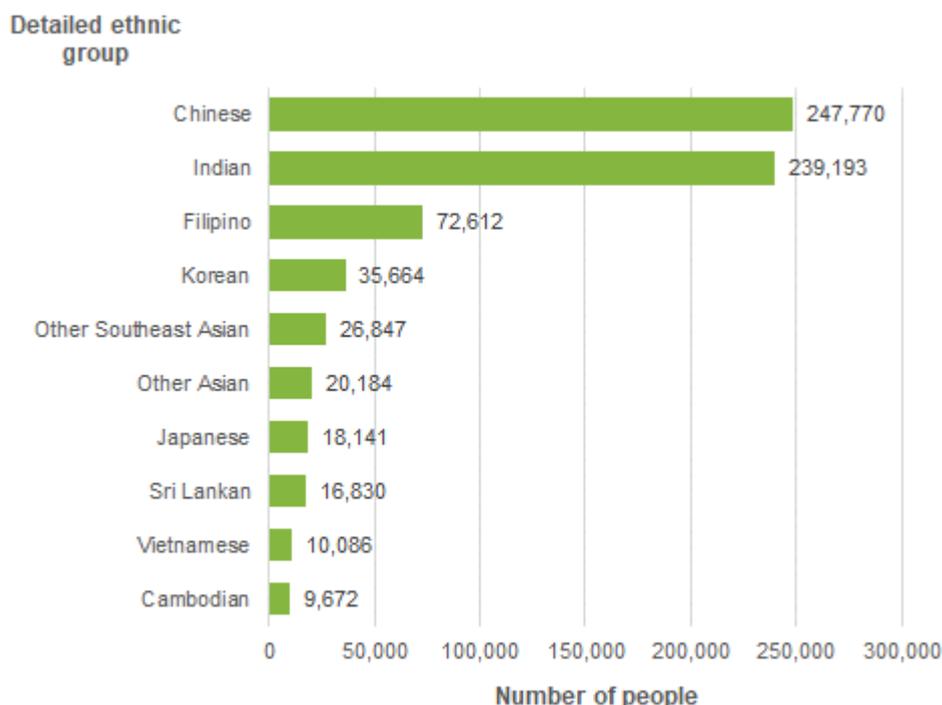
Results by territorial authority

The Asian population in New Zealand is mainly located in major urban areas, particularly:

- Auckland City (442,674 people)
- Christchurch City (54,984 people)
- Wellington City (37,158 people)
- Hamilton City (29,718 people)
- Lower Hutt City (15,888 people)
- Tauranga City (10,401 people)
- Palmerston North City (10,143 people).

Figure 26: Number of people identifying as Asian, by territorial authority, 2018
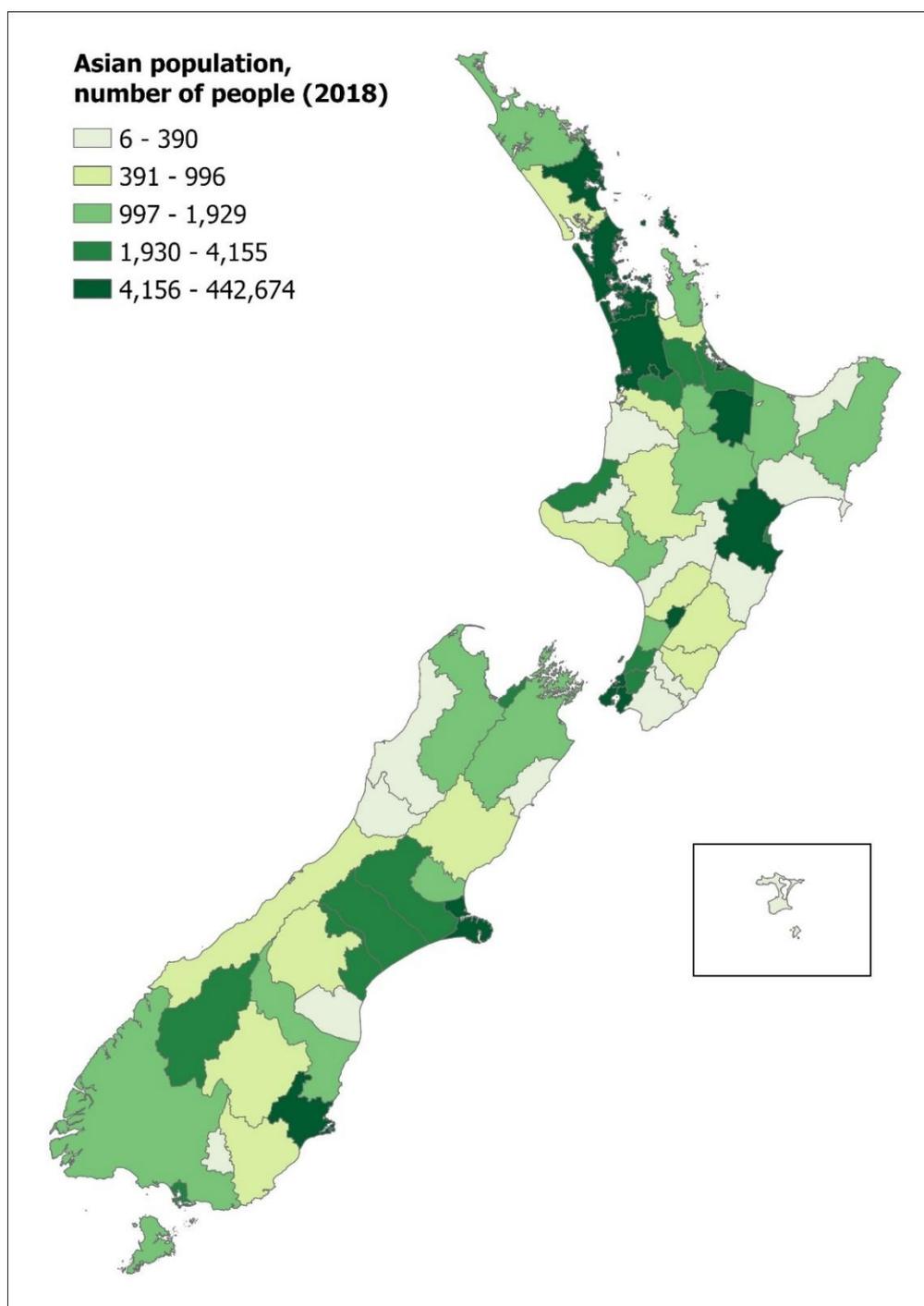
Source: New Zealand Census of Population and Dwellings

As a percentage of the total population, the Asian population was largest in the following territorial authorities:

- Auckland City (28.2% of the population)
- Hamilton City (18.5%)
- Wellington City (18.3%)
- Lower Hutt City (15.2%)
- Christchurch City (14.9%)
- Palmerston North City (12.0%)
- Queenstown-Lakes District (9.9%).

Figure 27: Percentage of the population who identified as Asian, by territorial authority, 2018
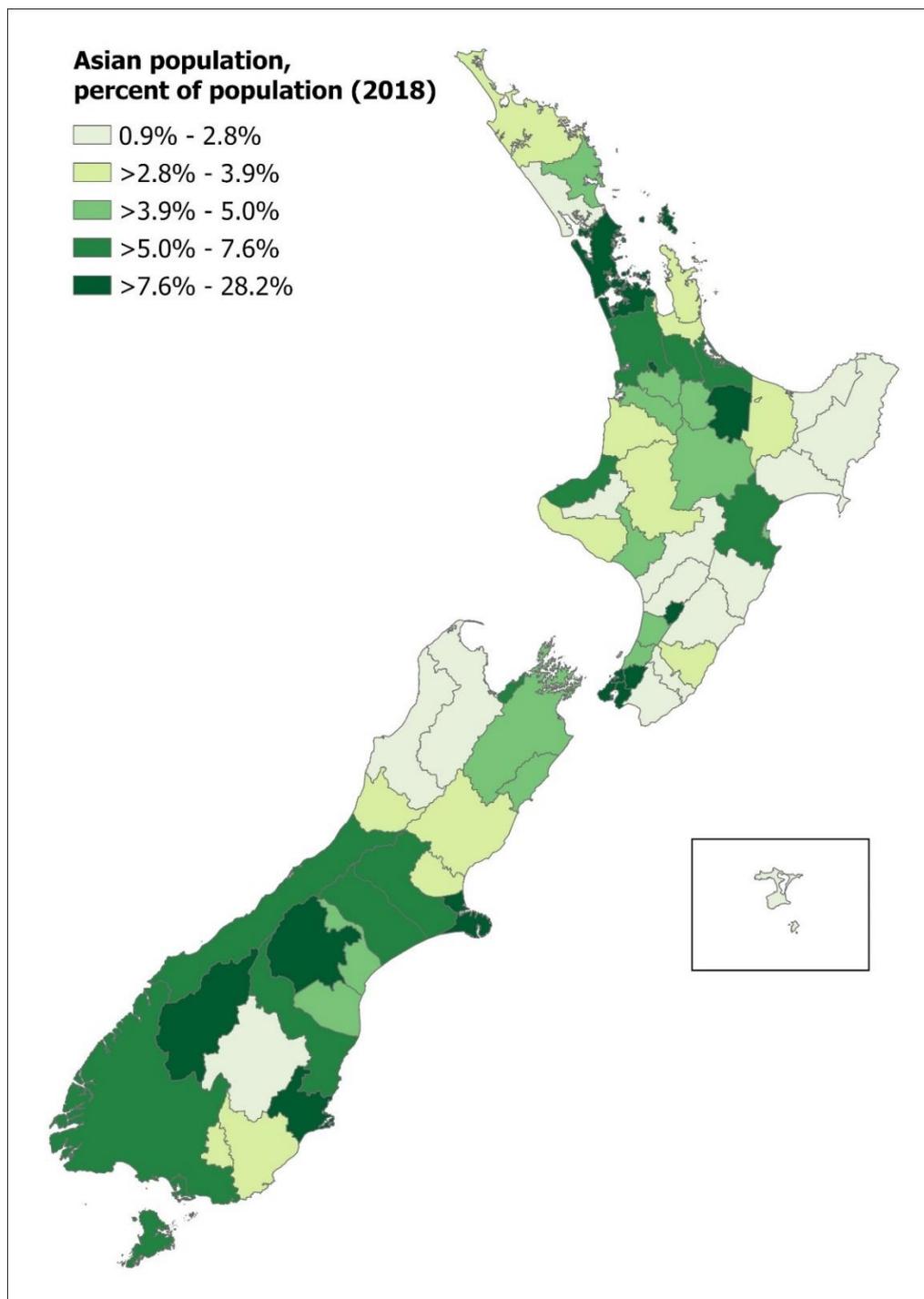
Source: New Zealand Census of Population and Dwellings

6.7 Middle Eastern / Latin American / African (MELAA) population

The ethnic group 'MELAA' includes Middle Eastern, Latin American and African people. These are diverse ethnicities, and represent ethnic minorities in New Zealand. People from these ethnic groups may have specific language, cultural and religious practices.

It is important to understand the ethnic diversity of the population, to help tailor services and meet the needs of the local community, including providing official information about hazards, what to do in a disaster, and how to access help after a disaster, in relevant languages for the local population. Civil defence and emergency management (CDEM) groups specifically consider the needs of culturally and linguistically diverse (CALD) populations in their emergency management planning (MCDEM, 2013a).

Indicator definition

Usually resident population who identified with one or more Middle Eastern, Latin American or African (MELAA) ethnic groups (total response).

About 70,000 people identify as MELAA ethnic groups in New Zealand

In 2018, there were 70,332 people who identified as Middle Eastern, Latin American or African (MELAA) ethnic group in New Zealand (Figure 28). This number had increased since 2013 (about 47,000 people).

Figure 28: Middle Eastern/Latin American/African (MELAA) population (total response ethnic group), 2006, 2013, 2018
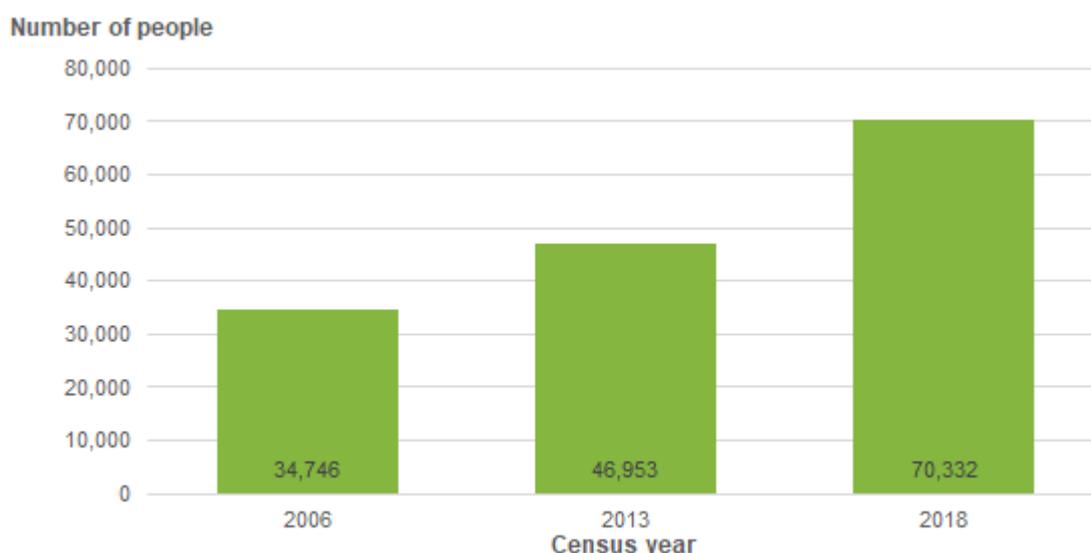
Source: New Zealand Census of Population and Dwellings

In 2018, the MELAA population represented 1.5% of the population, up from 1.2% in 2013 (Figure 29).

Figure 29: Middle Eastern/Latin American/African (MELAA) population (as percentage of total population) (total response ethnic group), 2006, 2013, 2018
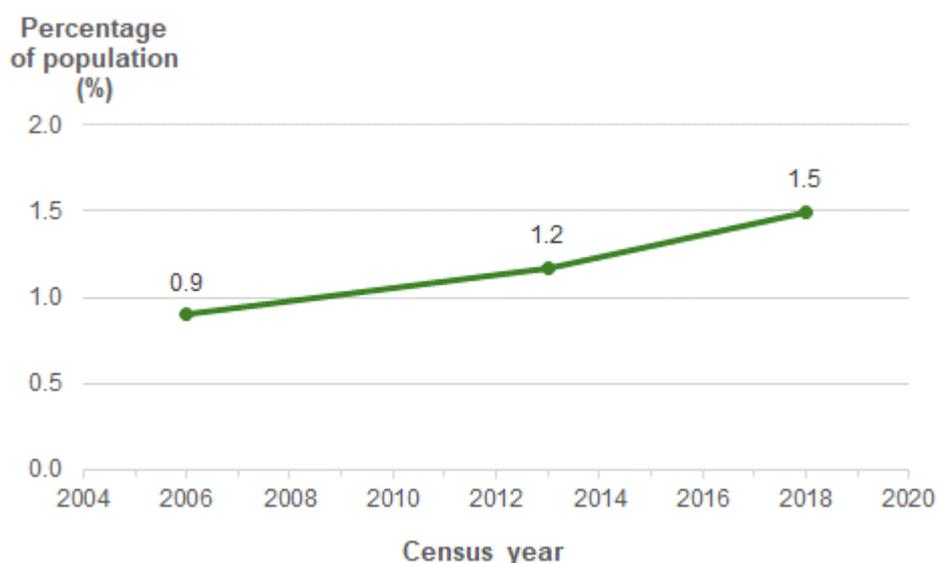
Source: New Zealand Census of Population and Dwellings

Initial results from the 2023 Census show that the MELAA population was 92,760 people in 2023, about 1.9% of the total population (Stats NZ, 2024a).

In 2018, the ethnic groups in the MELAA ethnic group were Middle Eastern (about 28,000 people), Latin American (25,700 people) and African (16,890 people) in 2018 (Figure 30).

Figure 30: MELAA population, by detailed ethnic group (total response ethnic group), 2018
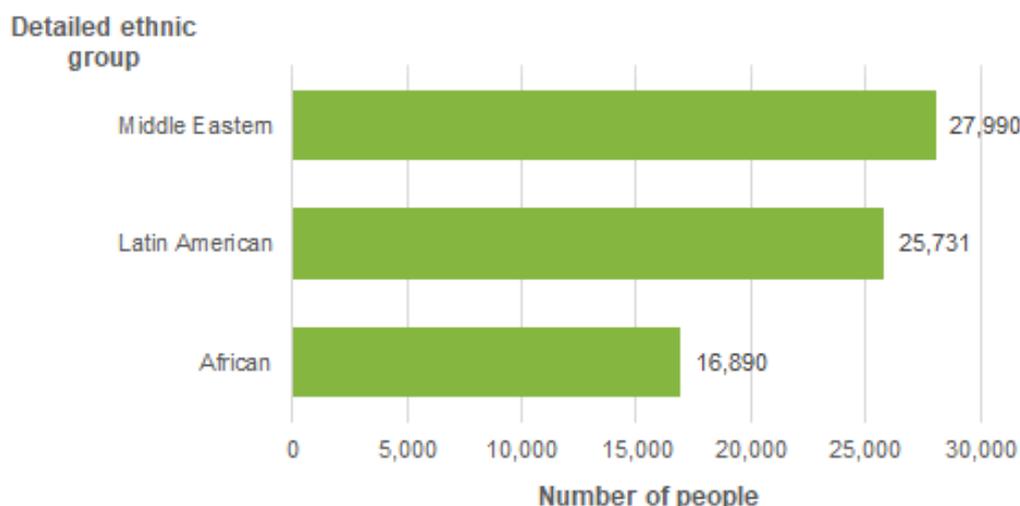
Source: New Zealand Census of Population and Dwellings

Results by territorial authority

The Middle Eastern / Latin American / African (MELAA) population in New Zealand is mainly located in major urban areas, particularly:

- Auckland City (35,838 people)
- Wellington City (6,135 people)
- Christchurch City (5,580 people)

- Hamilton City (3,606 people)
- Dunedin City (1,845 people)
- Queenstown-Lakes District (1830 people)
- Lower Hutt City (1668 people).

Figure 31: Number of people identifying as Middle Eastern/Latin American/African (MELAA) (total response), by territorial authority, 2018

MELAA population, number of people (2018)
- 0 - 42
- 43 - 114
- 115 - 255
- 256 - 471
- 472 - 35,838
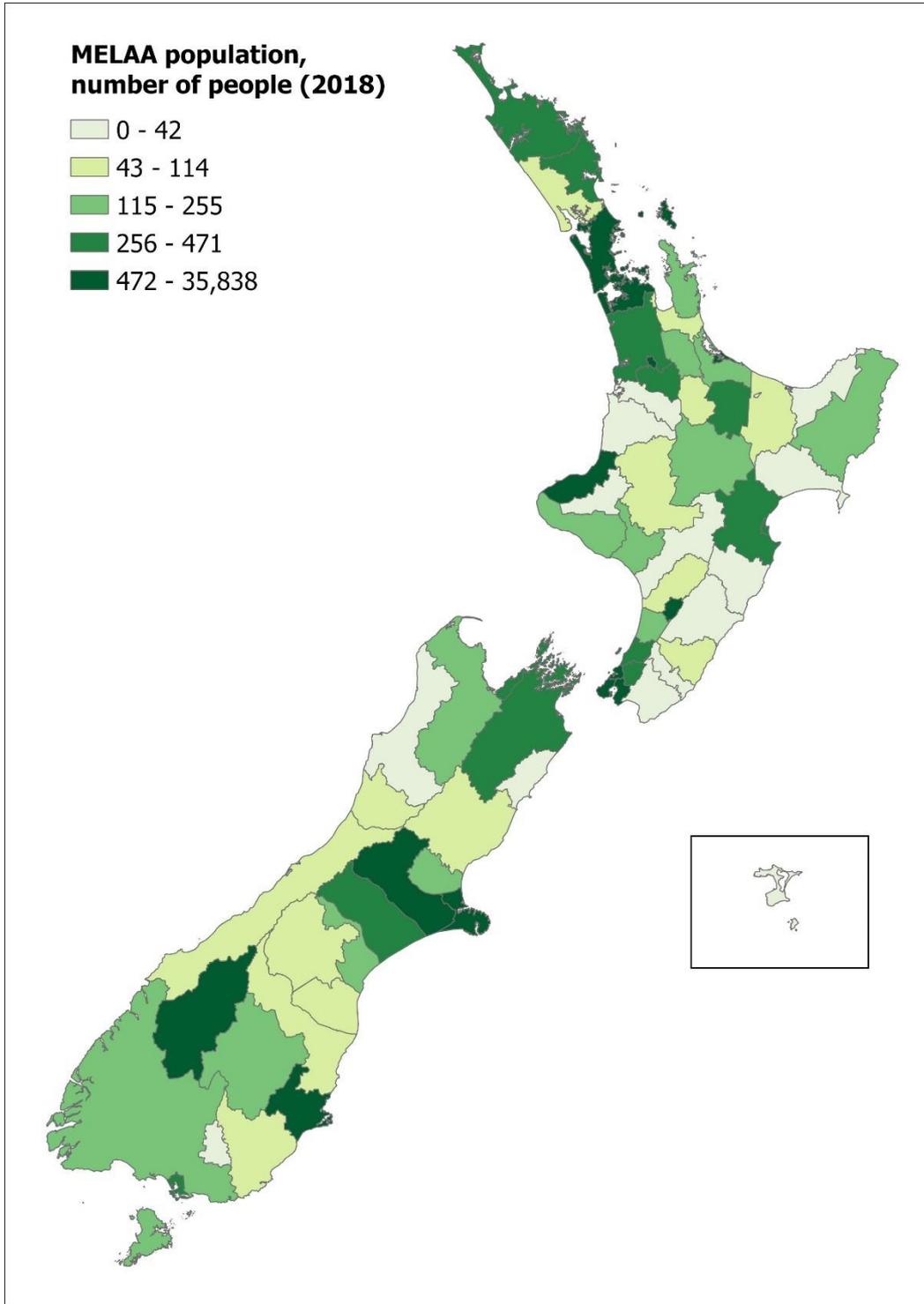
Source: New Zealand Census of Population and Dwellings

As a percentage of the total population, the MELAA population was largest in the following territorial authorities:

- Queenstown-Lakes District (4.7% of the population)
- Wellington City (3.0%)
- Auckland City (2.3%)
- Hamilton City (2.2%)
- Mackenzie District (1.8%)
- Lower Hutt City (1.6%).

Figure 32: Percentage of the population who identified as Middle Eastern/Latin American/African (MELAA) (total response), by territorial authority, 2018
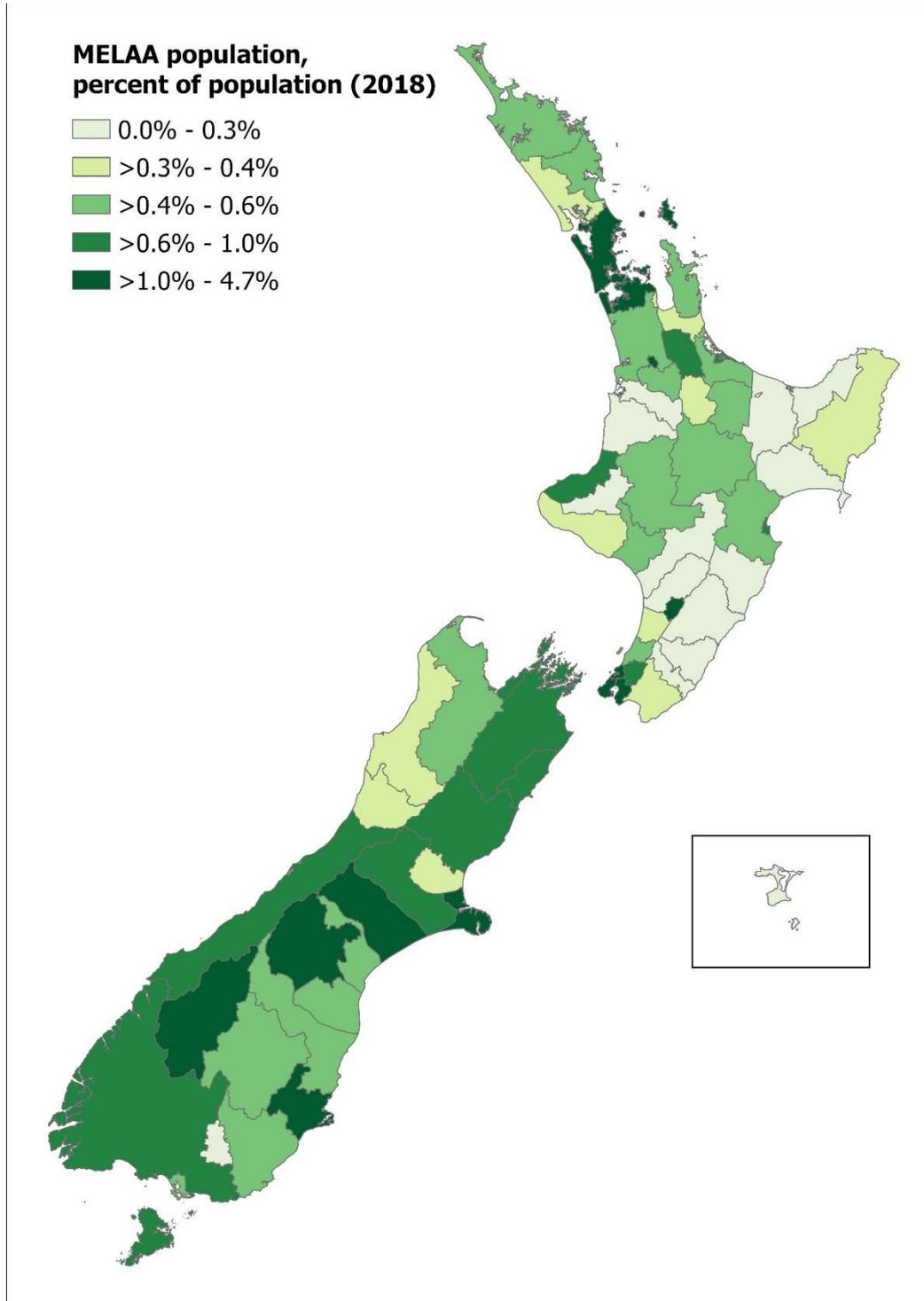
Source: New Zealand Census of Population and Dwellings

6.8 European population

The 'European' ethnic group is the main ethnic group in New Zealand. Sometimes, the European ethnic group may be used as a comparator ethnic group. However, the 'total response European' ethnic group includes people who have reported multiple ethnicities (such as European and Māori), so this group may overlap with other ethnic groups, which affects the ability to properly compare groups. To do appropriate comparisons between ethnic groups, sometimes we report indicators by the ethnic groups 'sole European' or 'non-Māori-non-Pacific-non-Asian'.

Indicator definition

Usually resident population who identified with the European ethnic group (total response).

Seven in ten New Zealanders identified as European ethnicity in 2018

In 2018, 3.3 million people identified as European (including New Zealand European) in the Census (total response ethnic groups) (Figure 33). This had increased from about 3 million in 2013.

Figure 33: European population (total response ethnic group), 2006, 2013, 2018
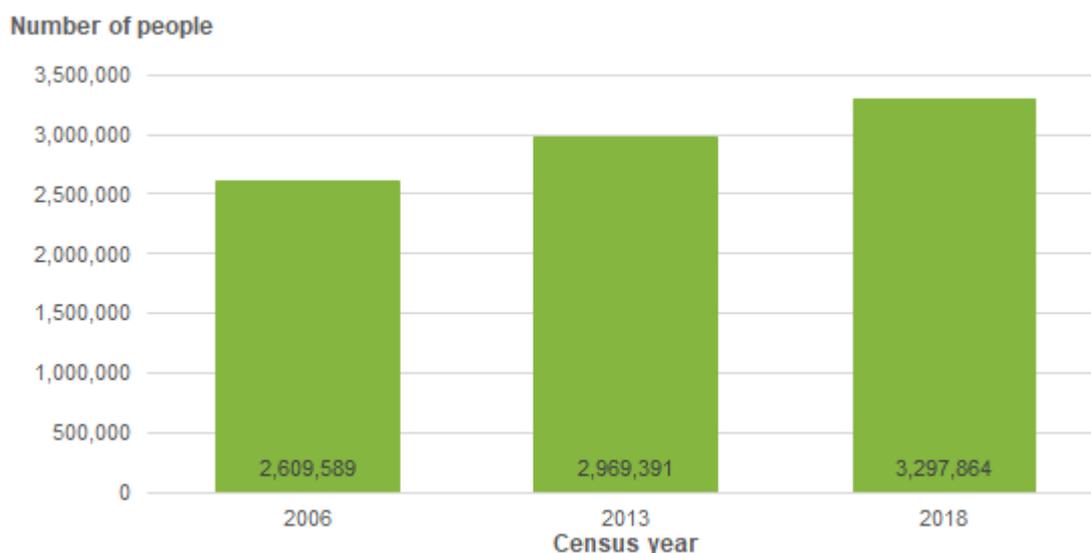
Source: New Zealand Census of Population and Dwellings

The European population represented 70.2% of the New Zealand population in 2018 (Figure 34).

Figure 34: European population (as percentage of total population) (total response ethnic group), 2006, 2013, 2018
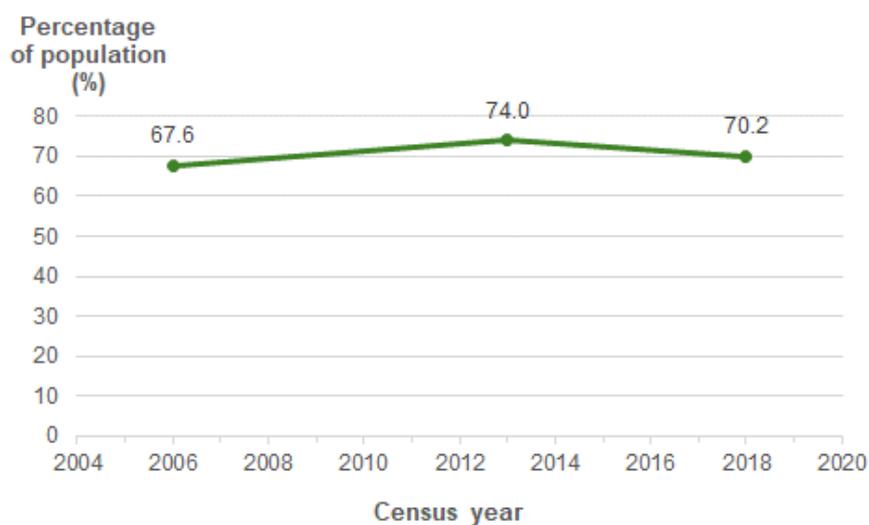
Initial results from the 2023 Census show that the European population was 3,383,742 people in 2023, about 67.8% of the total population (Stats NZ, 2024a).

Most people who identify as European are sole-European

The European total response ethnic group also includes everyone who identifies with the European ethnic group and another ethnic group (such as Māori, Pacific peoples, Asian, MELAA or Other). When looking at the sole European (ie European-only) ethnic group, the numbers are slightly lower. This group is sometimes used as a comparator group for comparisons, as it will not overlap with other ethnic groups.

In 2018, there were about 2.8 million people who identified solely as European, which represented the majority (about 85%) of the total response European population (Figure 35).

Figure 35: European population (total response ethnic group and European only), 2006, 2013, 2018
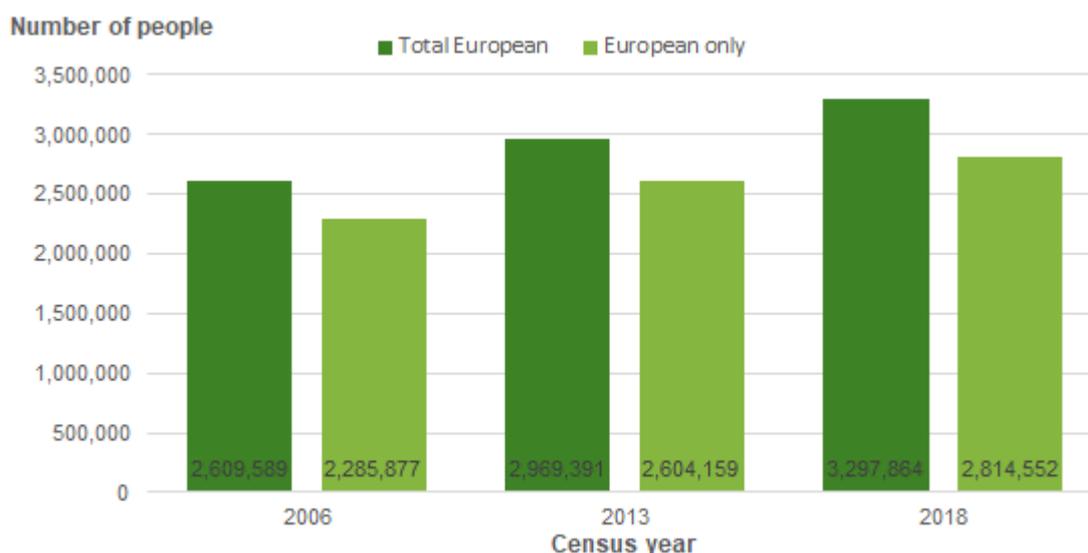
In 2018, about 70.2% of the population identified as European, while 59.9% of the population identified solely as European (Figure 36).

Figure 36: European population (total response ethnic group and European only) as a percentage of the total population, 2006, 2013, 2018
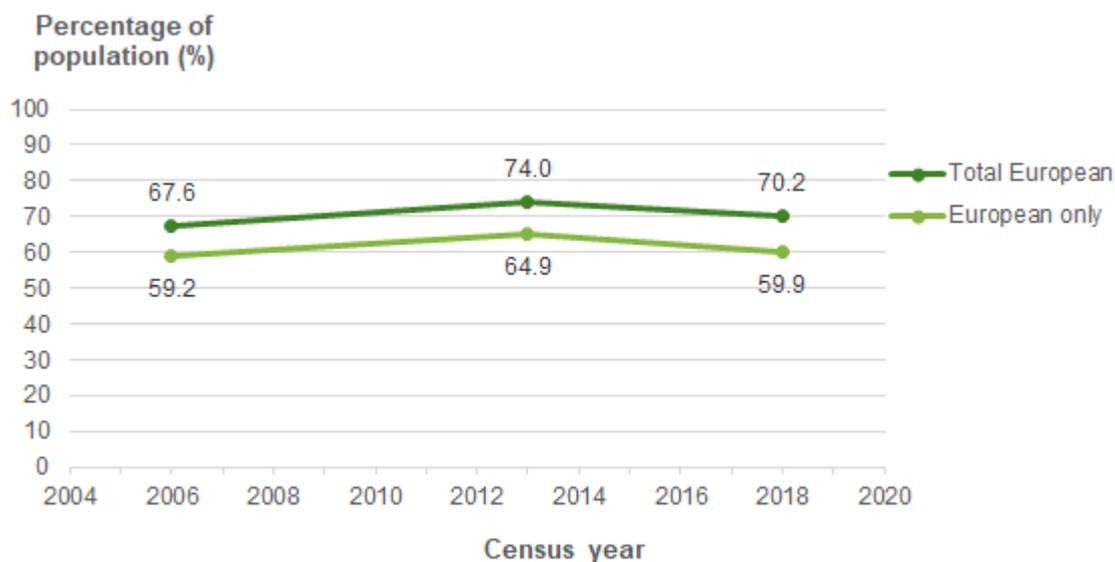
Source: New Zealand Census of Population and Dwellings

Results by territorial authority

The territorial authorities with the largest European populations are the main cities, including Auckland, Christchurch City, Wellington City, and Tauranga City (Figure 37).

Figure 37: Number of people identifying as European (total response), by territorial authority, 2018
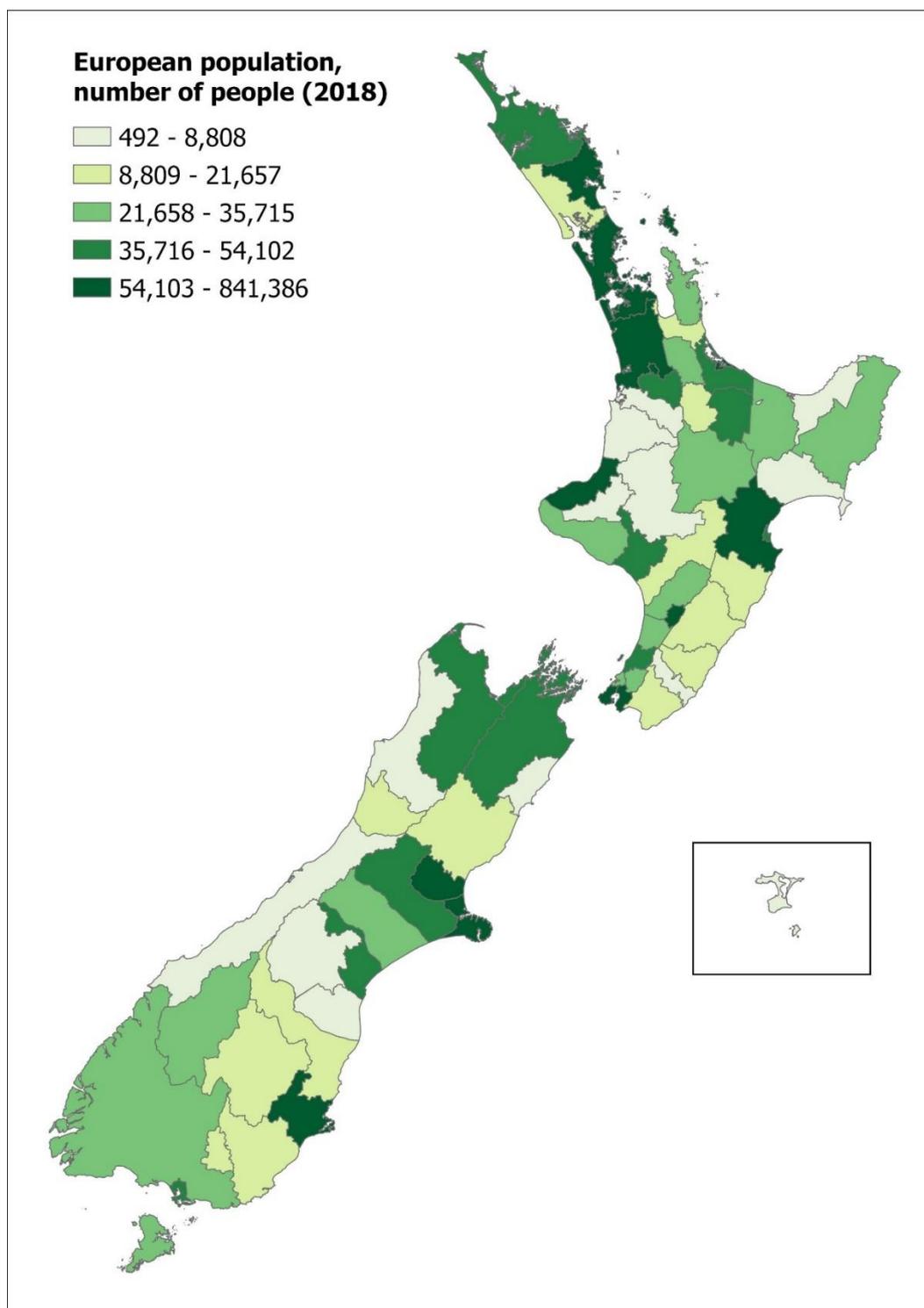
European population, number of people (2018)
- 492 - 8,808
- 8,809 - 21,657
- 21,658 - 35,715
- 35,716 - 54,102
- 54,103 - 841,386

Source: New Zealand Census of Population and Dwellings

As a percentage of the total population, the European population was largest in many of the South Island (excluding Christchurch) and Wairarapa territorial authorities.

Figure 38: Percentage of the population who identified as European (total response), by territorial authority, 2018
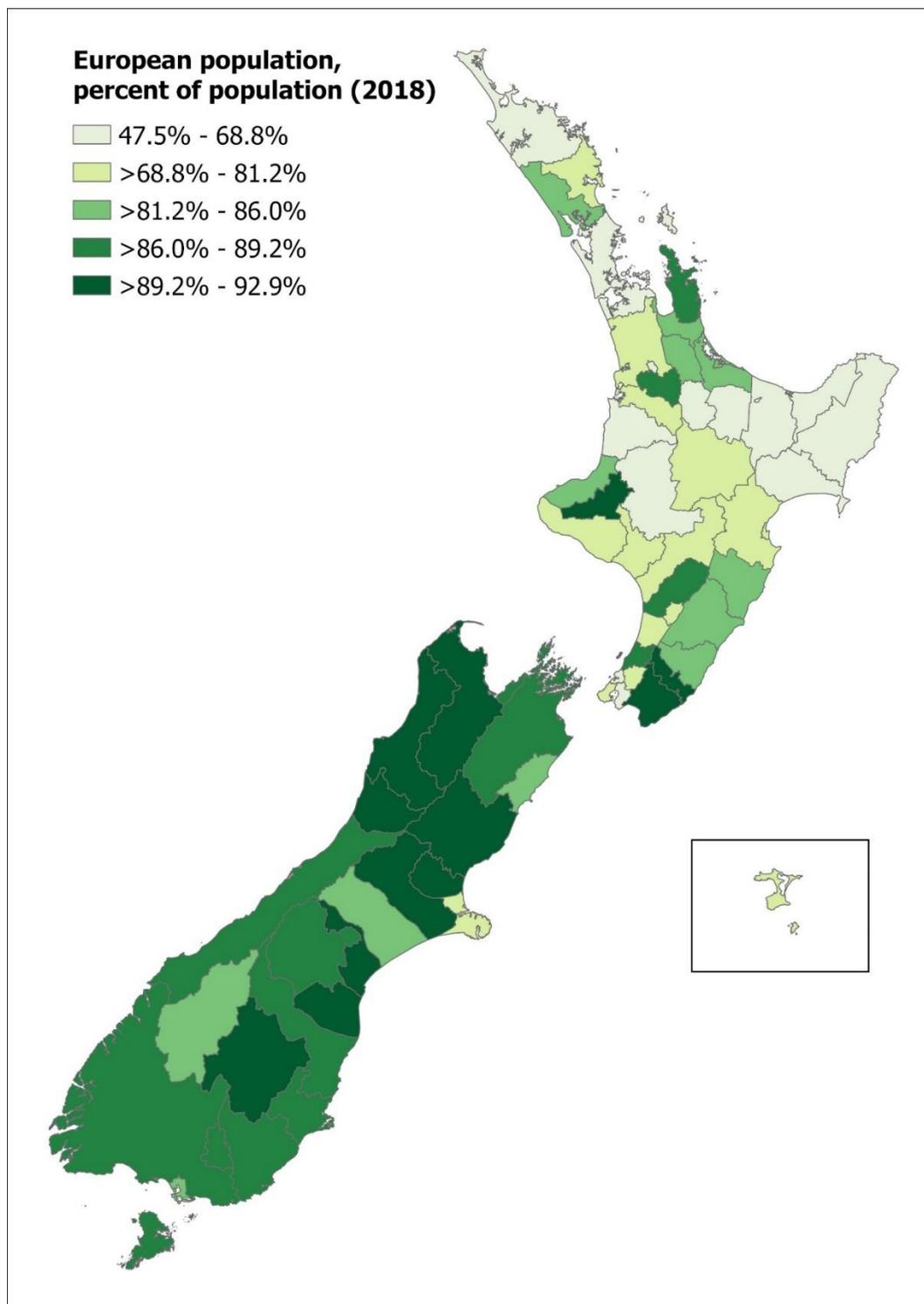
Source: New Zealand Census of Population and Dwellings

6.9   People living in rural areas

The New Zealand population has become increasingly urban, like the rest of the world. The size of New Zealand cities has grown in both population count and land area.

Living in rural areas can be a source of both resilience and vulnerability for climate-related hazards. Rural communities are often close-knit and have many strengths and resilience. The rural environment can also encourage a healthy lifestyle. Rural communities are often prepared for short-term isolation and/or power cuts, particularly in regions where this may happen relatively frequently due to weather conditions (eg winter snow).

However, in rural areas, populations may live in more dispersed areas, often in less accessible geographies. In rural areas, the smaller population size means that services such as water and sewerage treatment plants are less cost-effective. Farmers and outdoor workers may be adversely impacted by extreme weather events, heatwaves and droughts. Rural areas are also more susceptible to being isolated during a hazard event, due to disruptions to key infrastructure (such as roading, communications, power). People living rurally can also have more difficulty in accessing health services, for example due to longer travel distances and less services available.

By contrast, urban areas have higher numbers of people, and people living closer together. The increased numbers of people can allow good environmental management, such as water treatment plants, wastewater treatment, and public transport. However, urban areas can experience urban heat island effect (where temperatures increase due to concrete), air pollution, noise pollution, and hazardous substances, if residential zones are close to industrial zones. Higher density areas mean that more people may be affected by a disaster (such as a flood) within a geographic area.

Indicator definition

This indicator measures the number and percentage of people living in rural areas, according to the New Zealand Census of Population and Dwellings. Urban-rural classifications are based on the Urban Rural Indicator (IUR):

- major urban area (100,000+ residents)
- large urban area (30,000–99,999 residents)
- medium urban area (10,000–29,999 residents)
- small urban area (1,000–9,999 residents)
- rural/other areas (less than 1,000 residents); these include 'rural settlements' (which have 200–999 residents or at least 40 dwellings) and 'other rural areas'.

A full list of urban areas (major, large, medium, small) from the 2018 IUR is provided in Appendix 3.

About one in six New Zealanders lived in rural areas in 2018

Most New Zealanders live in the urban areas (Figure 39). In 2018:

- 51.2% of the population lived in the major urban areas of Auckland, Christchurch, Wellington, Hamilton, Tauranga, Dunedin and Lower Hutt
- 14.1% lived in large urban areas (such as Rotorua, Whanganui and Invercargill)
- 8.4% lived in medium urban areas (such as Cambridge, Te Awamutu and Rolleston)

- 10.0% lived in small urban areas (such as Thames, Stratford and Gore)
- 16.3% of New Zealanders lived in rural areas.

Figure 39: People living in urban and rural areas in New Zealand (estimated percentage of the population, %), 2018
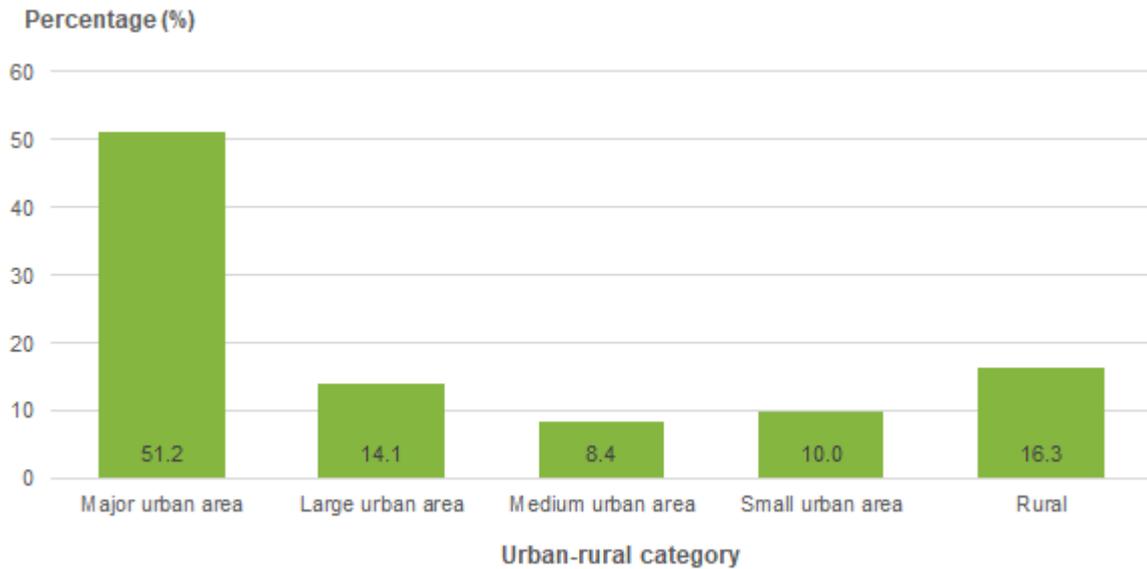

Note: Percentages are estimates, as counts have been summed over small areas (Statistical Area 2).
Source: New Zealand Census of Population and Dwellings

Māori have a higher proportion living in more rural areas

Māori have a relatively high proportion of their population living in rural areas (18.0%) and/or small urban areas (14.7%) (Figure 40). In New Zealand, most people in the Pacific, Asian, and Middle Eastern/Latin American/African (MELAA) ethnic groups live in major urban areas or large urban areas.

Figure 40: People living in urban and rural areas in New Zealand (estimated percentage of each ethnic group, %), by total response ethnic group, 2018
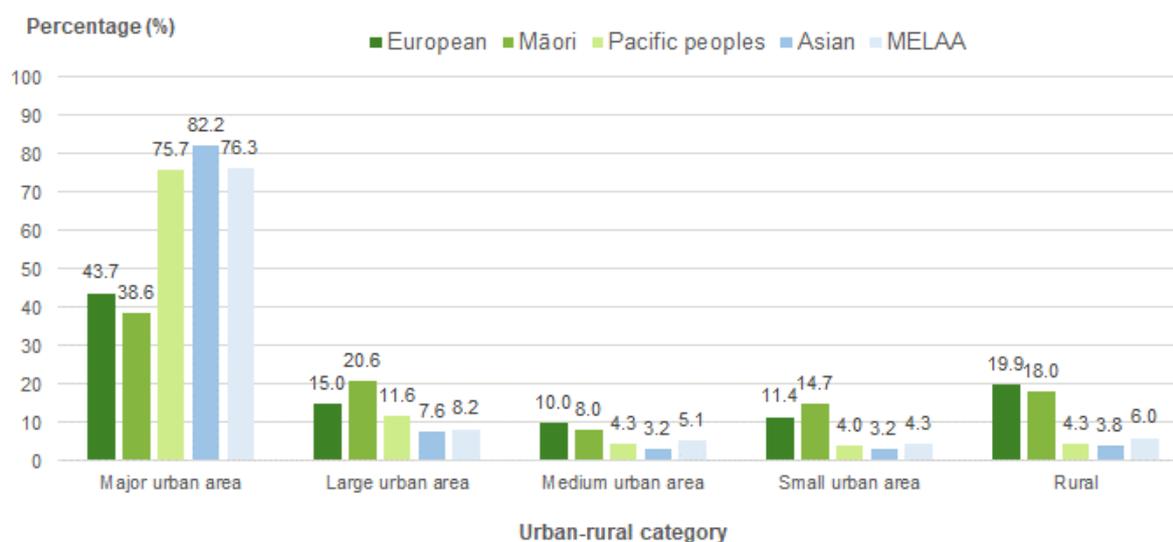
Note: MELAA is Middle Eastern/Latin American/African ethnic groups. The Urban Rural Indicator (IUR) classification has been used. Total response ethnic groups have been used to present ethnic groups. This means that everyone who reported as being one of these ethnic groups have been included. These ethnic groups cannot be directly compared with one another, as they may be overlapping. Percentages are estimates, as this analysis summed ethnic populations over SA2 populations.
Source: New Zealand Census of Population and Dwellings

Results by territorial authority

Some territorial authorities have a high proportion of the population living in rural areas, particularly in the Northland and Waikato regions, and in the South Island. These territorial authorities include:

- Chatham Islands Territory (100.0% of the population)
- Hurunui District (83.5%)
- Southland District (78.9%)
- Kaipara District (70.3%)
- Mackenzie District (70.1%)
- Ōtorohanga District (70.0%)
- Westland District (66.5%)
- Clutha District (64.5%)
- Far North District (64.4%)
- Waikato District (64.4%).

Figure 41: Estimated percentage of the population living in rural areas, by territorial authority, 2018
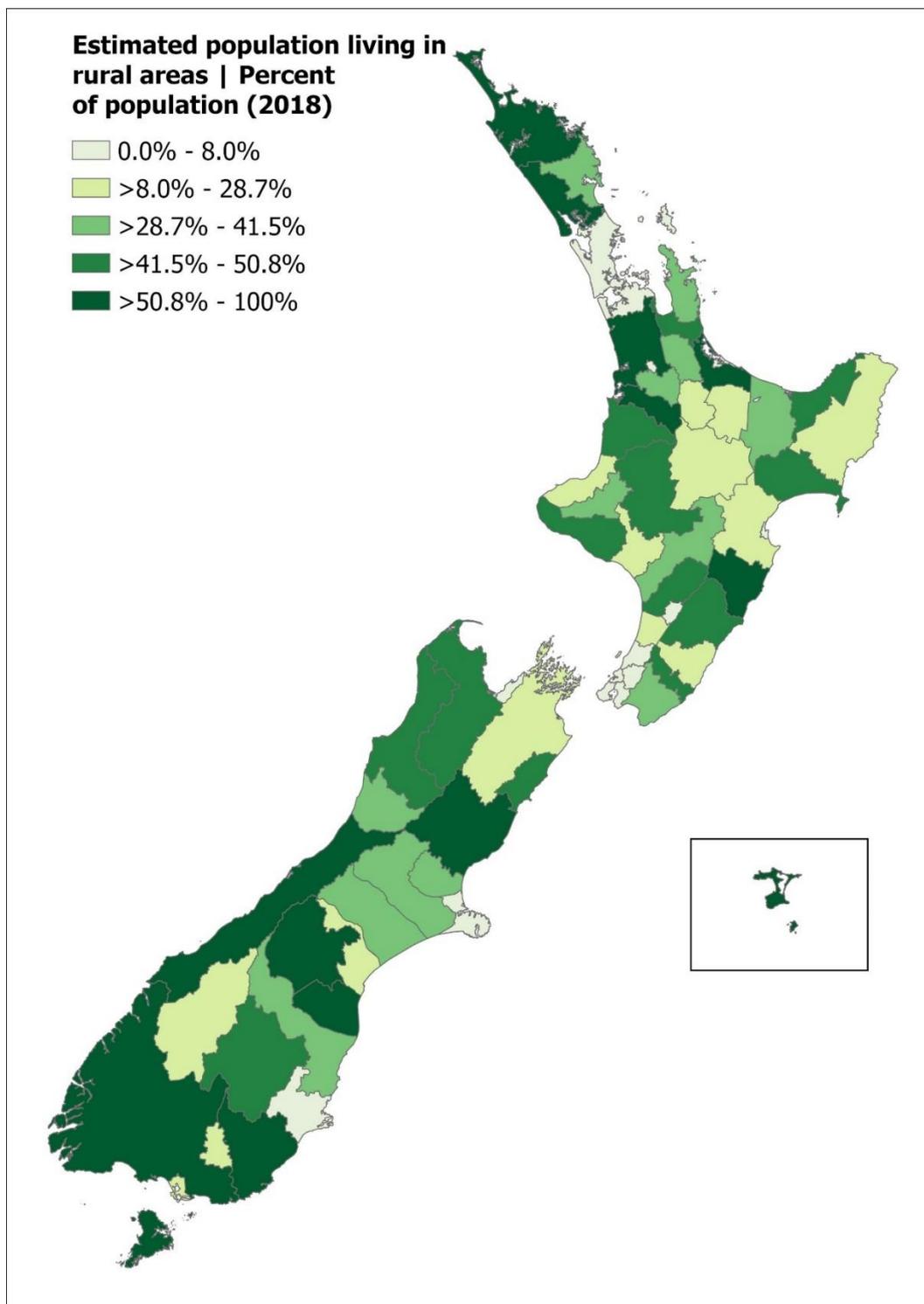
Note: Percentages are estimates, as counts have been summed over small areas (Statistical Area 2).
Source: New Zealand Census of Population and Dwellings

7 Children

This section presents social vulnerability indicators relating to the child population.

7.1 Overview

Children are vulnerable to climate-related hazards and health impacts

Children, particularly young children, are vulnerable to the impacts of climate-related hazards such as floods, storms, wildfires and heatwaves. Children rely on adult caregivers to protect them during a hazard event, and to move them out of harm's way. Babies and young children may need to be carried during an evacuation. Children are also more susceptible to health impacts, for example from floodwaters and heatwaves. Children's bodies are still developing and growing, which makes them more susceptible to illness and toxins. Young children are particularly vulnerable to extreme heat, as their bodies have less ability for thermoregulation. Children are also more susceptible to psychological impacts (such as anxiety) after disasters such as flooding (WHO, 2013).

Households with children may struggle with response and recovery

Families with children can also be vulnerable during and after a hazard event. They may have financial difficulties due to having dependents, which may influence their ability to prepare and recover. They may find the clean-up and recovery difficult if they do not have childcare available. Parents are likely to want to pick up kids from daycares and schools in the event of an emergency, which may put them in the path of direct hazards (such as floodwaters). Closure of schools and early childhood education centres (ECEs) after a hazard event - temporarily and/or permanently - can make recovery more difficult for parents (through a lack of childcare) and children (through changes to their routine), and may impact on long-term recovery.

Children can also be a source of resilience

Children can also be a source of strength and resilience. Schools play an important role in terms of social connectedness in the community. Children can help build social connectedness in communities, through connections at childcare, school, and children's sports and activities. Some schools may also be the site of a Civil Defence Centre in an emergency event.

Children and young people can also share information about hazards and emergency preparedness that they have learned at school with their parents and family. In communities where many people do not speak English, young people may play an important role as a 'language bridge' for their parents and community elders (Marlowe and Bogen, 2015). Young people tend to be technology-savvy, and are likely to be able to access information through social media and online information sources.

Key indicators related to children

Key indicators in this section include:

- Children aged 0–14 years
- Young children (aged 0–4 years)

- Households with at least one child aged 0–14 years
- Household with at least one young child (aged 0–4 years)

7.2   Children aged 0–14 years

Children are more sensitive to the impacts of climate-related hazards. They rely on adult caregivers to protect them during a hazard event, and to move them out of harm's way. Children are also more susceptible to many health impacts from climate-related hazards, (such as injury, drowning, infections, and diarrhoea/gastrointestinal disease), as their bodies are still developing and growing. Children with pre-existing health conditions (such as asthma) are particularly at risk from adverse health impacts.

Families with children can also find it difficult in the clean-up and recovery, if they do not have childcare available. However, children can also play a key role in resilience and recovery, through strong school and community networks.

Indicator definition

This indicator shows children aged 0–14 years, among the census usually resident population, from the NZ Census of Population and Dwellings.

Nearly one million children in New Zealand in 2018

In 2018, there were 923,403 children aged 0–14 years in New Zealand (Figure 42). This was an increase from 2013 (865,629 children).

Figure 42: Number of children aged 0–14 years, 2006, 2013, 2018
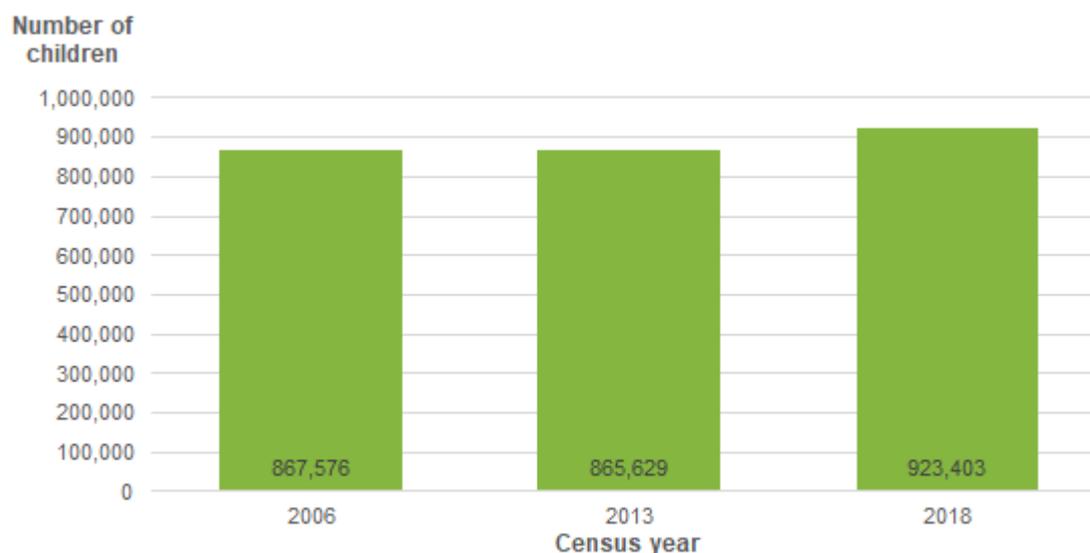
Source: New Zealand Census of Population and Dwellings

As a percentage of the total population, children decreased from 21.5% in 2006, to 20.4% in 2013 and 19.6% in 2018 (Figure 43).

Figure 43: Children aged 0–14 years, as a percentage of total population, 2006, 2013, 2018
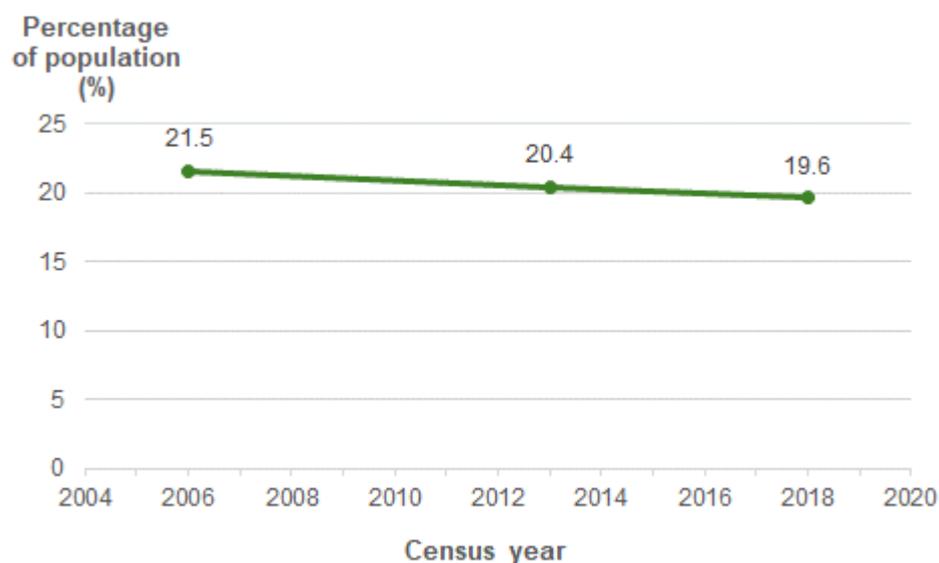
Source: New Zealand Census of Population and Dwellings

Initial results from the 2023 Census show that there were 936,297 children aged 0–14 years in New Zealand in 2023, about 18.7% of the total population (Stats NZ, 2024a).

One in three Māori and Pacific peoples are aged 0–14 years

In 2018, among all children aged 0–14 years, 26.9% were Māori, 13.9% were Pacific peoples, 15.6% were Asian, 1.9% were Middle Eastern/Latin American/African (MELAA), and 67.3% were European. These ethnic groups are total response, so include all people who identified as being of that ethnic group; percentages will therefore add to more than 100%.

Māori and Pacific peoples have younger populations than other ethnic groups in New Zealand. In 2018, about one in three Māori (32.1%) and Pacific peoples (33.6%) were aged 0–14 years (Figure 44).

Figure 44: Percentage of each ethnic group aged 0–14 years, 2018 (%)
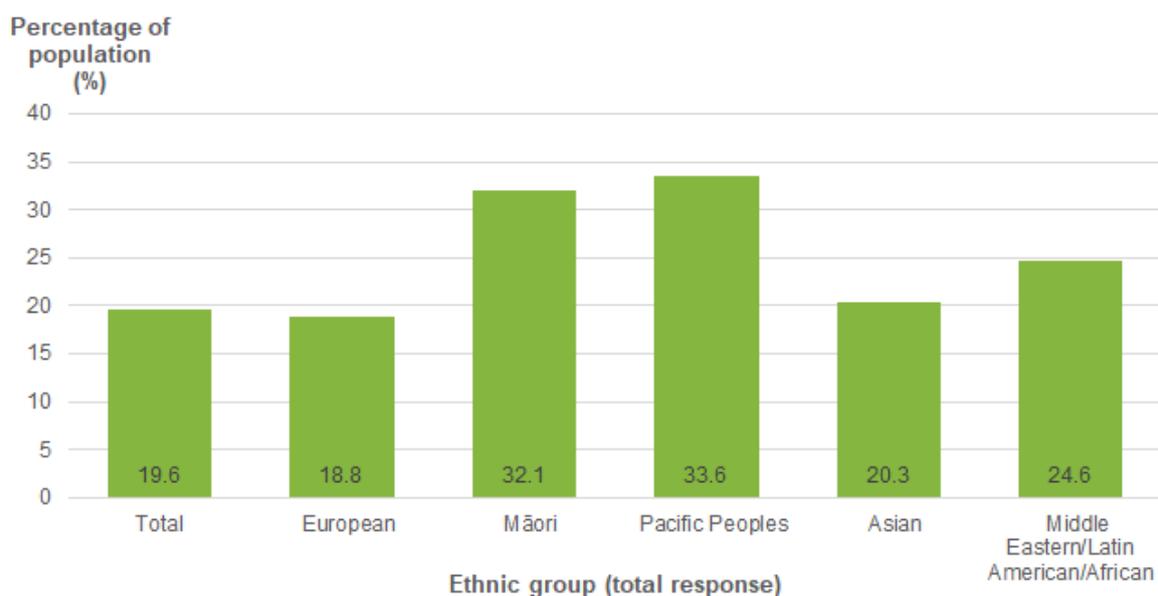
Note: Total response ethnic groups have been used, so everyone has been included in all ethnic groups they identified with.
Source: New Zealand Census of Population and Dwellings

Some areas have higher proportion of population being children

Some territorial authorities had a higher percentage of their population in the age group of 0–14 years in 2018. These included many of the territorial authorities in the Tairāwhiti / Bay of Plenty regions.

The following territorial authorities had almost one in four people in their population who were aged 0–14 years:

- Kawerau District (24.0% of the population)
- Porirua City (23.8%)
- Gisborne District (23.7%)
- Wairoa District (23.5%)
- Waikato District (23.4%)
- South Waikato District (23.0%).

Figure 45: Percentage of the population aged 0–14 years, by territorial authority, 2018
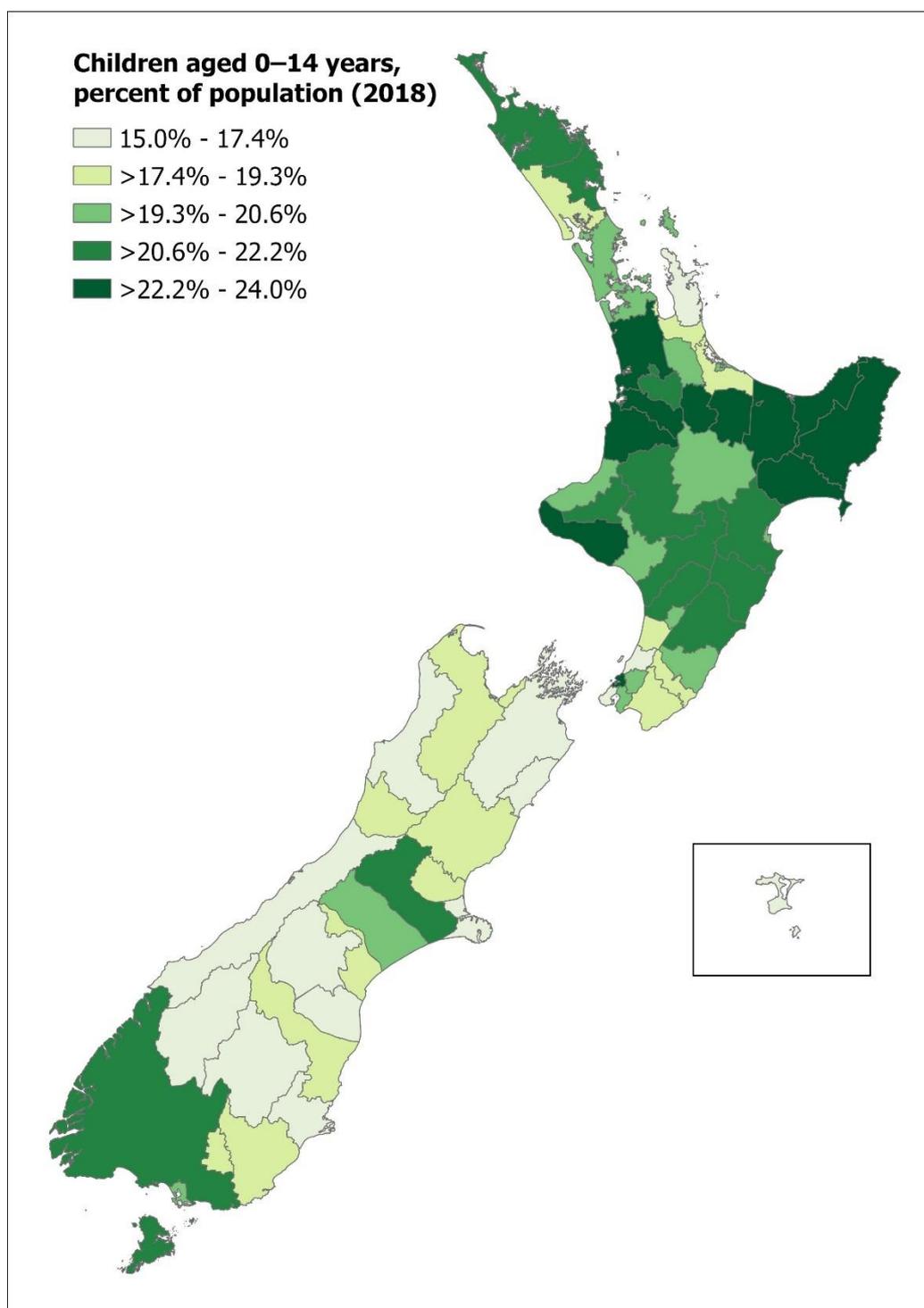
Source: New Zealand Census of Population and Dwellings

## The percentage of the population aged 0–14 years is projected to decrease

The number of children (0–14 years) in New Zealand is projected to stay at about the same number (close to a million) from 2023 to 2073 (Figure 46). Overall, children (0–14 years) are projected to decrease from 19.0% of the population in 2020, down to 13.9% of the population by 2073 (Figure 47). Younger children (0–4 years) have similar patterns.

Figure 46: Projected number of children in New Zealand, 2020–2073
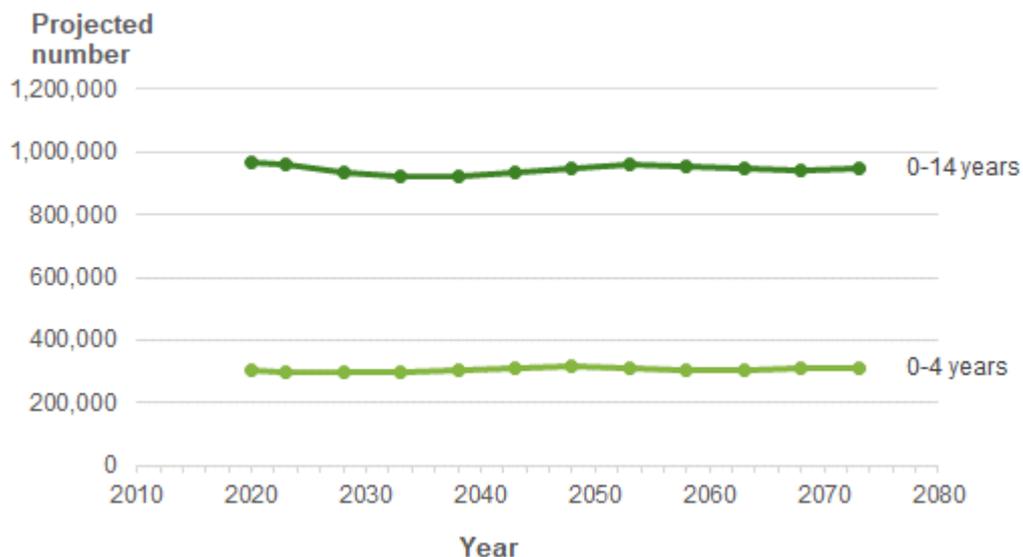
Source: Stats NZ population projections, by age and sex (50th percentile projections, 2020(base)–2073), NZ.Stat

Figure 47: Projected child population, as a percentage of the total population in New Zealand, 2020–2073
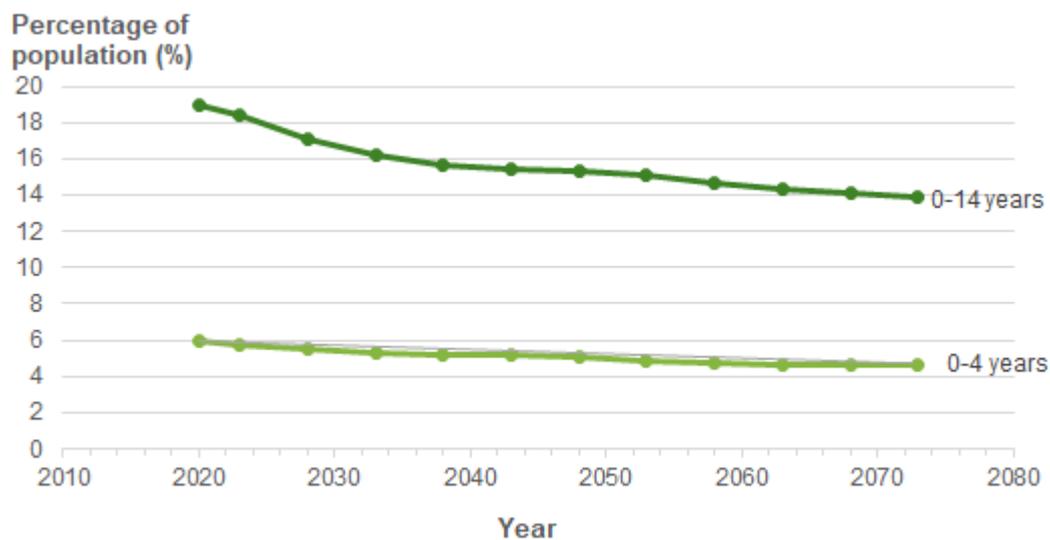
Source: Stats NZ population projections, by age and sex (50th percentile projections, 2020(base)–2073), NZ.Stat

7.3   Young children aged 0–4 years

Young children are particularly vulnerable to the impacts of climate-related hazards. They rely on adult caregivers to protect them during a hazard event, and to move them out of harm's way. Young children will not be able to recognise hazards, and may not be able to move themselves or communicate.

Young children are particularly susceptible to many health impacts from climate-related hazards, as their bodies are still developing and growing. Children are more susceptible to the health impacts of floods, including drowning, infections, diarrhoea, gastrointestinal disease, and subsequent dehydration, as well as the psychosocial impacts of floods. Families with children can also find the clean-up and recovery difficult, if they do not have childcare available.

Indicator definition

This indicator shows the number of young children aged 0–4 years, among the Census usually resident population, from the NZ Census of Population and Dwellings.

Nearly 300,000 young children in New Zealand in 2018

In 2018, there were 294,921 children aged 0–4 years in New Zealand. This was 6.3% of the total population in 2018.

The number of young children was relatively stable from 2013 to 2018 (Figure 48). As a percentage of the total population, young children decreased from 6.9% in 2013, to 6.3% in 2018 (Figure 49).

Figure 48: Number of young children aged 0–4 years, 2006, 2013, 2018
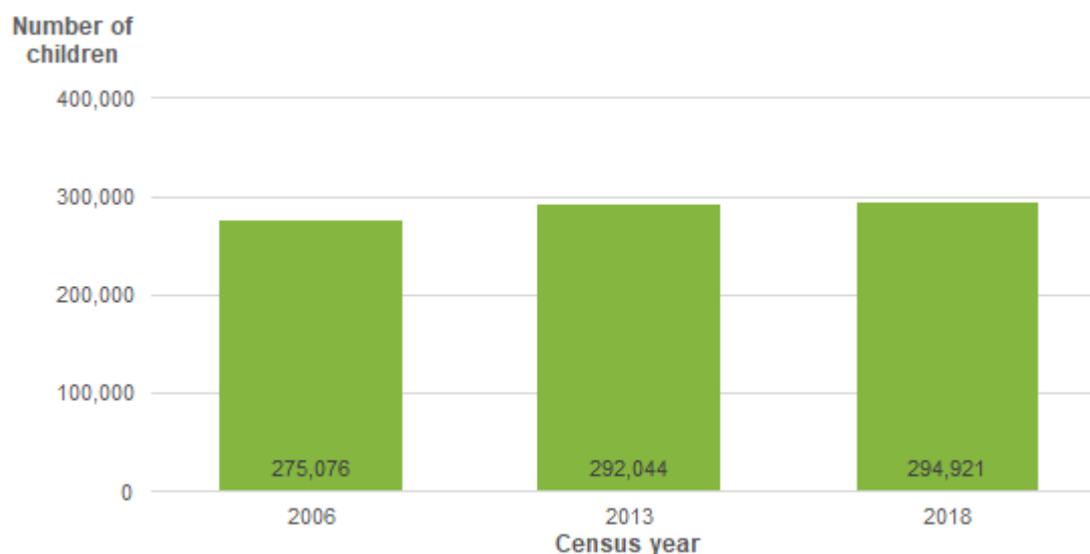
Source: New Zealand Census of Population and Dwellings

Figure 49: Percentage of the population who were aged 0–4 years, 2006, 2013, 2018
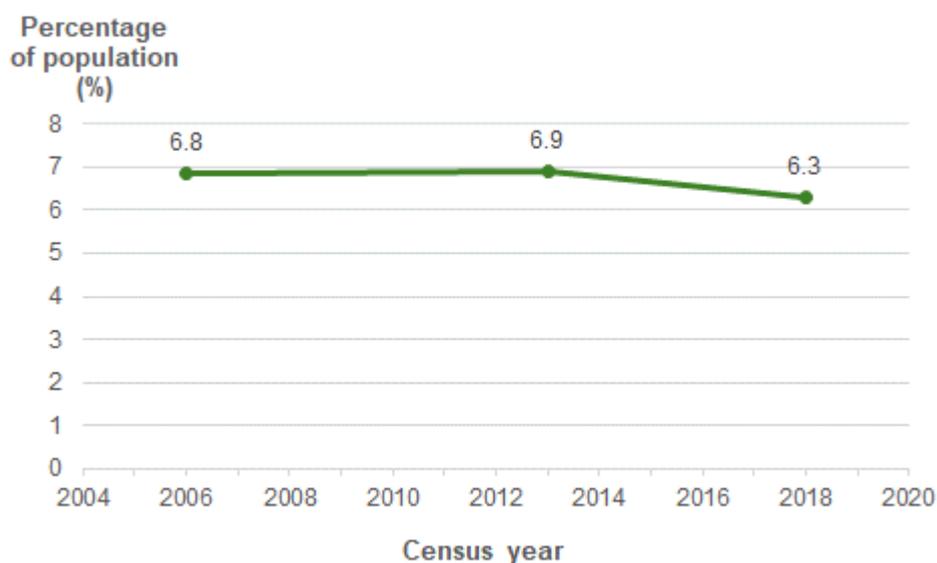
Source: New Zealand Census of Population and Dwellings

Initial results from the 2023 Census show that there were 288,387 young children aged 0–4 years in New Zealand in 2023, about 5.8% of the total population (Stats NZ, 2024a).

One in ten Māori and Pacific peoples are aged under 5 years of age

Māori and Pacific peoples have younger populations than other ethnic groups in New Zealand. In 2018, about one in ten Māori (10.5%) and Pacific peoples (11.1%) were aged 0–4 years (Figure 50).

Figure 50: Percentage of each ethnic group aged 0–4 years, 2018 (%)
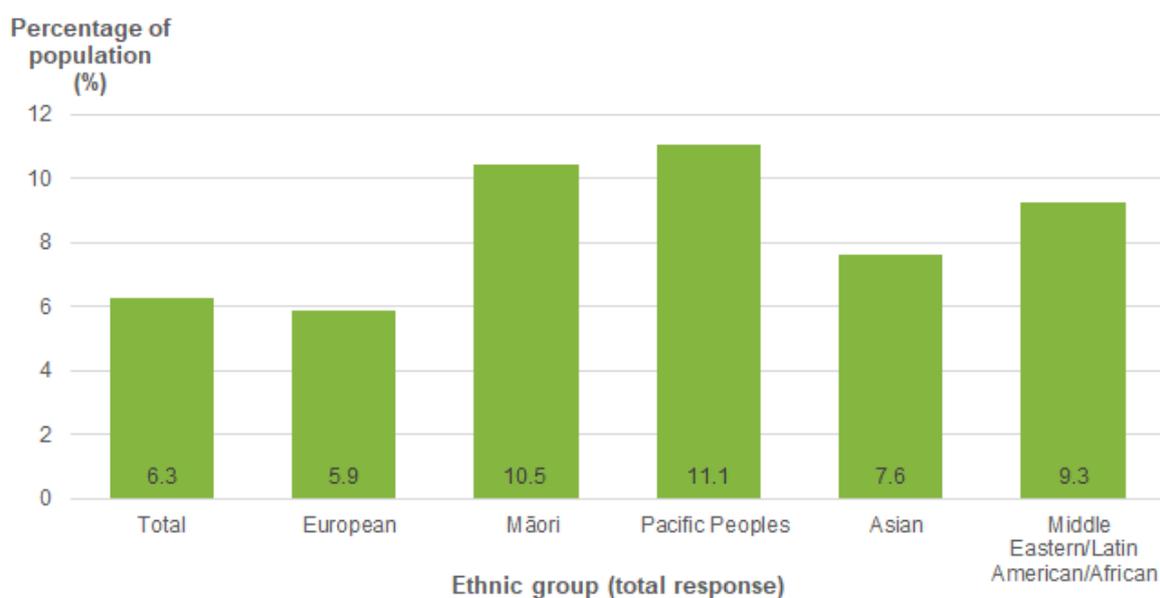
Source: New Zealand Census of Population and Dwellings

Some territorial authorities have a higher percentage of young children

In 2018, some territorial authorities had a higher percentage of their population in the younger age group of 0–4 years. These included:

- Kawerau District (8.0% of the population)
- South Waikato District (7.8%)
- Porirua City (7.8%)
- Ōpōtiki District (7.7%)
- Wairoa District (7.6%)
- Ōtorohanga District (7.6%)
- Gisborne District (7.5%).

Figure 51: Percentage of the population aged 0–4 years, by territorial authority, 2018
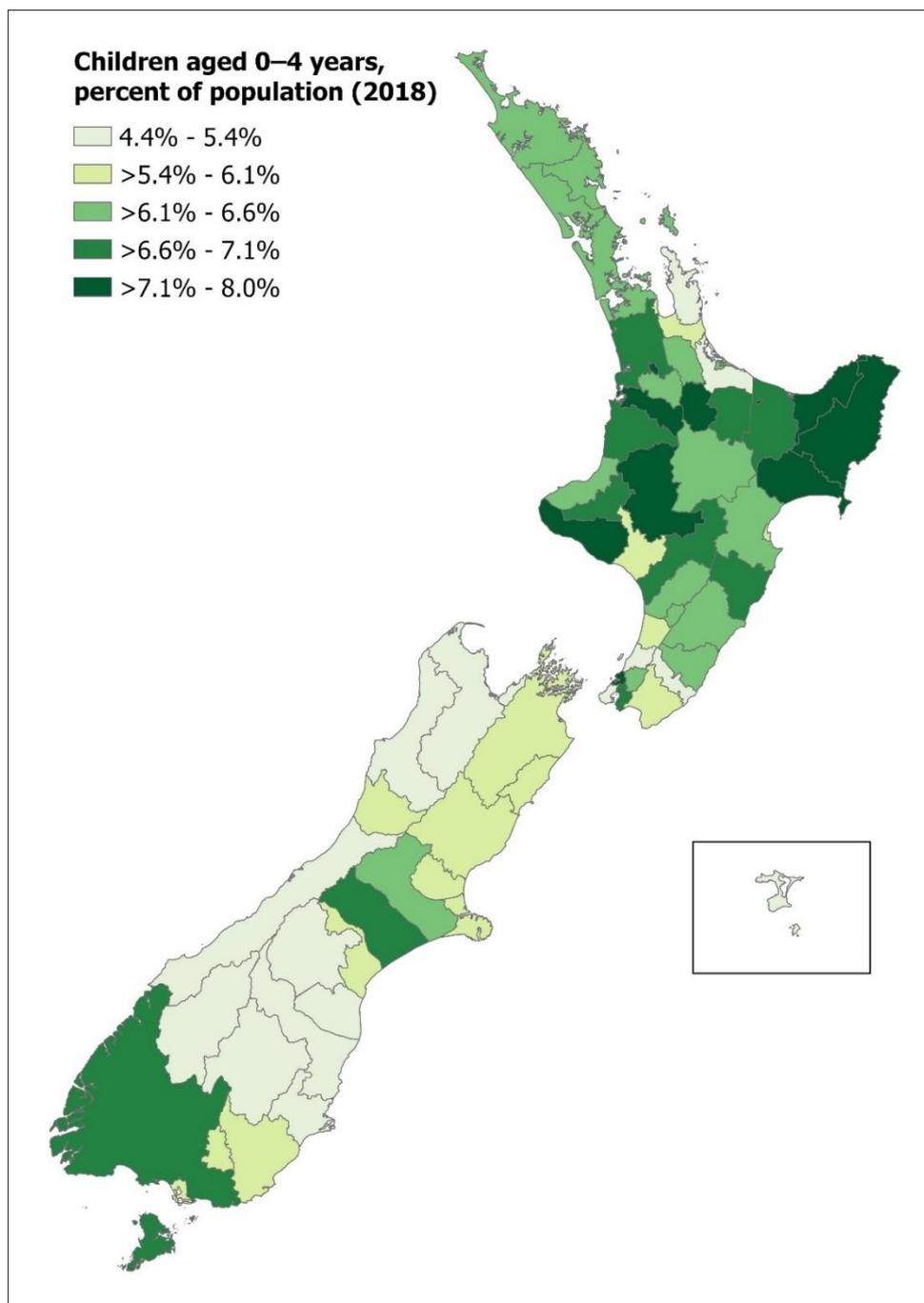
Source: New Zealand Census of Population and Dwellings

7.4   Households with at least one child aged 0–14 years

Households with children may be more vulnerable to negative impacts of climate-related hazards. Evacuation may be more difficult when needing to protect children. Households may find the clean-up and recovery difficult if there is no childcare available. Closure of schools and early childhood education centres (ECEs) after a flood - temporarily and/or permanently - can make recovery more difficult for parents (through a lack of childcare) and children (through changes to their routine), and have an impact on long-term recovery.

However, households with children can also be a source of strength and resilience. Children are often a source of community networks and connectedness, through local school, kindergartens, sports groups and activities. Having strong social connections and networks can be very helpful for coping during and after a natural hazard. Children and young people can share information that they have learned at school with their parents and family.

Indicator definition

This indicator shows households with at least one child aged 0–14 years, among all households (total stated). These data come from the 2013 and 2018 NZ Census of Population and Dwellings.

Almost one in three households have at least one child aged 0–14 years

In 2018, 29.5% of New Zealand households had at least one child aged 0–14 years. This was similar to 2013 (30.2%).

Figure 52: Percentage of households with at least one child aged 0–14 years, 2013 and 2018
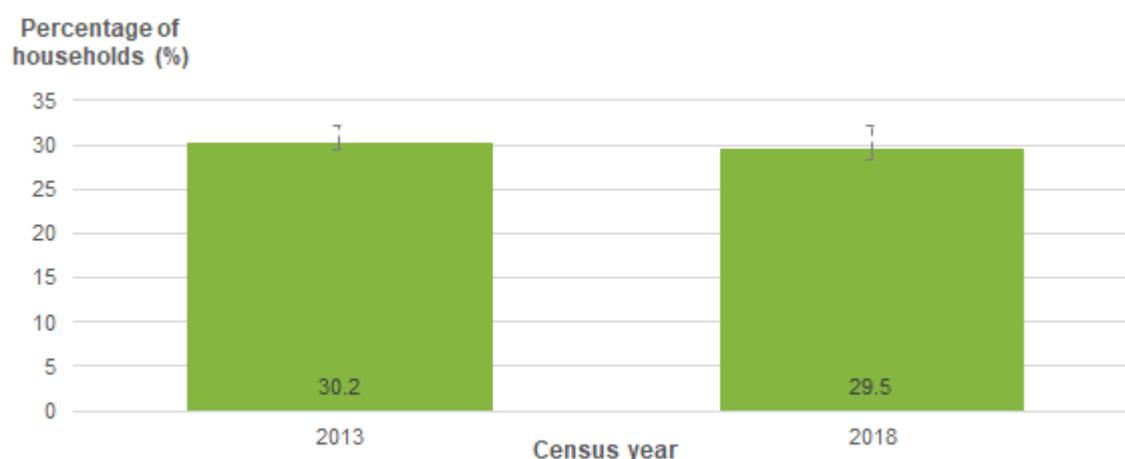
Notes: Percentages are presented among the total stated households. There is some uncertainty in the estimates (particularly 2018), due to missing data in the Census. Logical bounds are presented, to give the lower and upper bounds of what the percentage could be, allowing for the missing data due to lower response rates.
Source: New Zealand Census of Population and Dwellings

In 2018, this represented at least 468,873 households in New Zealand with at least one child aged 0–14 years, out of 1.6 million households. This number should be treated as a lower bound, due to some missing data in the 2018 Census.

Some territorial authorities have a higher percentage of households with children

In 2018, some territorial authorities had a higher percentage of households with at least one child aged 0–14 years. These territorial authorities included:

- Porirua City (37.9% of households)
- Selwyn District (36.2%)
- Waikato District (34.5%)
- Auckland City (33.8%)
- Hamilton City (32.6%)
- Gisborne District (32.0%)
- Ōtorohanga District (31.5%)
- Lower Hutt City (31.4%).

Figure 53: Percentage of households with at least one child aged 0–14 years, by territorial authority, 2018
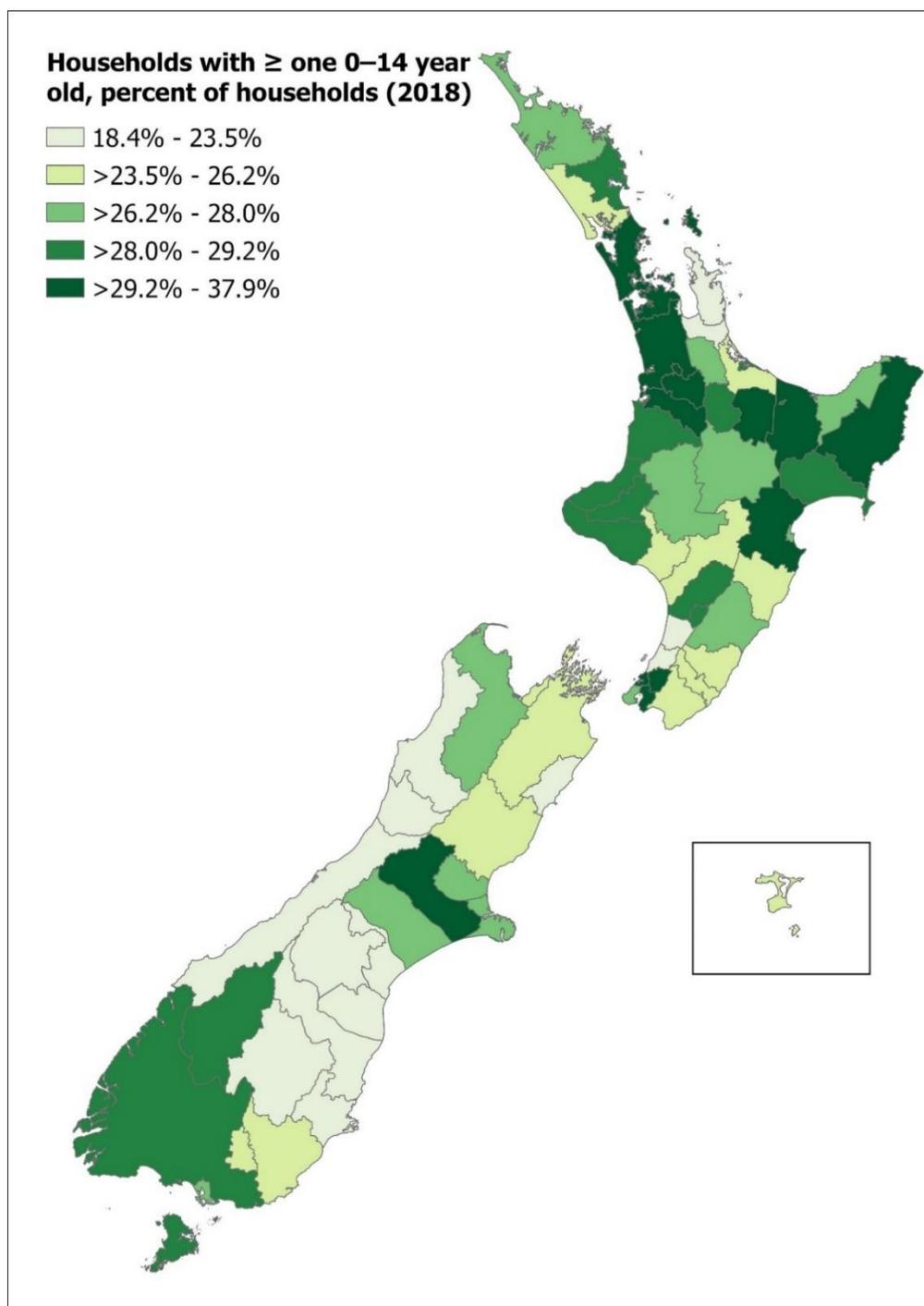
Source: New Zealand Census of Population and Dwellings

7.5 Households with at least one young child aged 0–4 years

Households with young children aged 0–4 years may be particularly vulnerable to climate-related hazards. Young children depend on adults to move them out of harm's way, and they may not be able to move themselves. Young children need to be supervised, so parents may find the clean-up and recovery process particularly difficult if they do not have childcare available.

Closure of early childhood education centres (ECEs) after a hazard event - temporarily and/or permanently - can make recovery more difficult for parents (through a lack of childcare) and children (through changes to their routine), and have an impact on long-term recovery.

However, households with children can also be a source of strength and resilience. Children are often a source of community networks and connectedness, through local school, kindergartens, sports groups and activities.

Indicator definition

This indicator shows households with at least one young child aged 0–4 years, among all households (total stated). These data come from the 2013 and 2018 NZ Census of Population and Dwellings.

One in eight households had at least one young child aged 0–4 years

In 2018, 12.8% of New Zealand households had at least one young child aged 0–4 years. This percentage was slightly lower than in 2013 (14.0%).

Figure 54: Percentage of households with at least one child aged 0–4 years, 2013 and 2018
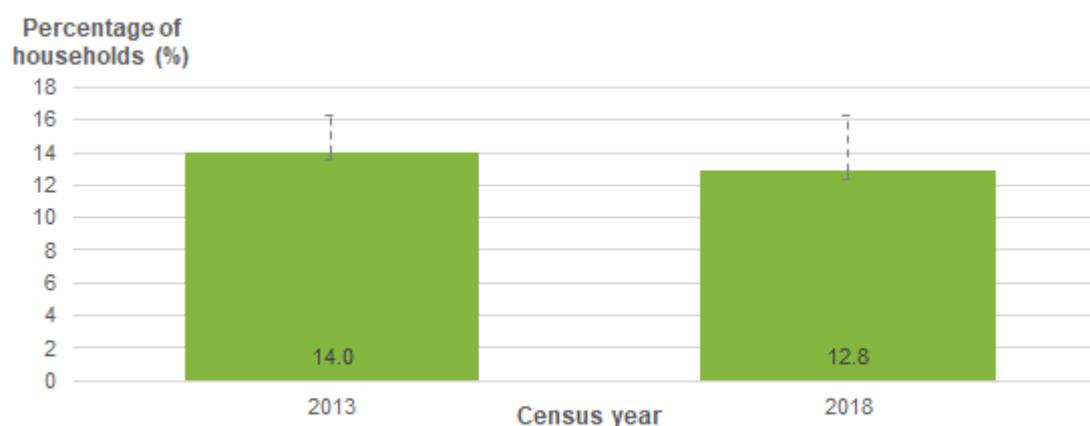
Notes: Percentages are presented among the total stated households. There is some uncertainty in the estimates (particularly 2018), due to missing data in the Census. Logical bounds are presented, to give the lower and upper bounds of what the percentage could be, allowing for the missing data due to lower response rates.
Source: New Zealand Census of Population and Dwellings

In 2018, this represented at least 203,979 households with at least one young child aged 0–4 years. This number should be treated as a lower bound due to some missing data in the Census.

Some territorial authorities have a higher percentage of households with young children

In 2018, some territorial authorities had a higher percentage of households with young children aged 0–4 years. These included:

- Porirua City (17.2% of households)
- Hamilton City (15.2%)
- Auckland City (15.0%)
- Selwyn District (15.0%)
- Ōtorohanga District (15.0%)
- Waikato District (14.5%)
- Lower Hutt City (14.1%).

Figure 55: Percentage of households with at least one young child aged 0–4 years, by territorial authority, 2018
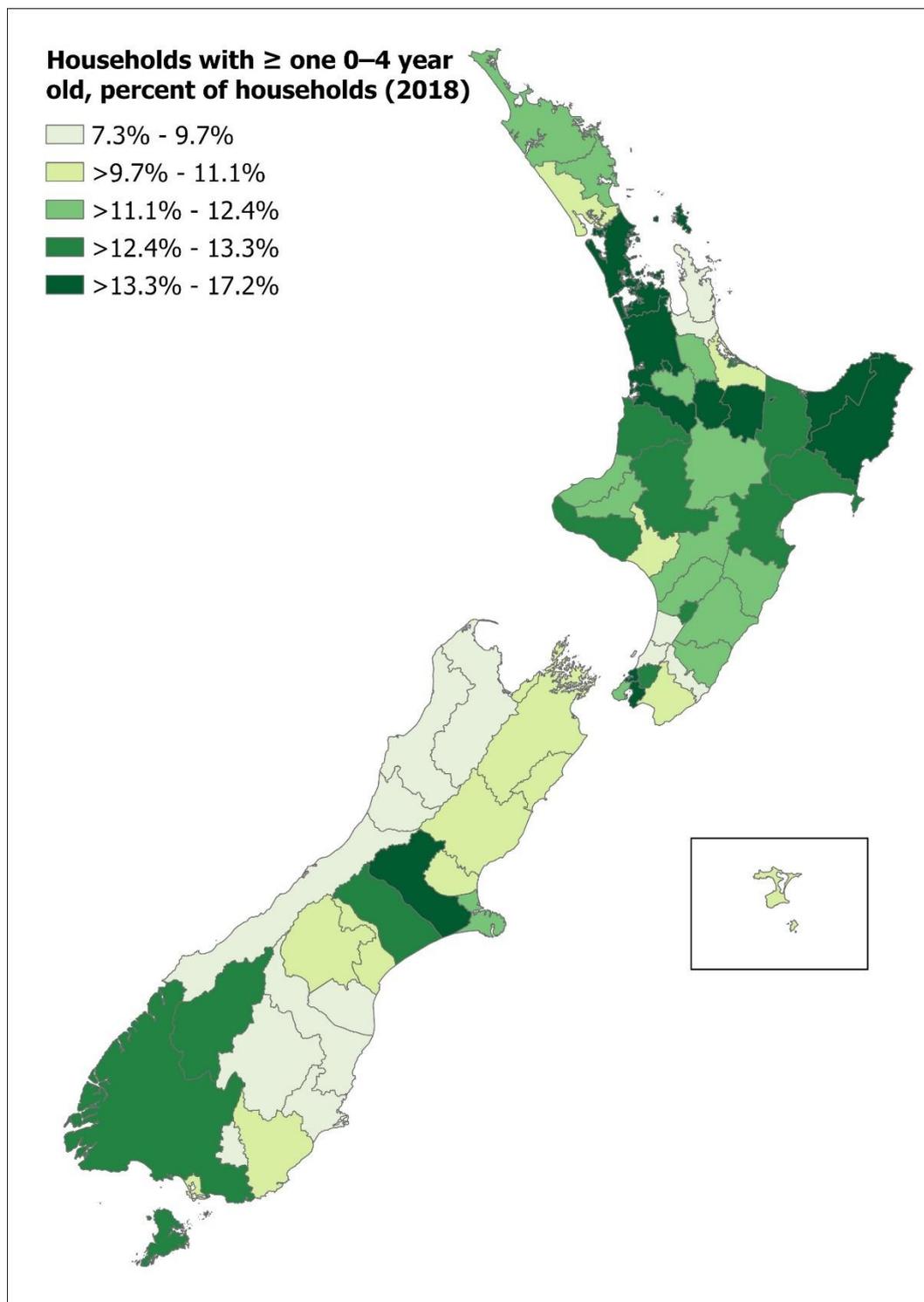
Source: New Zealand Census of Population and Dwellings

8 Older adults

This section presents social vulnerability indicators relating to older adults.

8.1 Overview

Older adults may be more vulnerable to climate-related hazards and health impacts

Older adults can be more vulnerable to climate-related hazards, such as floods, heatwaves and wildfires. Many of the vulnerabilities that older adults experience are due to other types of vulnerabilities that become more common in the older ages. For example, older adults tend to be less mobile, and may have physical disabilities. This can make evacuation and clean-up activities more difficult for them. Older adults are more likely to have pre-existing health conditions, such as coronary heart disease and diabetes (see page 121). This puts them at risk of complications from these diseases after a flood. Older adults are also more likely to have hearing and/or vision loss, which can make it more difficult for them to access information, evacuate, and clean-up their properties after a flood.

Older adults may also have limited social networks and be socially isolated, particularly if they live alone. Older adults may not have access to the internet, and therefore they may prefer to access information through other means.

Older adults can also be resilient to climate-related hazards

Older adults can also have resilience to climate-related hazards. Older adults may have a range of skills and knowledge from work and other activities throughout their lives, which can give some resilience to climate-related hazards. If older adults have lived in an area for a long time, they may be more aware of the local hazards. They may have strong social networks and connections, depending on their activities. Older adults may also be community leaders and/or trusted sources of advice and guidance, such as kaumātua.

For adults with pre-existing medical conditions and/or disabilities, those with good emergency preparedness and emergency plans will be more resilient to climate-related hazards.

Key indicators related to older adults

Key indicators in this section include:

- Older adults aged 65+ years
- Older adults aged 75+ years
- Older adults aged 85+ years
- Households with an older adult (65+ years) living alone

8.2   Older adults aged 65+ years

Older adults are more sensitive to climate-related hazards. They may have pre-existing health conditions (such as heart disease, diabetes) that make them more susceptible to the health impacts of climate-related hazards. They may have mobility issues or hearing/vision loss, which may affect their ability to evacuate or get out of harm's way, and to access information. They may also have limited social networks and be socially isolated, particularly if they live alone. Recovery can often take a long time, because they may depend on others to help with clean-up and to negotiate with insurers and other agencies. Older adults may also have resilience, for example through skills and knowledge gained throughout their lives from work and other activities.

Indicator definition

This indicator shows older adults aged 65+ years, among the census usually resident population, in the NZ Census of Population and Dwellings.

Over 700,000 people aged 65+ years in 2018

In 2018, there were 715,167 people aged 65+ years in New Zealand (Figure 56). This had increased since 2013 (607,035 people).

**Figure 56:** Number of older adults aged 65+ years, 2006, 2013, 2018
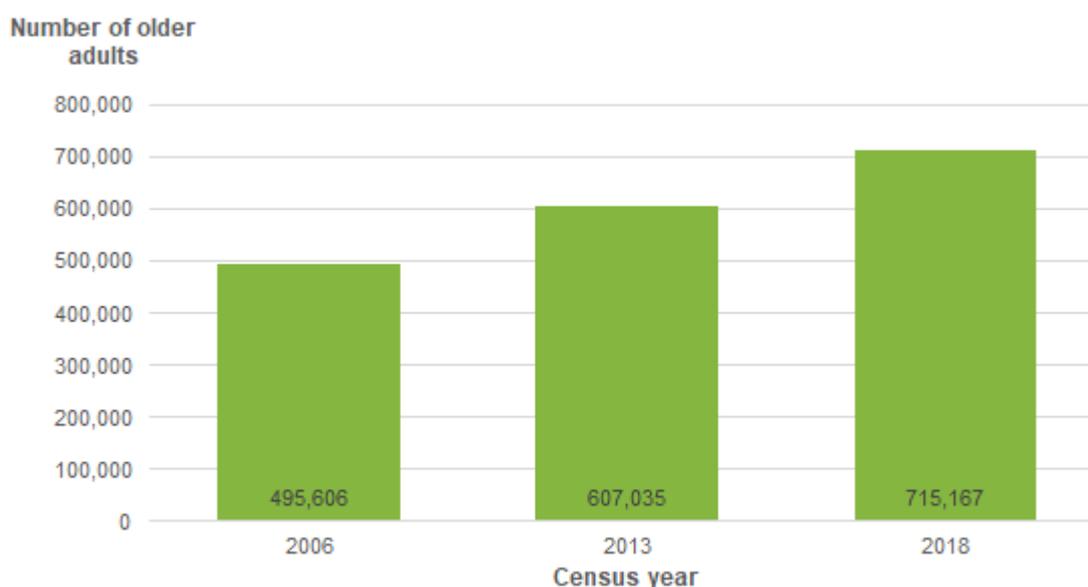
Source: New Zealand Census of Population and Dwellings

In 2018, 53.4% of people aged 65+ years were female (382,242), compared with 46.6% being male (332,925 people).

Almost one in six New Zealanders were aged 65 years or over in 2018

In 2018, 15.2% of the population were aged 65+ years (Figure 57). This percentage had increased from 12.3% in 2006 and 14.3% in 2013.

Figure 57: Percentage of the population aged 65+ years (among total population), 2006, 2013, 2018
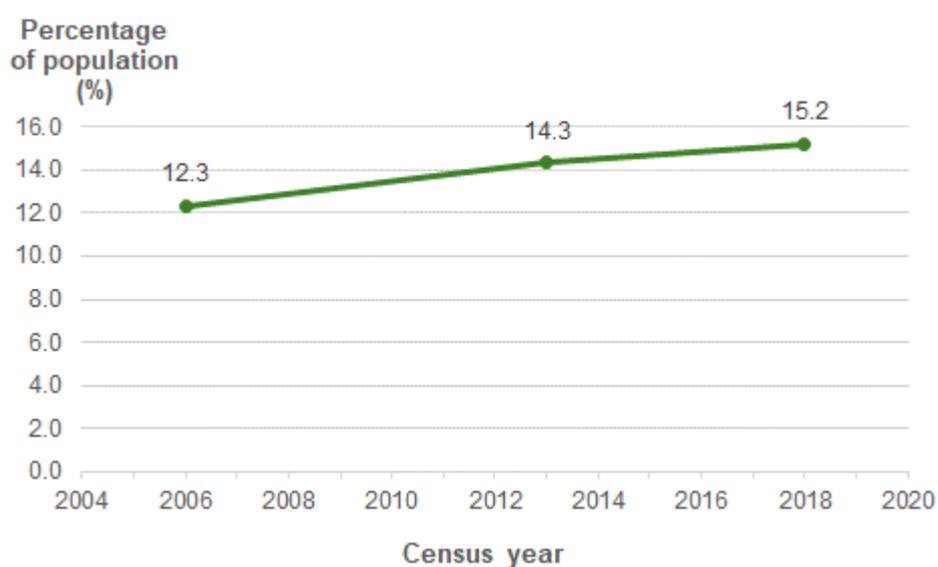
Source: New Zealand Census of Population and Dwellings

The older population has grown since the 2018 Census. Initial results from the 2023 Census show that there were 828,585 people aged 65+ years in New Zealand in 2023, about 16.6% of the total population (Stats NZ, 2024a).

Some territorial authorities have a higher percentage of older adults

In 2018, some territorial authorities had a higher percentage of the population aged 65+ years. These included:

- Thames-Coromandel District (31.0% of the population)
- Kāpiti Coast District (26.2%)
- Horowhenua District (24.7%)
- Hauraki District (23.6%)
- Buller District (23.2%)
- Central Otago District (22.8%)
- Waitaki District (22.7%)
- Waimate District (22.6%).

Figure 58: Percentage of the population aged 65+ years, by territorial authority, 2018

Adults aged 65+ years old, percent of population (2018)
- 10.5% - 15.0%
- >15.0% - 17.5%
- >17.5% - 19.3%
- >19.3% - 21.9%
- >21.9% - 31.0%
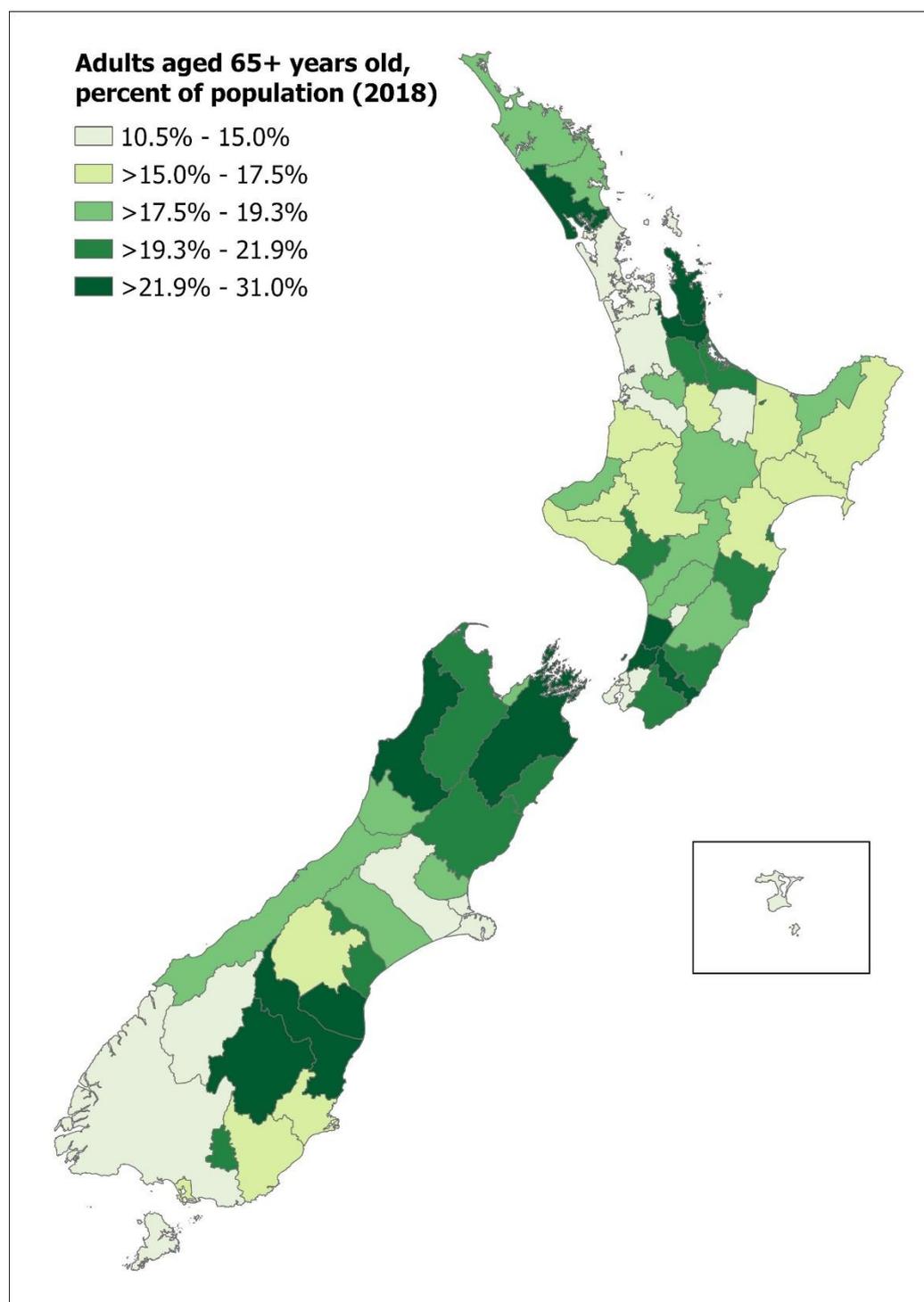
Source: New Zealand Census of Population and Dwellings

The size of the older population is projected to increase substantially in coming decades

Population projections show that the New Zealand population is ageing, and the number of older adults aged 65+ years in New Zealand is likely to increase to nearly 2 million adults by 2073. Projections also show that percentage of older adults aged 65+ years is expected to increase from 15.6% in 2020, to 28.2% of the population by 2073.

This will make it even more important that people reach older age in good health.

Figure 59: Projected number of older adults in New Zealand, 2020–2073
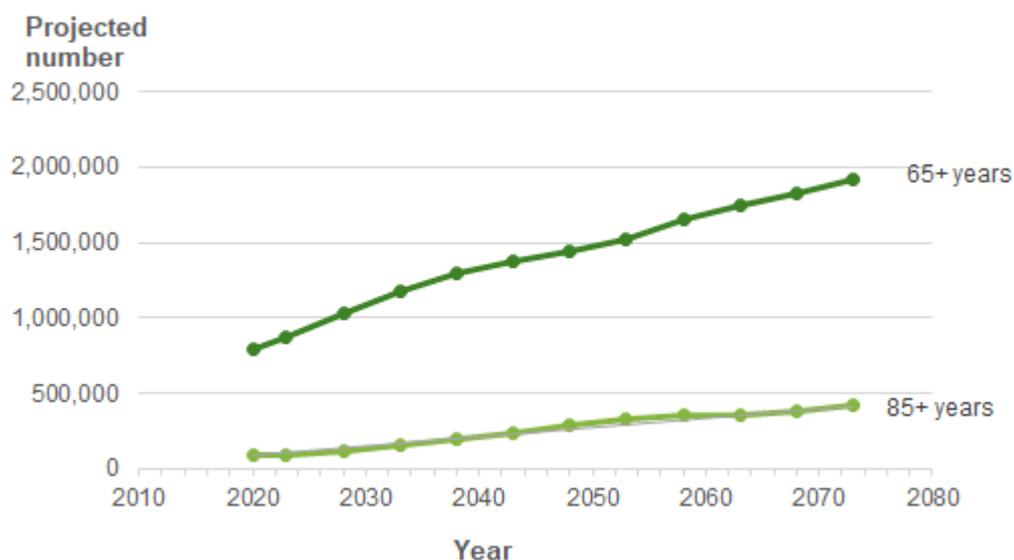
Source: Stats NZ population projections, by age and sex (50th percentile projections, 2020(base)–2073), NZ.Stat

Figure 60: Projected older adult population, as a percentage of the total population in New Zealand, 2020–2073
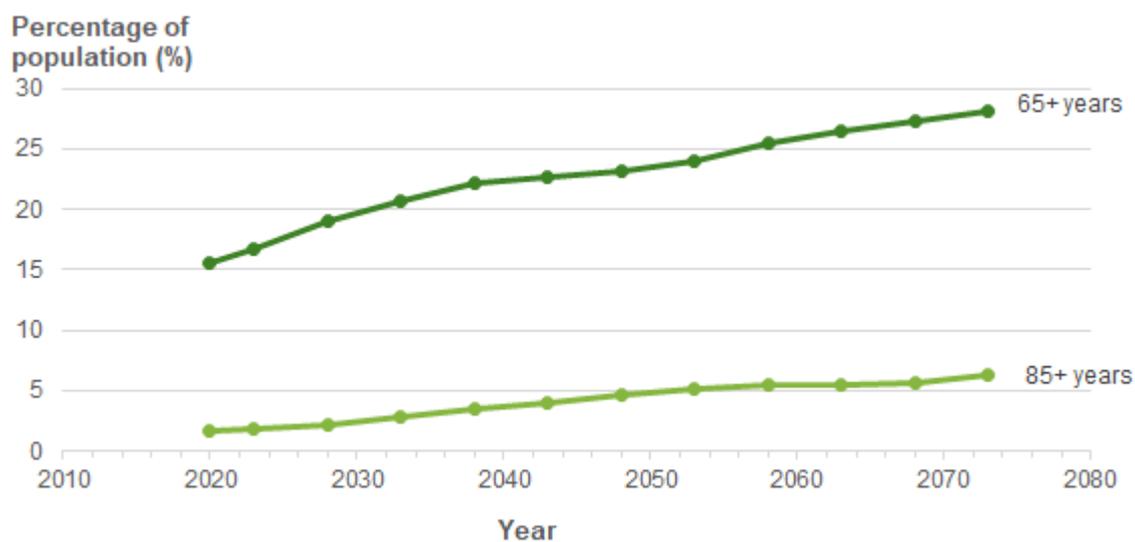
Source: Stats NZ population projections, by age and sex (50th percentile projections, 2020(base)–2073), NZ.Stat

8.3   Older adults aged 75+ years

Older adults aged 75+ years are more vulnerable to climate-related hazards. They may have mobility issues or hearing/vision loss, which may affect their ability to evacuate or get out of harm's way, and to access information. Chronic health conditions and disabilities are more common in older age, particularly among those aged 75+ years (see page 122).

They may also have limited social networks and be socially isolated, particularly if they live alone. Recovery can often take a long time, because they may depend on others to help with clean-up and to negotiate with insurers and other agencies. Older adults may also have resilience, for example through skills and knowledge gained throughout their lives from work and other activities.

Indicator definition

This indicator shows older adults aged 75+ years, among the census usually resident population, from the NZ Census of Population and Dwellings.

About 300,000 people aged 75+ years in 2018

In 2018, there were 302,505 people aged 75+ years in New Zealand (Figure 61). This number had increased since 2013 (260,901 people).

Figure 61: Number of older adults aged 75+ years, 2006, 2013, 2018
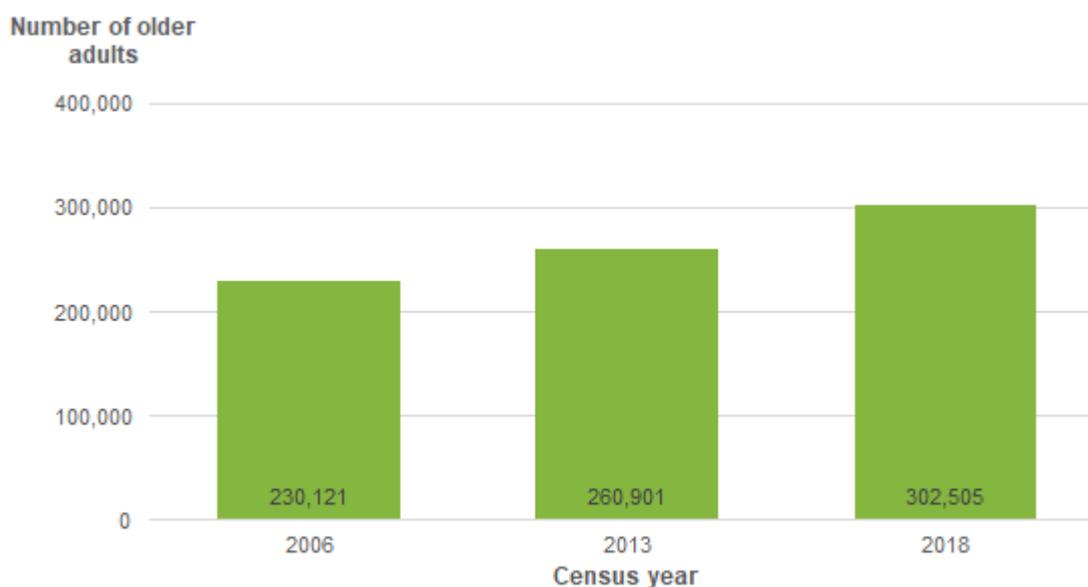
Source: New Zealand Census of Population and Dwellings

In 2018, 56.4% of people aged 75+ years were female (170,601), compared with 43.6% being male (131,901 people).

Over 6% of New Zealanders were aged 75 years or over in 2018

In 2018, 6.4% of the population were aged 75+ years (Figure 62). This percentage had increased from 6.2% in 2013.

Figure 62: Percentage of the population aged 75+ years, 2006, 2013, 2018
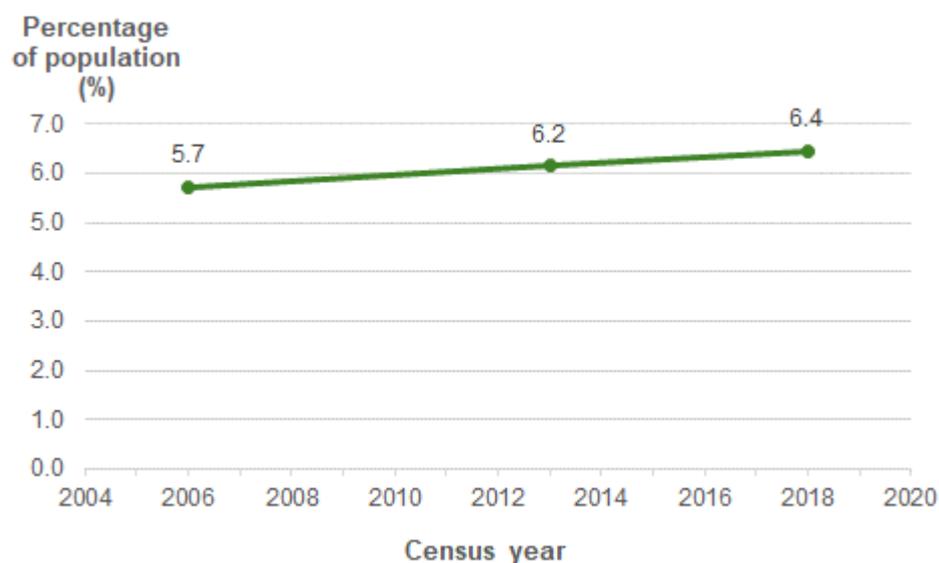
Source: New Zealand Census of Population and Dwellings

The population aged 75+ years has grown since the 2018 Census. Initial results from the 2023 Census show that there were 362,655 people aged 75+ years in New Zealand in 2023, about 7.3% of the total population (Stats NZ, 2024a).

Some territorial authorities have a higher percentage of older adults

In 2018, some territorial authorities had a higher percentage of the population aged 75+ years. These included:

- Kāpiti Coast District (12.8% of the population)
- Thames-Coromandel District (11.7%)
- Horowhenua District (10.8%)
- Waitaki District (10.1%)
- Gore District (10.0%)
- Timaru District (9.9%)
- Waimate District (9.7%)
- Hauraki District (9.6%).

Figure 63: Percentage of the population aged 75+ years, by territorial authority, 2018

Adults aged 75+ years old, percent of population (2018)

- 3.6% - 5.9%
- >5.9% - 7.1%
- >7.1% - 8.0%
- >8.0% - 9.1%
- >9.1% - 12.8%
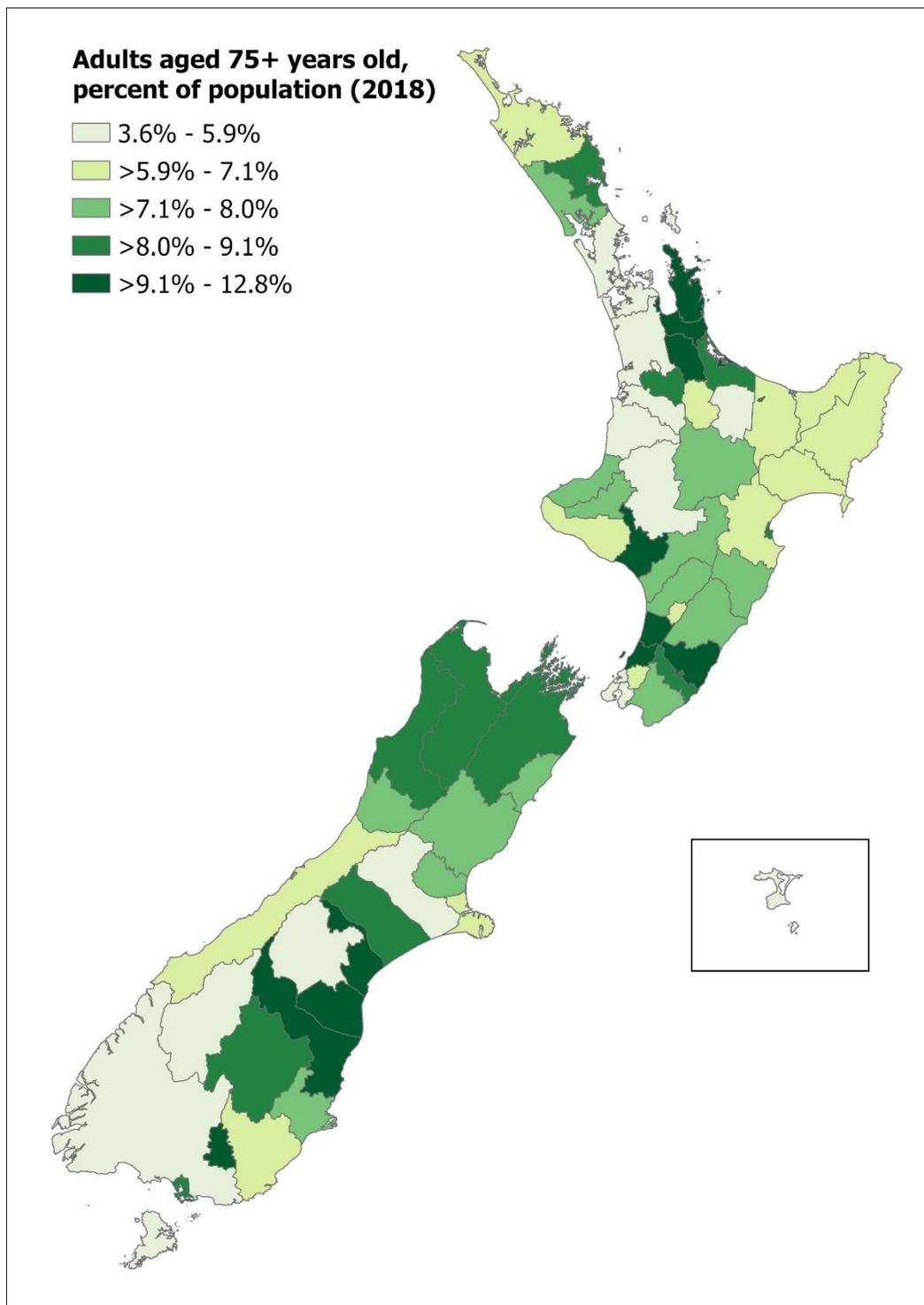
Source: New Zealand Census of Population and Dwellings

8.4   Older adults aged 85+ years

Older adults aged 85+ years are particularly vulnerable to climate-related hazards. They are very likely to have pre-existing health conditions that make them more susceptible to the health impacts of climate-related hazards (such as heatwaves). Most adults in this age group will have a health vulnerability. This age group are also very likely to have mobility issues or hearing/vision loss, which may affect their ability to evacuate or get out of harm's way. In New Zealand, about 27% of the population aged 85+ years lived in care facilities in 2017/18 (Eldernet, 2023).

Indicator definition

This indicator shows older adults aged 85+ years, among the census usually resident population, in the NZ Census of Population and Dwellings.

About 84,000 people aged 85+ years in 2018

In 2018, there were 84,351 people aged 85+ years in New Zealand (Figure 61). This number had increased since 2013 (up from 73,317 people).

Figure 64: Number of older adults aged 85+ years, 2006, 2013, 2018
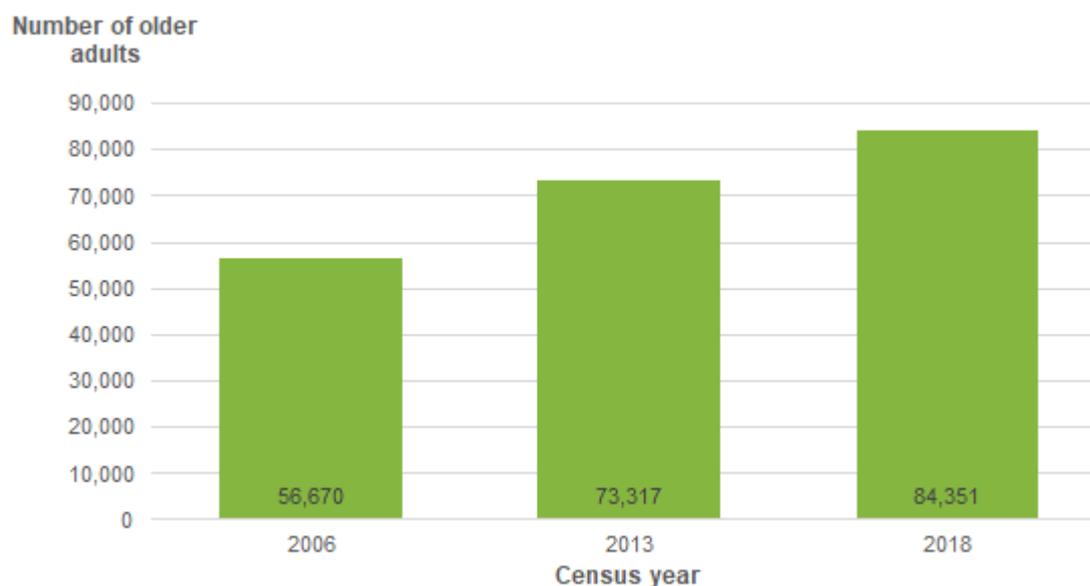
Source: New Zealand Census of Population and Dwellings

Almost two thirds of people aged 85+ years are female

In 2018, 62.4% of people aged 85+ years were female (52,596 people), compared with 37.6% being male (31,752 people).

Almost 2% of New Zealanders were aged 85 years or over in 2018

In 2018, 1.8% of the population were aged 85+ years (Figure 65). This percentage had increased from 1.4% in 2006 and 1.7% in 2013.

Figure 65: Percentage of the population aged 85+ years, 2006, 2013, 2018
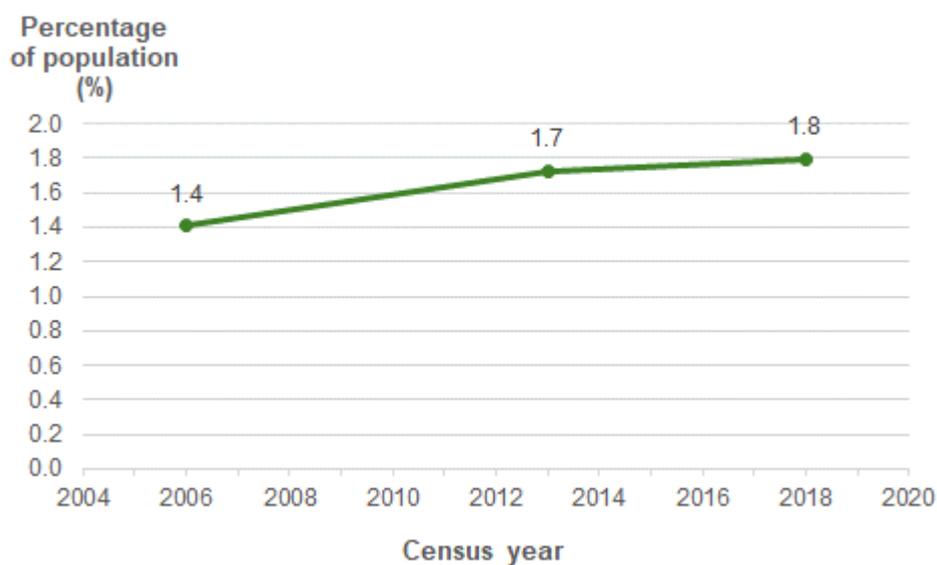
Source: New Zealand Census of Population and Dwellings

Initial results from the 2023 Census show that there were 91,032 people aged 85+ years in New Zealand in 2023, about 1.8% of the total population (Stats NZ, 2024a).

Some territorial authorities have a higher percentage of older adults

In 2018, some territorial authorities had a higher percentage of the population aged 85+ years. These included:

- Kāpiti Coast District (3.8% of the population)
- Gore District (3.1%)
- Thames-Coromandel District (3.0%)
- Waitaki District (2.9%)
- Timaru District (2.8%)
- Horowhenua District (2.8%)
- Tauranga City (2.7%)
- Whanganui District (2.7%)
- Masterton District (2.7%).

Figure 66: Percentage of the population aged 85+ years, by territorial authority, 2018
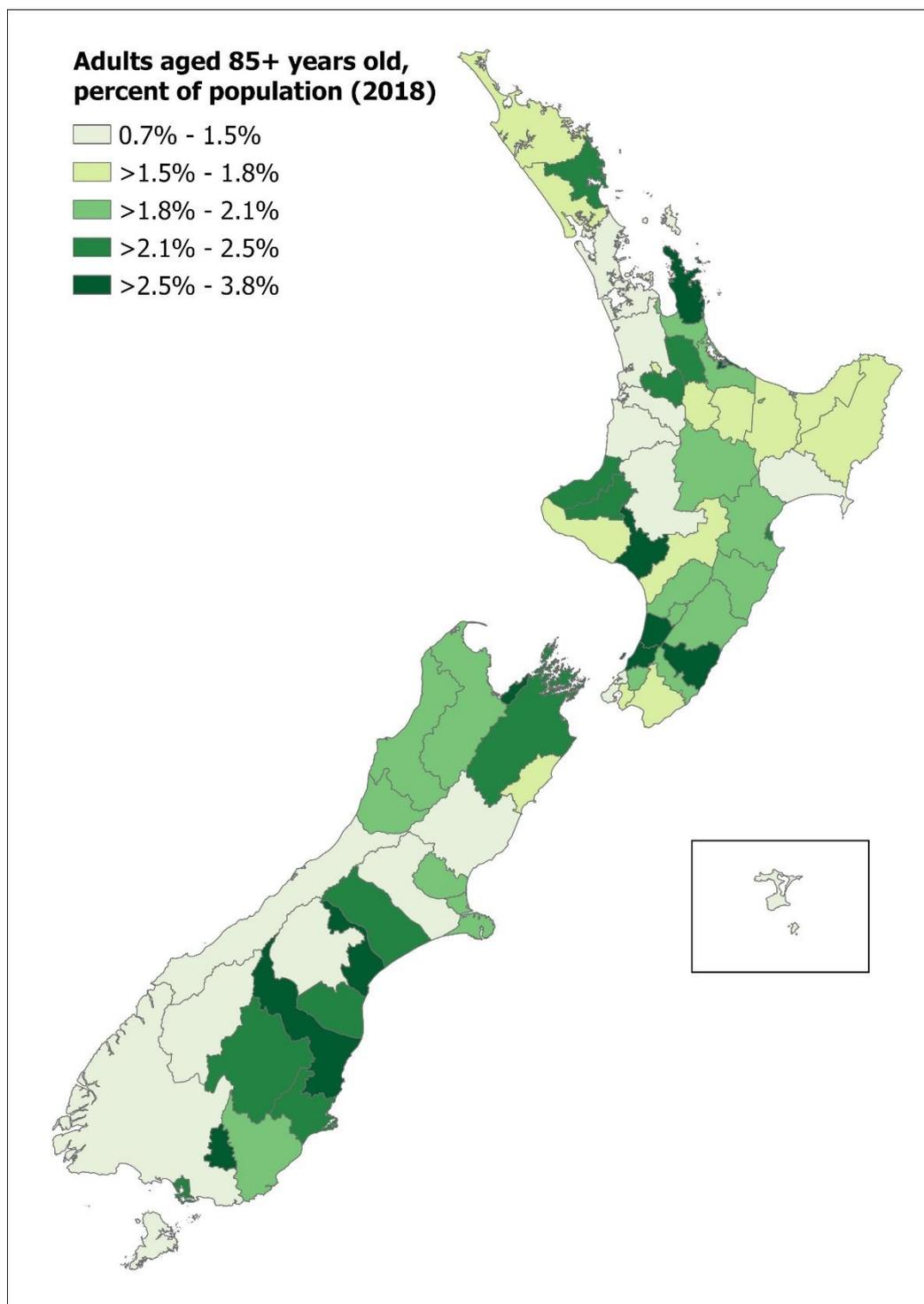
Source: New Zealand Census of Population and Dwellings

The population aged 85+ years is expected to increase in coming decades

Population projections show that the percentage of older adults aged 85+ years is expected to increase from 1.7% of the New Zealand population in 2020, to 4.7% by 2048, and 6.3% by 2073.

Figure 67: Projected number of older adults in New Zealand, 2020–2073
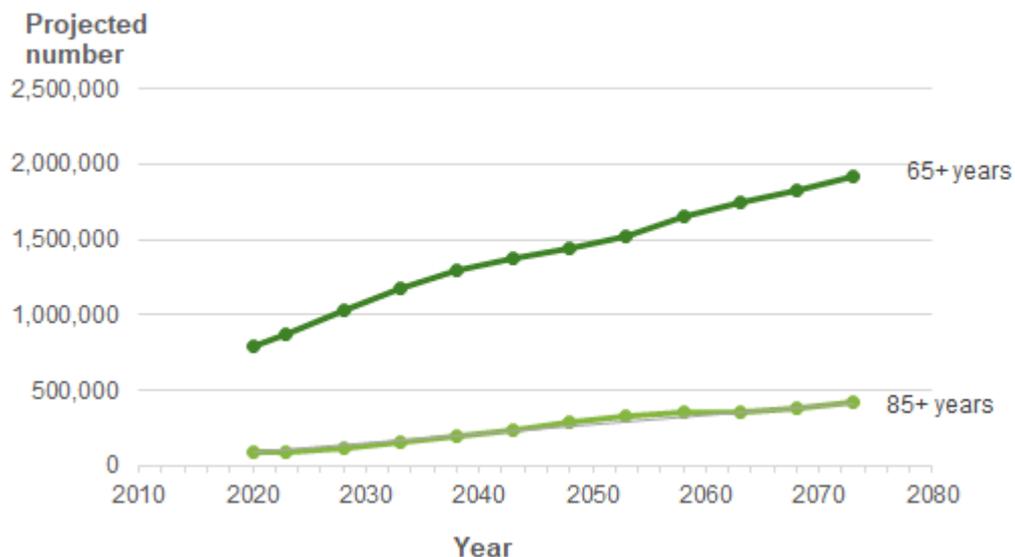
Figure 68: Projected older adult population, as a percentage of the total population in New Zealand, 2020–2073
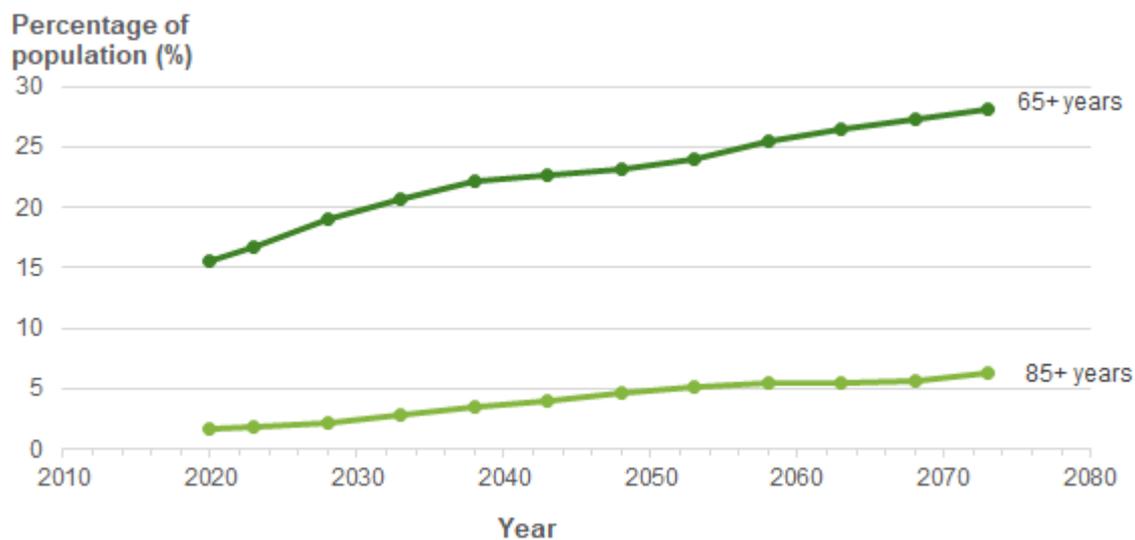
8.5 Households with an older adult (65+ years) living alone

Older adults living alone may be particularly vulnerable to climate-related hazards. Older adults are often more susceptible to hazards, and living alone can compound this vulnerability as there is no one else in the household to help them during an emergency. This makes social connections and networks more important for these people. Older adults living alone may experience social isolation, if they do not have other strong social networks. Additionally, if older adults are in ill health or frail, they may also need to rely on others to help them during a hazard event (such as a flood), for example to evacuate and/or to help clean-up afterwards. However, older adults living alone in independent self-care units in retirement complexes may have some people nearby for social contact and support.

Indicator definition

This indicator shows households with an older adult (65+ years) living alone, among all households in occupied private dwellings (total stated). These data come from the NZ Census of Population and Dwellings.

About one in ten households have an older adult living alone

In 2018, there were 170,322 households reported to have an older adult (aged 65+ years) living alone (Figure 69). This number had increased from 2006 and 2013.

Figure 69: Number of households with an older adult (65+ years) living alone, 2006, 2013, 2018


Notes: Numbers should be treated as lower bounds, as there was some missing data due to lower response rates in the Census.
Source: New Zealand Census of Population and Dwellings

Older adults living alone represented 10.7% of all households in 2018. This had increased from 9.6% in 2006 (Figure 70).

Figure 70: Percentage of households with an older adult (65+ years) living alone, 2006, 2013, 2018
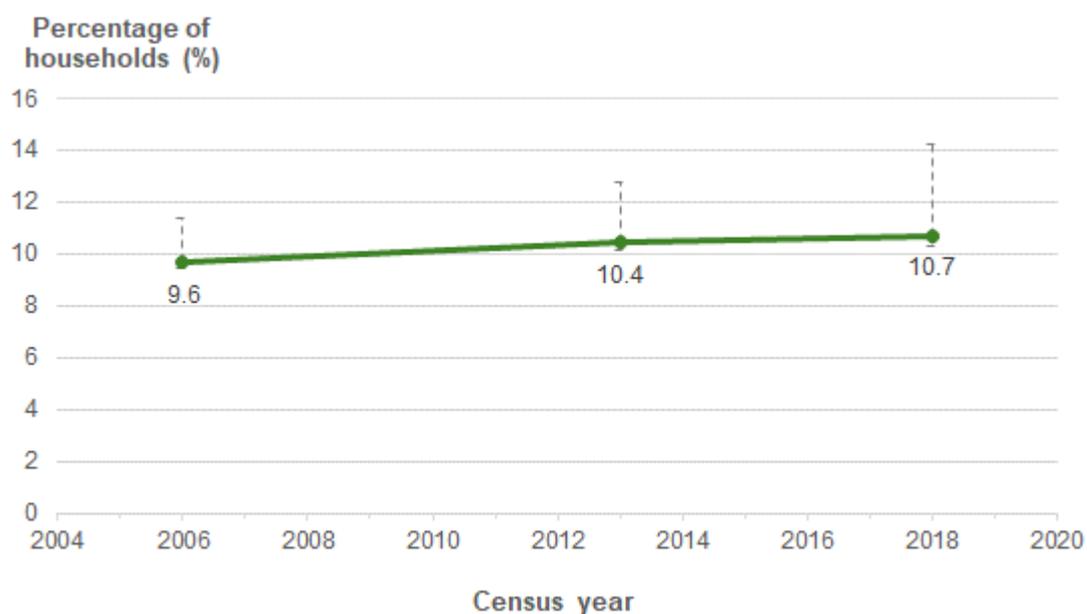
Notes: Percentages are presented among the total stated households. There is some uncertainty in the estimates (particularly 2018), due to missing data in the Census. Logical bounds are presented, to give the lower and upper bounds of what the percentage could be, allowing for the missing data due to lower response rates.
Source: New Zealand Census of Population and Dwellings

In 2018, these 170,322 adults aged 65+ years who lived alone represented about 23.8% of the total population aged 65+ years. This percentage had decreased from 27.8% of people aged 65+ years in 2006, and 25.9% in 2013.

Results by territorial authority

Some territorial authorities had a higher percentage of households with an older adults aged 65+ years living alone in 2018. These included:

- Kāpiti Coast District (18.1% of households)
- Thames-Coromandel District (17.6%)
- Horowhenua District (17.2%)
- Whanganui District (16.6%)
- Buller District (15.9%)
- Gore District (15.8%)
- Hauraki District (15.7%)
- Masterton District (15.5%).

Figure 71: Percentage of households with an older adult (65+ years) living alone, by territorial authority, 2018
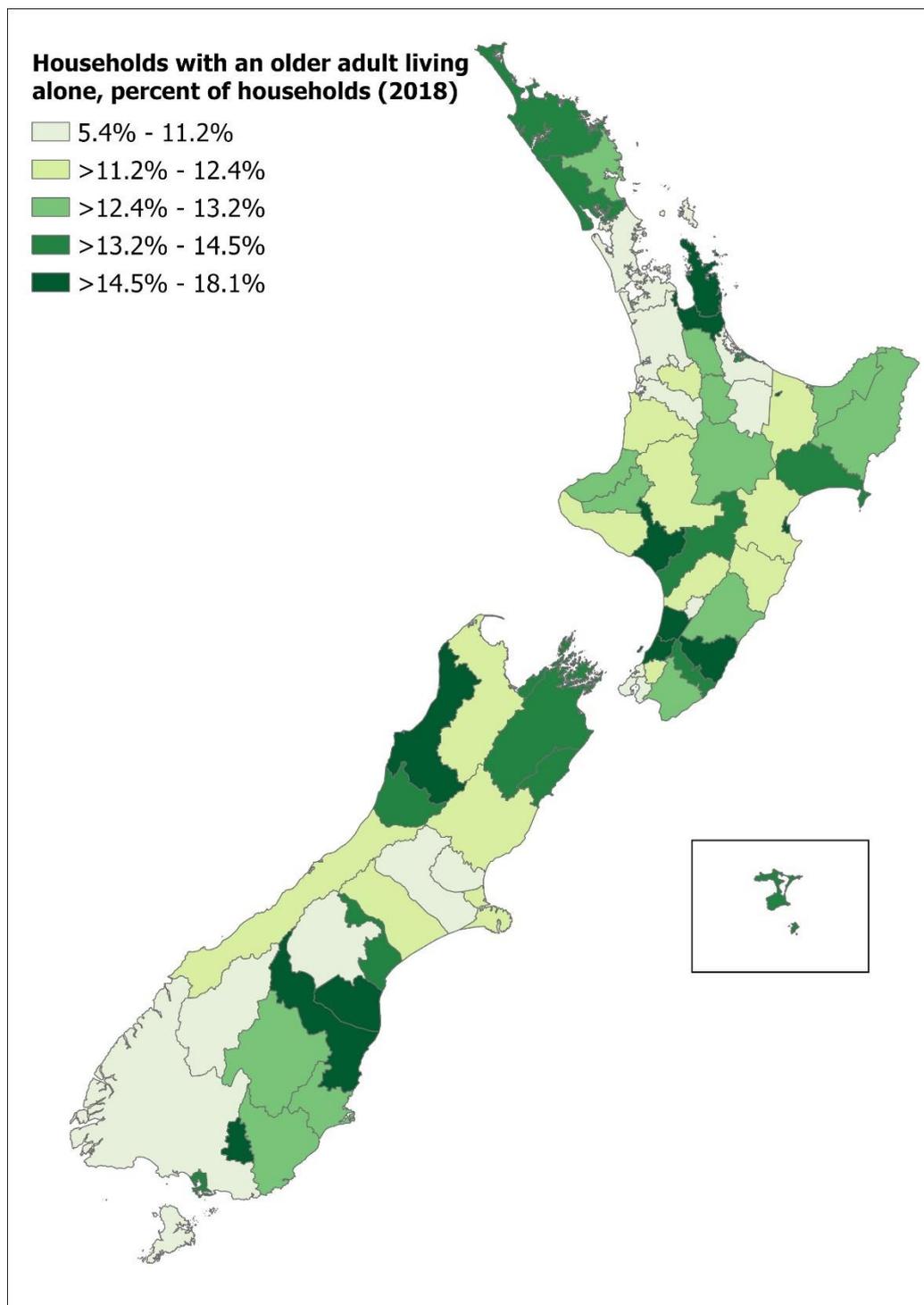
Source: New Zealand Census of Population and Dwellings

9 Health and disability status

This section presents information relating to health and disability status. Health and disability status is an important sensitivity or susceptibility to climate-related hazards. People with pre-existing health conditions and/or disabilities are more likely to be affected if they are exposed to a hazard.

While we currently do not have any social vulnerability indicators related to health and disability status, some brief information is provided here as an overview, as this is an important part of vulnerability.

9.1 People with pre-existing health conditions

People with pre-existing health conditions are more susceptible to health impacts

People with chronic health conditions are more susceptible to climate-related hazards. People with **ischaemic heart disease** are at higher risk of a heart attack after a flood, due to stress and excess activity from evacuation and clean-up activities. They may also be more susceptible to health impacts during heatwaves, and due to poor air quality (including during wildfires). People with **diabetes** may need to access insulin in order to live, so isolation during an extreme weather event and/or power outages to keep fridges working, can cause adverse health impacts. People with diabetes may suffer complications such as diabetic foot as a result of injuries in floodwaters (WHO, 2013); they are also more susceptible to health impacts during a heatwave (Moon, 2021). People with **respiratory conditions (such as asthma)** are more susceptible to the impacts of heatwaves, floods, and wildfires, as well as poor air quality. People with **chronic pain or arthritis** may have issues with mobility. Other health conditions can also increase a person's susceptibility to hazards such as flooding, including renal failure, cystic fibrosis, cancer, and being immune-compromised (WHO, 2013).

People who require essential medications and/or health services are also more vulnerable. Disruptions to people's access to these may occur during floods or storm if people cannot get home to their medications, if there are power outages, and/or if access to healthcare services is cut off. Many medications (such as blood pressure medication) are required daily, and any disruptions can lead to a worsening in health status.

It should be noted that much of the health loss from the above chronic conditions is due to risk factors that can be modified, including smoking, high body mass index, high systolic blood pressure, dietary risks, alcohol use, and low physical activity (Ministry of Health, 2020). Public health action on these risk factors, resulting in a longer-term reduction in chronic disease prevalence in New Zealand, would help build a healthier population who are more resilient to climate-related hazards.

We currently do not have any specific social vulnerability indicators for health status. However, the New Zealand Health Survey can provide an initial overview of the prevalence of main health conditions in New Zealand adults.

Table 11 shows that large numbers of the New Zealand adult population are affected by chronic health conditions. In 2022/23, about 12.3% of adults had medicated asthma, 6.0% had been diagnosed with diabetes, and 4.3% had been diagnosed with ischaemic heart disease.

Table 11: Prevalence of selected health conditions, among adults aged 15+ years, 2012/13, 2017/18, 2022/23

	Prevalence (%) among adults aged 15+ years (unadjusted), by year			Estimated number of adults	Significant change between years?	
	2012/13	**2017/18**	**2022/23**	**2022/23**	**2012/13 to 2022/23**	**2017/18 to 2022/23**
Chronic health conditions						
Ischaemic heart disease	4.8%	4.6%	4.3%	181,000	↓	
Asthma (medicated)	10.9%	12.1%	12.3%	515,000	↑	
Diabetes	5.8%	5.9%	6.0%	251,000		
Chronic pain	17.7%	19.7%	21.3%	894,000	↑	
Arthritis	15.2%	17.1%	17.8%	746,000	↑	
People taking medication						
High blood pressure (diagnosed and currently taking medication)	15.9%	16.4%	16.7%	702,000		

Note: Unadjusted prevalence estimates are presented. Prevalences are estimates; 95% confidence intervals are available. Statistical tests for changes for chronic health conditions were carried out by the Ministry of Health, and adjust for age differences; arrows shows statistically significant changes (p-value lower than 0.05).
Source: New Zealand Health Survey, 2022/23 NZHS Annual Data Explorer (accessed 26 Feb 2024)

In addition to these statistics about adults, 12.4% of children aged 2–14 years also had medicated asthma (about 104,000 children).

Older adults have a higher prevalence of many health conditions

Older people have a higher prevalence of many of the conditions presented in Table 11. Table 12 presents the prevalence of these conditions among people aged 75+ years.

In 2022/23, almost one in five adults aged 75+ years (18.2%) had been diagnosed with ischaemic heart disease. About half of adults aged 75+ years (52.8%) take medication for high blood pressure (which is important to take regularly). Half of all adults aged 75+ years have been diagnosed with arthritis, which may impair their mobility and/or cause chronic pain.

Table 12: Prevalence of selected health conditions, among older adults aged 75+ years, 2012/13, 2017/18, 2022/23

	Prevalence (%) among older adults aged 75+ years (unadjusted), by year			Significant change between years?	
	2012/13	**2017/18**	**2022/23**	**2012/13 to 2022/23**	**2017/18 to 2022/23**
Chronic health conditions (75+ years)					
Ischaemic heart disease	22.1%	22.1%	18.2%	↓	
Asthma (medicated)	11.0%	12.5%	11.2%		
Diabetes	15.2%	16.3%	16.5%		
Chronic pain	34.2%	33.3%	35.5%		
Arthritis	51.2%	51.3%	50.0%		
People taking medication (75+ years)					
High blood pressure (diagnosed and currently taking medication)	53.6%	54.7%	52.8%		

Note: Unadjusted prevalence estimates are presented. Prevalences are estimates; 95% confidence intervals are available. Statistical tests for changes for chronic health conditions were carried out by the Ministry of Health, and adjust for age differences; arrows shows statistically significant changes (p-value lower than 0.05).
Source: New Zealand Health Survey, 2022/23 NZHS Annual Data Explorer (accessed 13 March 2024)

9.2 People with mental health conditions

People with pre-existing mental health issues are more susceptible

People with pre-existing mental health issues are more susceptible to the impacts of a hazard event (such as floods and heatwaves) (USGCRP, 2016). They may have more difficulties in coping with the stress of flooding or hazard events. People with certain mental health conditions and/or taking certain medications can also be more susceptible to the health impacts of heatwaves. Substance misuse can increase after a hazard event as well, due to stress.

The prevalence of psychological distress had almost doubled from 2012/13 (6.2% of adults) to 2022/23 (11.9%), which was a statistically significant increase (Table 13).

Furthermore, in 2021–23, in the two weeks before participating in the survey, about one in three adults (34.8%) experienced mild or greater anxiety and/or depression symptoms. This included 26.6% of adults experiencing mild or greater symptoms of anxiety, and 29.0% of adults experiencing mild or greater symptoms of depression. These were all statistically significant increases since 2016/17.

Table 13: Prevalence of selected mental health measures, among adults aged 15+ years

	Prevalence (%) among adults aged 15+ years (unadjusted), by year			Estimated number of people	Significant change between years?
Mental health and wellbeing	**2012/13**	**2017/18**	**2022/23**	**2022/23**	**2017/18 to 2022/23**
Psychological distress (high or very high) (K10)	6.2%	8.6%	11.9%	502,000	↑
Anxiety and/or depression symptoms		**2016/17**	**2021–23**	**2021–23**	**2016/17 to 2021–23**
Anxiety symptoms (mild or greater) (GAD-7 score of 5+)		18.5%	26.6%	1,113,000	↑
Depression symptoms (mild or greater) (PHQ-9 score of 5+)		19.9%	29.0%	1,210,000	↑
Anxiety/depression symptoms (mild or greater)		25.0%	34.8%	1,452,000	↑

Note: Results are presented for the survey years for which they are available. Unadjusted prevalence estimates are presented. Prevalences are estimates; 95% confidence intervals are available. Statistically significant changes between years were assessed and reported by the Ministry of Health, and took into account changing age structures in the population over time; arrows shows statistically significant changes (p-value lower than 0.05).
Source: New Zealand Health Survey, 2022/23 NZHS Annual Data Explorer (accessed 26 Feb 2024) and Mental Health and Problematic Substance Use Data Explorer (Ministry of Health, 2024) (accessed 18 June 2024)

9.3   People with disabilities

People with a disability are more vulnerable to impacts of climate-related hazards

People who are restricted in daily activities by a physical, learning or mental disability may be more vulnerable to the impacts of natural hazards (Sloman and Margaretha, 2018), including climate-related hazards.

People with a disability may have difficulty evacuating, moving themselves, understanding hazards and/or instructions and/or taking care of themselves. They may also depend on caregivers to help them prepare for a flood, and evacuate if needed. They may have difficulty accessing emergency shelters if these are not accessible for people with mobility issues and/or service dogs. People with a hearing or vision disability may have difficulties in accessing information if it is not provided in an accessible format, and communicating with others during a hazard event.

Disability data is vitally important for disaster risk reduction and understanding climate risk, to help assess community risks, access to information, services and infrastructure, and to understand capacities and barriers that need to be addressed (Sloman and Margaretha, 2018). For example, CDEM activities and planning need to be inclusive of people with disability, to ensure that services and activities are accessible to everybody (MCDEM, 2013b). Considering the needs of disabled people, in particular making information and services accessible to all, disability-inclusive decision-making, reducing inequities for disabled people, and reducing barriers, is vitally important for supporting the resilience of disabled people (Stein et al., 2024).

We currently do not have any social vulnerability indicators for disability status for 2018. However, the 2013 Disability Survey can provide an initial overview of the prevalence of main types of disabilities in New Zealand adults.

Table 14 shows the percentage of the population with different types of disabilities, according to the 2013 Disability Survey (Stats NZ, 2014). Almost one in four New Zealanders (24%) had a disability (physical, hearing, vision, intellectual and/or psychological/psychiatric impairment) in 2013. About 59% of older adults aged 65+ years had a disability in 2013 (Table 15). One in four (26%) Māori had a disability in 2013 (Table 15), a similar rate to Europeans despite having a younger population. Adjusting disability rates to the age profile of the total population, Māori had a higher disability rate (32%) than Pacific (26%), European (24%) and Asian (17%) (Stats NZ, 2014).

Table 14: People with a disability, 2013, by disability type (estimated number and percentage of population)

Type of disability	Description	Percent (2013)	Estimated number (2013)
Overall disability	All physical, hearing, vision, intellectual and psychological/ psychiatric disabilities	24%	1,062,000
Physical disability	People with a physical impairment that limits their everyday activities	14%	632,000
Hearing disability	People limited in their everyday activities by hearing loss that assistive devices such as hearing aids did not eliminate	9%	380,000
Vision disability	People limited in their everyday activities by vision loss that assistive devices such as glasses did not eliminate	4%	168,000
Intellectual disability	People with an intellectual disability	2%	89,000
Psychological or psychiatric impairment	People living with a long-term emotional, psychological or psychiatric condition that either causes difficulty with everyday activities, or causes difficulty communicating, mixing with others, or socializing	5%	242,000
Other	Other impairment types covered by the survey included: speaking, learning, memory, development delay	8%	358,000

Notes: These results show an estimate of people with a disability, as a percentage of the Census usually resident population.
Source: 2013 Disability Survey (Stats NZ, 2014)

Table 15: People with a disability, 2013, by age group and ethnic group (estimated number and percentage of population)

Analysis	Population group	Percent (2013)	Estimated number (2013)
Age group	0–14 years	11%	95,000
	15–44 years	16%	283,000
	45–64 years	28%	314,000
	65+ years	59%	370,000
Ethnic group (total response)	European	25%	842,000
	Māori	26%	176,000
	Pacific peoples	19%	51,000
	Asian	13%	60,000
	Other (MELAA and other)	28%	36,000

Notes: These results show an estimate of people with a disability, as a percentage of the Census usually resident population. MELAA is Middle Eastern/Latin American/African ethnic groups.
Source: 2013 Disability Survey (Stats NZ, 2014)

The results of this survey will be able to be updated with the 2023 Disability Survey, once results have been released.

9.4   Pregnant women

Pregnant women are more vulnerable to adverse impacts of hazard events

Pregnant women may be at increased risk during and after a hazard event such as a flood. They face increased risk of premature delivery, underweight infants and infant mortality. Some women may have to deliver their babies without hospital care if health services are unavailable or inaccessible during a hazard event. Some women may be evacuated without access to medical records, or they may lose prenatal vitamins or essential medication. Pregnant women may also have a poorer immune response than non-pregnant women (Menne and Murray, 2013).

About 60,000 women give birth each year in New Zealand

In 2022, 57,957 women in New Zealand gave birth, and 57,711 babies were born (Health NZ - Te Whatu Ora, 2023). The number of women who gave birth each year has been relatively consistent from 2013 (59,252 women) to 2022 (57,957 women), with the exception of an increase in 2021 (Figure 72).

Figure 72: Number of women who gave birth each year, 2007–2022
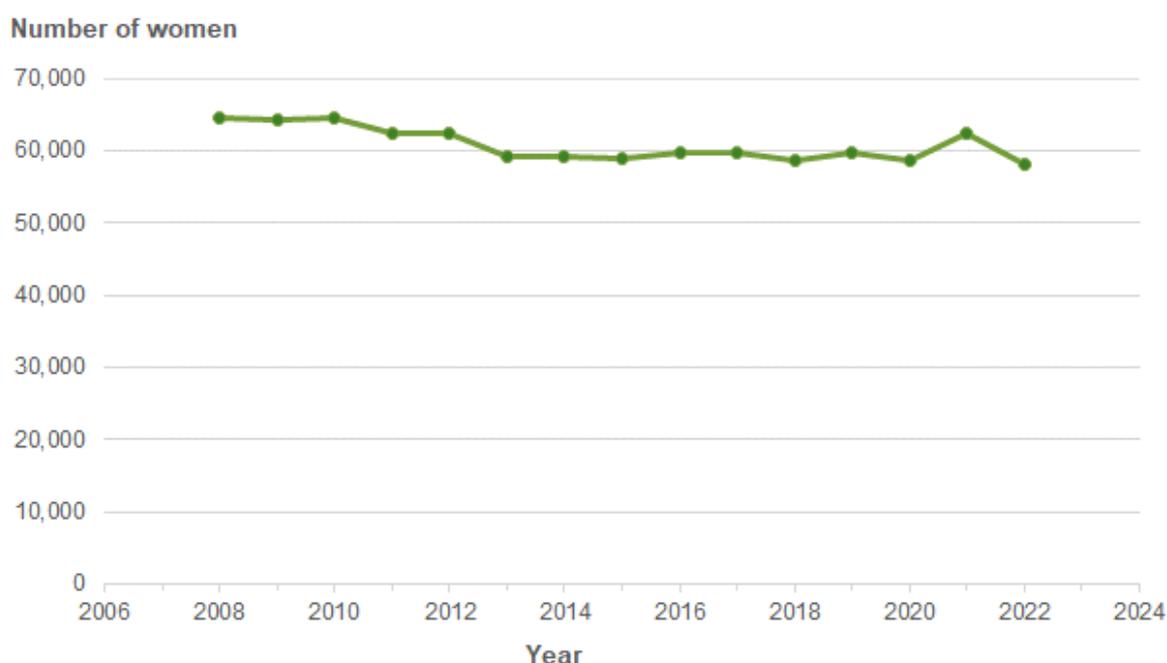
Source: Maternity web tool (Health New Zealand, 2024)(accessed 16 June 2024)

A proxy of the number of children aged less than 1 year (ie under 12 months of age) can be used at the neighbourhood level to give an approximate number of pregnant women in a year. In the 2018 Census, the number of children aged less than 1 year was 58,158 babies, similar to the number of women who had given birth in that year (58,566 women).

10 Having enough money to cope with crises and losses

This section presents social vulnerability indicators relating to having enough money to cope with crises and losses.

10.1 Overview

Having enough money to cope with crises and losses is an important part of resilience

Having sufficient money and resources enables people to be more resilient to climate-related hazards. This includes:

- **Preparing for hazards**: being able to afford insurance, flood protection materials, air conditioning/heat pumps
- **Coping with hazard events**: having emergency food and supplies put aside, having a motor vehicle to allow evacuation if necessary
- **Recovering from hazard events**: having a financial buffer to allow replacement of items destroyed in an extreme weather event, carrying out repairs to damaged property, being able to move to better housing (eg out of damaged / damp / mouldy housing after a flood)

People who may struggle financially before, during and/or after an emergency

People with low incomes and/or not enough money to cope with crises/losses often do not have the money to protect themselves from climate-related hazards, such as with insurance or flood protection materials or works. They may not have sufficient emergency food and supplies. In some cases, they may have difficulties providing enough food for their household on a weekly basis.

People with not enough money to cope with crises may also struggle during the recovery stage after a flood, and may take a long time to recover.

- People may find it difficult to afford to replace all the damaged goods from their house.
- People may end up staying in damp and mouldy houses through an inability to repair damages or leave.
- For people who own their house but have low income, they may not be able to afford flood protection works, such as installing better drainage. This can lead to water ponding for months under the house, leading to mould issues that can impact people's health.
- Financial stress can also lead to mental health impacts.

Some population groups are particularly vulnerable to financial stress.

- People who are unemployed can find it difficult to recover after an extreme weather event (such as a flood), due to a lack of income, and little financial buffer.
- Parents in single-parent households often have to bear all the financial costs on their own, meet all the basic needs (eg food, housing, and emotional support for children) and cope with the stress without the emotional support of another adult in the household.

There can also be a neighbourhood effect

If many households in an affected area suffer from financial hardship, this leads to less resilience in the neighbourhood, as people struggling to meet their household's own basic needs have fewer resources to share (Phibbs et al., 2016). This impact may also be seen at Civil Defence Centres / Community Emergency Hubs, given that some of these centres do not provide any resources for the local community except an emergency radio. Poorer communities may take longer to 'build back' after a disaster.

If many people are unable to afford to leave their damaged housing, continuing to live in an area contaminated by floodwaters can be bad for morale and community resilience, as well as health.

It is important to note that 'having enough money to cope with crises/losses' may mean different things for different people, depending on their level of community support, access to other resources (such as home-grown food), and where they live (urban vs rural).

Where financial vulnerability intersects with other vulnerabilities (eg age) or disproportionately affects particular population groups (eg Māori, Pacific peoples), this is important to address for equitable outcomes.

Social vulnerability indicators related to this dimension

Key indicators in this section include:

- People living in areas of high socioeconomic deprivation (NZDep deciles 9–10)
- Unemployed
- Not in labour force
- Single parent households
- Households with no car

10.2 Living in areas of high socioeconomic deprivation

Low income and living in low income neighbourhoods are key vulnerabilities for disaster resilience. People on low incomes will find it harder to adequately prepare for disasters, adapt to hazards, and in the event of a hazard event, to cope with and recover from the hazard. Low income households may not have all the resources they need to survive and recover after a hazard event, and may struggle with having enough food, water, money and transport. Additionally, there can be a neighbourhood effect; in communities where many households are without basic household resources, community resilience is eroded, and people in these neighbourhoods are likely to experience worse adverse outcomes after a disaster event (Phibbs et al., 2016).

Indicator definition

This indicator shows the percentage of the population living in areas of high socioeconomic deprivation, according to the NZDep. The New Zealand Index of Deprivation (NZDep) is an area-based measure of socioeconomic deprivation in Aotearoa New Zealand (Atkinson et al., 2020). It measures the level of deprivation for people in each small area. NZDep is based on Census variables, and has been created for every Census year since 1991.

The NZDep2018 was based on nine Census variables:

- people with no access to the internet at home
- people aged 18–64 years receiving a means-tested benefit
- people living in equivalised household with income below an income threshold
- people aged 18–64 who are unemployed
- people aged 18–64 years without any qualifications
- people not living in their own home
- people aged under 65 living in a single parent family
- people living in crowded households
- people living in dwellings that are always damp and/or always have mould greater than A4 size.

These NZDep variables are similar to several social vulnerability indicators in this report, including:

- unemployment (page 136)
- single parent households (page 144)
- people living in crowded households (page 184)
- damp dwellings (page 189)
- mouldy dwellings (page 195)
- households with no internet access (page 169)
- households living in rental dwelling (page 179).

NZDep is displayed as deciles (Figure 73). Each NZDep decile contains about 10% of small areas in New Zealand.

- Decile 1 represents the 10% of areas with the least deprived scores.
- Decile 10 represents the 10% of areas with the most deprived scores.

NZDep can also be presented as quintiles, whereby approximately 20% of the New Zealand population is in each quintile. Quintile 5 is the same as deciles 9–10.

Note that in each version of the NZDep, about 10% of the population is always in the most deprived decile. However, the distribution in different population groups (such as ethnic groups) is important, as is the geographical distribution. For this reason, no national results or comparisons over time have been presented for this indicator, but results are presented by geographic region and for important population groups.

Figure 73: Map of NZDep2018 deciles, by SA2 (with territorial boundaries shown)
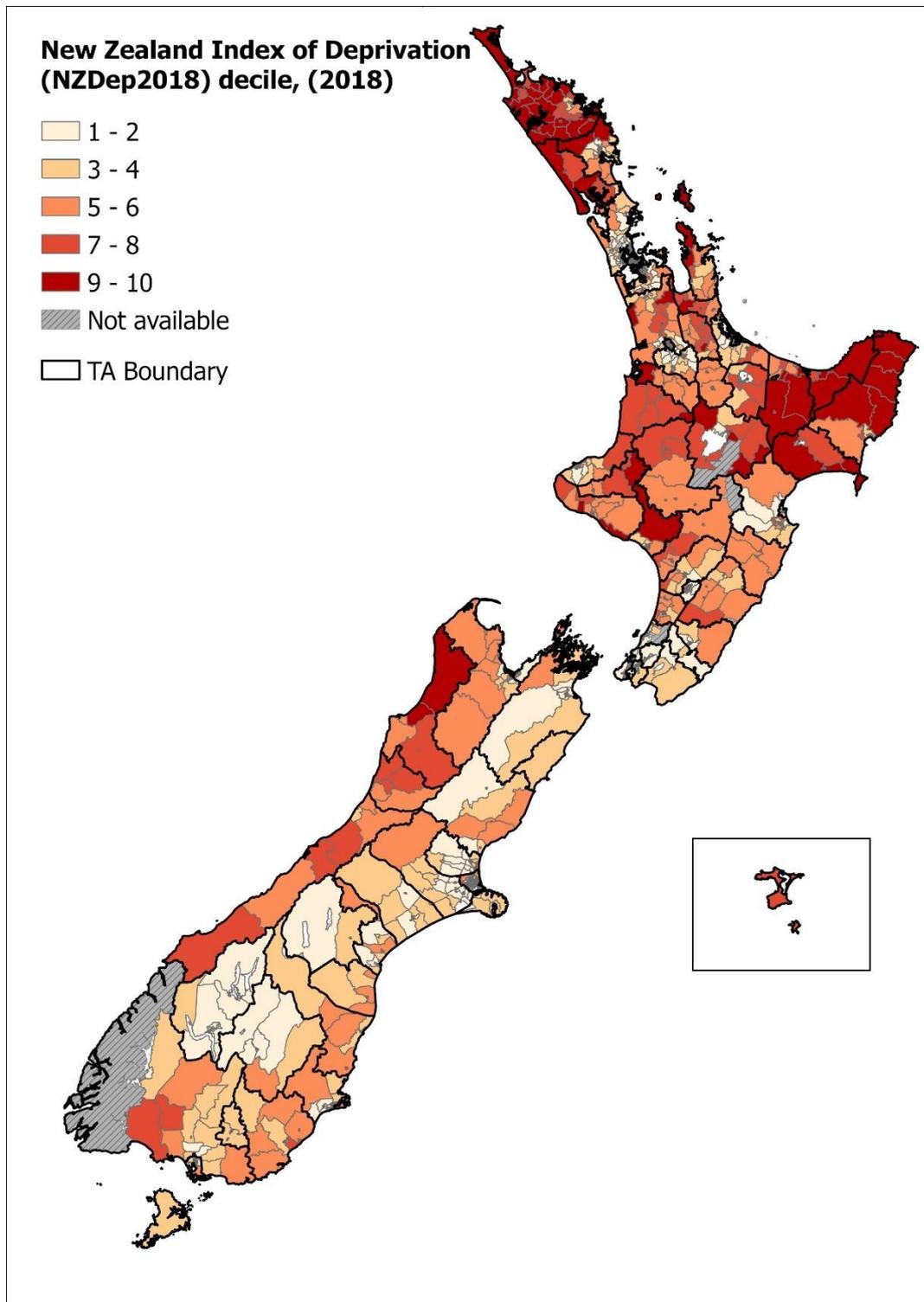

Source: NZDep2018 (Atkinson et al., 2020)

Results by territorial authority

Nationally, about 20% of the population live in high deprivation areas (NZDep2018 deciles 9–10). However, some territorial authorities have a much higher percentage of the population living in more deprived areas (Figure 74). These include:

- Kawerau District (88.9% of the population)
- Wairoa District (76.5%)
- Ōpōtiki District (69.3%)
- Chatham Islands Territory (62.9%)
- Far North District (58.1%)
- South Waikato (53.8%)
- Gisborne District (49.3%)
- Waitomo District (47.8%)
- Whanganui District (46.2%)
- Ruapehu District (46.0%).

Figure 74: Percentage of the population living in high deprivation areas (NZDep2018 deciles 9–10), by territorial authority, 2018

People living in high-deprivation areas, percent of population (2018)

- 0.0% - 7.1%
- >7.1% - 15.5%
- >15.5% - 24.9%
- >24.9% - 40.8%
- >40.8% - 88.9%
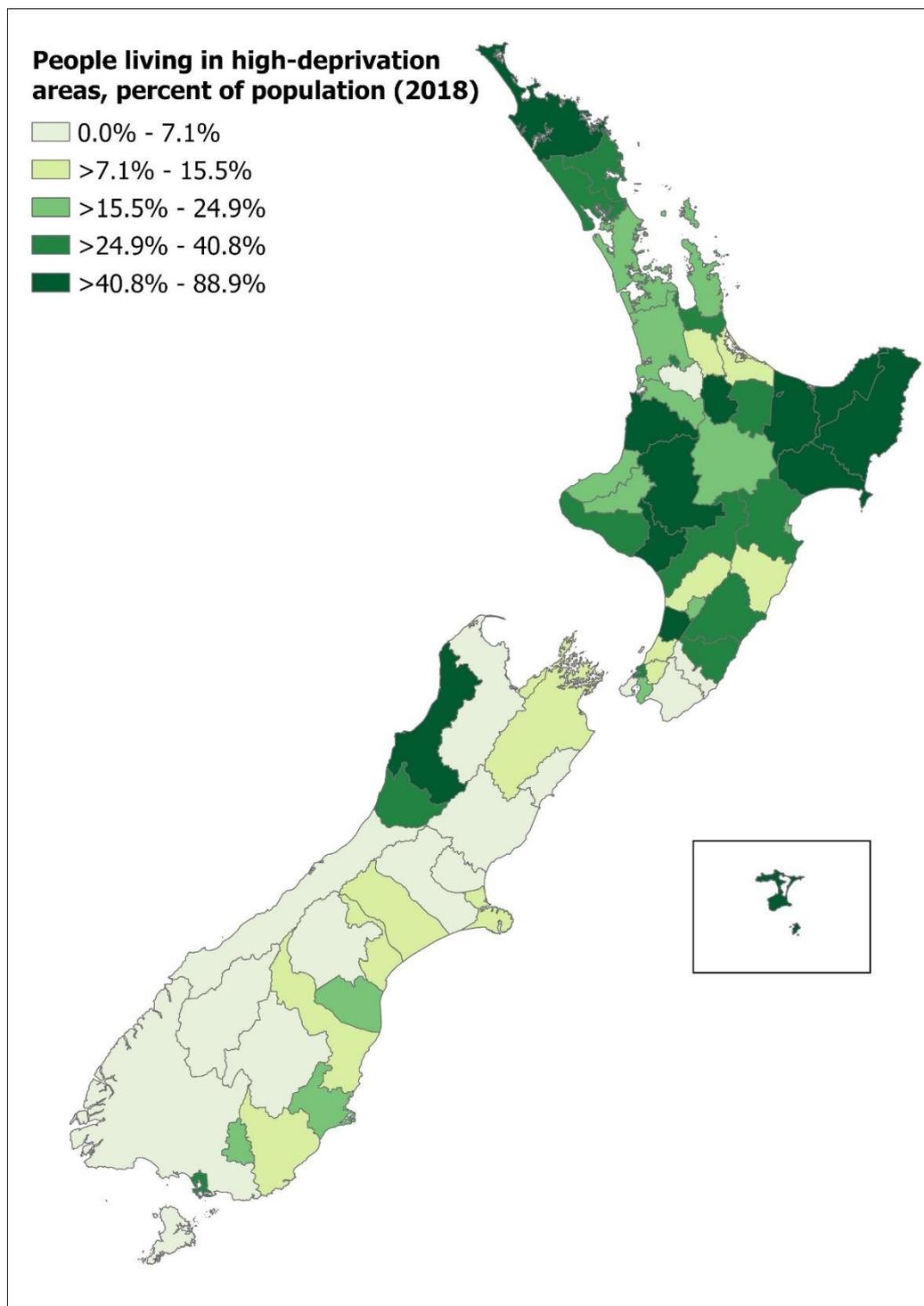
Note: High deprivation refers to NZDep2018 deciles 9–10. Nationally, about 20% of the population live in high deprivation areas.
Source: NZDep2018 (Atkinson et al., 2020)

Children more likely to be living in more deprived areas

Children are disproportionately represented in more socioeconomically deprived areas, with about 25.3% of children living in the 20% most deprived areas (deciles 9–10). Children are already more susceptible to the impacts of climate-related hazards, so living in more deprived areas can compound vulnerability.

Older adults were somewhat less likely to be living in the most deprived areas (Figure 75).

Figure 75: Percentage of children and older adults living in NZDep2018 deciles, 2018
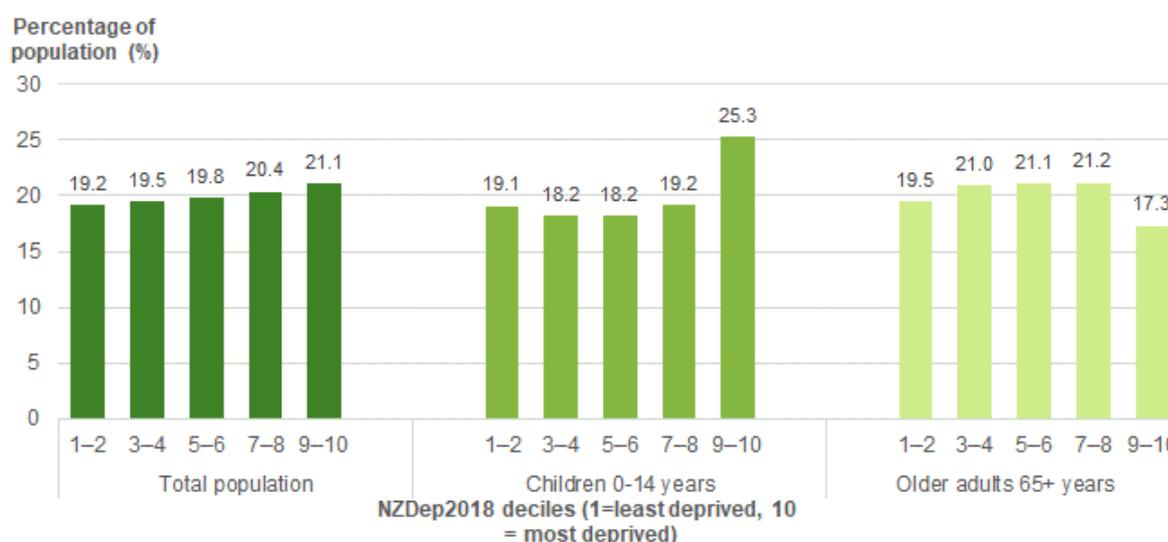

Source: NZDep2018 (Atkinson et al., 2020)

Māori and Pacific peoples disproportionately live in more socioeconomically deprived areas

Māori and Pacific peoples were much more likely to be living in more socioeconomically deprived areas than other people. Over half of all Pacific peoples (54.9%) and 42.9% of Māori were living in NZDep2018 deciles 9 and 10 (the 20% most deprived areas). This compares to 12.5% of non-Māori-non-Pacific-non-Asian people.

Figure 76: Percentage of the population living in NZDep2018 deciles, by ethnic group, 2018
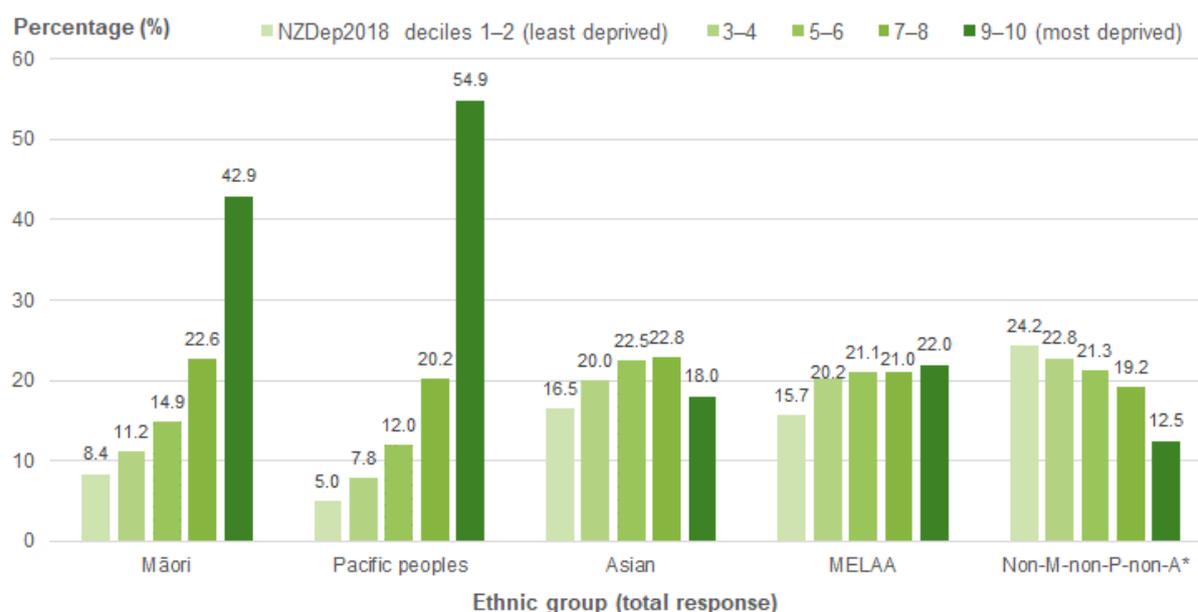

Notes: * "Non-M-non-P-non-A" is non-Māori-non-Pacific-non-Asian, and includes people who only identified as European, MELAA or Other. It should not be compared with the MELAA group, as these two groups are overlapping. MELAA is Middle Eastern/Latin American/African ethnic groups.
Source: NZDep2018 (Atkinson et al., 2020)

Among children, Māori and Pacific children were disproportionately living in the most socioeconomically deprived areas. In 2018, 56.9% of Pacific children and 44.1% of Māori children were living in NZDep2018 deciles 9–10 (Figure 77).

Figure 77: Percentage of child population living in NZDep2018 deciles, children aged 0–14 years, by total response ethnic group, 2018
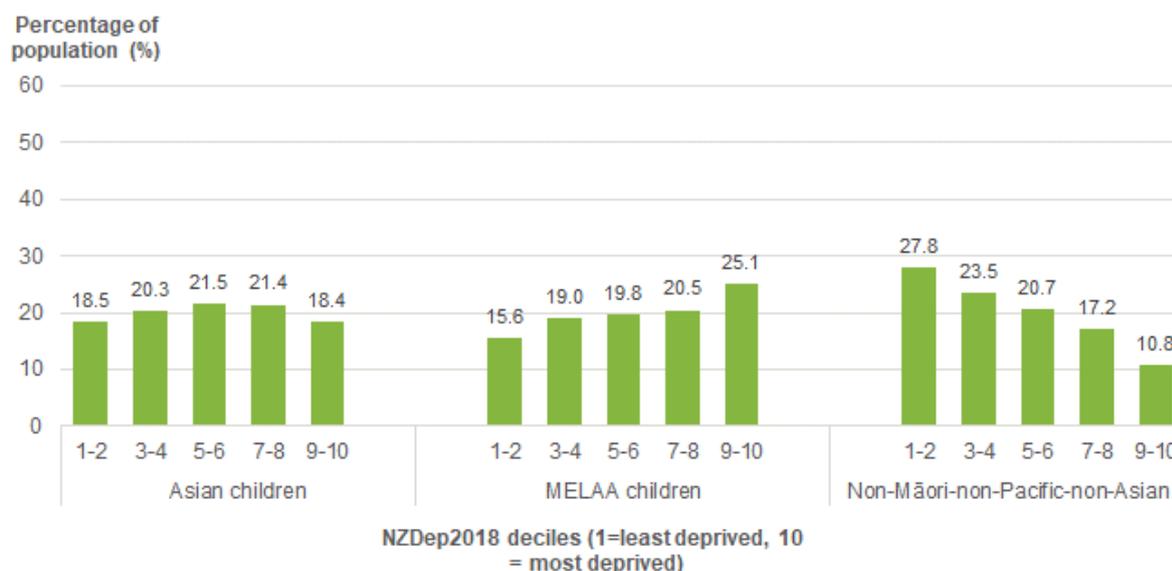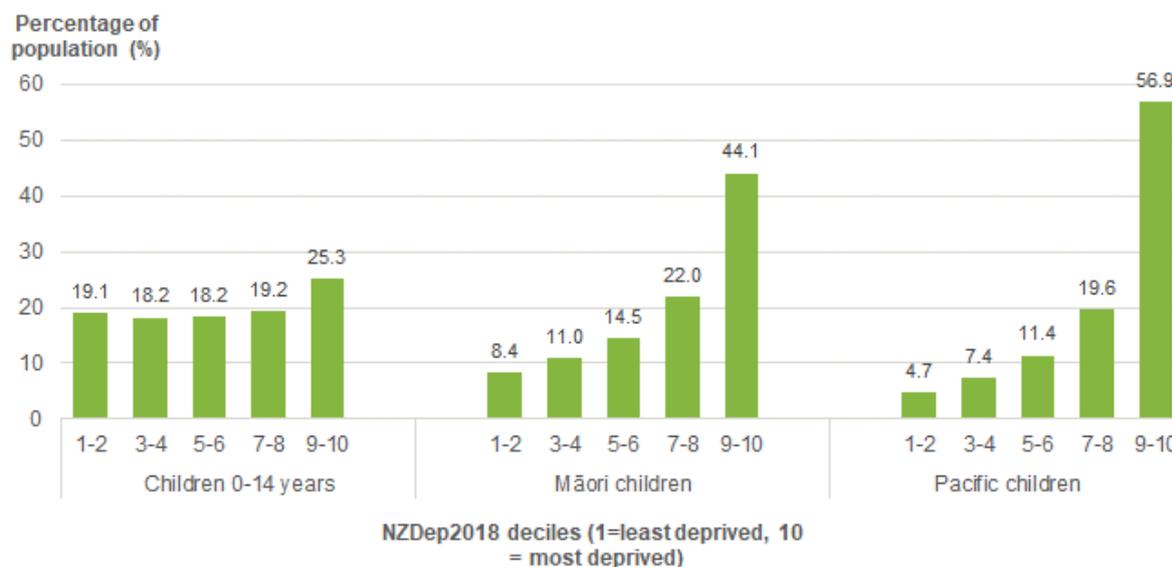
Source: NZDep2018 (Atkinson et al., 2020)

10.3 Unemployed (among 15+ years)

People who are unemployed are unlikely to have the financial means to prepare, cope with, recover from, and adapt to climate-related hazards.

Unemployed people are likely to have a low income, and therefore may not have the money to protect themselves from flooding and other hazards (through insurance, flood protection materials or works), or sufficient emergency food and supplies. After a hazard event (eg flood), recovery can take a long time for these people, and they may end up staying in damaged or damp and mouldy houses through an inability to leave. Financial stress can also impact on mental health.

Indicator definition

This indicator shows the number of people who were unemployed, as a percentage of the Census usually resident population aged 15 years and over, at the time of the Census. Stats NZ define unemployed as anyone who has no job, is working age, is available for work and has looked for work in the past 4 weeks or has a new job to start within the next 4 weeks.

About 4% of adults were unemployed in 2018

In 2018, 151,035 adults aged 15+ years were unemployed at the time of the Census. This number had decreased slightly since the 2013 Census day (Figure 78).

Figure 78: Number of people aged 15+ years who were unemployed at the time of the Census, 2006, 2013, 2018
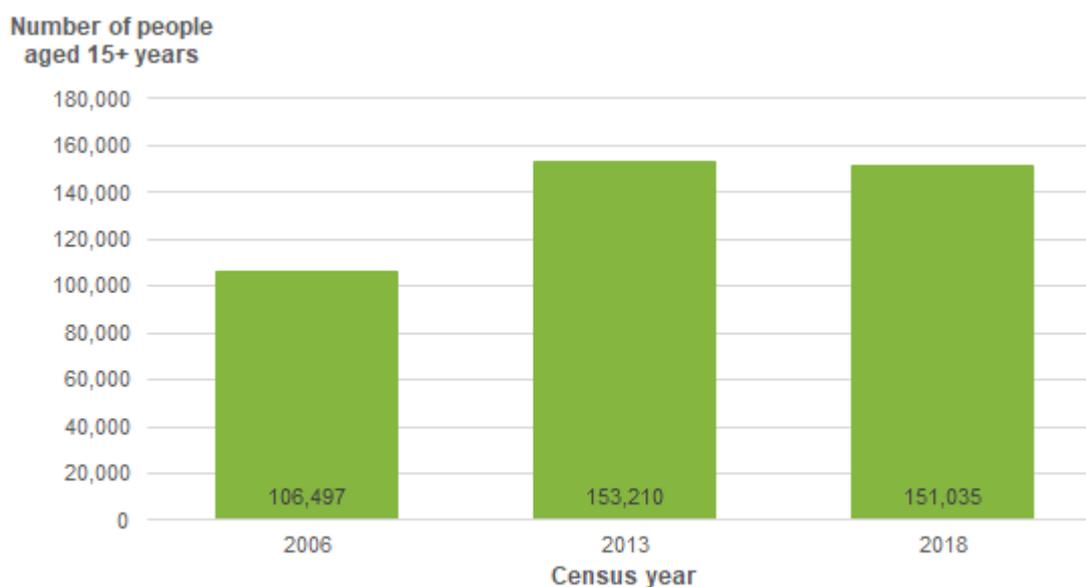
Source: New Zealand Census of Population and Dwellings

In 2018, 4.0% of the population aged 15+ years were unemployed at the time of the Census. This had decreased somewhat since 2013, but was higher than in 2006 (Figure 79).

Figure 79: Percentage of the population aged 15+ years who were unemployed at the time of the Census, 2006, 2013, 2018
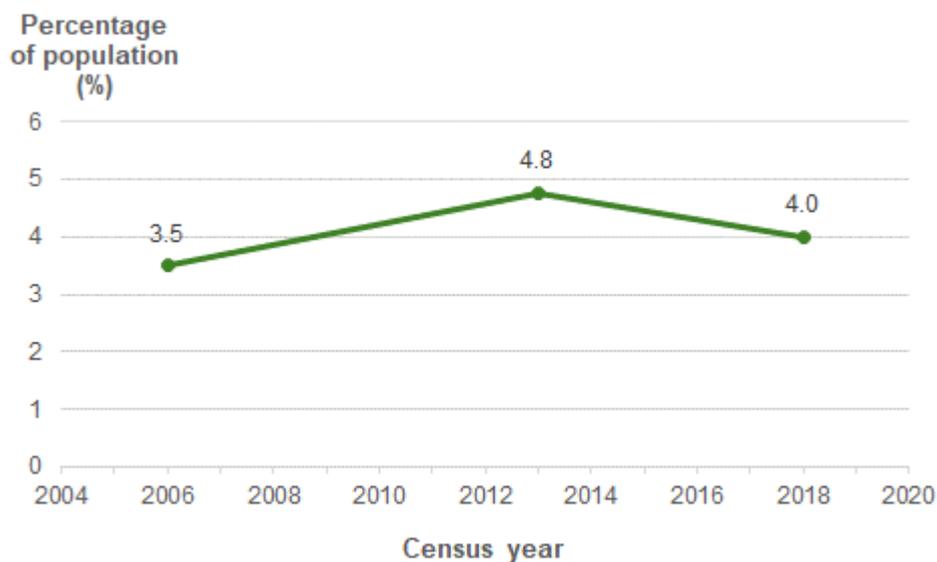
Source: New Zealand Census of Population and Dwellings

Unemployment statistics are available more regularly at the national level. Recent statistics show a seasonally-adjusted unemployment rate of 4.0% in the December 2023 quarter (Stats NZ, 2024b), similar to the rate in 2018.

Māori and Pacific peoples experienced high unemployment rates

On Census day in 2018, unemployment rates were relatively high among Māori (8.1%), Pacific peoples (7.1%), and Middle Eastern/Latin American/African (MELAA) (6.4%) ethnic groups (Figure 80). The unemployment rates were 4.2% for Asians and 3.2% for the European ethnic group in 2018.

Figure 80: Percentage of the population aged 15+ years who were unemployed at the time of the Census, by ethnic group, 2018
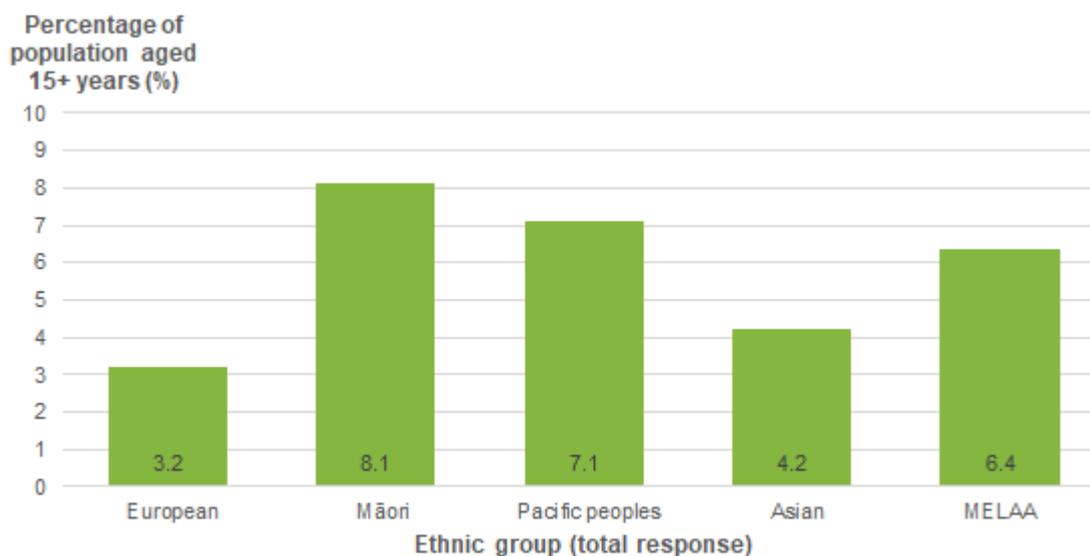
Note: Total response ethnic groups have been presented, so people will be included in every ethnic group they have identified with. This means that the ethnic groups overlap, and should not be directly compared with each other. MELAA is Middle Eastern/Latin American/African ethnic groups.
Source: New Zealand Census of Population and Dwellings

These patterns had remained relatively consistent across Census years (Figure 81).

Figure 81: Percentage of the population aged 15+ years who were unemployed at the time of the Census, by ethnic group, 2006, 2013, 2018
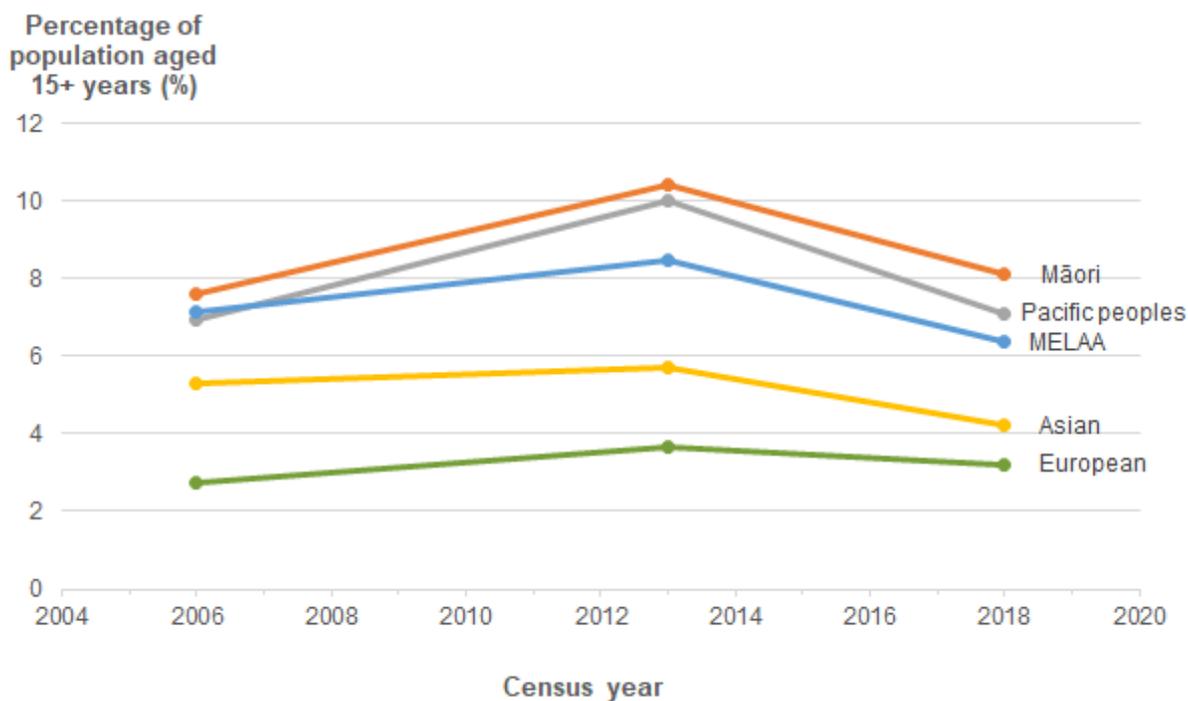

Note: Total response ethnic groups have been presented, so people will be included in every ethnic group they have identified with. This means that the ethnic groups overlap, and should not be directly compared with each other.
Source: New Zealand Census of Population and Dwellings

Results by territorial authority

Some territorial authorities have a higher percentage of adults aged 15+ years who were unemployed at the time of the 2018 Census (Figure 82). These include:

- Kawerau District (10.1% of the population aged 15+ years)
- Ōpōtiki District (7.3%)
- Wairoa District (7.2%)
- Far North District (6.6%)
- South Waikato District (6.3%)
- Rotorua District (6.1%)
- Whakatāne District (5.7%)
- Hamilton City (5.6%)
- Porirua City (5.5%).

Figure 82: Percentage of the adult population (15+ years) who were unemployed on Census day, by territorial authority, 2018
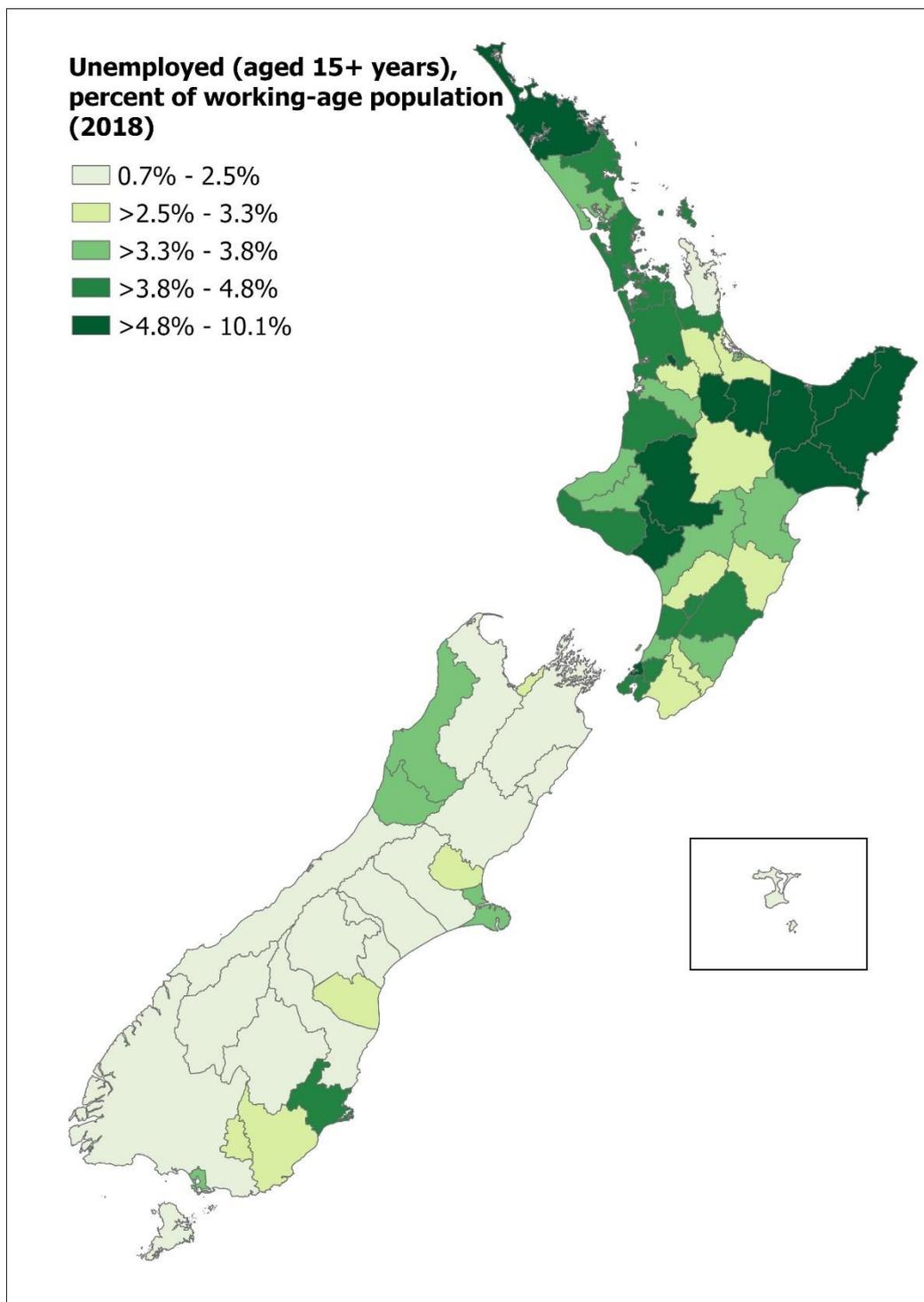
Source: New Zealand Census of Population and Dwellings

10.4   Not in labour force (among 15+ years)

People who are not in the labour force (ie people who are neither employed or unemployed) may have a low income. People with low incomes may not have the money to protect themselves from flooding (through insurance, flood protection materials or works), may not have sufficient emergency food and supplies, and may find it difficult to recover financially after a flood. The resulting stress can also impact on mental health.

Indicator definition

This indicator shows people not in the labour force at the time of the census, among the Census usually resident population aged 15 years and over.

'Not in the labour force' includes retired people, people with personal or family responsibilities (eg unpaid housework and childcare), people attending educational institutions, people permanently unable to work due to physical or mental disabilities, people temporarily unavailable for work, and those not actively seeking work.

One in three adults were not in the labour force in 2018

In 2018, 1.18 million people aged 15+ years were not in the labour force (out of 3.77 million people aged 15+ years) (Figure 83).

Figure 83: Number of people aged 15+ years who were not in the labour force at the time of the Census, 2006, 2013, 2018
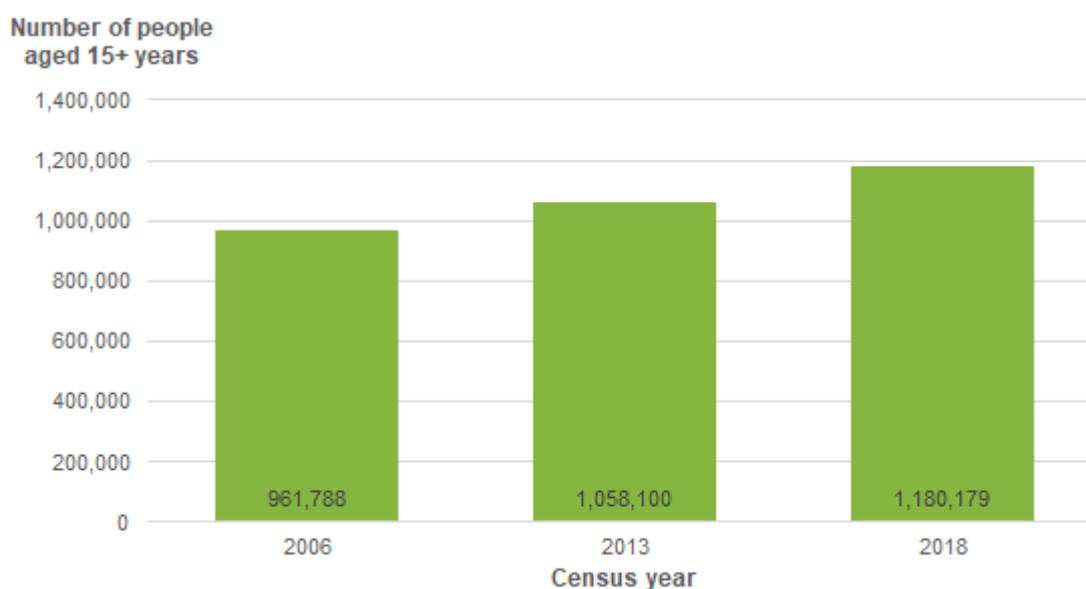
Source: New Zealand Census of Population and Dwellings

This represented about one-third of all adults (31.3%) not being in the labour force in 2018, similar to 2013 (32.9%) and 2006 (31.5%) (Figure 84).

Figure 84: Percentage of people aged 15+ years who were not in the labour force (among the population aged 15+ years), 2006, 2013, 2018
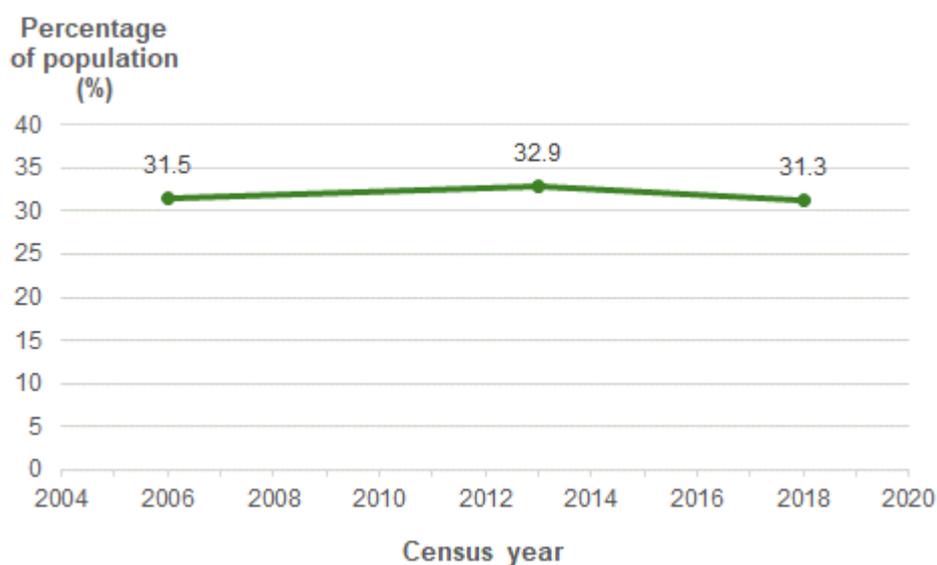
Source: New Zealand Census of Population and Dwellings

Similar rates by ethnic group for not being in the labour force

The percentage of the adult population who were not in the labour force was similar by ethnic group (total response) in 2018:

- European: 31.3%
- Māori: 29.4%
- Pacific peoples: 30.6%
- Asian: 30.8%
- Middle Eastern/Latin American/African (MELAA): 28.9%.

Results by territorial authority

Some territorial authorities have a higher percentage of adults aged 15+ years who were not in the labour force at the time of the 2018 Census. These include:

- Thames-Coromandel District (43.3% of the population aged 15+ years)
- Kawerau District (43.1%)
- Horowhenua District (41.9%)
- Buller District (39.8%)
- Kāpiti Coast District (39.6%)
- Hauraki District (39.2%)
- Far North District (38.7%)
- Whanganui District (38.3%)
- Kaipara District (38.2%).

Figure 85: Percentage of the adult population (15+ years) who were not in the labour force on Census day, by territorial authority, 2018
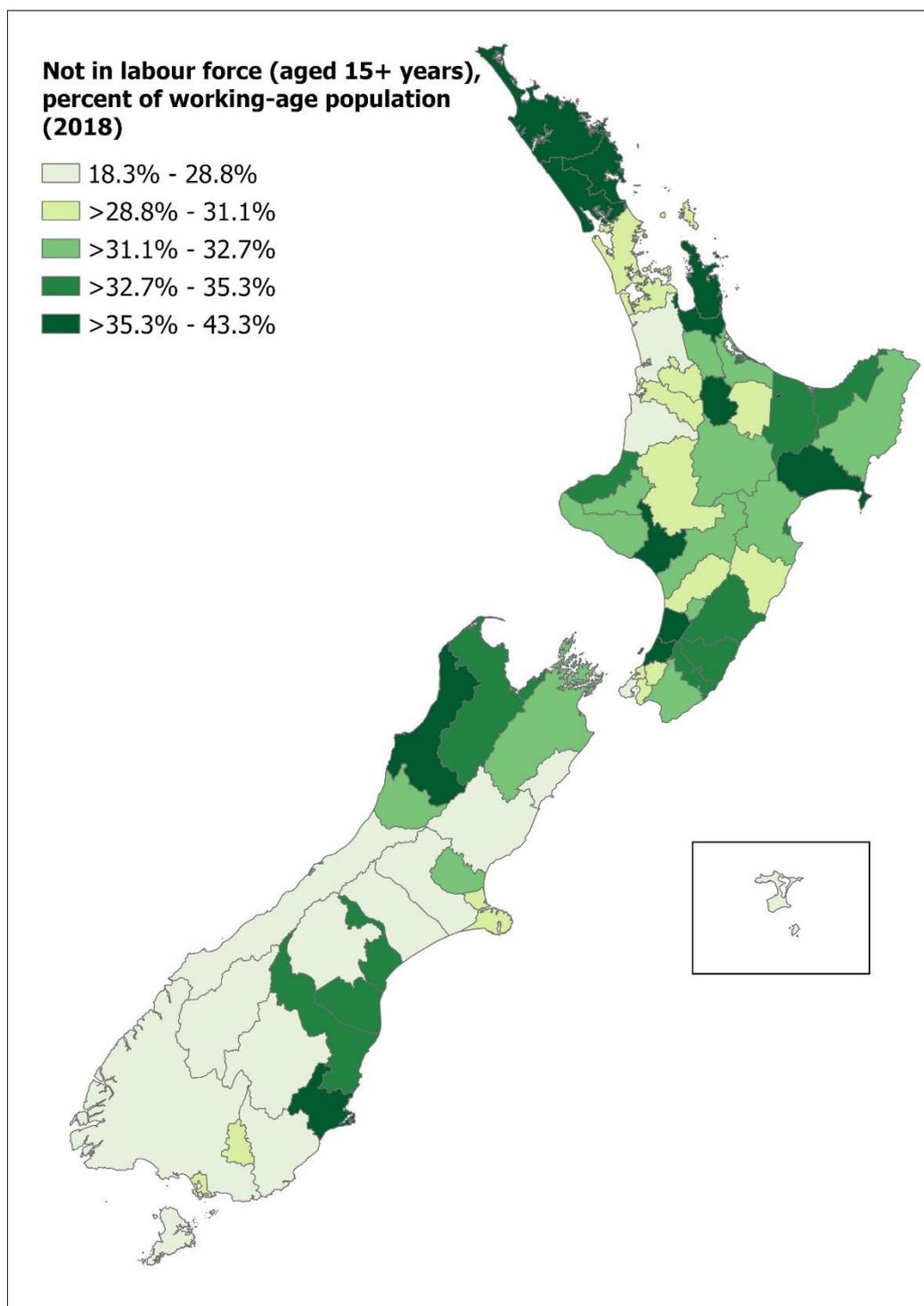
Source: New Zealand Census of Population and Dwellings

10.5   Single parent households

Single parents are a vulnerable population group, as they often have to bear all the financial costs on their own, as well as coping with stress without emotional support. Single parents are less likely to have a fulltime job than other people (Bretherton and Flynn, 2019), which may be due to the challenges of being responsible for caring for children. Additionally, childcare may be difficult to arrange during the clean-up stage after a hazard event such as a flood. Financial stress and lack of emotional support after a hazard event can also impact on mental health. Single parent households are more likely to experience food insecurity (Ministry of Health, 2019b), and are less likely to have household emergency supplies (see section 14). Therefore, they might struggle to prepare for and/or recover from hazard events, and may need further support and services.

About 82% of one parent families in New Zealand were female sole parents in 2018, according to New Zealand Census data.

Indicator definition

This indicator shows households with single-parent families with one or more dependent children, as a percentage of households living in occupied private dwellings (total stated), from the NZ Census of Population and Dwellings.

Note that single-parent households is one of the Census variables used to create the NZDep2018 index (namely, people aged under 65 living in a single parent family).

Almost 9% of households were single parent households in 2018

In 2018, 8.6% of households were single parent households, similar to 2013 (9.0%) (among total stated households) (Figure 86).

Figure 86: Percentage of households that were single parent households, 2013, 2018
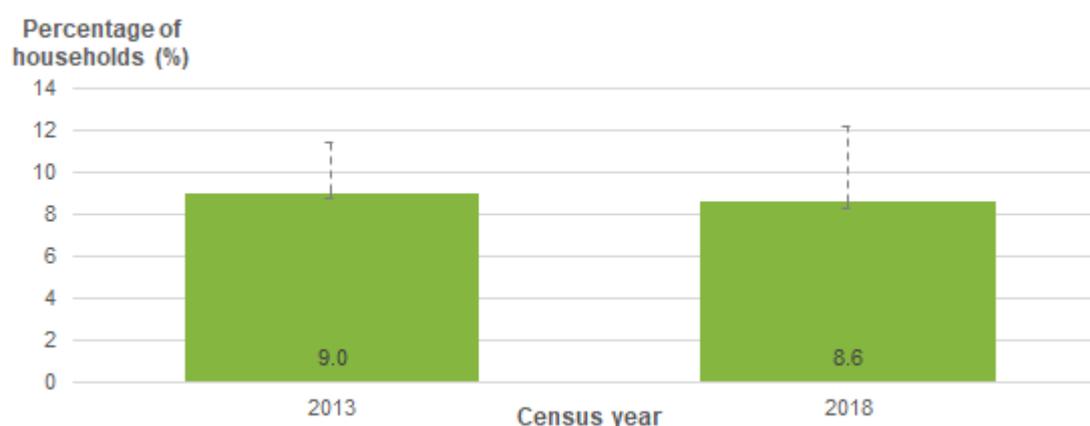
Notes: Percentages are presented among the total stated households. There is some uncertainty in the estimates (particularly 2018), due to missing data in the Census. Logical bounds are presented, to give the lower and upper bounds of what the percentage could be, allowing for the missing data due to lower response rates.
Source: New Zealand Census of Population and Dwellings

This represented 135,987 households in 2018 that were single parent households. However, this number should be treated as a lower bound, due to missing data (due to lower response rates) in the 2018 Census.

Results by territorial authority

Some territorial authorities had a higher percentage of households that were single parent households in 2018 (Figure 87). These territorial authorities included:

- Gisborne District (12.6% of households)
- Kawerau District (12.2%)
- Wairoa District (11.6%)
- Porirua City (11.4%)
- Ōpōtiki District (10.8%)
- Whanganui District (10.7%)
- Hamilton City (10.4%)
- Napier City (10.4%)
- Rotorua District (10.2%).

Figure 87: Percentage of households that were single-parent households, by territorial authority, 2018
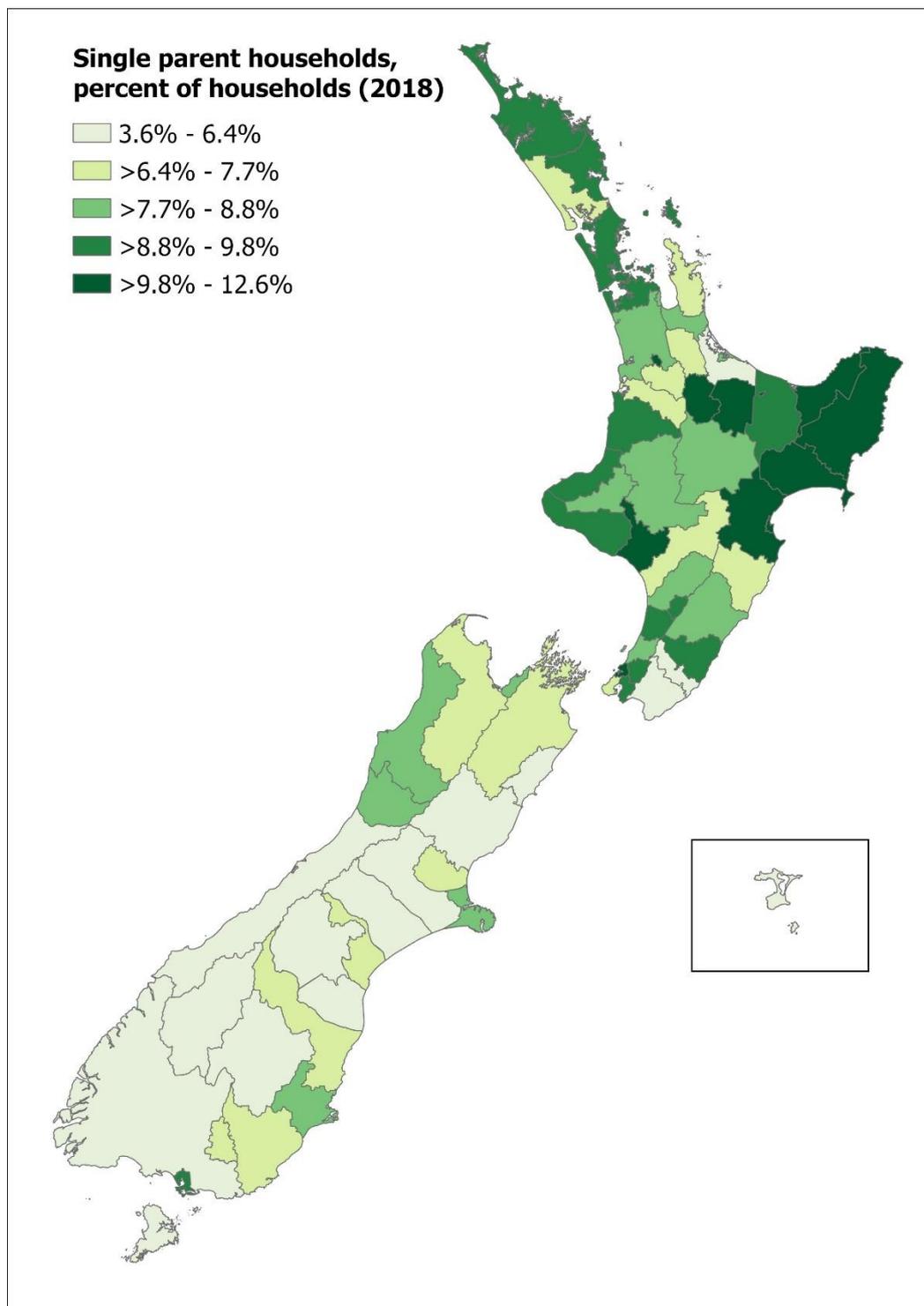
Source: New Zealand Census of Population and Dwellings

10.6 Households with no motor vehicle

Having a vehicle allows a household to react and act quickly when evacuation is needed. Having no access to a vehicle may make it difficult to quickly escape hazards (such as floodwaters or wildfires) or to evacuate a flood zone with belongings and/or pets. A vehicle also allows people to travel to cool zones (eg public air-conditioned facilities) during a heatwave. In this way, lack of access to transportation can limit mobility and increase social vulnerability (Rufat et al., 2015).

Having no vehicle may make it more difficult for older adults, people with young children, and those with physical disabilities to move around. People with no access to a vehicle are vulnerable to disruptions to the public transport network, and are more likely to be (or become) socially isolated.

Having no vehicle may be due to a lack of money to afford it, and/or a decision to not own a car. In some places, it can be beneficial to have no motor vehicle, particularly if there is good public transport, and/or active transport (eg walking, cycling) is possible. Using public transport and/or active transport can have health benefits, as well as environmental benefits.

Indicator definition

This indicator shows households with no motor vehicle, among all households (total stated), from the NZ Census of Population and Dwellings.

Almost 7% of households have no motor vehicle

In 2018, an estimated 6.6% of households had no motor vehicle. This appears to be a decrease since 2013 (Figure 88).

Figure 88: Percentage of households with no motor vehicle in New Zealand, 2006, 2013, 2018
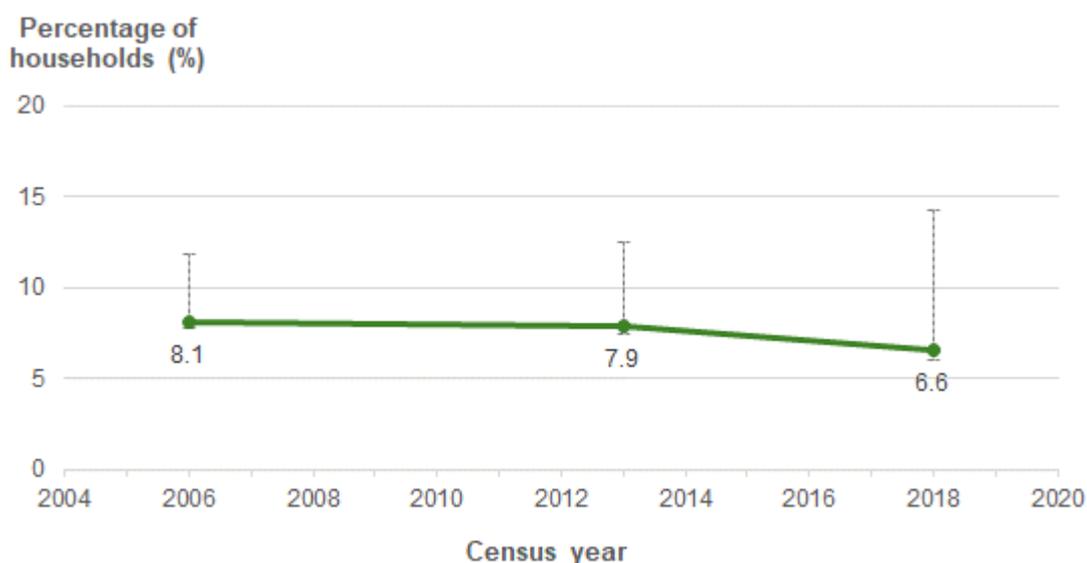

Note: Logical bounds have been shown on the graph as dotted lines. Logical bounds show the maximum and minimum possible values for the percentage, when taking into account missing data. There was missing data for this variable for 4.1% of households in 2006, 5.0% of households in 2013, and 8.3% of households in 2018. Source: New Zealand Census of Population and Dwellings

In 2018, 100,302 households reported that they had no motor vehicle, down from 116,379 households in 2013, and 112,758 households in 2006. However, there is substantial missing data for this indicator, particularly for the 2018 Census, which makes it more difficult to draw conclusions about changes over time. These numbers should be treated as lower bounds.

Having no motor vehicle was more common in major urban areas and more deprived areas

Having no motor vehicle was much more common for households in major urban areas (8.1% of households) and large urban areas (7.6%), compared with rural areas (2.0% of households) (Figure 89).

Figure 89: Estimated percentage of households with no motor vehicle in New Zealand, by urban/rural classification, 2018

Notes: Percentages are estimates, as they are based on numbers summed over SA2s.
Source: New Zealand Census of Population and Dwellings

Having no motor vehicle was much more common in high deprivation areas. One in nine (11.9%) households in the most deprived areas (NZDep2018 decile 10) had no motor vehicle, compared with 2.0% of households in the least deprived areas (decile 1) (Figure 90).

Figure 90: Estimated percentage of households with no motor vehicle in New Zealand, by NZDep2018 decile, 2018
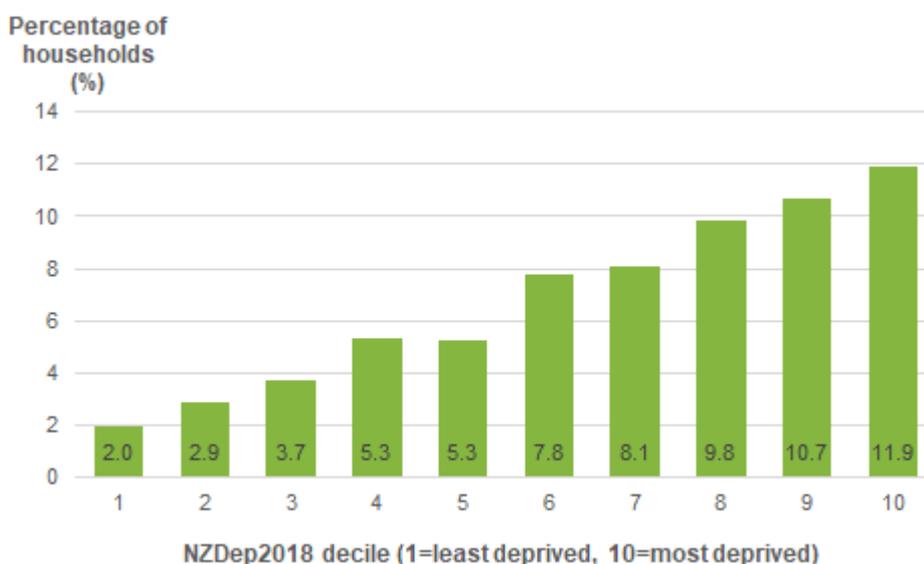
Notes: Percentages are estimates, as they are based on numbers summed over SA2s.
Source: New Zealand Census of Population and Dwellings

Some major urban areas as well as small urban areas have higher rates

Some territorial authorities with larger percentages of households with no motor vehicle were major urban areas:

- Wellington City (14.7% of households)
- Dunedin City (9.9%)
- Lower Hutt City (8.9%).

These higher percentages are likely to be partly explained by the large availability and use of public transport and active transport, and households living close to the central city.

Other territorial authorities with higher percentages of households with no motor vehicle included:

- Chatham Islands Territory (10.4% of households)
- Whanganui District (8.8%)
- Wairoa District (8.7%)
- Buller District (8.2%)
- Kawerau District (8.2%)
- Horowhenua District (8.0%).

Where these households are in a hazard zone (eg flood hazard zone), having no motor vehicle may be a disadvantage for evacuation.

Figure 91: Percentage of households that had no motor vehicle, by territorial authority, 2018

Households with no motor vehicle, percent of households (2018)

- 1.2% - 4.0%
- >4.0% - 5.4%
- >5.4% - 6.2%
- >6.2% - 7.6%
- >7.6% - 14.7%
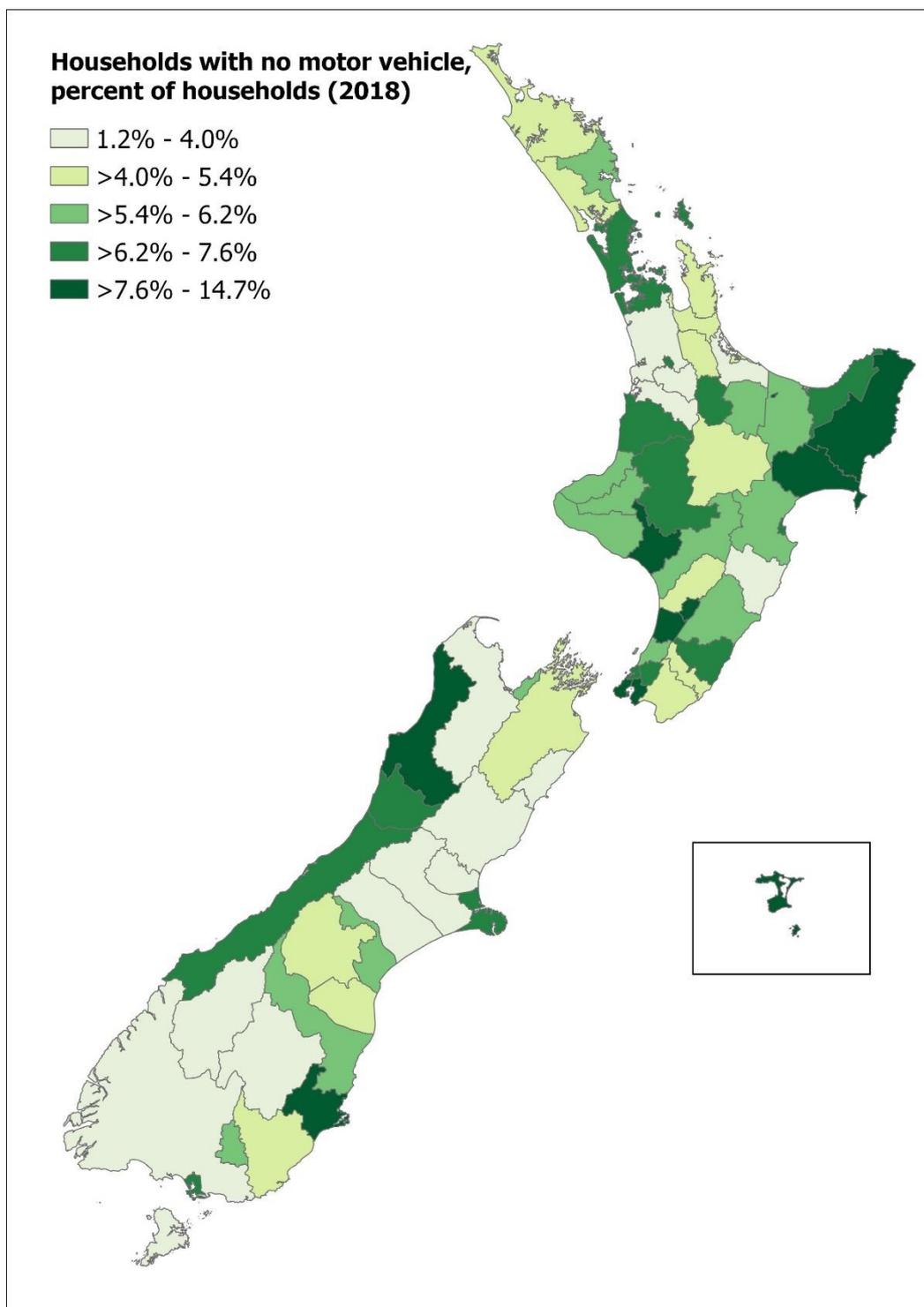
Source: New Zealand Census of Population and Dwellings

11 Social connectedness

This section presents social vulnerability indicators relating to social connectedness.

11.1 Overview

Having strong social connections builds resilience

Having strong social connections, networks and kinship ties can be very helpful for resilience, as it helps people to:
- know their neighbours and other people in the community
- help and support other people during and after a hazard event
- be able to share resources with others.

Maintaining strong social connections after a hazard event (for example, when communities are displaced and need to relocation) has been shown to result in better health outcomes for older adults (Hikichi et al., 2017). Households with children may have good social connections, through school networks, while ethnic and cultural groups may also have strong social networks.

Social isolation can increase vulnerability

Social isolation can make people vulnerable during and after a hazard event (eg flood, wildfire, heatwave). People who are socially isolated may not have others to help them if needed, including for evacuation, and clean-up. People who are new to an area, and particularly people who have recently arrived in New Zealand, may struggle more after a hazard event. They may not know other people in their neighbourhood, or how to access official support.

Community locations can be important for social connections

Schools, early childhood centres, marae and places of worship are important places for social networks and social connectedness in a community. Other places of cultural/spiritual significance, such as urupā, are also important for the local people.

Communities and neighbourhoods may also have other 'bumping spaces', where people informally gather, meet, and/or literally 'bump into' other people in their community. These spaces may include open squares, local shops, community centres, parks, playgrounds, school gates, local libraries, green spaces, and local pubs and cafes. These places can help people make friends, build social connectedness, and increase local resilience (Banwell and Kingham, 2023).

People may also have social connections through other groups, such as sporting and social groups, church groups, social clubs, and volunteering.

Social vulnerability indicators related to this dimension

Key indicators in this section include:

- One-person households
- Immigrants arriving in the past year (ie in the past 12 months)
- Immigrants arriving in the past 0-1 years (ie in the past 24 months)

Other relevant indicators include:

- Living in rental housing (see page 179)
- Older adults living alone (see page 118)
- Single parent households (see page 144)

11.2 One-person households

Living alone can increase a person's vulnerability to the impacts of climate-related hazards (such as floods and heatwaves), due to not having the support that living with others gives. People who live alone may be more socially isolated, and may not have others to help them if needed, including for evacuation, and clean-up after a hazard event. They may need to rely more on having strong social connections, networks and kinship ties in the neighbourhood for coping during and after a flood. People living alone may also be less able to afford flood protection measures, and/or may be more affected financially if they have to take time off work for clean-up. It is important for emergency plans and advice to consider the needs of people living alone, particularly those who may not have strong social connections or good communications.

Indicator definition

This indicator shows one-person households, among all households in occupied private dwellings (total stated), from the NZ Census of Population and Dwellings.

Almost one in four households have only one person

In 2018, 361,377 households in New Zealand reported having only one person living in them. This had increased from 328,302 households in 2006 (Figure 92).

Figure 92: Number of one-person households (ie households with one person living alone) in New Zealand, 2006, 2013, 2018
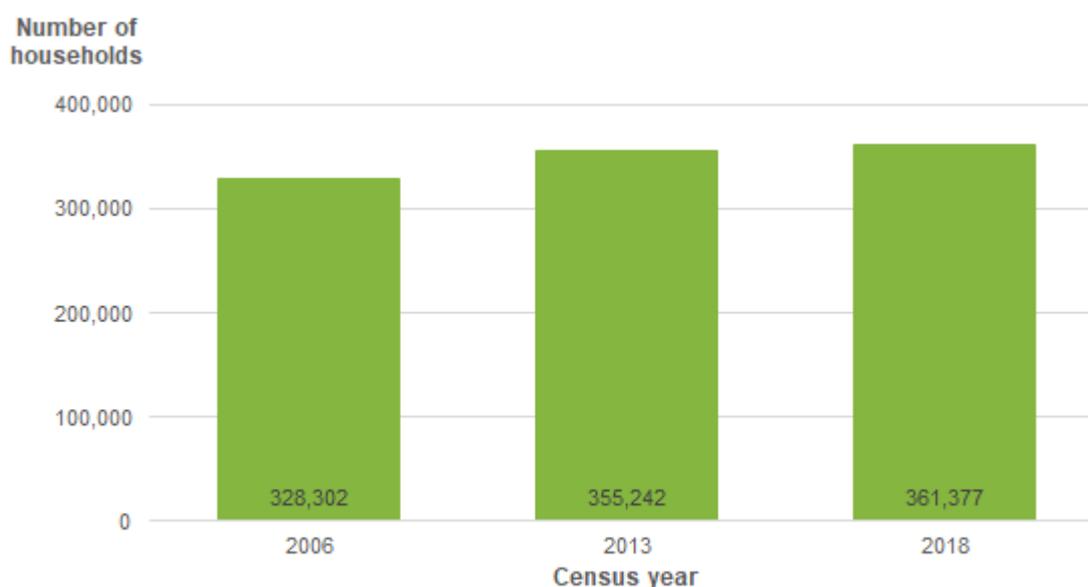
Notes: Numbers should be treated as lower bounds, as there was some missing data due to lower response rates in the Census.
Source: New Zealand Census of Population and Dwellings

In 2018, this represented 22.7% of households in New Zealand that had only one person. This percentage had remained relatively consistent since 2006 (Figure 93).

Figure 93: Percentage of households with only one person, 2006, 2013, 2018
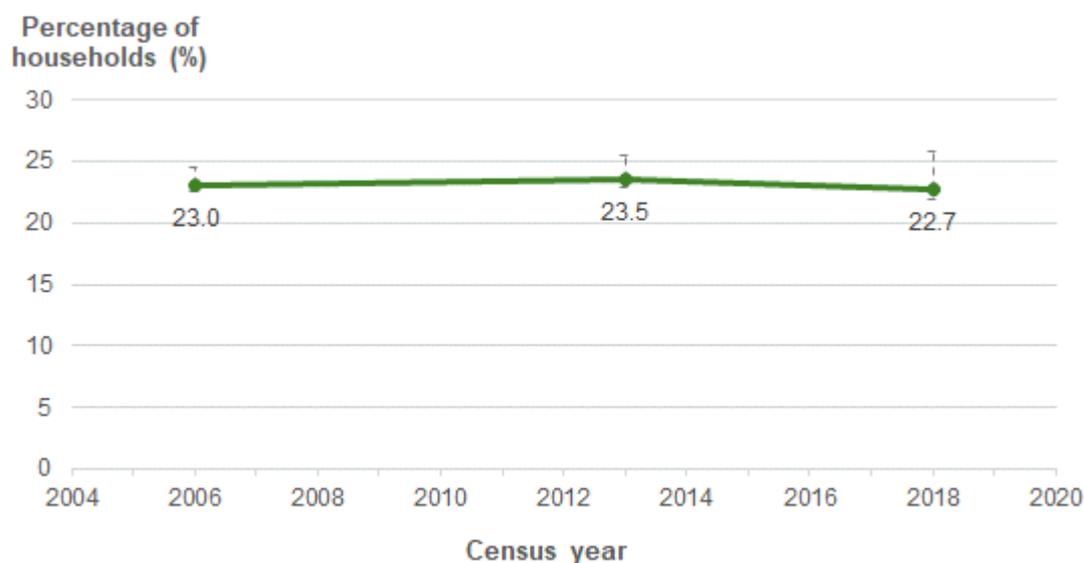

Notes: Percentages are presented among the total stated households. There is some uncertainty in the estimates (particularly 2018), due to missing data in the Census. Logical bounds are presented, to give the lower and upper bounds of what the percentage could be, allowing for the missing data due to lower response rates.
Source: New Zealand Census of Population and Dwellings

In 2018, almost half of these households were older adults aged 65+ years living alone (170,322 households, 47.1% of all households with one person) (see section 8.5 for more details on households with older adults living alone).

In some areas, about one in three households have only one person

In 2018, some territorial authorities had a higher percentage of households with only one person in them. These included:

- Buller District (36.3% of households)
- Whanganui District (32.8%)
- Grey District (31.6%)
- Westland District (31.1%)
- Horowhenua District (30.9%)
- Ruapehu District (30.8%)
- Gore District (30.5%)
- Thames-Coromandel District (29.7%)
- Waitaki District (29.7%).

Figure 94: Percentage of households with only one person, by territorial authority, 2018

Source: New Zealand Census of Population and Dwellings

11.3   Immigrants arrived in the past year

Immigrants who have arrived in New Zealand in the previous year may be more vulnerable to climate-related hazards. They may not have strong social connections, if they have arrived recently in the country. They may also be less aware of hazards, how to prepare for hazards, what to do in a disaster, and how to seek assistance after a disaster. They may find it difficult to receive, access and/or understand information, if English is their second language. Immigrants may also come from different cultures and/or speak other languages, and therefore may be an important group to consider for CDEM emergency management and preparedness, as they may require additional support (MCDEM, 2013a).

Indicator definition

This indicator shows immigrants who arrived in the past year (ie past 12 months), among the usually resident population, from the NZ Census of Population and Dwellings.

About 1.6% of residents arrived in New Zealand in the past year

In 2018, 73,617 people were usually resident in New Zealand and had arrived in New Zealand in the past year (0–12 months) (Figure 95). This was about 1.6% of the population, similar to 2006 (1.5%) and slightly higher than 2013 (1.2%) (Figure 96).

Figure 95: Number of immigrants who arrived in the past 12 months, 2006, 2013, 2018
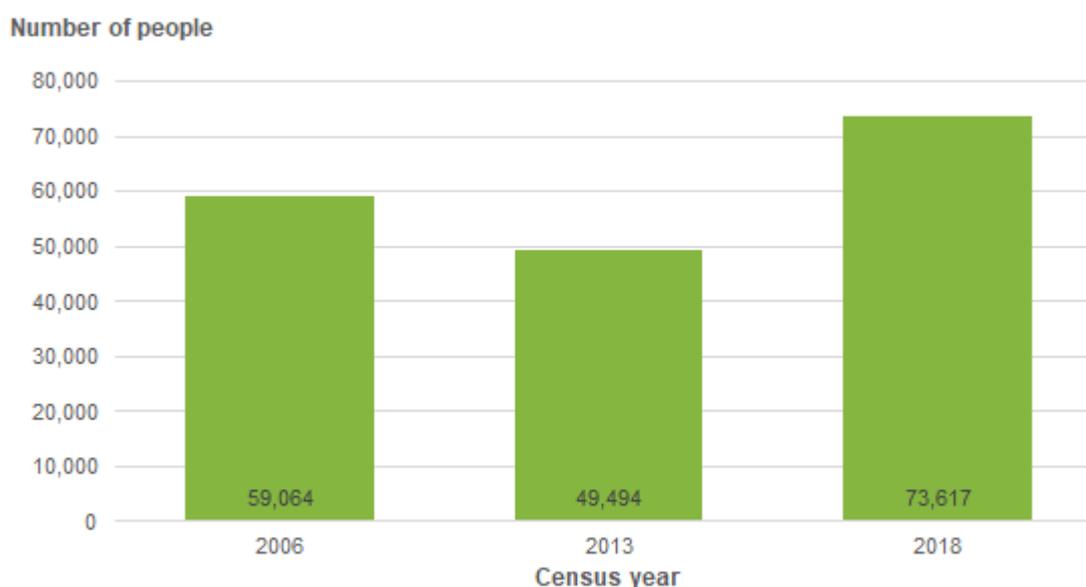
Source: New Zealand Census of Population and Dwellings

Figure 96: Percentage of the population who arrived in the past 12 months, 2006, 2013, 2018
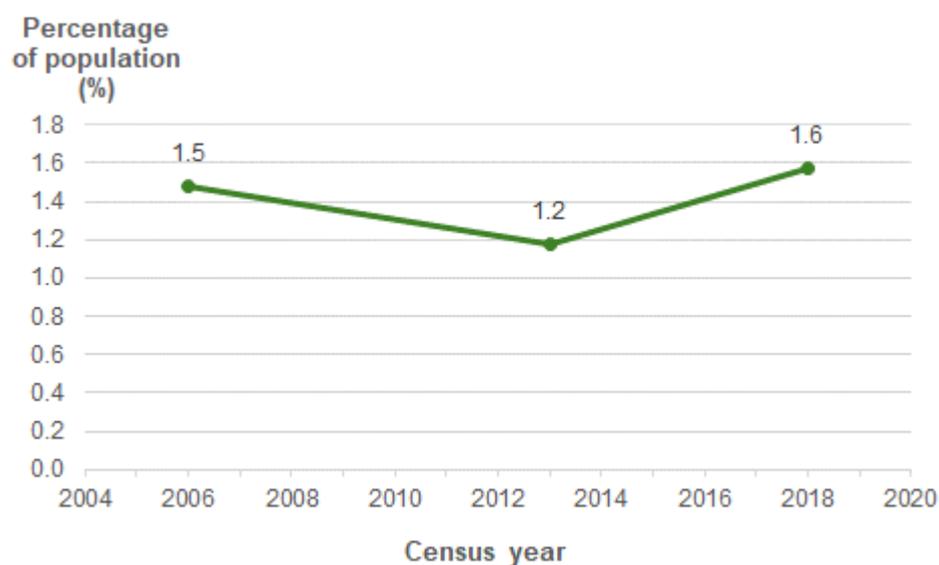
Source: New Zealand Census of Population and Dwellings

Results by territorial authority

In 2018, some territorial authorities had a higher percentage of the population who had arrived in the past year. These territorial authorities mostly included tourist areas in the South Island, and major New Zealand cities:

- Queenstown-Lakes District (5.1% of the population)
- Mackenzie District (3.4%)
- Wellington City (2.5%)
- Auckland City (2.2%)
- Westland District (2.1%)
- Hamilton City (1.9%)
- Christchurch City (1.8%)
- Kaikōura District (1.7%)
- Central Otago District (1.7%).

Figure 97: Percentage of people who arrived in New Zealand in the past 12 months, by territorial authority, 2018
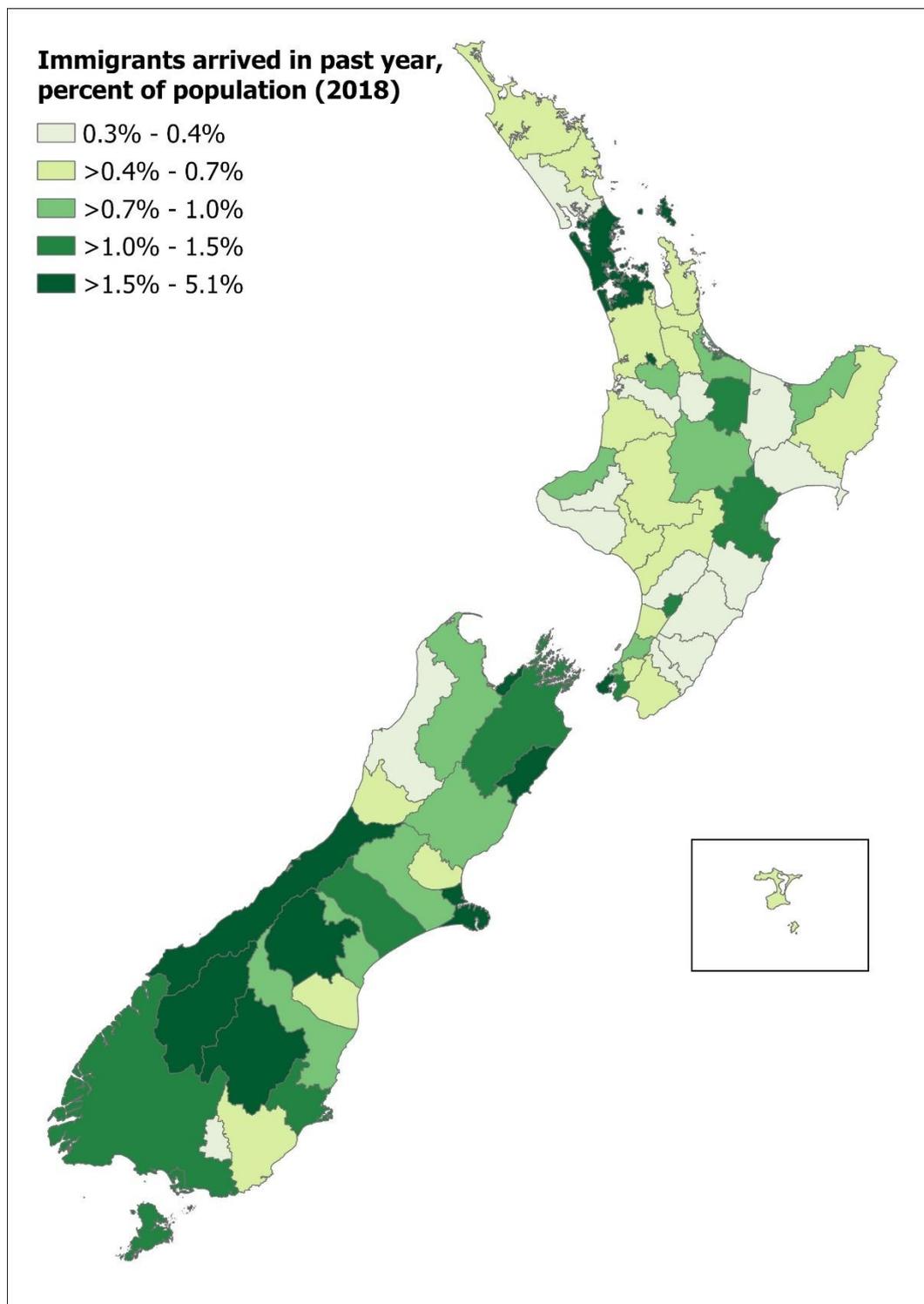
Source: New Zealand Census of Population and Dwellings

11.4   Immigrants arrived in the past two years

Immigrants who have arrived in New Zealand in the previous two years may be more vulnerable to climate-related hazards. They may still not have strong social connections, if they have only lived for less than two years in the country. Additionally, recent immigrants may also be less aware of hazards, how to prepare for hazards, what to do in a disaster, and how to seek assistance after a disaster. Immigrants may also come from different cultures and/or speak other languages, and therefore may be an important group to consider for CDEM emergency management and preparedness, as they may require additional support (MCDEM, 2013a)

Indicator definition

This indicator shows immigrants who arrived in New Zealand in the past 24 months (ie the past 0–1 years according to the Census), among the usually resident population, from the NZ Census of Population and Dwellings.

Almost 150,000 residents had arrived in New Zealand in the past 24 months

In 2018, 148,002 people were usually resident in New Zealand and had arrived in New Zealand in the past 24 months. This was a substantial increase from 2013 (93,162 people) (Figure 98).

Figure 98: Number of immigrants who arrived in New Zealand in the past 24 months, 2006, 2013, 2018

Number of people
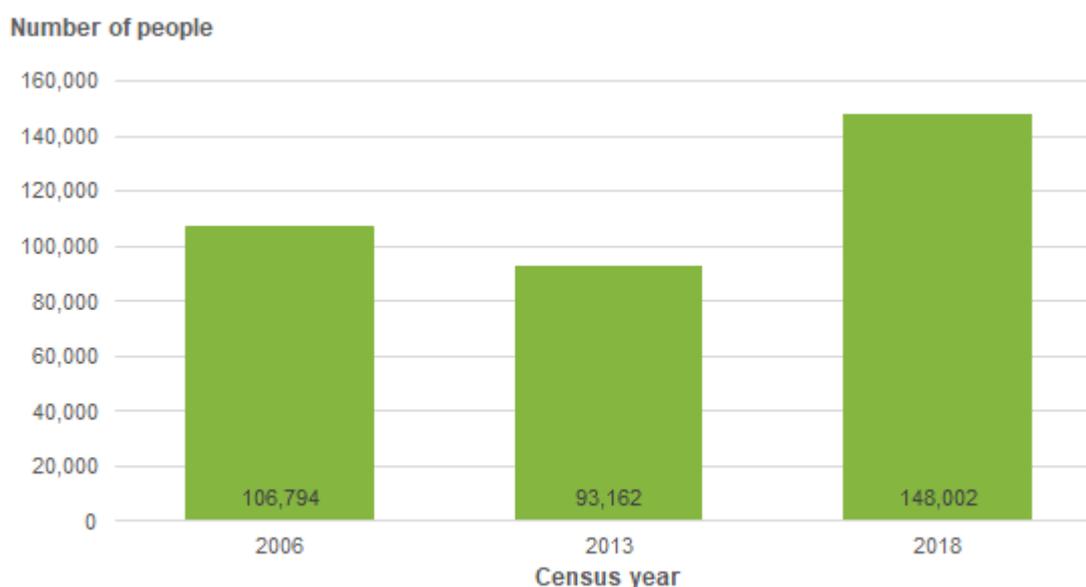
Source: New Zealand Census of Population and Dwellings

In 2018, about 3.2% of the Census usually resident population had arrived in New Zealand in the past 24 months, an increase from 2013 (2.2% of the population) (Figure 99).

Figure 99: Percentage of the population who arrived in New Zealand in the past 24 months, 2006, 2013, 2018
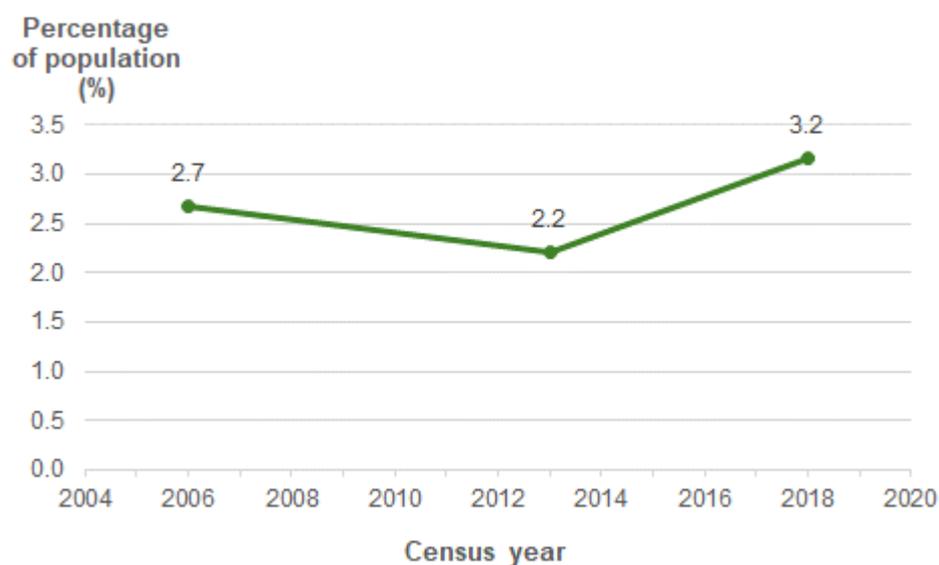

Source: New Zealand Census of Population and Dwellings

Results by territorial authority

In 2018, some territorial authorities had a higher percentage of the population who had arrived in New Zealand in the past two years. These included:

- Queenstown-Lakes District (10.5% of the population)
- Mackenzie District (6.1%)
- Wellington City (4.7%)
- Auckland City (4.6%)
- Hamilton City (3.8%)
- Christchurch City (3.8%)
- Westland District (3.4%).

Figure 100: Percentage of people who arrived in New Zealand in the past 24 months, by territorial authority, 2018
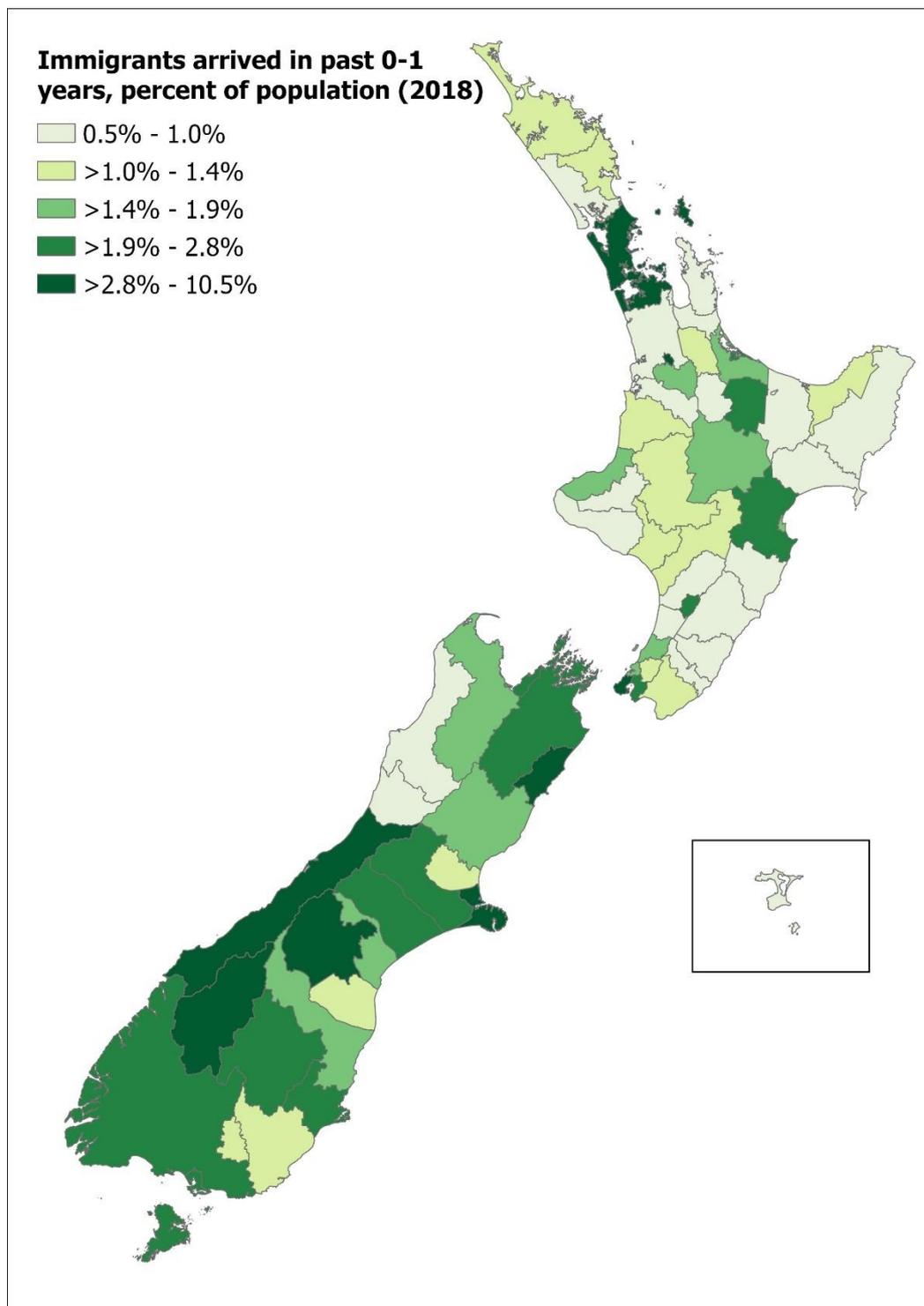
Source: New Zealand Census of Population and Dwellings

12 Awareness, knowledge and skills to cope with hazards

This section presents social vulnerability indicators relating to awareness, knowledge and skills to cope with hazards.

12.1 Overview

Awareness of hazards and relevant information is important for resilience

Understanding information is important for being able to prepare, understand early warnings, know where to evacuate to, and how to cope during a hazard event, and how to access services after an emergency. Being able to access information is important, before, during and after a hazard event.

Mobile phones allow communication with friends, family and neighbours, as well as accessing information and getting emergency alerts. Information is commonly made available through the internet, and households without access to the internet may find it more difficult to access this information.

Additionally, people who have limited English language skills, or who are new to the country, may have difficulties accessing and understanding information. People who do not speak English may not be able to understand risks, warnings, and emergency directives that are conveyed only in English (Li et al., 2023).

Furthermore, a lack of awareness of local natural hazards is an important cause of vulnerability to flooding and other hazards. People who are new to the area, or who are tourists, can be vulnerable for this reason. Education can increase awareness of hazards, relevant information, and help in navigating bureaucratic processes (Davies et al., 2018). Providing accessible information to the public (eg about local hazards, what to do in an emergency, how to access services during and/or after a hazard event) is important for resilience.

Some groups of people may be particularly vulnerable, including:
- people who have limited proficiency in English
- people who are new to New Zealand, such as tourists, recent immigrants, and refugees
- people without access to telecommunications or internet, particularly if the internet is the main way that information is shared before, during and after a flood (eg how to get prepared for a flood, updated weather information, boil water notices, how to access help)
- people who do not have previous experience or indigenous knowledge of flood hazards and impacts
- people who are new to the local area, such as seasonal workers, transitory workers (such as truck drivers), and tourists.

Social vulnerability indicators related to this dimension

Key indicators in this section include:
- Households with no access to a mobile phone

- Households with no access to the internet
- People who do not speak English

Other relevant indicators include:

- Living in rental housing (see page 179)
- Immigrants arriving in the past year (see page 157)
- Immigrants arriving in the past two years (see page 160)

12.2 Households with no access to a mobile phone

In a hazard event (such as a flood or extreme weather event), mobile phones (eg cellphones, smart phones) are an important way for communicating with friends, family, neighbours and colleagues, as well as getting information updates. Emergency alerts and/or information may also be sent via mobile phones.

People with no access to a cellphone may find it more difficult to get information and get in contact with people, particularly when they are away from a landline phone and/or computer.

Resilience of the mobile phone network plays an important role in a hazard event as well. In main towns and cities, the cellphone network is relatively robust to natural hazards and is a top priority for repairs, although still relies on people having electricity to recharge their phones. In rural areas, the cellphone network is more vulnerable, as faults may not be able to be fixed as quickly.

Indicator definition

This indicator shows the number of households that have no access to a mobile phone, among all households in occupied private dwellings (total stated), from the NZ Census of Population and Dwellings.

Most households have access to a mobile phone

In 2018, about 8.1% of households did not have access to a mobile phone. This percentage had decreased dramatically since 2006 (25.8%) and 2013 (16.3%) (Figure 101).

Figure 101: Percentage of households with no access to a mobile phone, 2006, 2013, 2018
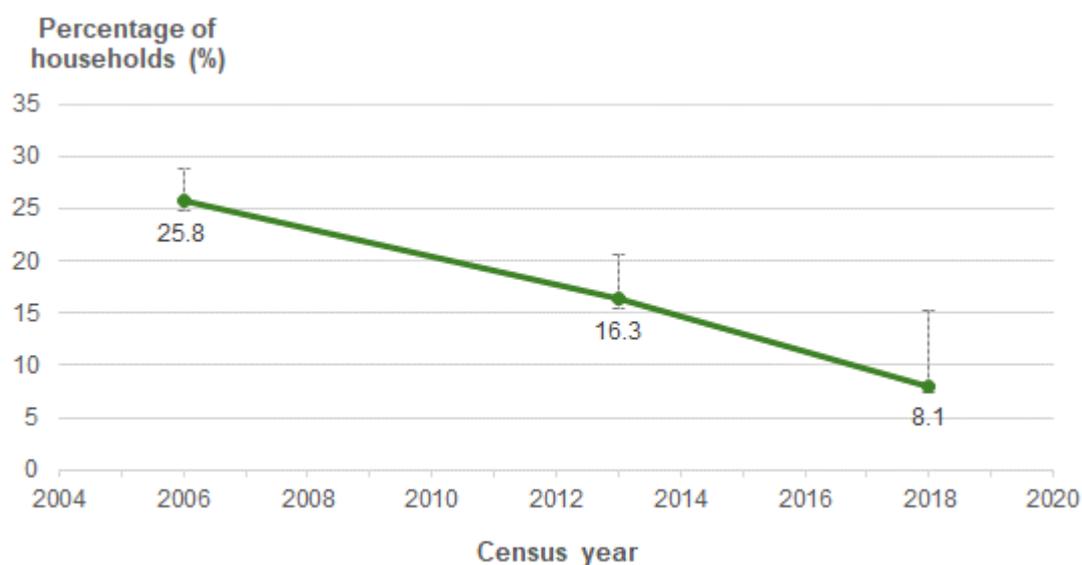
Note: There is some uncertainty in the estimates (particularly 2018), due to missing data. Logical bounds are presented, to give the lower and upper bounds of what the percentage could be, allowing for missing data due to lower response rates.
Source: New Zealand Census of Population and Dwellings

In 2018, 122,976 households reported no access to a mobile phone. However, this number should be taken as a lower bound, as there was substantial missing data in the 2018 Census.

The number of households without access to a mobile phone is likely to have further decreased since 2018. The 2023 Census will allow updated information about this indicator.

Similar percentages of households without a mobile phone across urban and rural areas

There were relatively similar percentages of households without access to a mobile phone across urban and rural areas in 2018 (Figure 102). However, the percentage was slightly higher in rural areas, where 8.9% of households had no mobile phone. This higher rate may partly have been due to issues with mobile coverage in rural areas at the time of the 2018 Census.

Figure 102: Estimated percentage of households with no access to a mobile phone, by urban/rural category, 2018
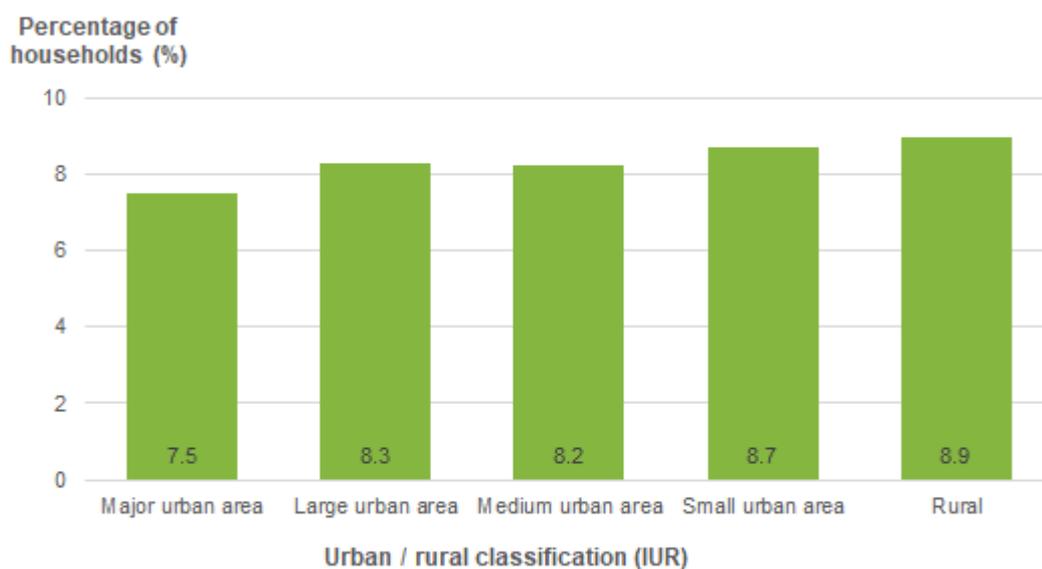
Notes: Percentages are estimates, as they are based on numbers summed over SA2s.
Source: New Zealand Census of Population and Dwellings

One in eight households in more deprived areas do not have access to a mobile phone

In 2018, the percentage of households without access to a mobile phone was much higher in the most deprived areas (NZDep2018 decile 10) (12.2%) compared with the least deprived areas (decile 1) (3.9%) (Figure 103). In the most deprived areas, this represents about one in eight households without access to a mobile phone.

Figure 103: Estimated percentage of households with no access to a mobile phone, by socioeconomic deprivation (NZDep2018 deciles), 2018
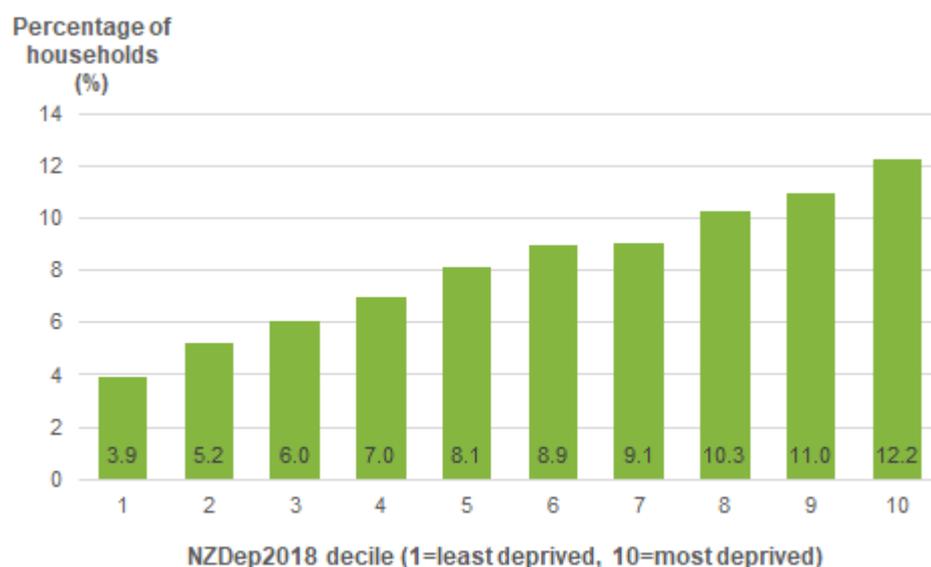
Notes: Percentages are estimates, as they are based on numbers summed over SA2s.
Source: New Zealand Census of Population and Dwellings

Results by territorial authority

In 2018, some territorial authorities had a higher percentage of households who had no access to a mobile phone. These included:

- Chatham Islands (93.8% of households)
- Wairoa District (19.5%)
- Westland District (18.5%)
- Waitomo District (17.8%)
- Ōpōtiki District (17.7%)
- Ruapehu District (16.2%)
- Tararua District (15.3%)
- Buller District (15.0%).

Figure 104: Percentage of households who had no access to a mobile phone, by territorial authority, 2018
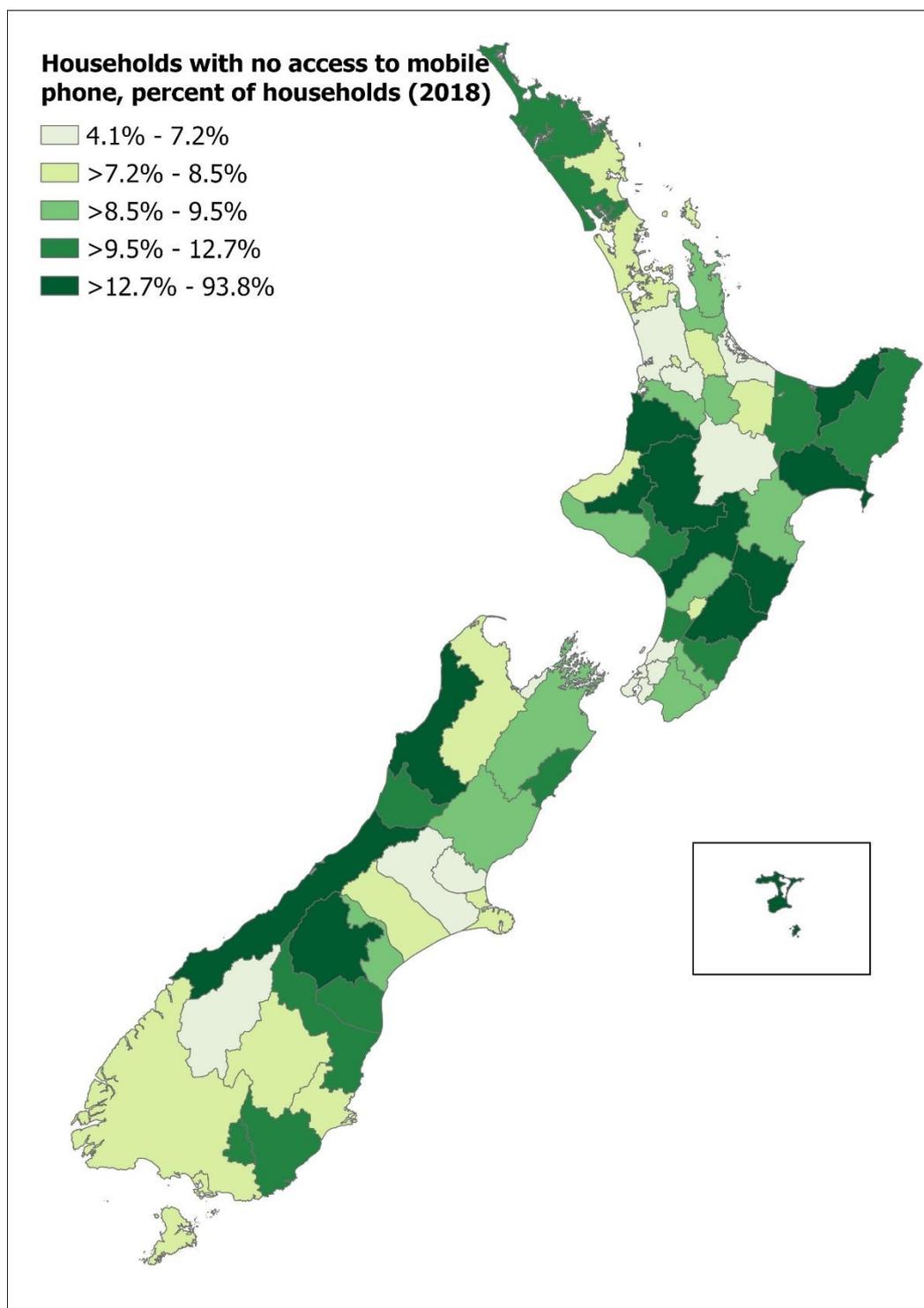
Source: New Zealand Census of Population and Dwellings

12.3   Households with no access to the internet

People with no access to the internet may have difficulty accessing information about hazards (such as flood hazards), and how to prepare and act, before, during and after a hazard event. Understanding and accessing this information is important for being able to prepare, understand early warnings, know where to evacuate to, how to cope and how to access support services after an emergency.

People with no access to the internet will need to rely on other media or avenues of information (such as the radio, information pamphlets, and other people) to get information updates during a hazard event. Therefore, it is important that information is provided in a variety of formats, not simply online, particularly for more vulnerable communities where having the internet is not as common.

Indicator definition

This indicator shows households with no access to the internet, as a percentage of all households in occupied private dwellings (total stated).

It should be noted that the 2018 Census was mainly administered via online forms (accessible via the internet), although paper forms were also available. As a result, there may be an undercount in the true number of households with no access to the internet.

About 14% of households had no access to the internet in 2018

In 2018, 13.9% of households had no access to the internet. This had decreased substantially from 2006 (39.5% of households) and 2013 (23.2%) (Figure 105).

Figure 105: Percentage of households with no access to the internet, 2006, 2013, 2018
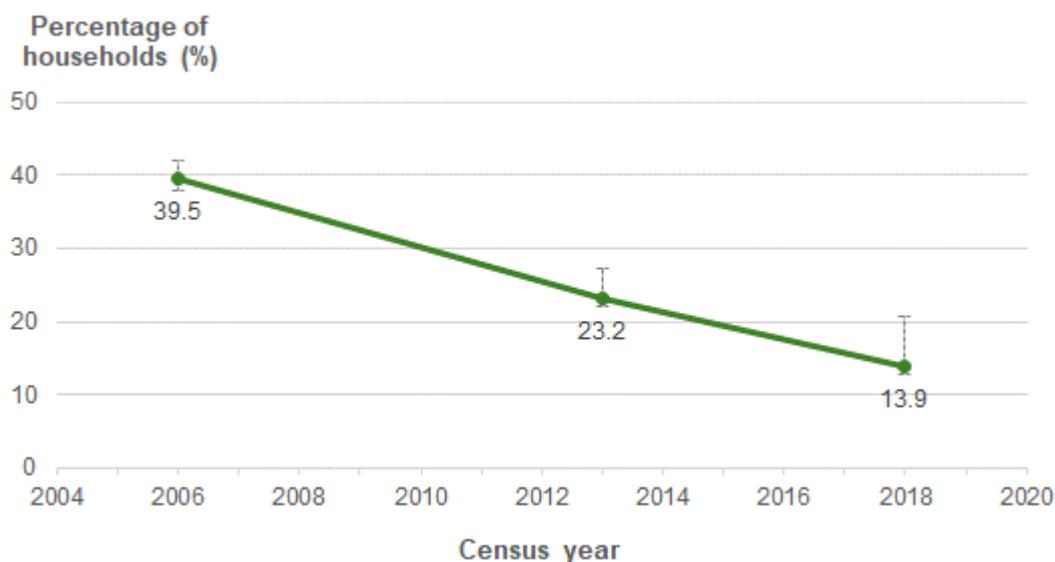
Note: There is some uncertainty in the estimates (particularly 2018), due to missing data. Logical bounds are presented, to give the lower and upper bounds of what the percentage could be, allowing for missing data due to lower response rates.
Source: New Zealand Census of Population and Dwellings

In 2018, this represented at least 211,722 households that did not have access to the internet. However, this number should be treated as a lower bound, as there was some missing data in the 2018 Census.

Almost one in five households in small urban areas did not have access to the internet in 2018

The highest percentage of households without access to the internet was in small urban areas (19.1%) (Figure 106).

Figure 106: Estimated percentage of households with no access to the internet, by urban/rural category, 2018

Percentage of households (%)

Major urban area	Large urban area	Medium urban area	Small urban area	Rural
11.2	16.3	15.9	19.1	14.9

Urban / rural classification (IUR)

Notes: Percentages are estimates, as they are based on numbers summed over SA2s.
Source: New Zealand Census of Population and Dwellings

In 2018, one in four households in the most deprived areas did not have access to the internet in 2018

The Census variable of households with no access to the internet is part of the New Zealand Index of Socioeconomic Deprivation (NZDep), so it is expected that there is a strong association between NZDep and this variable. However, it is still helpful to see the patterns by NZDep.

About one in four households (26.3%) in the most deprived areas (NZDep2018 decile 10) did not have access to the internet in 2018 (Figure 107).

Figure 107: Estimated percentage of households with no access to the internet, by NZDep2018 deciles, 2018
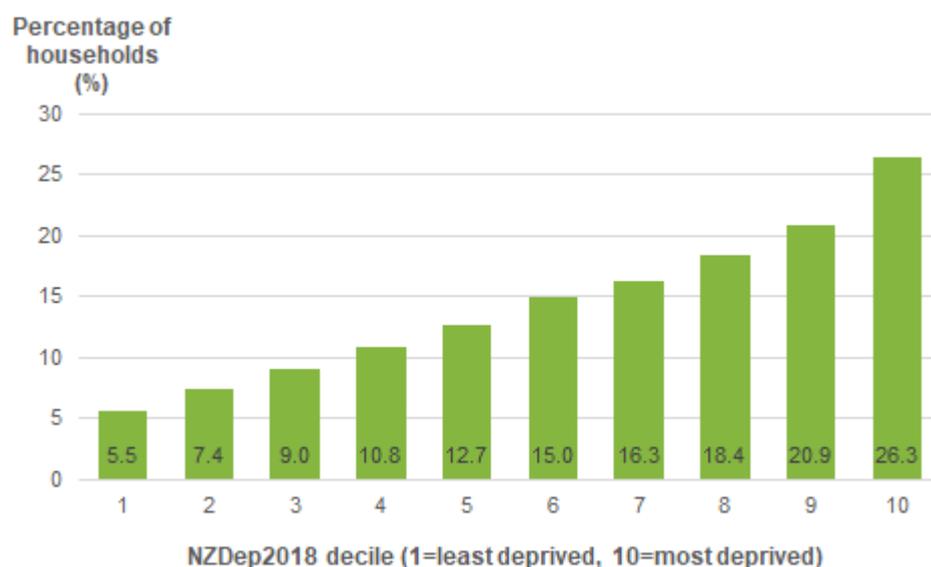
Notes: Percentages are estimates, as they are based on numbers summed over SA2s.
Source: New Zealand Census of Population and Dwellings

Results by territorial authority

In 2018, some territorial authorities had a higher percentage of households who had no access to the internet. These included:

- Chatham Islands (35.0% of households)
- Wairoa District (29.5%)
- Waitomo District (28.4%)
- Ōpōtiki District (27.9%)
- Buller District (27.3%)
- Ruapehu District (25.0%)
- Kawerau District (24.5%)
- Tararua District (23.7%).

Figure 108: Percentage of households who had no access to the internet, by territorial authority, 2018
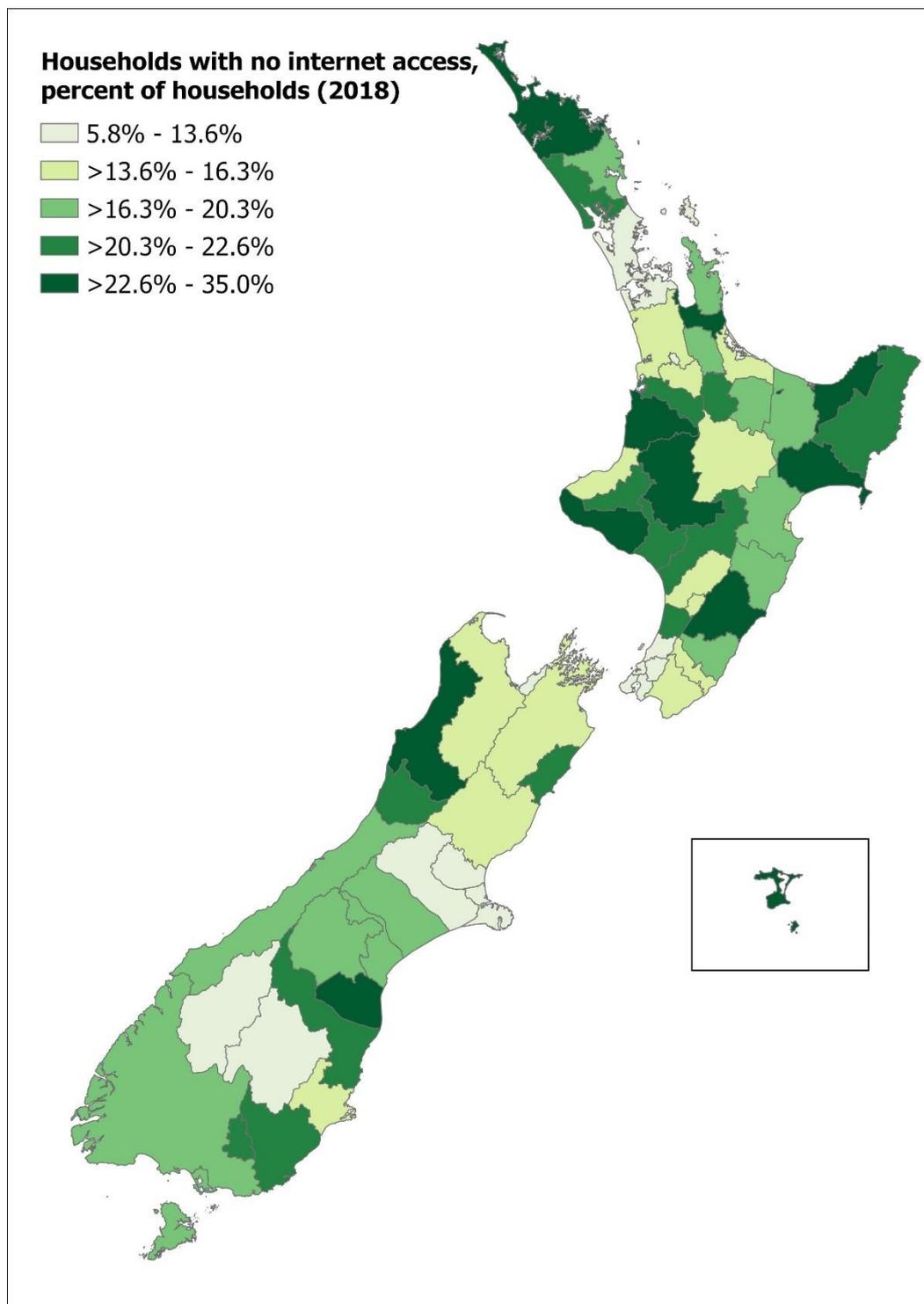
Source: New Zealand Census of Population and Dwellings

12.4 People who do not speak English

Understanding information is important for being able to understand the local flood hazards, prepare, understand early warnings, know where to evacuate to, how to cope, and how to access support services after an emergency. People who have limited proficiency in English (including those who are new to the country) may have difficulties receiving or accessing information about hazards, which may make them more vulnerable. They may not be able to understand risks, warnings, and emergency directives that are conveyed only in English (Li et al., 2023).

Understanding where non-English speakers live is helpful to inform disaster risk reduction activities. Providing information in other languages, including about hazards, what to do in a disaster, and where to go to access help afterwards, is very valuable. CDEM groups specifically consider the needs of culturally and linguistically diverse (CALD) communities (MCDEM, 2013a).

Indicator definition

This indicator shows people who do not speak English (ie cannot have a conversation about a lot of everyday things), as a percentage of the Census usually resident population (excluding people who do not speak at all, such as young children).

In 2018, about 2.5% of the New Zealand population did not speak English

In 2018, 115,833 people in New Zealand did not speak English, a substantial increase since 2013 (85,878 people) (Figure 109).

Figure 109: Number of people who did not speak English, 2006, 2013, 2018
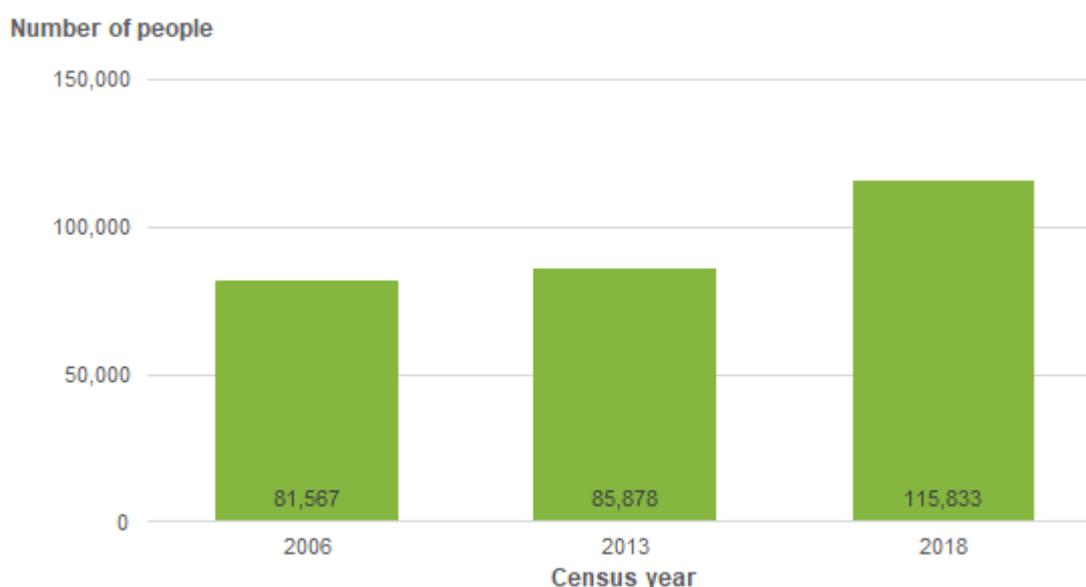
Source: New Zealand Census of Population and Dwellings

Overall, about 2.5% of the population did not speak English in 2018. The percentage had increased from 2006 (2.2%) and 2013 (2.2%) (Figure 110).

Figure 110: Percentage of the population who did not speak English, 2006, 2013, 2018
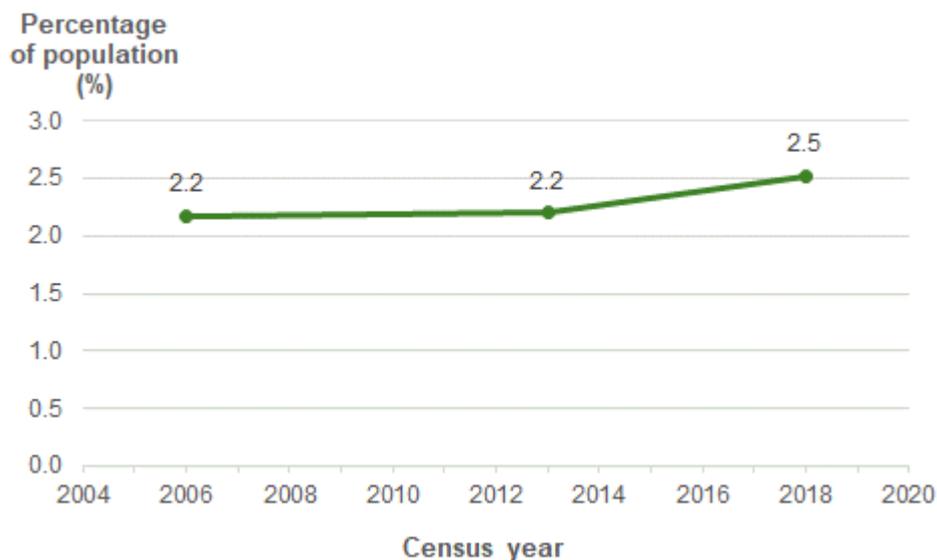
Source: New Zealand Census of Population and Dwellings

Four percent of the population in major urban areas do not speak English

Major urban areas had a higher percentage of the population who could not speak English (4.0%), compared with other urban/rural area types (Figure 111).

Figure 111: Estimated percentage of the population who did not speak English, by urban/rural category, 2018
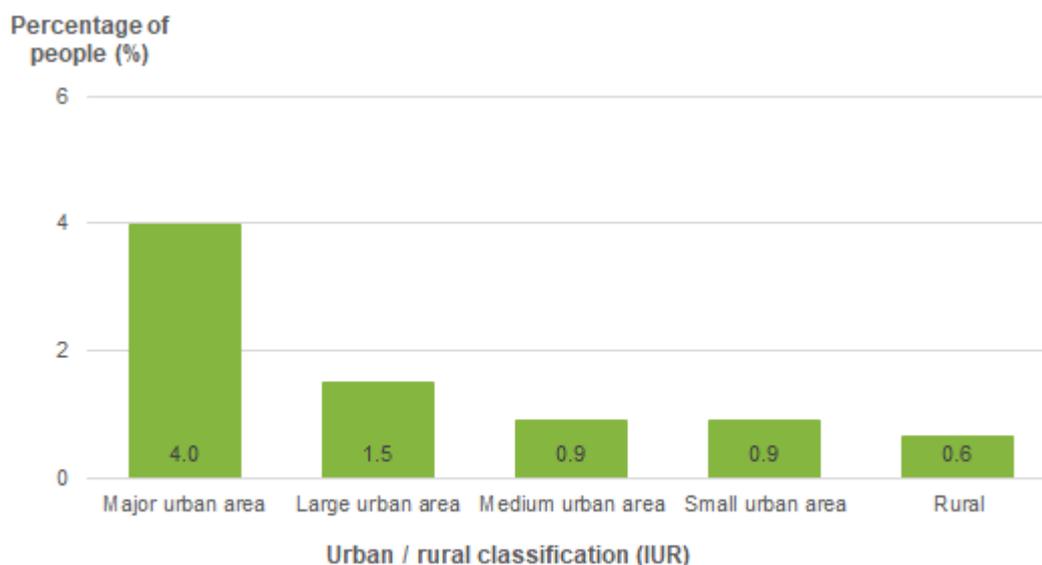
Notes: Percentages are estimates, as they are based on numbers summed over SA2s.
Source: New Zealand Census of Population and Dwellings

The percentage of the population not able to speak English was relatively consistent across NZDep2018 deciles, except for the most deprived decile (decile 10), which had a somewhat higher percentage at 4.0% (Figure 112).

Figure 112: Estimated percentage of the population who do not speak English, by socioeconomic deprivation (NZDep2018 deciles), 2018
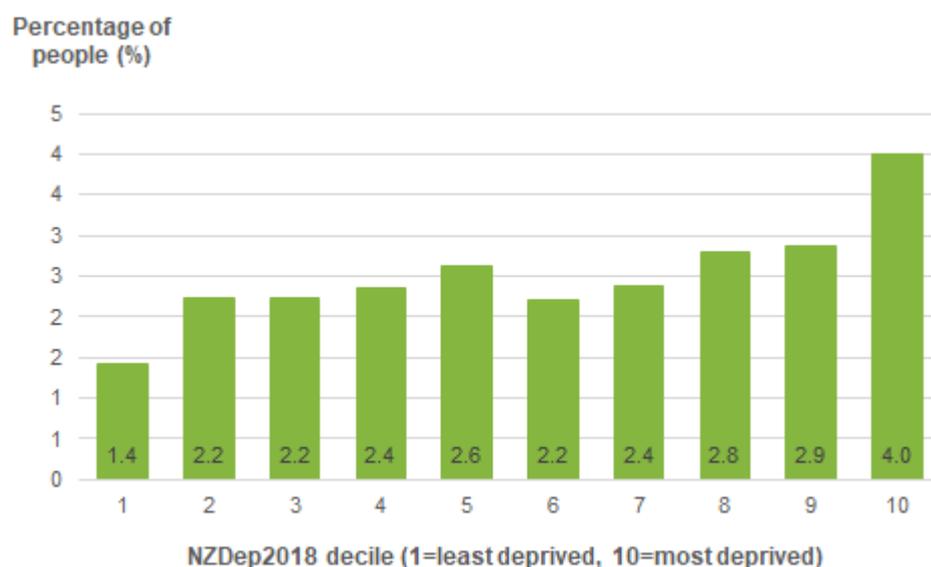
Percentage of people (%)

Decile	Percentage
1	1.4
2	2.2
3	2.2
4	2.4
5	2.6
6	2.2
7	2.4
8	2.8
9	2.9
10	4.0

NZDep2018 decile (1=least deprived, 10=most deprived)

Notes: Percentages are estimates, as they are based on numbers summed over SA2s.
Source: New Zealand Census of Population and Dwellings

Almost 5 percent of Aucklanders do not speak English

In 2018, the main urban areas had higher percentages of people who did not speak English. These territorial authorities with higher percentages included:

- Auckland City (4.9% of people)
- Hamilton City (2.9%)
- Porirua City (2.5%)
- Lower Hutt City (2.5%)
- Christchurch City (2.1%)
- Wellington City (2.1%)
- Palmerston North City (1.9%)
- Rotorua District (1.7%).

Figure 113: Percentage of the population who did not speak English, by territorial authority, 2018

People who don't speak English, percent of population (2018)

- 0.0% - 0.5%
- >0.5% - 0.8%
- >0.8% - 1.1%
- >1.1% - 1.5%
- >1.5% - 4.9%
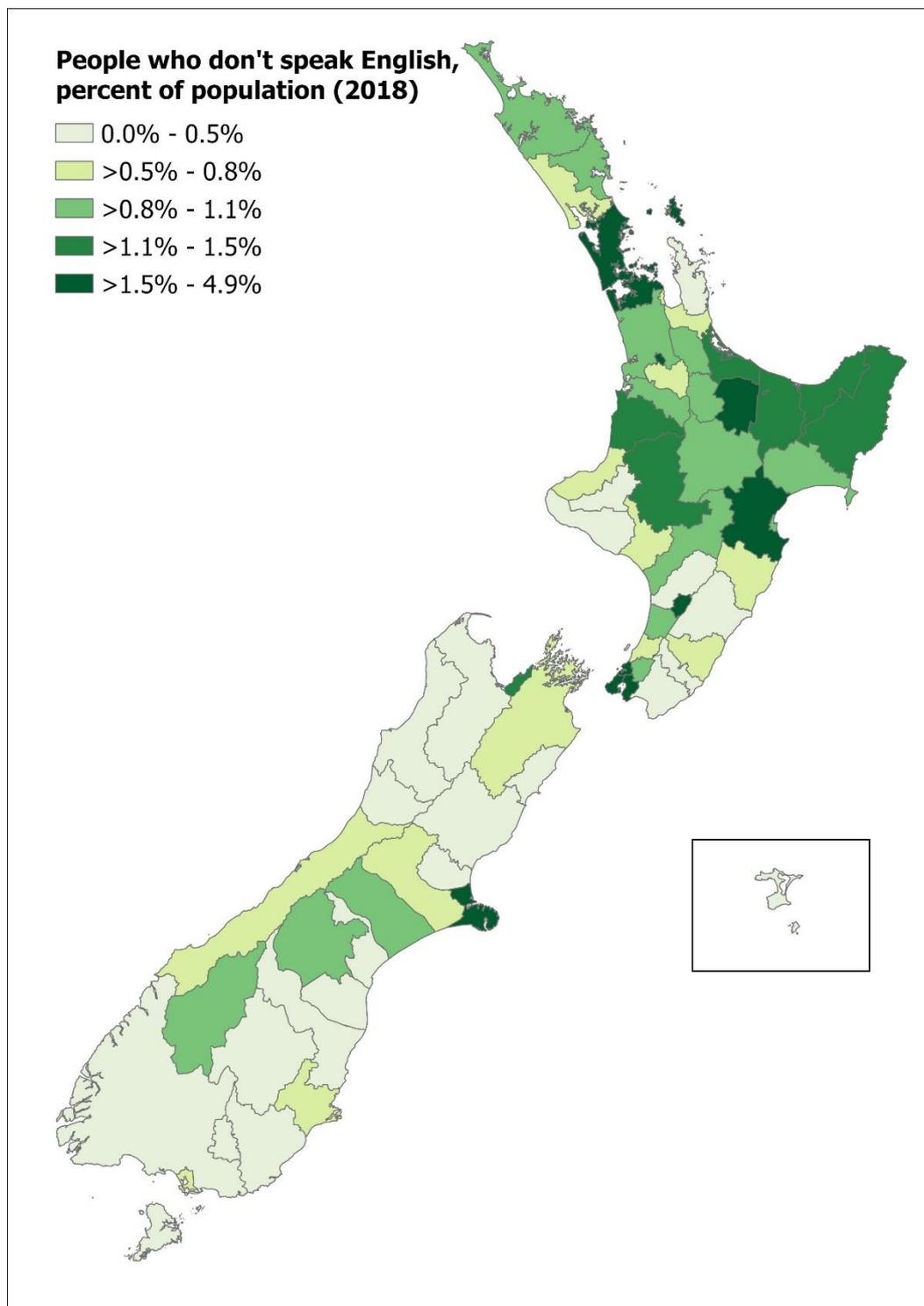
Source: New Zealand Census of Population and Dwellings

13 Safe, secure and healthy housing

This section presents social vulnerability indicators relating to having safe, secure and healthy housing.

13.1 Overview

Safe, secure and healthy housing is important for resilience

Housing quality and safety can have an important impact on people's resilience and/or vulnerability. Shelter, warmth and security are some of the basic needs for human survival. Housing is also a key social determinant of health and wellbeing, and good quality housing can improve people's health.

For flood hazards, people may be more vulnerable if their house is located in a flood hazard zone (particularly in areas of deep water or overland flow), if their house is not well constructed, or if floor heights are not high enough to escape floodwaters. For heatwaves, houses need to have adequate ventilation, and ideally some way of cooling the house down.

People's living situations may also make them more vulnerable

People's living situation can also make them vulnerable. People living in rental housing are more vulnerable to climate-related hazards, such as floods, heatwaves and wildfires (Li et al., 2023, Davies et al., 2018, Joynt and Golubiewski, 2019). People living in rental housing are at risk of displacement after a hazard event, if the home-owners need to do repairs. Rental properties are also generally of poorer quality than owner-occupied houses (White et al., 2017), and renters may have very limited ability to make changes or improvements to dwellings to make them more resilient to hazards.

Living in crowded households can make people more vulnerable to the impacts of climate-related hazards such as floods, extreme weather events and heatwaves (Joynt and Golubiewski, 2019, Palaiologou et al., 2019, Li et al., 2023). People living in crowded houses are also at increased risk of infectious diseases, and are particularly vulnerable if displaced from their home. Overcrowded houses can also increase the number of people in a hazard zone, and put pressure on emergency resources in a household.

Damp and mouldy housing can negatively affect health, and can cause respiratory impacts such as asthma (Prezant and Douwes, 2011).

Shelter during an emergency can provide resilience

Emergency shelters, and in particular marae, can be important sources of resilience for a local community, as they can provide safe shelter for people during a disaster. If houses are not safe in a flood, people need to have an emergency shelter they can go to in their local area. This emergency shelter needs to be out of the hazard zone, accessible to all, and provide shelter from the weather. In many communities, marae have played a vitally important role in providing emergency shelter during disasters.

Māori also face distinct challenges

Māori also face some distinct challenges that make them more vulnerable to climate-related hazards (Faulkner, 2019). For example, Māori freehold land lies in collective ownership, and

therefore cannot be sold. This means that people living in houses on Māori land cannot relocate from vulnerable environments, or move if the property is damaged in a flood. These people may have difficulties in recovering after a flood, and may remain living in flood-damaged houses if they do not have the resources to repair the house or have alternative accommodation. Iwi may also have limited options for protecting marae in vulnerable areas (including in flood hazard zones), as it may be difficult to relocate them.

Social vulnerability indicators related to this dimension

Key indicators in this section include:

- Living in rented dwellings
- People living in crowded households
- Damp dwellings
- Mouldy dwellings
- Homelessness and/or severe housing deprivation

Other relevant indicators include:

- Dwellings with no access to safe running water (see page 230)
- Dwellings with no access to a fridge (see page 232)
- Dwellings with no electricity (see page 234)

13.2   Living in rented dwellings

Housing quality and safety can have an important impact on people's vulnerability. People living in rental housing are more vulnerable to climate-related hazards, such as floods, heatwaves and wildfires.

Rental housing is generally of poorer quality than owner-occupied housing in New Zealand, and is more likely to have damp and mould (White et al., 2017). People in rental housing may have very limited ability to make improvements to the house (such as installing insulation, ventilation, flood protection works) in order to improve its resilience to hazards (Joynt and Golubiewski, 2019).

People in rental housing are also less likely to have basic household emergency preparedness (Stats NZ, 2022). People living in rental housing are also at higher risk of being displaced and/or made homeless after a flood or hazard event (for example if the owners need to do repairs); this can lead to fewer rental properties available, higher rents, and higher unmet need for housing after a disaster (Howden-Chapman et al., 2021, Phibbs et al., 2016).

Living in rental housing is part of the New Zealand Index of Socioeconomic Deprivation (NZDep2018) (Atkinson et al., 2020).

Indicator definition

This indicator shows households that are living in rented dwellings (ie that are not owned and not held in a family trust), as a percentage of all households in occupied private dwellings.

Increase in households living in rental dwellings

In 2018, 586,131 households were living in rental dwellings (out of 1.6 million households). This number had increased substantially since 2006 (451,965 households) and 2013 (512,109 households) (Figure 114).

Figure 114: Number of households living in rented dwellings, 2006, 2013, 2018
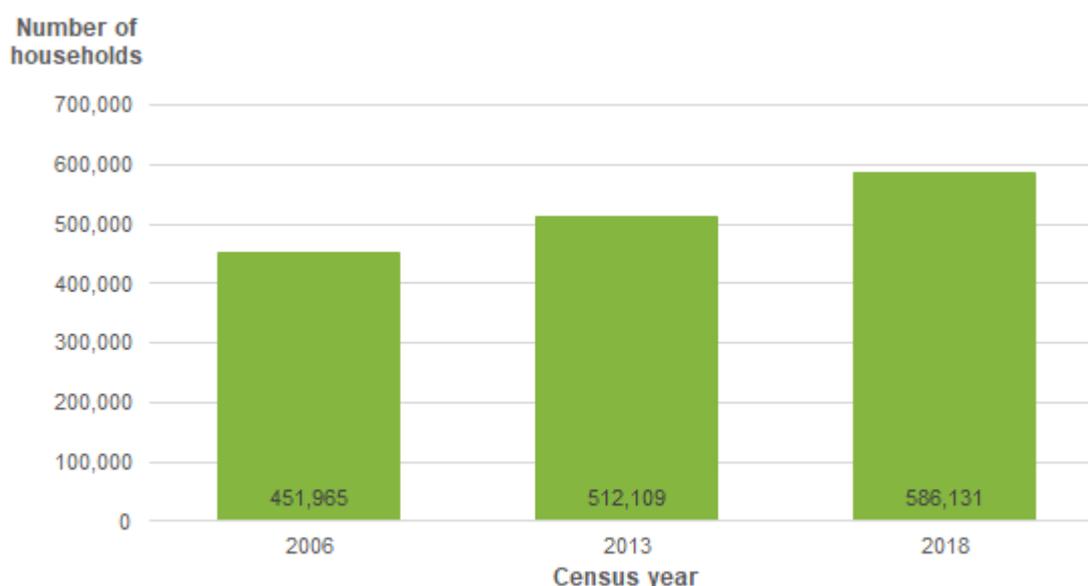
Source: New Zealand Census of Population and Dwellings

The percentage of all households living in rented dwellings was 35.5% in 2018, a slight increase since 2006 (33.1%) and 2013 (35.2%) (Figure 115).

Figure 115: Percentage of households living in rented dwellings, 2006, 2013, 2018
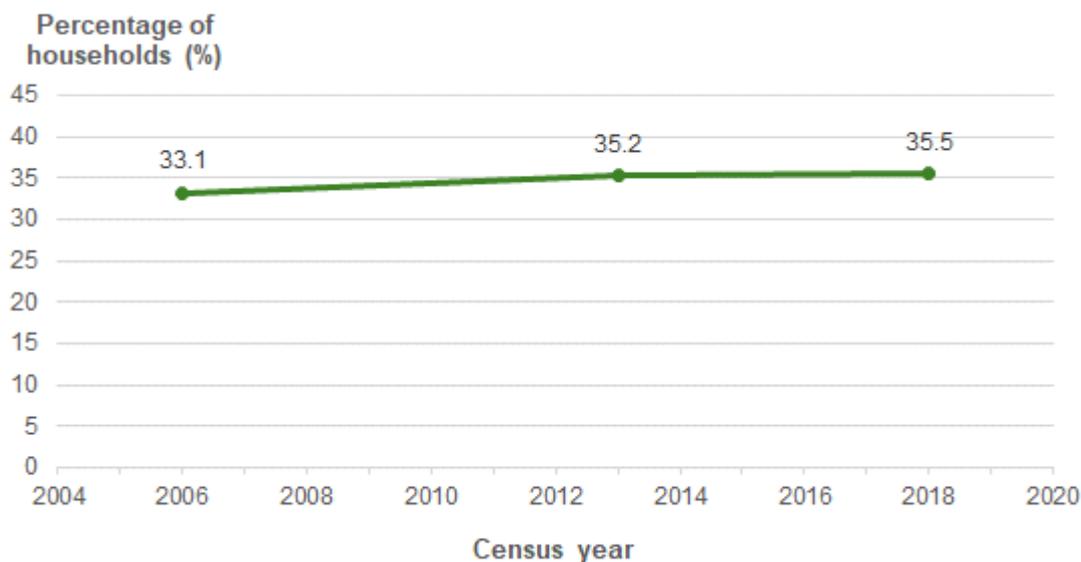
Source: New Zealand Census of Population and Dwellings

Stats NZ reported that home ownership rates were lowest in 2018 since 1951 (Stats NZ, 2020b).

Living in rented dwellings is most common in major urban areas

Major urban areas had the highest percentage of households living in rental dwellings (40.9%) (Figure 116).

Figure 116: Estimated percentage of households living in rented dwellings, by urban/rural category, 2018
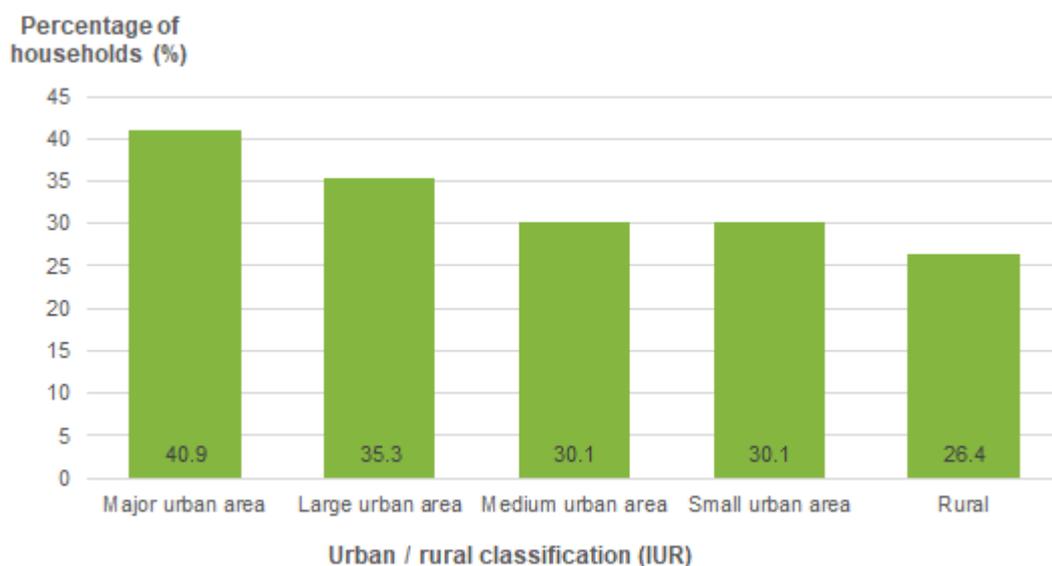
Notes: Percentages are estimates, as they are based on numbers summed over SA2s.
Source: New Zealand Census of Population and Dwellings

Higher levels of renting in more deprived areas

Living in rented dwellings is part of the New Zealand Index of Deprivation (NZDep2018), so it is expected that there is a strong association between NZDep and this variable. However, it is still helpful to see the patterns by NZDep.

Over half of households (54.6%) in the most deprived areas (NZDep2018 decile 10) were living in rented dwellings, compared with 18.4% of households in the least deprived areas (NZDep2018 decile 1) (Figure 117).

Figure 117: Estimated percentage of households living in rented dwellings, by socioeconomic deprivation (NZDep2018 deciles), 2018
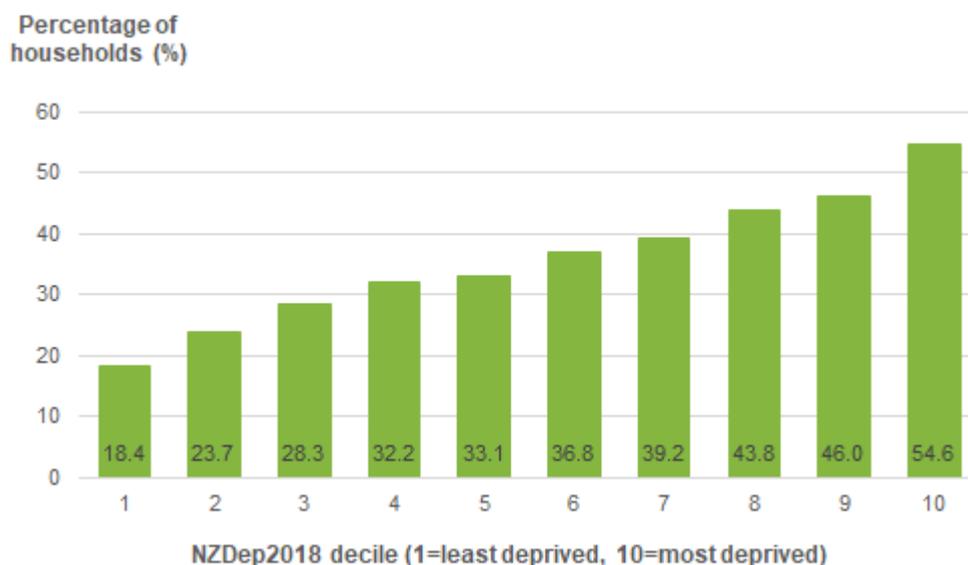
Notes: Percentages are estimates, as they are based on numbers summed over SA2s.
Source: New Zealand Census of Population and Dwellings

Māori, Pacific peoples and MELAA have high rates of renting

In 2018, there were high rates of living in rental housing among people in the following ethnic groups: Māori (69.0%), Pacific peoples (79.0%) and Middle Eastern/Latin American/African (MELAA) (74.3%) (Figure 118). These statistics reflect low home ownership rates among these ethnic groups, as well as issues with housing affordability (Stats NZ, 2020b).

Figure 118: Percentage of population living in rented dwellings, by ethnic group, 2018
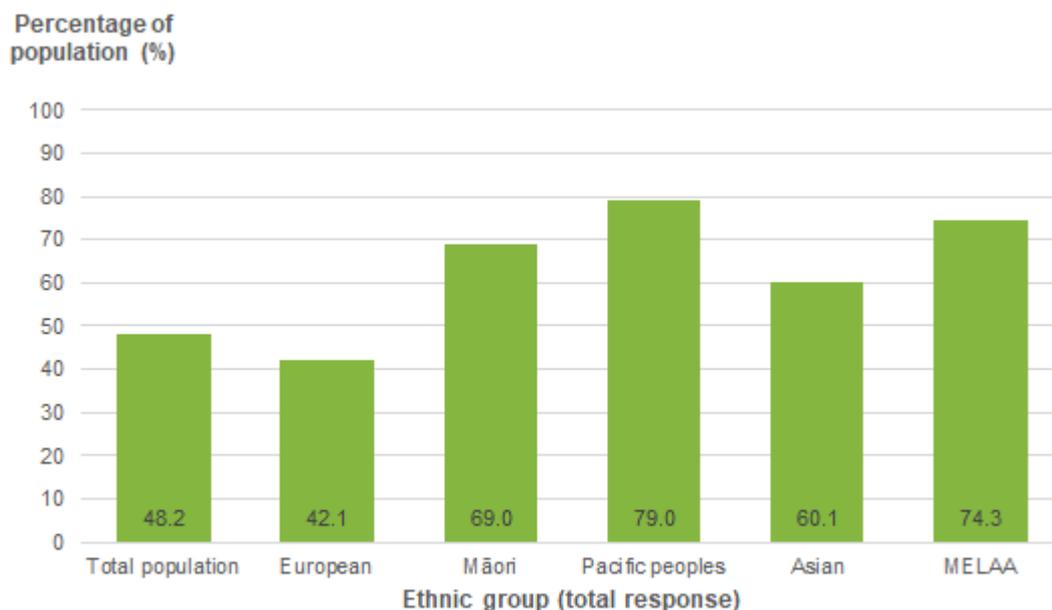
Percentage of
population (%)

Source: New Zealand Census of Population and Dwellings

Results by territorial authority

In 2018, some territorial authorities had a higher percentage of households who were living in rented dwellings. These included:

- Hamilton City (46.1% of households)
- Chatham Islands Territory (44.6%)
- Wellington City (41.3%)
- Gisborne District (40.6%)
- Auckland City (40.6%)
- Waitomo District (40.3%)
- Ruapehu District (40.2%)
- Wairoa District (39.0%)
- Rotorua District (37.9%).

Figure 119: Percentage of households living in rented dwellings, by territorial authority, 2018
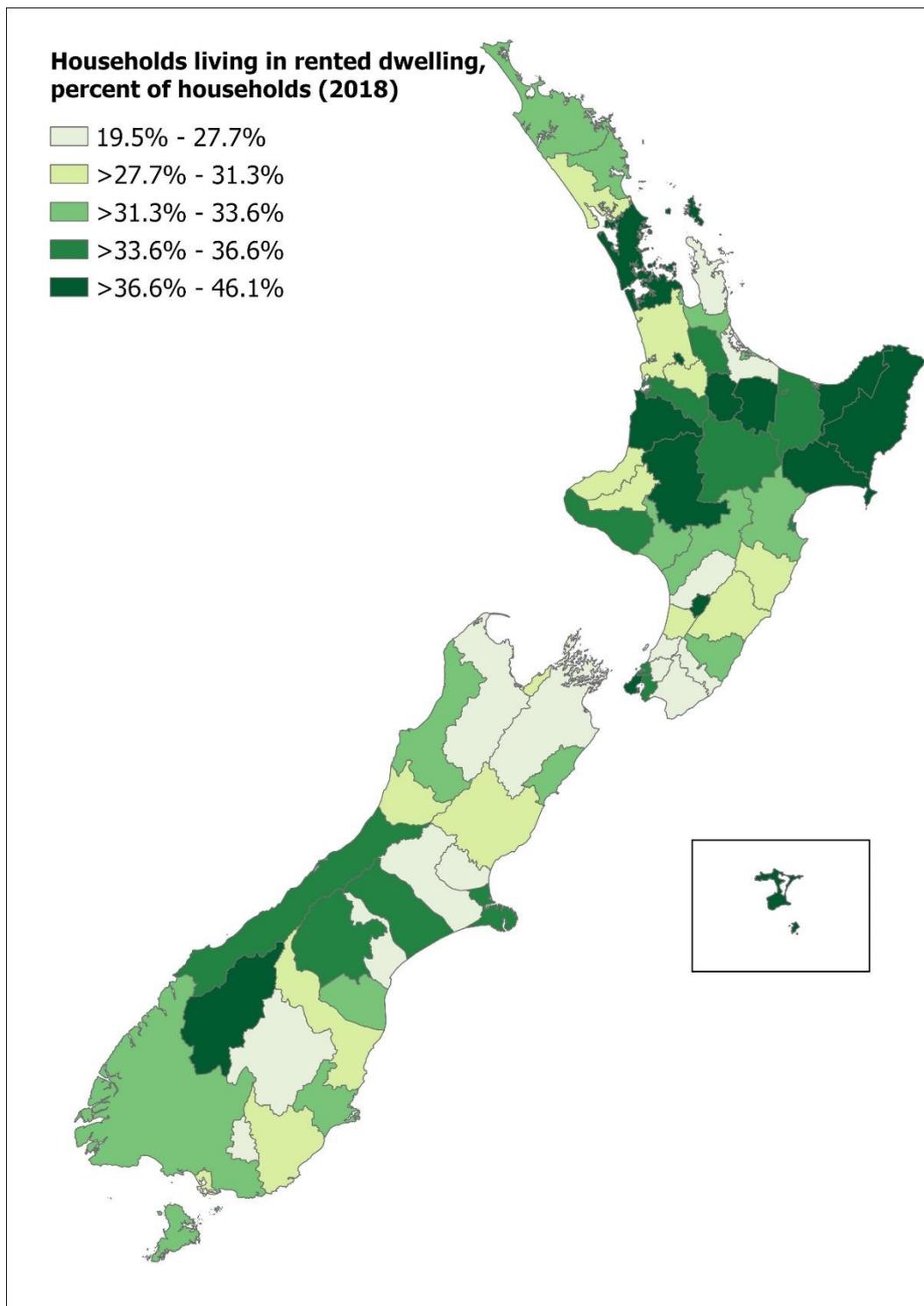
Source: New Zealand Census of Population and Dwellings

13.3 People living in crowded households

Living in safe, secure and healthy housing is an important aspect of resilience. Living in crowded households can make people more vulnerable to the impacts of climate-related hazards such as floods, extreme weather events and heatwaves.

Household crowding can increase the spread of infectious diseases (such as lower respiratory tract infections, gastroenteritis, meningococcal disease, and tuberculosis) (Baker et al., 2013). Children are more susceptible to these diseases. People living in crowded households are also more likely to have chronic conditions and respiratory problems, as well as low income, which can increase their vulnerability to extreme heat events (Joynt and Golubiewski, 2019).

Household crowding is also part of the New Zealand Index of Deprivation (NZDep) (Atkinson et al., 2020).

Indicator definition

This indicator shows people living in crowded households, as a percentage of the Census usually resident population (total stated). Crowded households are defined as those needing one or more bedrooms, according to the Canadian National Occupancy Standard (CNOS).

One in ten people live in crowded households

In 2018, 10.8% of New Zealanders (431,000 people) lived in a crowded household. This included 3.7% of the population (147,630 people) living in houses considered severely crowded (2 or more bedrooms needed).

Similar results from 2006 to 2018

The percentage of people living in crowded households was relatively similar in 2018 (10.8%) compared with 2006 (10.4%) and 2013 (10.1%) (Figure 120).

Figure 120: Percentage of people living in crowded households, total, by census year
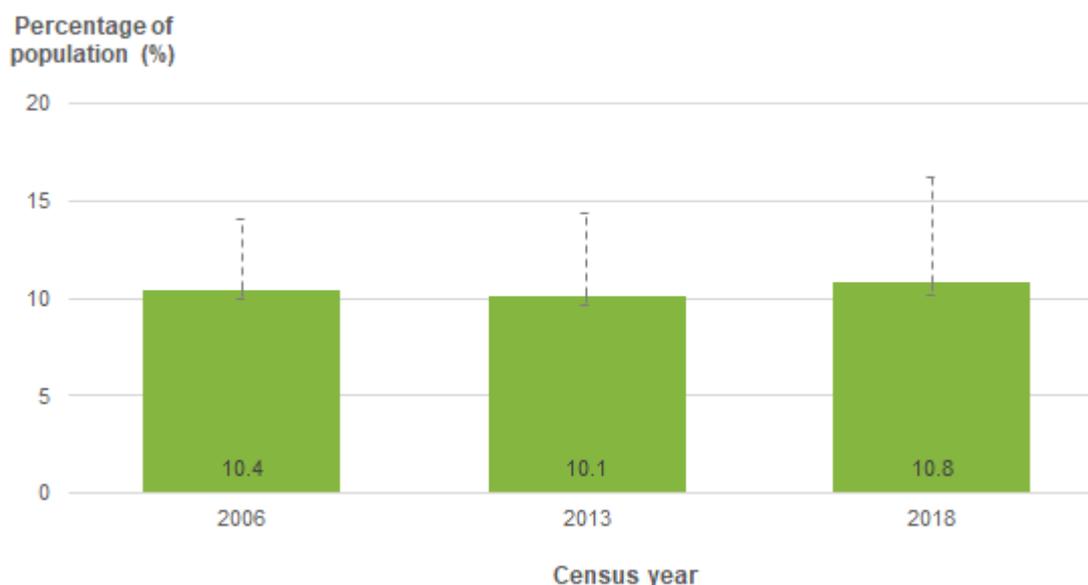
Percentage of population (%)

[Bar chart showing percentage of population in crowded households by census year. 2006: 10.4, 2013: 10.1, 2018: 10.8, each with error bars. Y-axis ranges from 0 to 20.]

Census year

Note: There is some uncertainty in the estimates (particularly 2018), due to missing data. Logical bounds are presented, to give the lower and upper bounds of what the percentage could be, allowing for the missing data due to lower response rates for the 2018 Census.
Source: New Zealand Census of Population and Dwellings

Children and young people are more likely to be living in crowded households

In 2018, one in six children aged 0–14 years (16.1%) lived in a crowded household, and 18.7% of young people aged 15–24 years lived in crowded households.

Only a small percentage (3.0%) of older people aged 65+ years were living in crowded households in 2018 (Figure 121).

Figure 121: Percentage of people living in crowded households, by age group, 2018
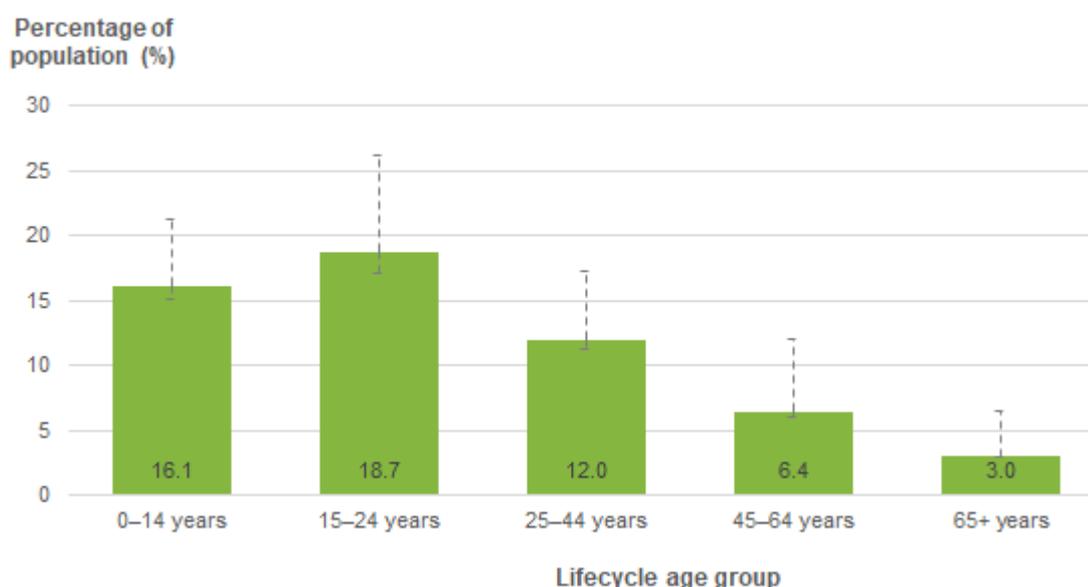
Percentage of population (%)

[Bar chart showing percentage of population in crowded households by age group in 2018. 0–14 years: 16.1, 15–24 years: 18.7, 25–44 years: 12.0, 45–64 years: 6.4, 65+ years: 3.0, each with error bars. Y-axis ranges from 0 to 30.]

Lifecycle age group

Note: There is some uncertainty in the estimates, due to missing data. Logical bounds are presented, to give the lower and upper bounds of what the percentage could be, allowing for the missing data due to lower response rates for the 2018 Census.
Source: 2018 New Zealand Census of Population and Dwellings

Many Māori and Pacific peoples are affected by household crowding

Around one in five Māori (20.8%) experienced household crowding in 2018. The percentage of Māori people who experience household crowding has remained relatively consistent over time, with a small increase recorded since 2013 (20.0%) (Figure 122).

Household crowding was high in Pacific peoples in 2018, with almost two in five Pacific peoples (38.5%) living in a crowded household. The percentage of Pacific people living in crowded households has slowly decreased from 2006 (42.6%) to 2018 (38.5%) (Figure 122).

Figure 122: Percentage of people living in crowded households, by ethnic group (total response), 2006, 2013, 2018
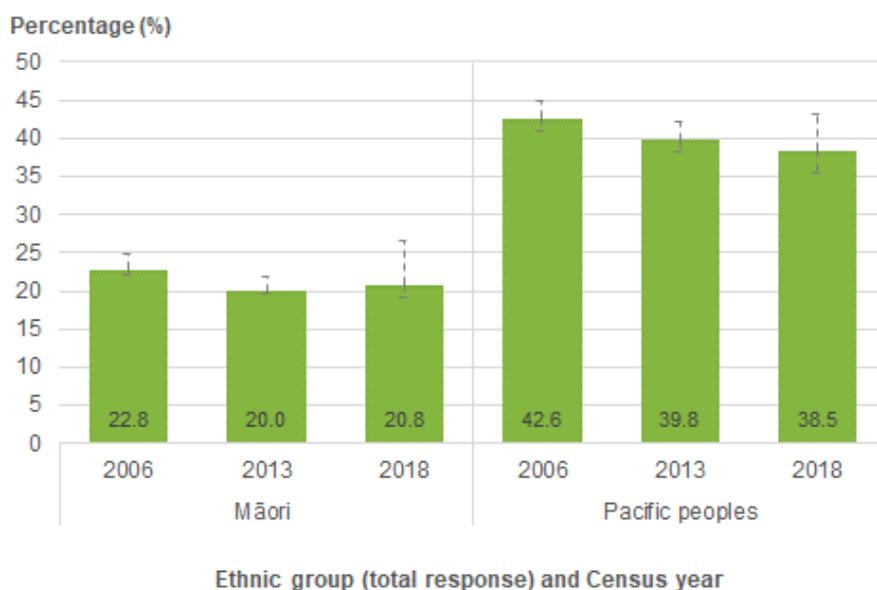
Note: There is some uncertainty in the estimates, due to missing data. Logical bounds give the lower and upper bounds of what the percentage could be, allowing for the missing data due to implementation problems with the Census. Total response ethnic groups have been used, so each ethnic group includes everyone who identified as that ethnic group. This means ethnic groups may overlap, and should not be directly compared.
Source: New Zealand Census of Population and Dwellings

Household crowding is not evenly distributed in New Zealand

Household crowding is worse in the North Island, where 10.9% of the population were living in crowded households in 2018. In the South Island, 5.4% of the population were living in crowded households.

In 2018, some territorial authorities had a higher percentage of people living in crowded households. These included:

- Ōpōtiki District (18.8% of the population)
- Kawerau District (18.5%)
- Wairoa District (17.3%)
- Auckland City (15.8%)
- Far North District (15.5%)
- Porirua City (15.4%)
- Gisborne District (14.9%)
- Rotorua District (13.8%)
- Whakatāne District (13.3%)
- Waitomo District (13.3%).

Figure 123: Percentage of people living in crowded households, by territorial authority, 2018

People living in crowded households, percent of population (2018)

- 3.3% - 5.0%
- >5.0% - 6.1%
- >6.1% - 8.2%
- >8.2% - 12.3%
- >12.3% - 18.8%
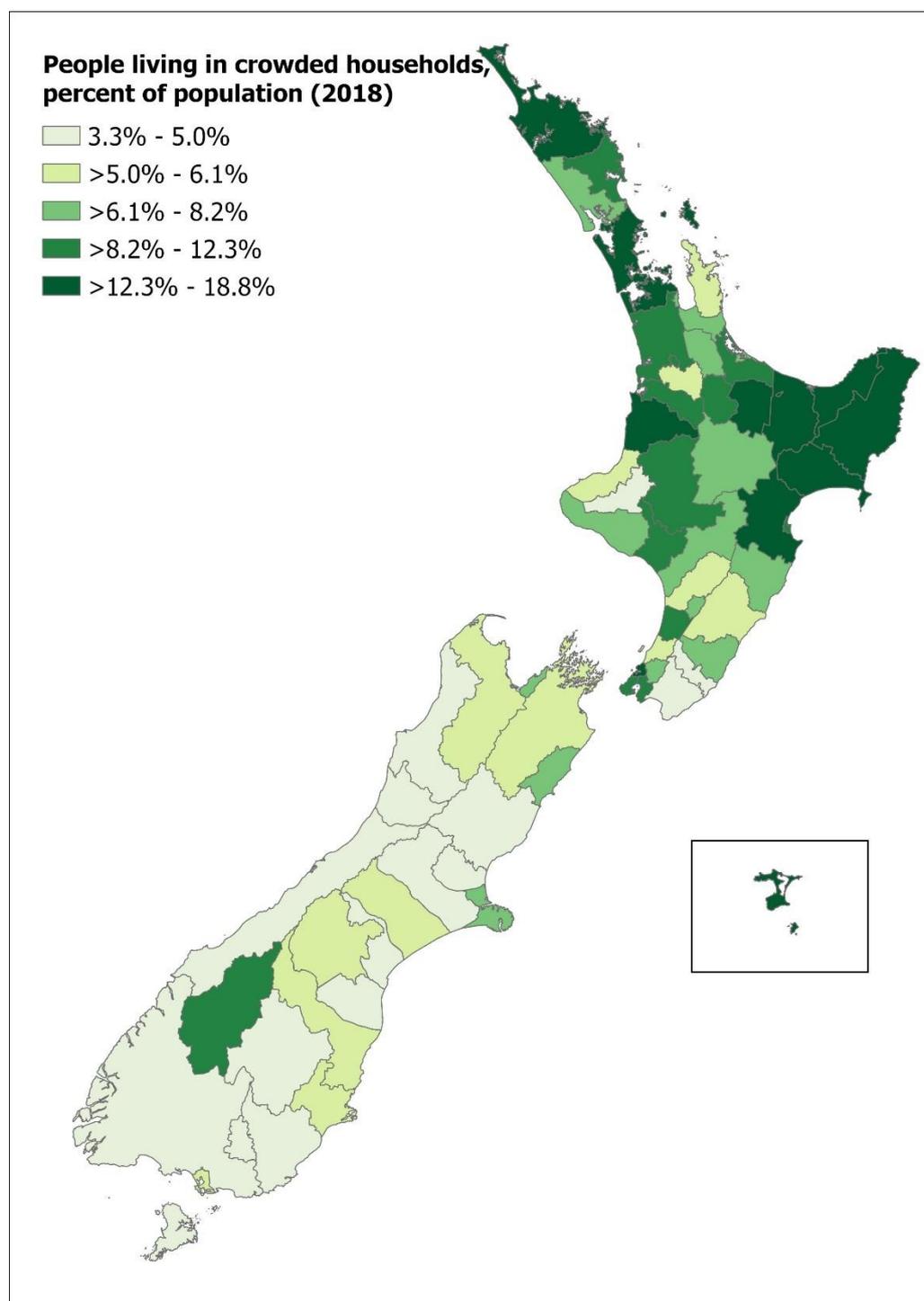
Source: New Zealand Census of Population and Dwellings

Notes about the household crowding data

Due to a lower response rate to the 2018 Census, much of the analysis had to be carried out using alternative sources such as administrative data and statistical imputation methods. Despite changes to the methodology and reduced participation in the 2018 Census, particularly in Māori and Pacific households, Census data for household crowding appeared to remain consistent with previous years (Stats NZ, 2020a).

Logical bounds have been used to show the maximum and minimum possible values for the percentages (ie worst- and best-case scenarios), when taking into account missing data.

These have been shown as error bars on the graphs. These logical bounds show the range in which the true value of the percentage must lie.

Additional statistics (including for the number of crowded households, and for Māori and Pacific specifically) are also available from Stats NZ.

13.4   Crowded households

Living in safe, secure and healthy housing is an important aspect of resilience. Crowded households have too many people living in them, for the number of bedrooms. Crowded households can make people more vulnerable to the impacts of climate-related hazards such as floods, extreme weather events and heatwaves.

Household crowding can increase the spread of infectious diseases (such as lower respiratory tract infections, gastroenteritis, meningococcal disease, and tuberculosis) (Baker et al., 2013). Children are more susceptible to these diseases. People living in crowded households are more likely to have chronic conditions and respiratory problems, as well as low income, which can increase their vulnerability to extreme heat events (Joynt and Golubiewski, 2019).

Monitoring the number of crowded households can be useful, although the indicator on people living in crowded households better shows the burden on the population.

Living in crowded households is also part of the New Zealand Index of Deprivation (NZDep) (Atkinson et al., 2020).

Indicator definition

This indicator shows crowded households, as a percentage of all households (total stated). Crowded households are defined as those needing one or more bedrooms, according to the Canadian National Occupancy Standard (CNOS).

More than 5% of households were crowded in 2018

In 2018, 5.7% of households in New Zealand were crowded. This represented 90,170 households that were crowded. This included 1.6% of households (24,620 households) that were considered severely crowded (2 or more bedrooms needed).

Increase in households that were crowded

The percentage of households that were crowded had increased from 5.0% in 2013, to 5.7% in 2018 (Figure 124).

Figure 124: Percentage of households that were crowded, 2006, 2013, 2018
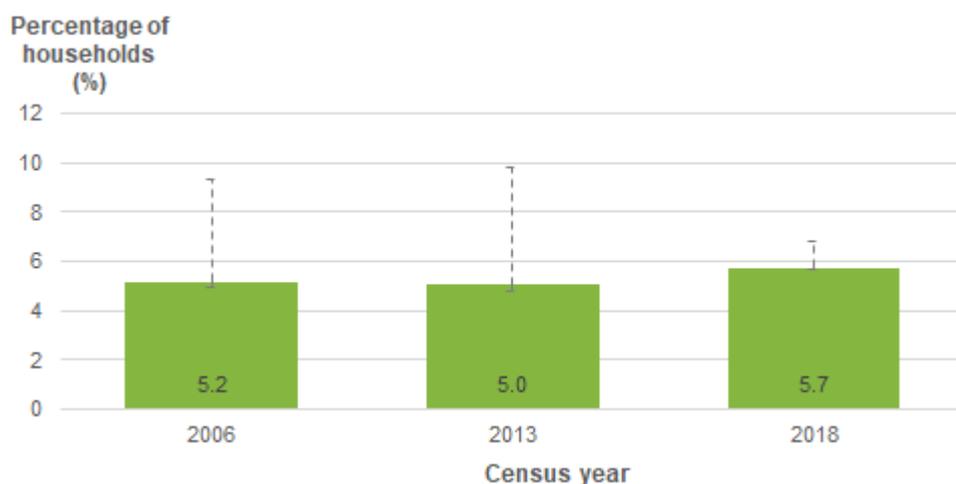
Notes: Percentages are presented among the total stated households. There is some uncertainty in the estimates due to missing data in the Census. Logical bounds are presented, to give the lower and upper bounds of what the percentage could be, allowing for the missing data. Data is not fully comparable between 2013 and 2018 due to alternative data sources used to provide some 2018 data, where this information was missing.
Source: New Zealand Census of Population and Dwellings

Household crowding is not evenly distributed in New Zealand

In 2018, some territorial authorities had a higher percentage of households that were crowded (Figure 125). These included:

- Ōpōtiki District (9.2% of households)
- Auckland City (8.9%)
- Wairoa District (8.9%)
- Porirua City (8.3%)
- Chatham Islands Territory (8.3%)
- Kawerau District (8.2%)
- Far North District (7.7%)
- Gisborne District (7.7%)
- Rotorua District (7.3%).

Figure 125: Percentage of households that were crowded, by territorial authority, 2018

Crowded households, 2018
(percent of households)

- 1.7% - 2.5%
- >2.5% - 3.1%
- >3.1% - 4.1%
- >4.1% - 6.4%
- >6.4% - 9.2%
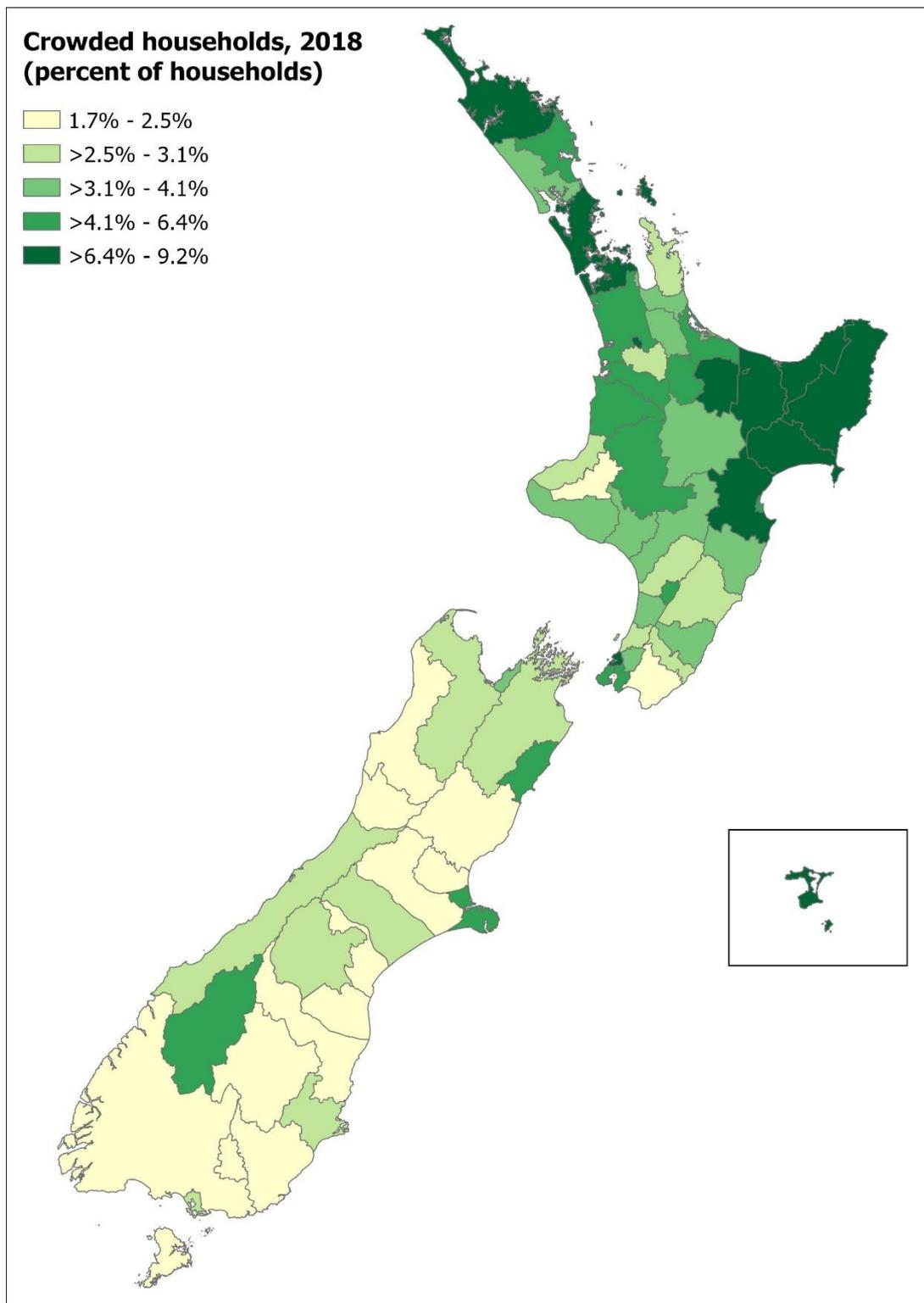
Source: New Zealand Census of Population and Dwellings

13.5 Damp dwellings

Damp and mouldy houses make people more susceptible to the negative impacts of climate-related hazards. Standing water under a house (for example, after a flood) may lead to housing being damp and mouldy.

Damp and mouldy housing can affect health in several ways, particularly increasing the risk of poor respiratory health (such as asthma, respiratory tract infections and bronchitis) (Braubach et al., 2011, Fisk et al., 2010). Young children and older people are particularly vulnerable to the effects of damp housing, as they spend proportionally more time indoors.

Indicator definition

This indicator shows the number of dwellings that were reported as damp 'always' or 'sometimes' (among total stated), from the 2018 Census. This was the first time this question had been included in the Census, so no results over time are available. The results shown come from the updated Census tables published in July 2020.

One in five dwellings were damp in 2018

In 2018, 21.5% of dwellings were damp 'sometimes' or 'always'. This included 3.0% of dwellings that were always damp (Figure 126).

Figure 126: Percentage of dwellings that were damp, 2018
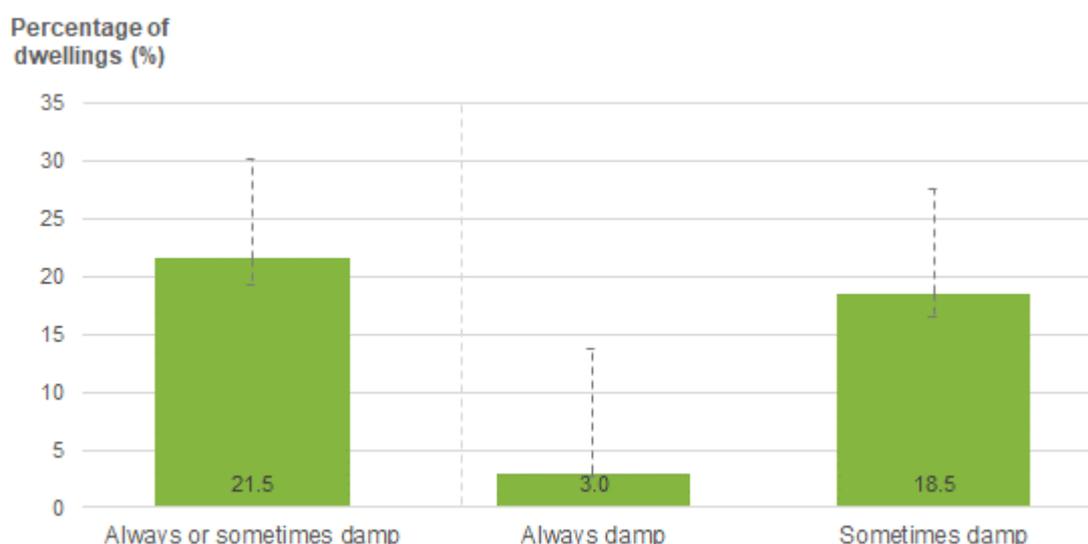

Notes: Percentages are presented among the total stated dwellings. There is some uncertainty in the estimates due to missing data in the 2018 Census. Logical bounds are presented, to give the lower and upper bounds of what the percentage could be, allowing for the missing data.
Source: New Zealand Census of Population and Dwellings

This represented 318,891 dwellings that were damp sometimes or all the time (out of 1.48 million dwellings stated). Of these, 44,520 dwellings were always damp. These numbers should be treated as lower bounds, due to missing data in the 2018 Census.

Māori and Pacific peoples more likely to live in damp dwellings

Some population groups were more likely to be living in damp dwellings (ie dwellings that were damp sometimes or always). Overall, 40.3% of Māori and 45.9% of Pacific peoples were living in damp dwellings in 2018 (Stats NZ, 2020c).

Figure 127: Percentage of the population living in dwellings that were damp sometimes or always, by ethnic group, 2018
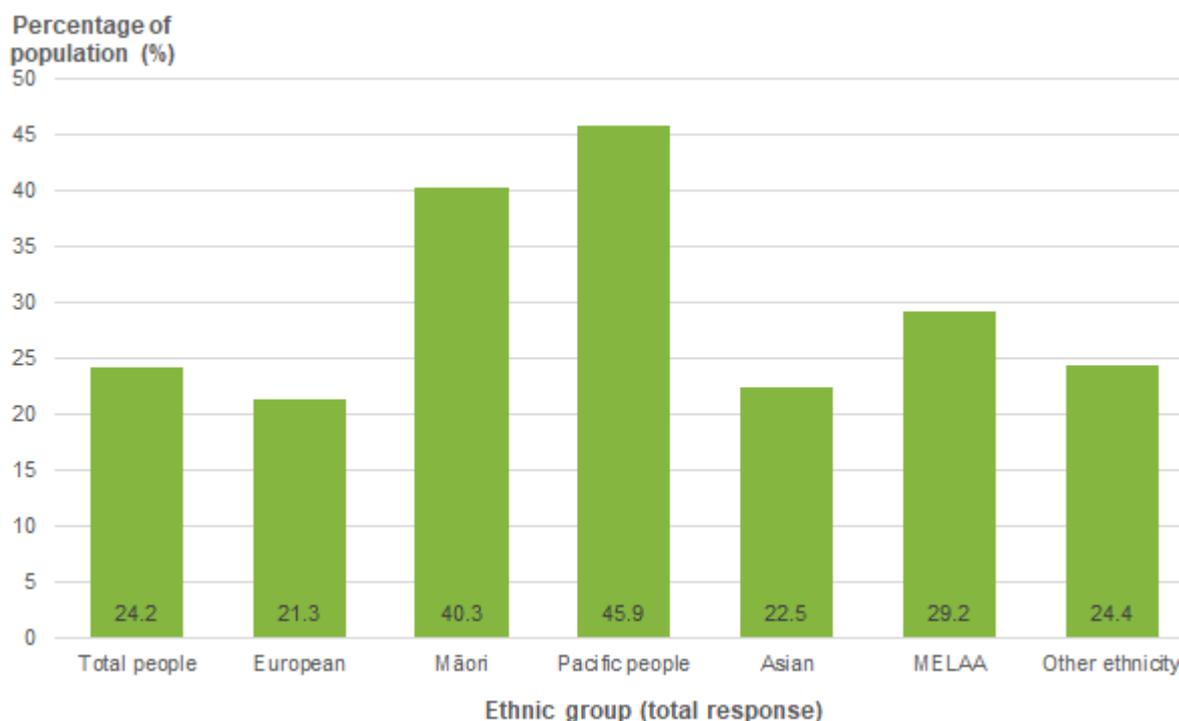
Note: Total response ethnic groups have been used, so each ethnic group includes everyone who identified as that ethnic group. This means ethnic groups may overlap, and should not be directly compared.
Source: New Zealand Census of Population and Dwellings (Stats NZ, 2020c)

Rented dwellings more likely to be damp

Rented dwellings were much more likely to be damp always or sometimes (38.1%) compared with dwellings that were owned or in a trust by household (14.8%). About 7.5% of rented dwellings were always mouldy, compared with 1.1% of non-rented dwellings (Stats NZ, 2019).

Results by territorial authority

In 2018, some territorial authorities had a higher percentage of dwellings that were sometimes or always damp. These included:

- Chatham Islands Territory (51.3% of dwellings)
- Wairoa District (35.6%)
- Ōpōtiki District (31.6%)
- Kawerau District (31.2%)
- Far North District (31.1%)
- Waitomo District (30.3%)
- Ruapehu District (30.2%)
- South Waikato District (28.7%)
- Rotorua District (27.0%).

Figure 128: Percentage of households that were sometimes or always damp, by territorial authority, 2018
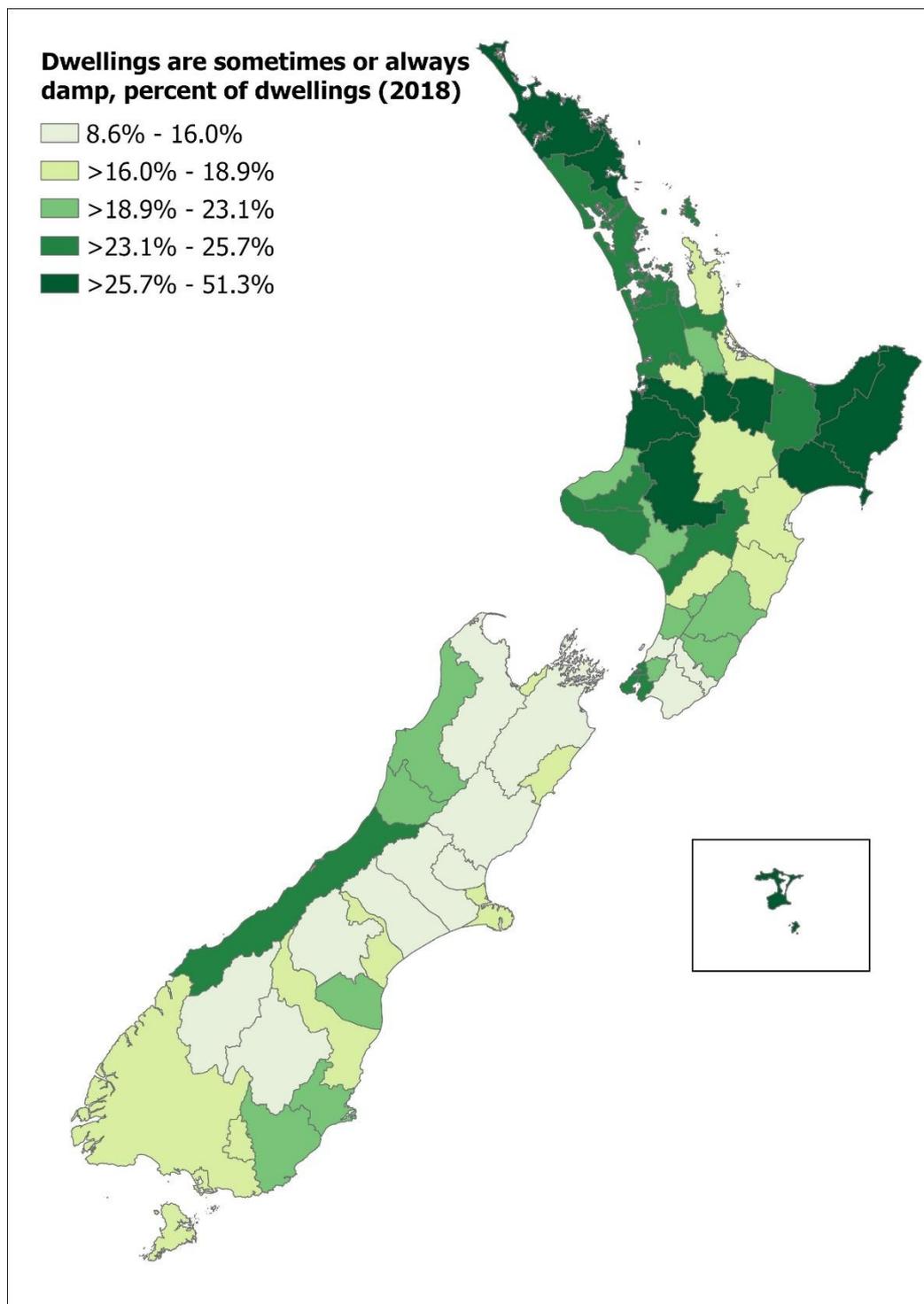
Source: New Zealand Census of Population and Dwellings

13.6 Mouldy dwellings

Damp and mouldy houses make people more susceptible to the negative impacts of climate-related hazards. Standing water under a house (for example, after a flood) may lead to housing be damp and mouldy.

Damp and mouldy housing can worsen the health of people living in the house, particularly respiratory health. Mould can irritate airways, and lead to respiratory toxin production and mould sensitisation (Keall et al., 2012, WHO, 2009). Dampness and mould growth can exacerbate asthma and increase the risk of asthma onset (Braubach et al., 2011). Indoor dampness and mould is also associated with an increased risk of respiratory tract infections and bronchitis (Fisk et al., 2010). Young children and older people are particularly vulnerable to the effects of poor housing, as they spend proportionally more time indoors and are more susceptible to health impacts.

Indicator definition

This indicator shows the number of dwellings that were reported as mouldy 'always' or 'sometimes' (among total stated), from the 2018 Census. Mould was defined as being visible mould larger than an A4-size piece of paper. This was the first time this question had been included in the Census, so no results over time are available. The results shown come from the updated Census tables published in July 2020.

About 17 percent of dwellings were mouldy in 2018

In 2018, 16.9% of dwellings were sometimes or always mouldy (that is, they had visible mould covering an area larger than the size of an A4 piece of paper). This included 4.3% of dwellings in New Zealand that were always mouldy (Figure 129).

Figure 129: Percentage of dwellings that were mouldy, 2018
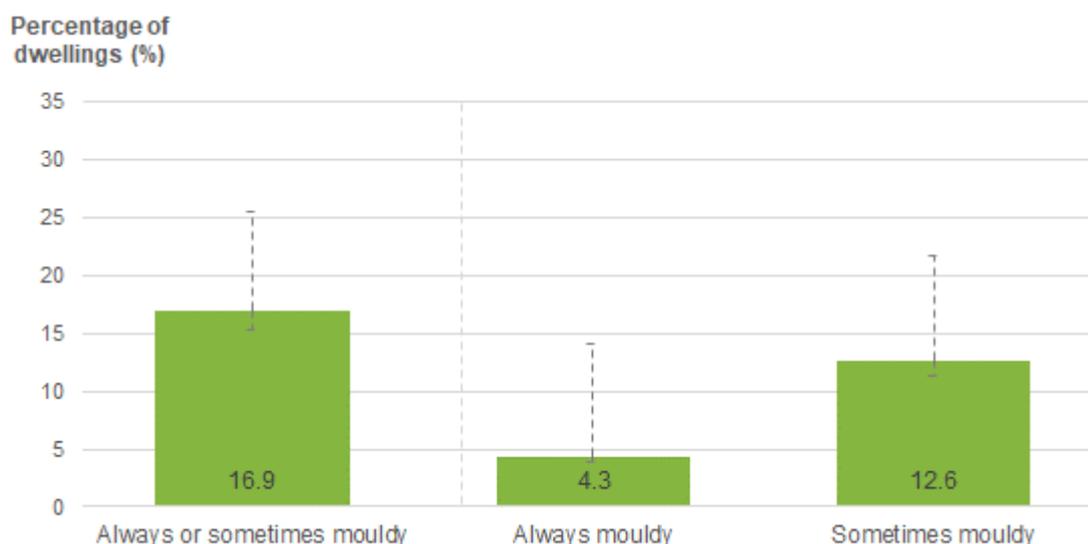
Notes: Percentages are presented among the total stated dwellings. There is some uncertainty in the estimates due to missing data in the 2018 Census. Logical bounds are presented, to give the lower and upper bounds of what the percentage could be, allowing for missing data.
Source: New Zealand Census of Population and Dwellings

In 2018, this represented 252,855 dwellings that were always or sometimes mouldy, of which 64,536 dwellings were always mouldy (out of 1.49 million dwellings stated). These numbers should be treated as a lower bound, due to missing data in the 2018 Census.

Māori and Pacific peoples more likely to live in mouldy dwellings

Some population groups were more likely to be living in dwellings that were mouldy sometimes or always (Figure 130). Overall, 33.0% of Māori and 41.8% of Pacific peoples were living in mouldy dwellings in 2018 (Stats NZ, 2020c).

Figure 130: Percentage of the population living in dwellings that were mouldy either sometimes or always (ie visible mould larger than a sheet of A4-paper), by ethnic group, 2018
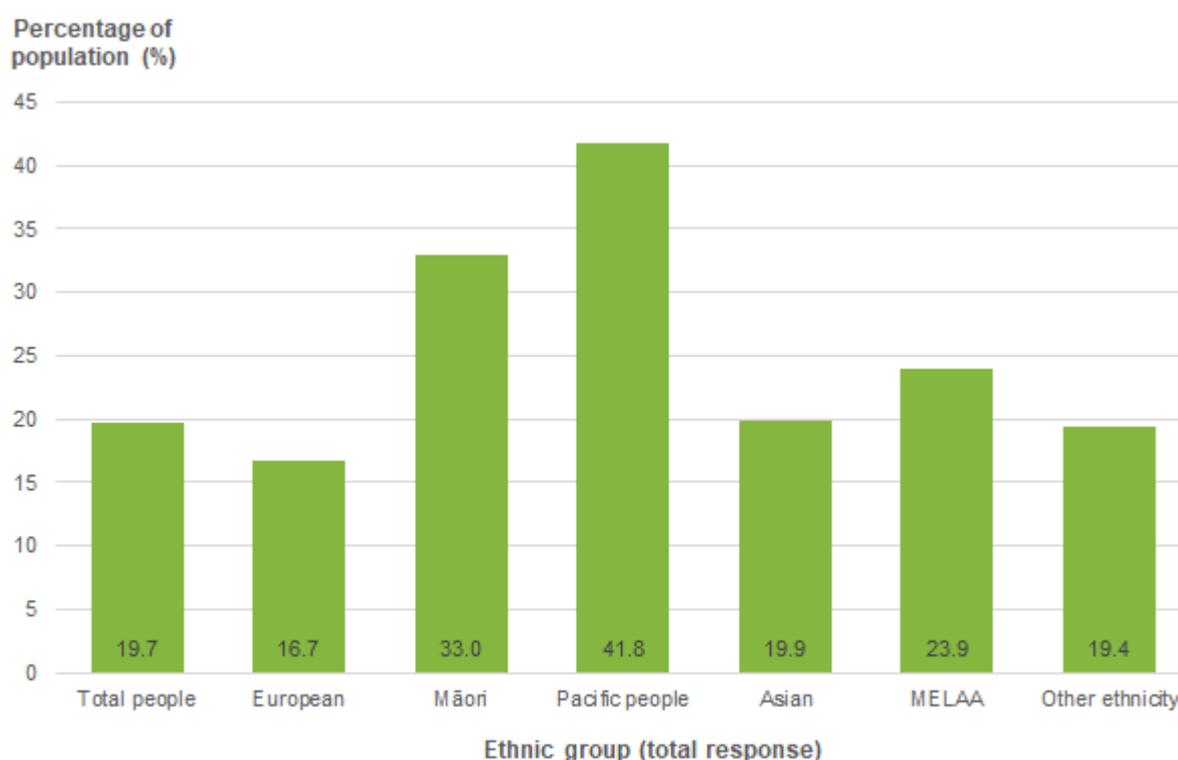
Notes: Total response ethnic groups have been used, so each ethnic group includes everyone who identified as that ethnic group. This means ethnic groups may overlap, and should not be directly compared.
Source: New Zealand Census of Population and Dwellings (Stats NZ, 2020c)

Mould was much more common in rented dwellings

Rented dwellings were much more likely to be mouldy always or sometimes (29.8%) compared with dwellings that were owned or in a trust by the household (11.6%). Almost one in ten rented dwellings were always mouldy (9.6%) compared with 2.1% of non-rented dwellings (Stats NZ, 2019).

Results by territorial authority

In 2018, some territorial authorities had a higher percentage of dwellings that were sometimes or always mouldy. These included:

- Chatham Islands (38.0% of dwellings)
- Wairoa District (27.4%)
- Ōpōtiki District (25.9%)

- Far North District (25.4%)
- Kawerau District (25.4%)
- Waitomo District (24.0%)
- South Waikato District (23.4%)
- Ruapehu District (22.5%)
- Rotorua District (22.2%)
- Whangarei District (21.6%)
- Gisborne District (21.3%)
- Auckland City (21.2%)
- Porirua City (20.7%).

Figure 131: Percentage of households that were sometimes or always mouldy, by territorial authority, 2018
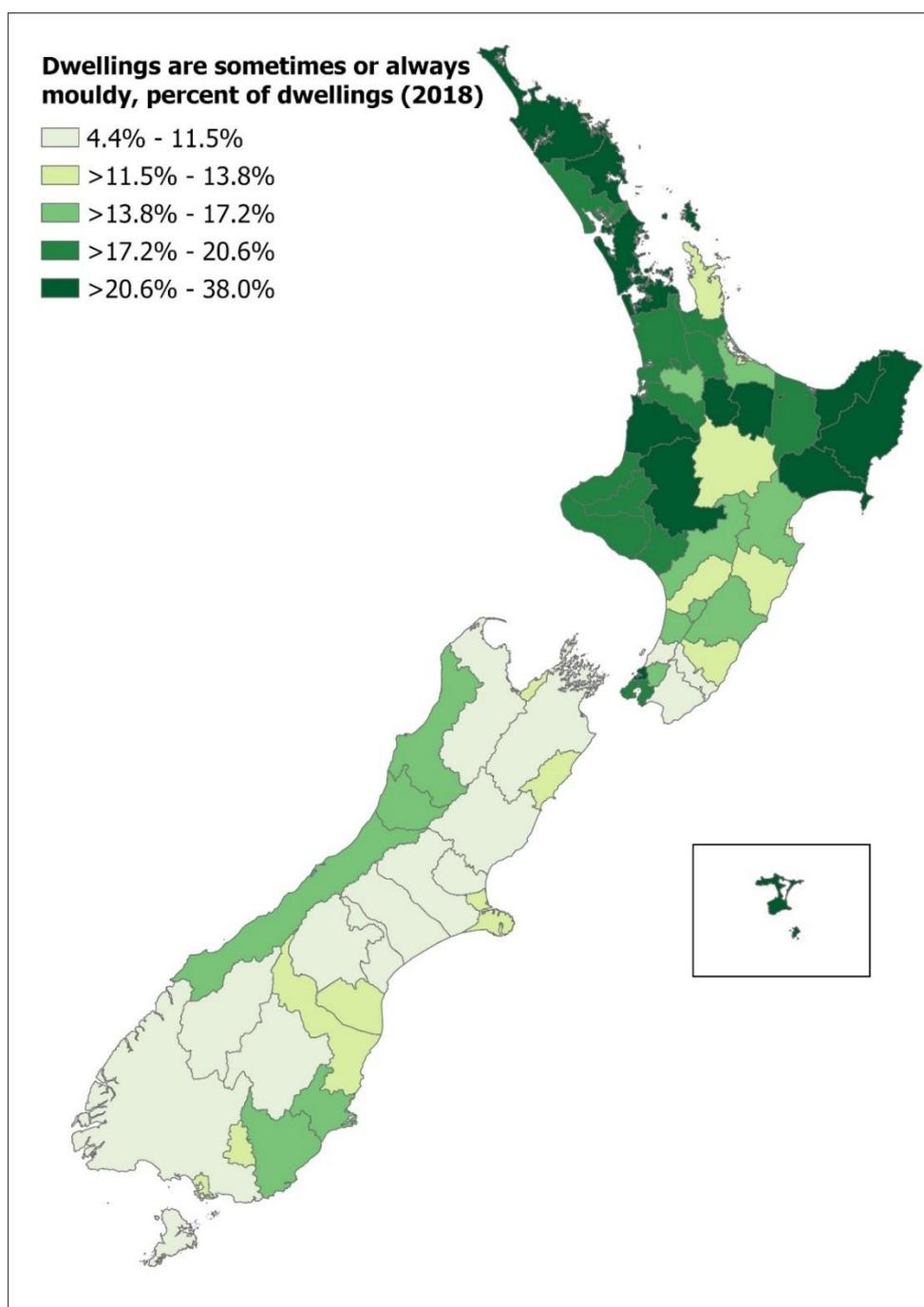
Source: New Zealand Census of Population and Dwellings

13.7 Homelessness and/or severe housing deprivation

Shelter, warmth and security are some of the basic needs for human survival. People who are homeless and/or 'severely housing deprived' are very vulnerable to the impacts of climate-related hazards, such as floods, extreme weather events, and heatwaves.

People who are homeless or in temporary or shared accommodation do not have permanent safe shelter, and may not have many belongings or emergency provisions. People without shelter may be highly exposed to extreme weather events, and may not have anywhere else to go. People experiencing severe housing deprivation are also likely to be experiencing a range of other vulnerabilities (Kidd et al., 2023). For example, they may find it difficult to access hazard information, early warnings about an event, or help during or after a hazard event. They may also lack social networks, and may not have good access or established relationships with health and support services. They are also more likely to have existing health and/or mental health conditions, which make them more susceptible to impacts of hazard events.

Indicator definition

This indicator shows estimates of people living in severely housing deprivation in 2013 and 2018, as a percentage of the Census usually resident population. This measure includes the following three categories:

(i) **Without shelter**: people without habitable accommodation (living rough, improvised dwelling, or in a mobile dwelling not in a motor camp)

(ii) **Temporary accommodation**: people living in emergency and transitional accommodation (eg night shelters, Women's refuge), commercial accommodation (eg camping grounds, motor camps, boarding houses, hotels, motels, vessels) and marae

(iii) **Sharing accommodation**: temporary residents in a severely crowded private dwelling.

These data come from the report *Severe housing deprivation in Aotearoa New Zealand, 2018* (Amore et al., 2021).

Over 40,000 people were experiencing severe housing deprivation in 2018, up from 2013

On Census night in 2018, 41,724 people were experiencing severe housing deprivation, which represented almost 1% of the population. This included 3,624 people without shelter, 7,929 people in temporary accommodation, and 30,171 people in shared accommodation (Figure 132).

Overall, this was an increase in numbers from 2013, when 37,289 people were severely housing deprived. The increases were largely driven by more people sharing accommodation in severely crowded households. These comparisons are indicative only.

Figure 132: Number of people in severe housing deprivation, 2013, 2018
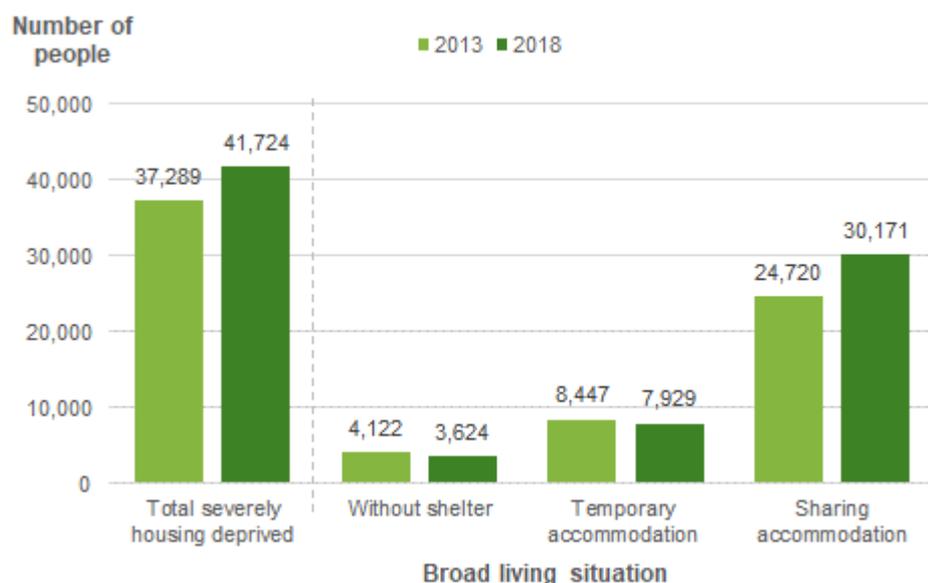
Source: Amore et al. (2021)

Overall, about 0.9% of the total New Zealand population were experiencing severe housing deprivation in 2018, similar to 2013 (Figure 133).

Figure 133: Percentage of the population in severe housing deprivation, 2013, 2018
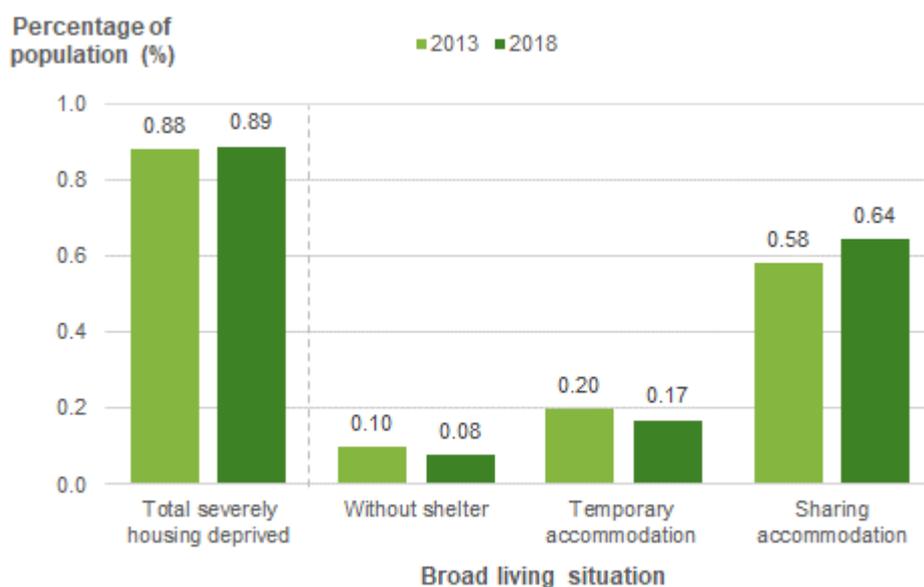
Note: Percentages have been rounded to nearest 0.01%.
Source: Amore et al. (2021)

Children and older adults affected by severe housing deprivation

In 2018, more than 8,000 children and more than 3,000 older adults aged 65+ years were affected by severe housing deprivation (Figure 134). Some of these children and older adults did not have shelter.

Figure 134: Number of children (0–14 years) and older adults (65+ years) in severe housing deprivation, 2018
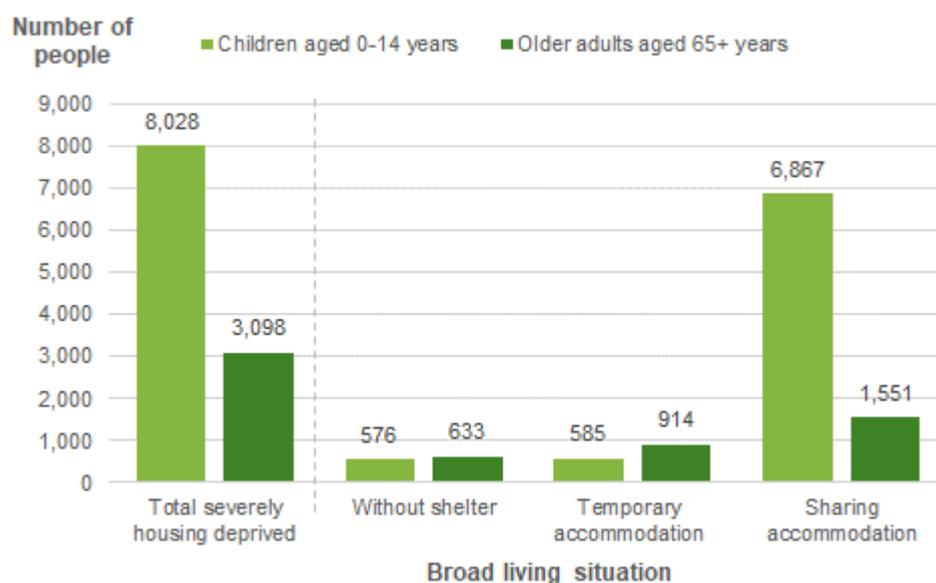
Source: Amore et al. (2021)

Overall, 0.87% of children aged 0–14 years and 0.43% of older adults aged 65+ years were experiencing severe housing deprivation in 2018.

Pacific peoples and Māori disproportionately affected by severe housing deprivation

In 2018, almost 13,000 Māori and over 9,000 Pacific peoples were experiencing severe housing deprivation, along with 13,574 Europeans, 8,610 Asians, and 730 people in the Middle Eastern/Latin American/African (MELAA) ethnic groups (Figure 135).

Figure 135: Number of people in severe housing deprivation, by ethnic group (total response), 2018
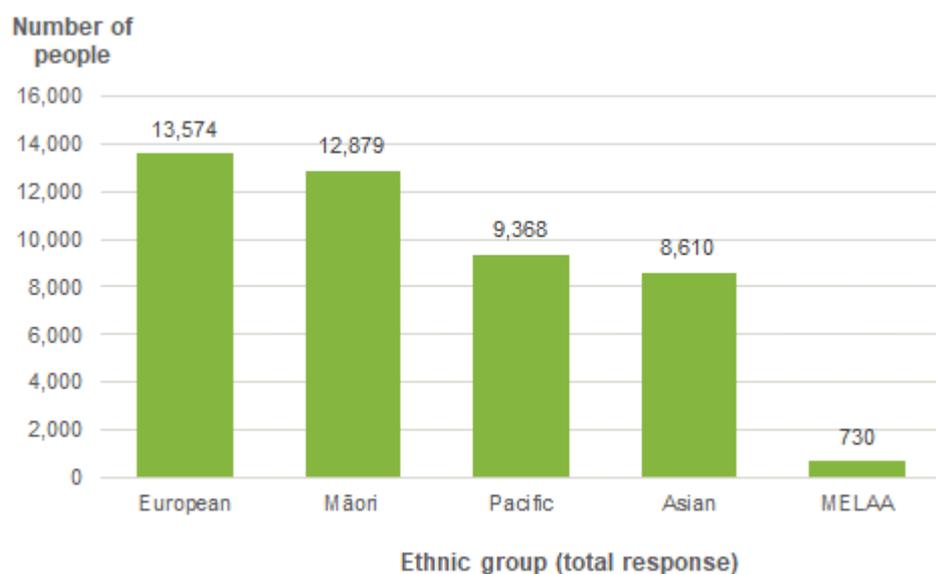
Notes: Total response ethnic groups have been used, so ethnic groups may overlap, and should not be compared with each other. MELAA is Middle Eastern / Latin American / African ethnic groups.
Source: Amore et al. (2021)

About 1.7% of the Māori population and 2.5% of the Pacific population were experiencing severe housing deprivation (Figure 136). This compared with 0.4% of the European ethnic group. (Note that total response ethnic groups have been used, so the disparity is likely to be larger.)

Figure 136: Percentage of the population in severe housing deprivation, by ethnic group (total response), 2018
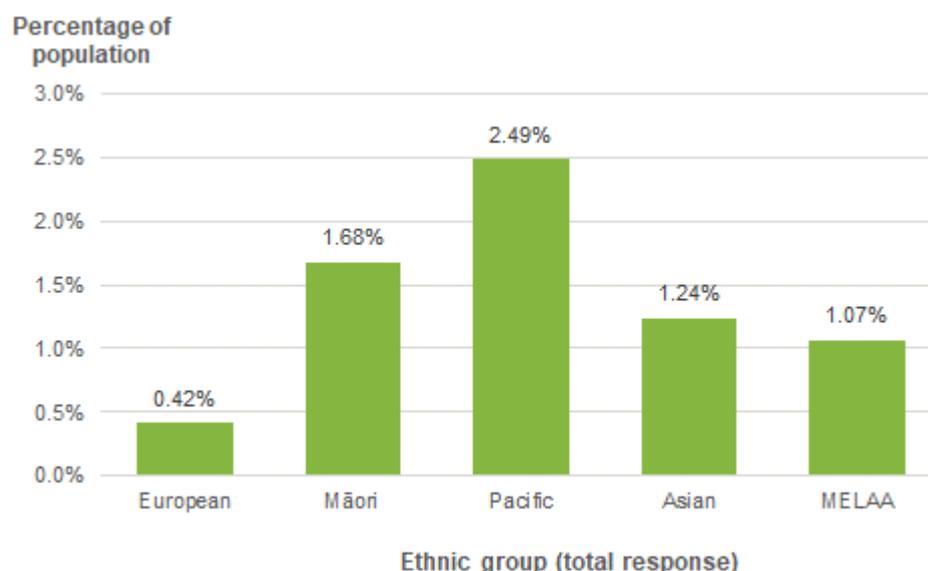
Notes: Total response ethnic groups have been used, so ethnic groups may overlap, and should not be compared with each other. MELAA is Middle Eastern / Latin American / African ethnic groups.
Source: Amore et al. (2021)

Māori and Pacific children and older adults were particularly impacted by severe housing deprivation. In 2018, 4,065 Māori children aged 0–14 years were living in severe housing deprivation, which was 1.6% of all Māori children. In 2018, 2,982 Pacific children were living in severe housing deprivation in 2018, which represented 2.3% of all Pacific children. This compared with 2,361 European children (0.4% of European children), 666 Asian children (0.5% of Asian children) and 96 Middle Eastern/Latin American/African (MELAA) children (0.6% of MELAA children)

Among older adults aged 65+ years, the largest ethnic group experiencing severe housing deprivation in 2018 were Europeans (1,521 older adults, 0.2%). However, as a percentage of each ethnic group, older Pacific peoples experienced the highest rate of severe housing deprivation (2.6%, 519 older adults). Among Māori older adults aged 65+ years, 387 experienced severe housing deprivation, which was 0.8% of this group.

Some territorial authorities are particularly impacted by severe housing deprivation

The largest absolute numbers of people in severe housing deprivation in 2018 were in:

- Auckland City (18,163 people, 1.2% of the population)
- Christchurch City (2,018 people, 0.5% of the population)
- Hamilton City (1,461 people, 0.9% of the population)
- Far North District (1,319 people, 2.0% of the population)
- Wellington City (1,254 people, 0.6% of the population)

- Whangarei District (1,097 people, 1.2% of the population)
- Hastings District (1,039 people, 1.3% of the population).

Figure 137: Number of people experiencing severe housing deprivation, by territorial authority, 2018
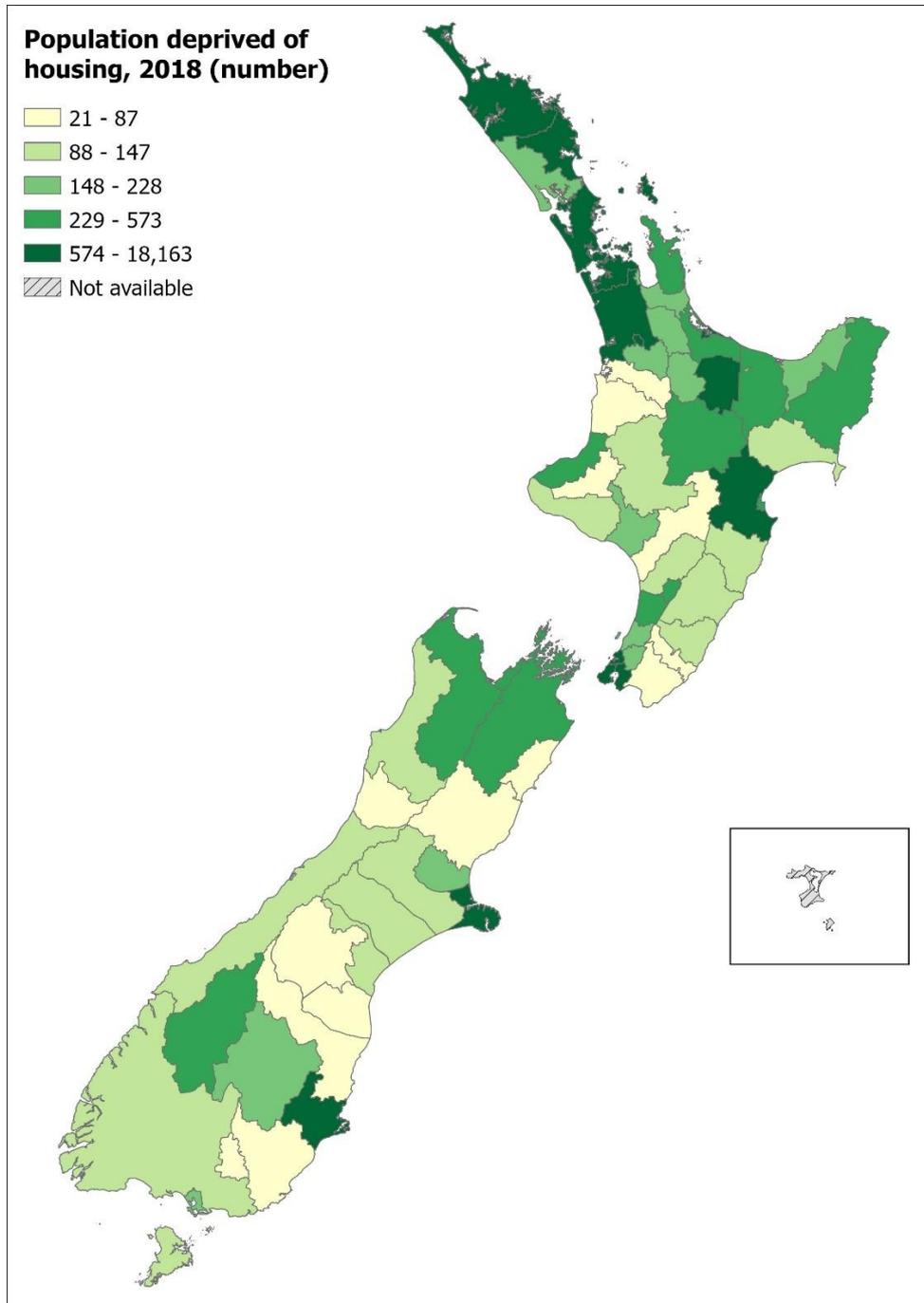
Source: Amore et al. (2021)

In 2018, some territorial authorities had a particularly high percentage of their population experiencing severe housing deprivation. These included:

- Kawerau District (2.3% of the population, 165 people)
- Ōpōtiki District (2.1% of the population, 192 people)
- Far North District (2.0% of the population, 1,319 people)
- Mackenzie District (1.4% of the population, 69 people)

- Wairoa District (1.4% of the population, 114 people)
- Rotorua District (1.3% of the population, 949 people)
- Hastings District (1.3% of the population, 1039 people)
- Whakatāne District (1.2% of the population, 442 people)
- Whangarei District (1.2% of the population, 1097 people).

Figure 138: Percentage of population experiencing severe housing deprivation, by territorial authority, 2018
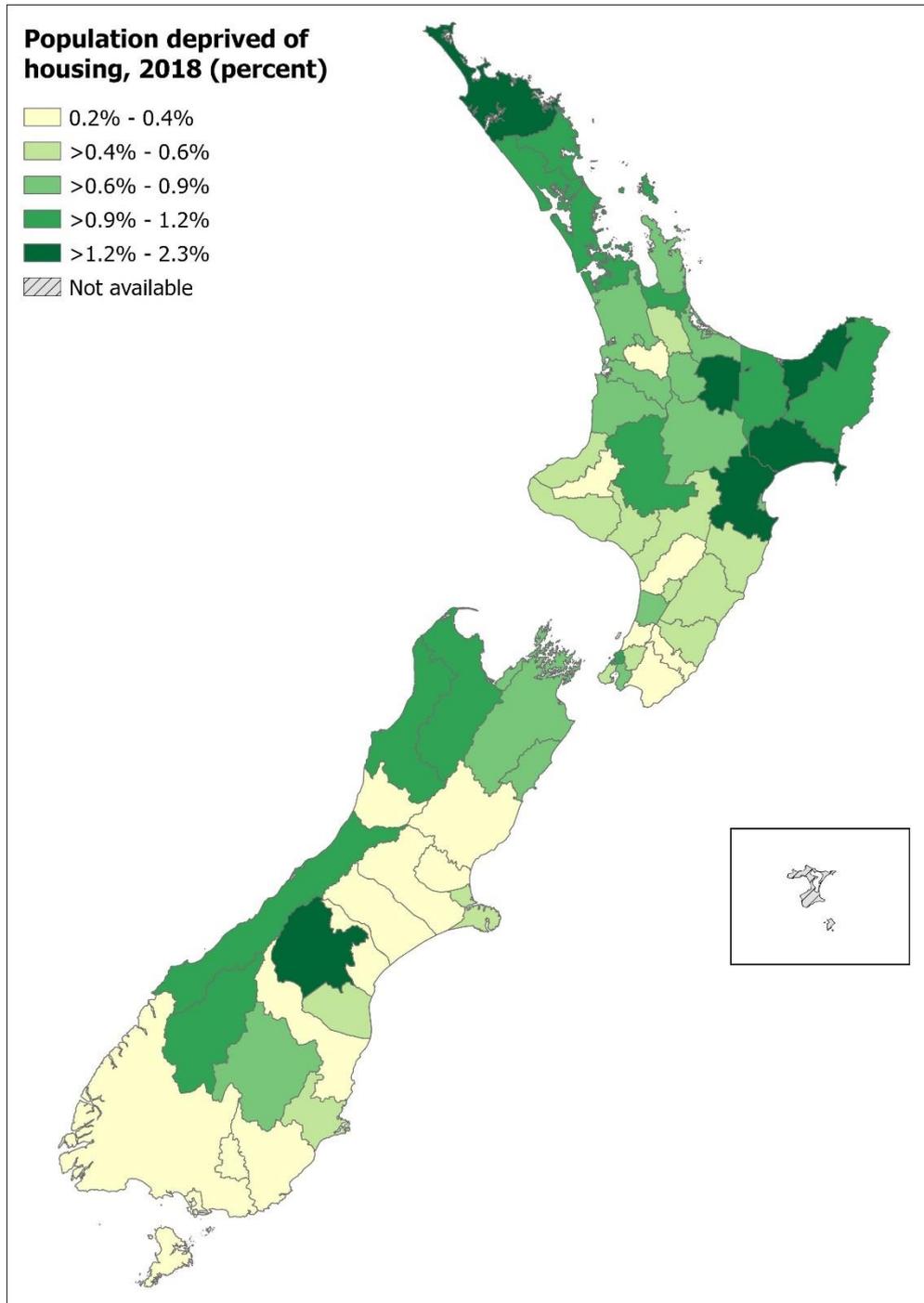
Source: Amore et al. (2021)

14 Enough food and water to cope with shortage

This section presents social vulnerability indicators relating to having enough food and water to cope with shortage.

14.1 Overview

Having enough food and water is essential

Having enough food and water is essential for survival. Having access to safe drinking water is also critically important for protecting health and wellbeing for some vulnerable population groups (especially newborns and young children, pregnant women, the elderly, and people with chronic health conditions). Floods and droughts can also affect the ability to produce food from the land, particularly in rural areas and/or isolated communities.

Having enough safe food and water, as well as ways of cooking food and ensuring that drinking water is safe, is essential for survival in the immediate days after a flood or other disaster, as well as longer term.

Household emergency preparedness can help households cope with shortage

A lack of emergency water, emergency food supplies, electricity supplies (to cook food, boil water, and keep fridges and freezers going) and/or shelter can severely impact on people's health and wellbeing. Other important items during a disaster include essential medication, torches, batteries, emergency cooking facilities (and/or ability to boil water), a way of disinfecting water (such as bleach, if boiling water is not an option), and emergency food that is safe to eat.

Households with good emergency preparedness, including emergency plans in place, are more likely to have sufficient supplies to get through a disaster.

Food insecurity due to lack of money affects some households

Food insecurity (a lack of access to safe, nutritious and affordable food) before a disaster can increase the risk of people not having sufficient food after a disaster. Households with food insecurity (a lack of access to safe, nutritious and affordable food) pre-disaster are also vulnerable. They are unlikely to have enough food to cope with shortages.

In New Zealand, some population groups are less likely to meet emergency preparedness requirements or have food security (Ministry of Health, 2019b, Statistics New Zealand, 2012). These groups include:

- people with low household incomes
- people living in rental housing (particularly public landlords)
- single parents
- people receiving a means-tested benefit.

Some dwellings do not have basic amenities

Additionally, some dwellings may not have basic amenities, such as safe running water, electricity, or a fridge. These basic amenities are important for dwellings to be habitable (particularly the first two). For example, without safe running water, it is difficult to have safe water to drink, or for sanitation and hygiene, and it is unlikely that the household will have enough safe water to cope with shortage in the event of a disaster.

Social vulnerability indicators related to this dimension

Key indicators in this section include:

- People in households with basic emergency preparedness guidelines (ie having enough food and water for three days, and having a household emergency plan)
- People in households with enough food for three days
- People in households with enough water for three days
- People in households with a household emergency plan
- Children living in households where food runs out often or sometimes
- Children living in households which use food grants or food banks often or sometimes
- Dwellings with no access to safe running water
- Dwellings with no power
- Dwellings with no fridge

Other relevant indicators include:

- Households living in rented dwellings (see page 179)
- Single-parent households (see page 144)
- Living in areas of high socioeconomic deprivation (see page 130)

These additional indicators can be used as proxy indicators to help understand the areas where people might be less likely to have enough food and water to survive after a flood, if neighbourhood-level data are not available for indicators of emergency preparedness and food security.

14.2   People in households with basic emergency preparedness

Having enough food and water to cope with shortage is essential for survival. Household emergency preparedness can help in a hazard event, such as a flood or extreme weather event.

Having enough emergency food and water for three days allows households to cope with any shortages of food and water they may experience (NEMA, 2024). Basic household preparation for a hazard event or natural disaster includes having a three-day supply of food and water, and having a household emergency plan (Statistics New Zealand, 2012).

Indicator definition

This indicator shows people who lived in households with basic emergency preparations, which is defined as the household reported as having all three of the following measures:

- having enough food for three days
- having enough water for three days
- having a household emergency plan.

These measures have been presented as an overall combined 'had basic emergency preparedness' (ie households that had all three measures), as well as individual measures (sections 14.3 to 14.5). These data come from published statistics from the New Zealand General Social Survey (Stats NZ, 2022), which is representative of the total New Zealand population (aged 15 years and over). 95% confidence intervals (95% CI) are shown to reflect the uncertainty in estimates due to taking a sample from the population, and show the range that we are 95% confident the true estimate lies within.

One in five say their household has basic emergency preparedness in 2021

In 2021, 83.0% (95% confidence interval: 81.4–84.6) of people lived in households with enough food for three days, while 46.9% (44.6–49.2) of people lived in households with enough water for three days. One in three people (30.9%; 28.8–33.0) lived in households with a household emergency plan (Figure 139).

Overall, 20.8% (18.9–22.6) of people lived in households with basic emergency preparations, defined as having all three household emergency preparedness measures (enough food and water for three days, and having a household emergency plan).

Figure 139: People living in households with basic emergency preparedness (percentage among population aged 15+ years), 2021
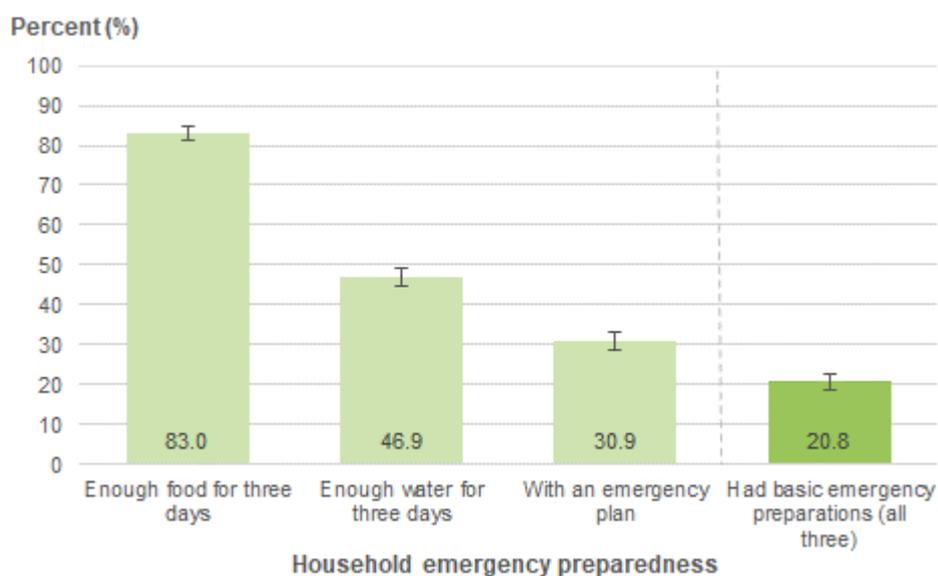
Note: 95% confidence intervals are shown.
Source: General Social Survey, Stats NZ (2022)

Little change in household emergency preparedness since 2012

Overall, the percentage of people in households with basic emergency preparedness increased from 2010 (17.0%) to 2012 (22.4%), likely due to the Christchurch earthquake (Figure 140). There had been little change in the ten years from 2012 to 2021.

Figure 140: People living in households with basic emergency preparedness (percentage among population aged 15+ years), 2008–2021
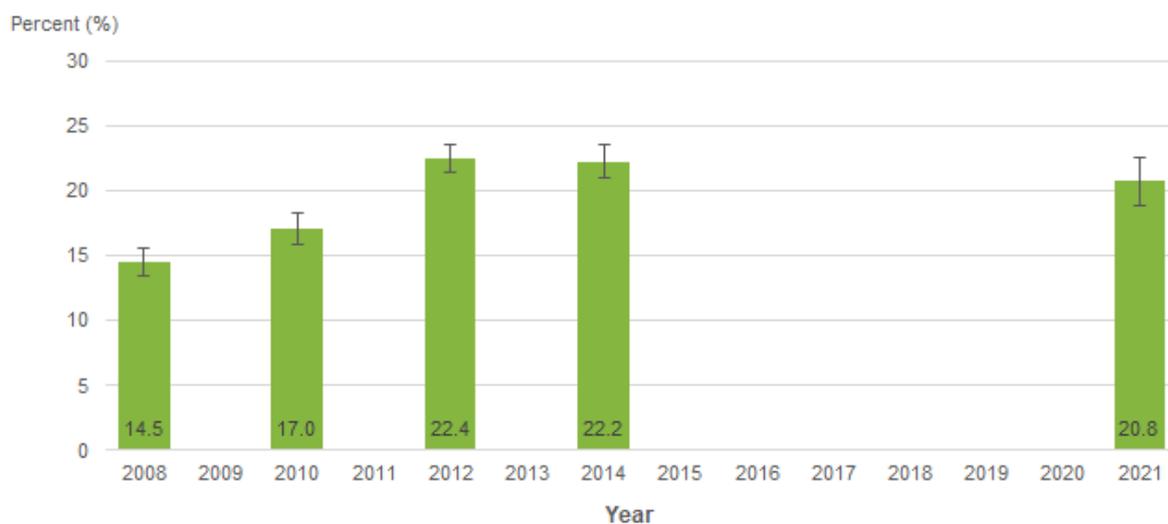
Note: 95% confidence intervals are shown.
Source: General Social Survey, Stats NZ (2022)

People living in rental homes were less likely to have basic household emergency preparedness

Overall in 2021, 13% of people living in rental homes said their household had basic emergency preparations, compared with 25% of people living in owner-occupied houses (Stats NZ, 2022).

14.3 People in households with enough food for three days

Having enough food and water is essential for survival. Having enough food for three days is one important aspect of emergency preparedness.

Household emergency preparedness can help in a hazard event, such as a flood or extreme weather event. In this type of event, emergency services (such as Civil Defence Emergency Management) may not be able to reach everyone immediately, and people may have to go without basic services for days or weeks (NEMA, 2024). Having enough emergency food and water for three days (or better, for a week) allows households to cope with any shortages of food and water they may experience.

Indicator definition

This indicator shows people living in households with enough food for three days. These data come from published statistics from the 2021 New Zealand General Social Survey. These statistics are representative of the total New Zealand population (aged 15 years and over). 95% confidence intervals are shown to reflect the uncertainty in estimates due to taking a sample from the population, and show the range that we are 95% confident the true estimate lies within.

Four in five households had enough food for three days

In 2021, 83.0% (95% confidence interval: 81.4–84.6) of people said their household had enough food for three days. This suggests that 17% of people lived in households that did not have enough food for three days. Having enough food for three days was the most common emergency preparedness out of the three measured (Figure 147).

Figure 141: People living in households with basic emergency preparedness (percentage among total population aged 15+ years), 2021
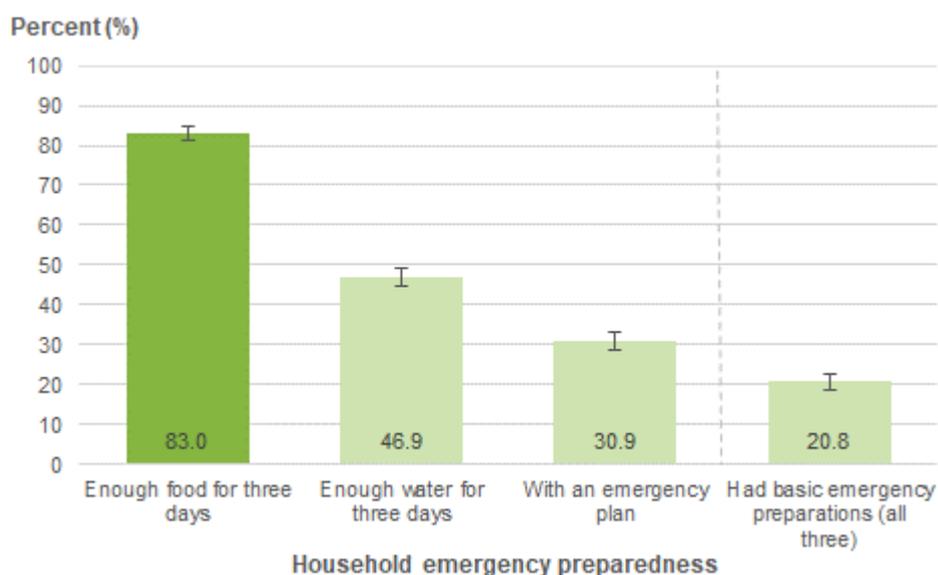

Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

Older adults (aged 65+ years) had higher levels of household emergency preparedness, with 90.9% having enough food for three days (Figure 142). By contrast, people aged 15–24 years and 25–44 years had lower levels of having enough food for three days.

Figure 142: Percentage of people living in households with enough food for three days, by age group, 2021
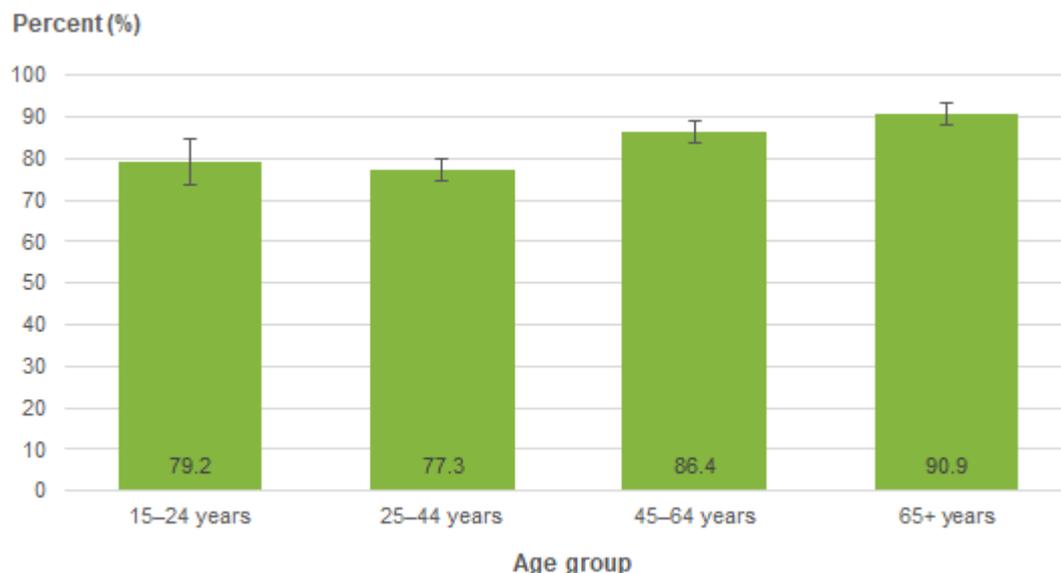
Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

One in three Pacific peoples did not have enough emergency food for three days

About 63.2% of Pacific peoples lived in a household that had enough food for three days (Figure 143). This suggests that about 37% (or one third) did not have enough food for three days, and is likely linked to food security issues and poverty, given the inequities experienced by Pacific peoples (see sections 10.2, 14.6, and 14.7).

Figure 143: People living in households with enough food for three days, by ethnic group (total response), (percentage among population aged 15+ years), 2021
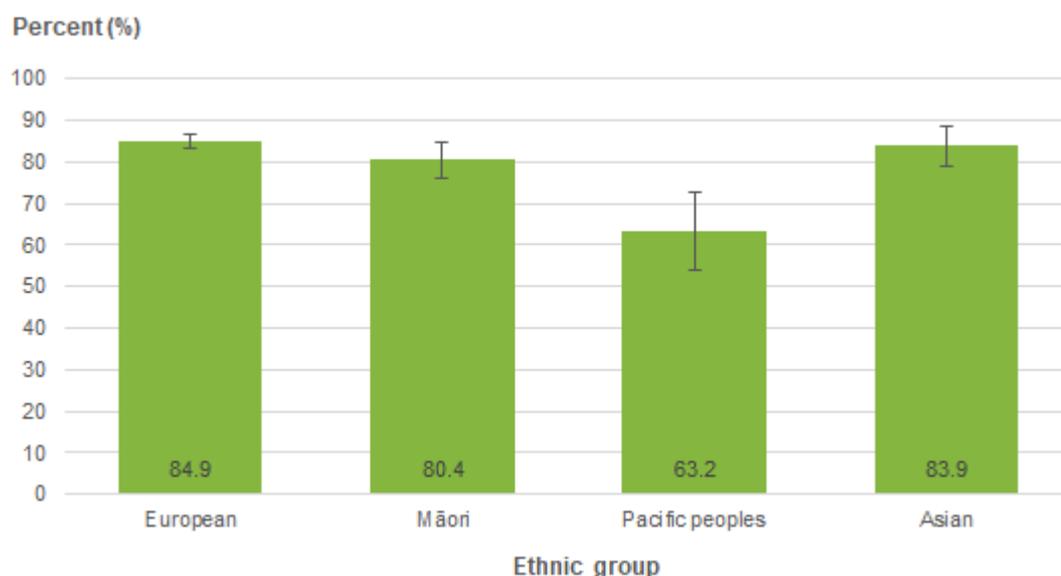
Notes: Total response ethnic groups have been used, so should not be directly compared with each other due to overlapping groups. 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

People living in rural areas were more likely to have enough food for three days

People living in rural areas were more likely to have basic emergency preparedness than people living in urban areas. About 90% of people living in households in rural areas had enough food for three days, compared with 81.8% of people in households in urban areas (Figure 144).

Figure 144: People living in households with enough food for three days, by urban/rural category (percentage among population aged 15+ years), 2021
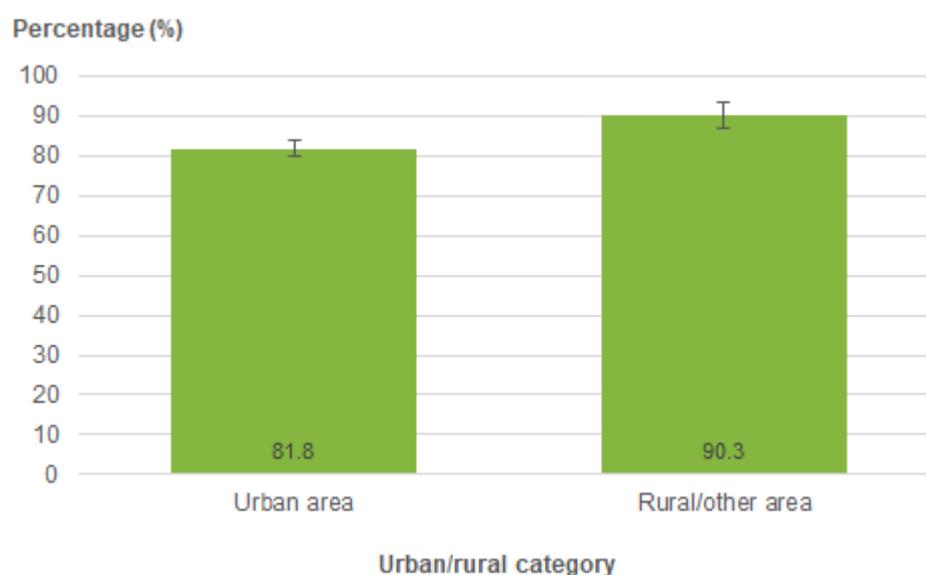
Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

People living in rental homes and sole parents were less likely to have basic emergency preparedness

People living in rental homes were less likely to report they had enough food for three days (74.3%) compared with those living in owner-occupied households (87.2%) (Figure 145).

Figure 145: People living in households with enough food for three days, by housing tenure, (percentage among population aged 15+ years), 2021

Percent (%)
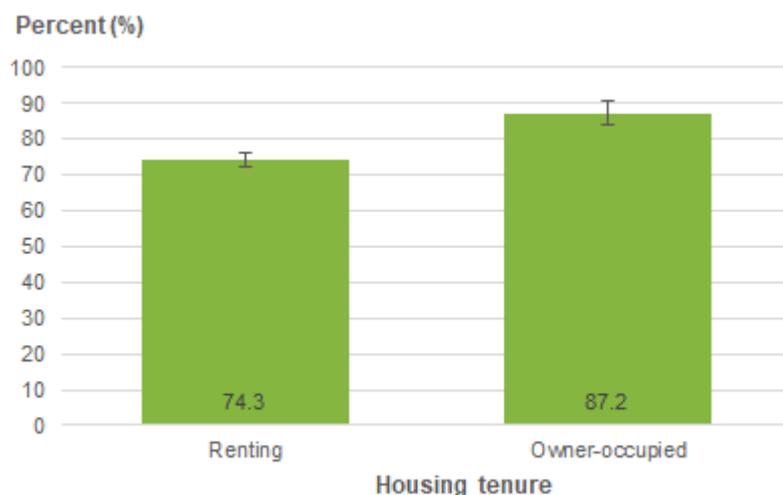
Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

Additionally, 70.7% of sole parents had enough food for three days in 2021, lower than the national rate.

Similar levels of having enough food for three days across regions

Regions had similar levels of having enough food for three days (Figure 146).

Figure 146: People living in households with enough food for three days, by geographical area, (percentage among population aged 15+ years), 2021

Percent (%)
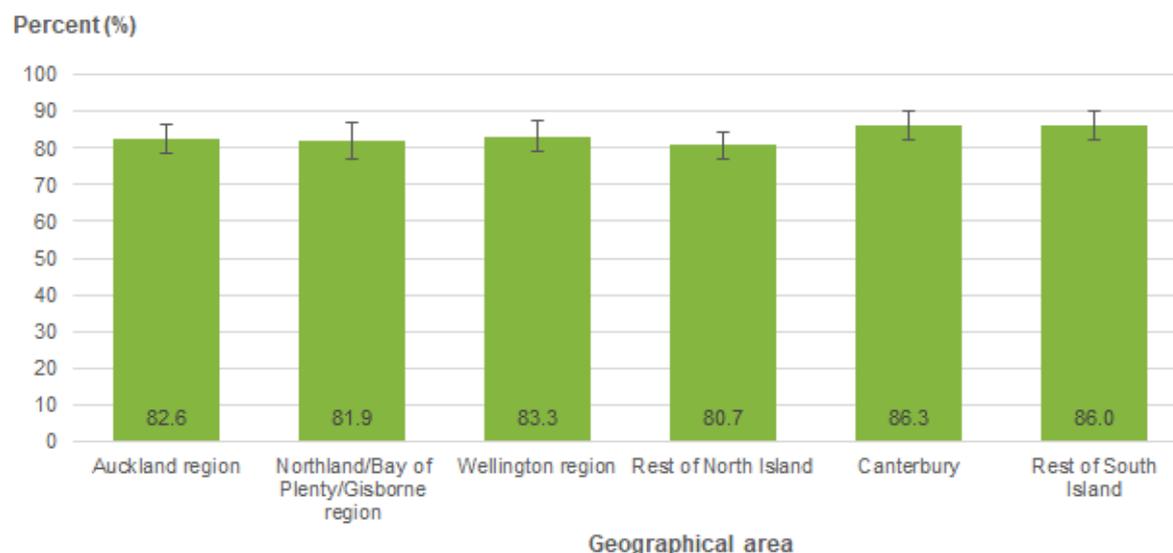
Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

14.4 People in households with enough water for three days

Having enough food and water is essential for survival. Water is essential for drinking, sanitation and cooking. In a hazard event, household water supplies (including drinking water) may be affected, and people may have to go without basic services (such as reticulated water) for days or even weeks (NEMA, 2024).

Having enough stored emergency water for at least three days (or better, for a week) allows households to cope with any water shortages they may experience. Households that do not have enough stored water for three days may struggle during a hazard event (such as flood, extreme storm event, or earthquake) and may need to rely on community water supplies.

Indicator definition

This indicator shows people living in households with enough water for three days. These data come from published statistics from the 2021 New Zealand General Social Survey. These statistics are representative of the total New Zealand population (aged 15 years and over). 95% confidence intervals are shown to reflect the uncertainty in estimates due to taking a sample from the population, and show the range that we are 95% confident the true estimate lies within.

Less than half of people say their household has enough water for three days

In 2021, 46.9% (95% confidence interval 44.6–49.2) of people said their household had enough water for three days (Figure 147).

Figure 147: People who live in households with basic emergency preparedness (percentage among population aged 15+ years), 2021
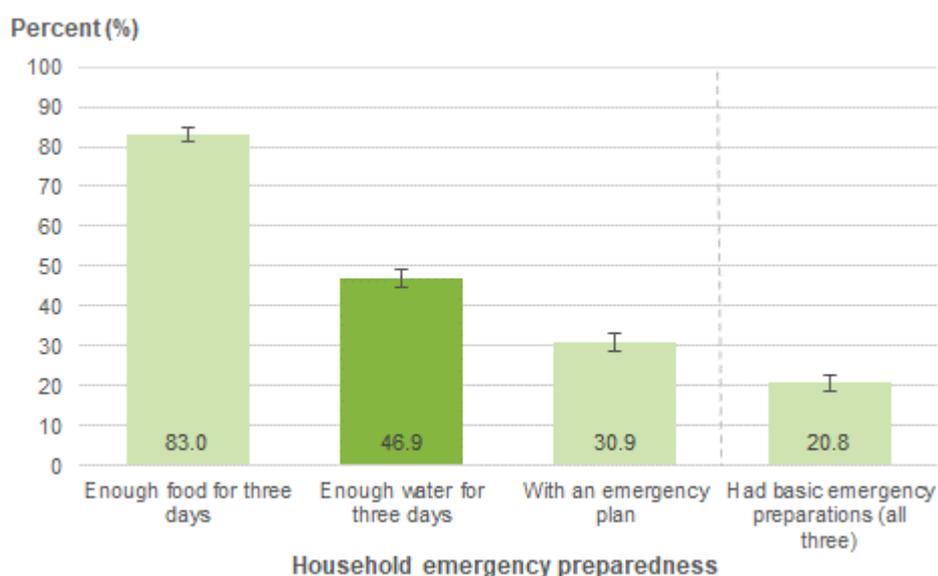

Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

Adults aged 45–64 years and 65+ years had somewhat higher levels of household emergency preparedness, with 52.8% and 54.7% respectively having enough water for three

days (Figure 148). However, this still represents just over half of adults aged 45+ years with sufficient water for three days.

By contrast, people aged 15–24 years and 25–44 years had lower levels of having enough water for three days (44.6% and 38.3% respectively).

Figure 148: Percentage of people living in households with enough water for three days, by age group, 2021
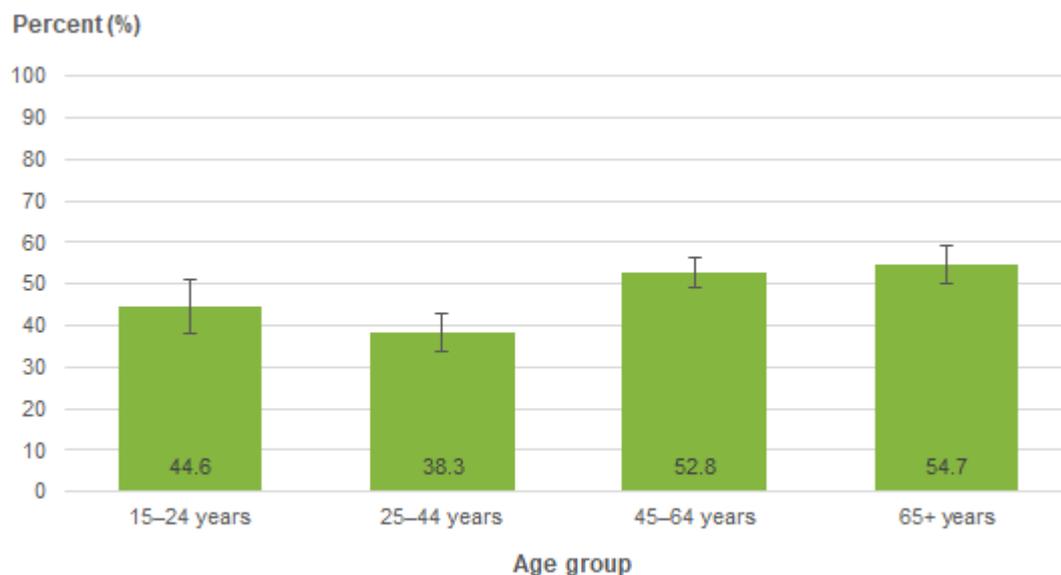
Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

Relatively similar levels across ethnic groups

The percentage of people living in households with enough water for three days was relatively similar by ethnic group (Figure 149).

Figure 149: People living in households with enough water for three days, by ethnic group (total response), (percentage among population aged 15+ years), 2021
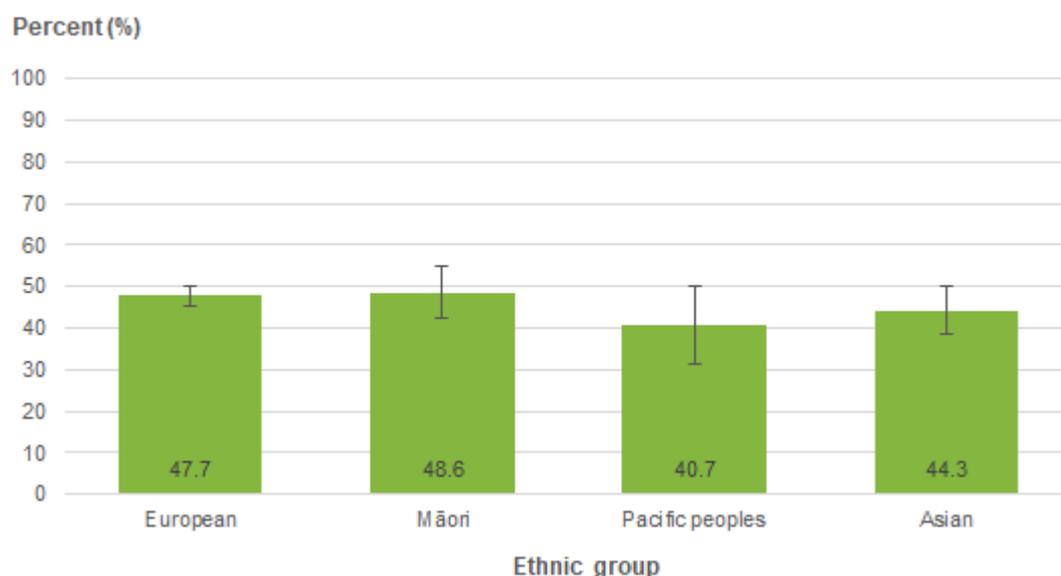

Notes: Total response ethnic groups have been used, so should not be directly compared with each other due to overlapping groups. 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

Households in rural areas much more likely to have enough water for three days

About 70.8% of people living in rural households had enough water for three days (Figure 150). This was much higher than people in households in urban areas, with 42.9% of people reporting their household had enough water for three days.

Figure 150: People living in households with enough water for three days, by urban/rural, (percentage among population aged 15+ years), 2021
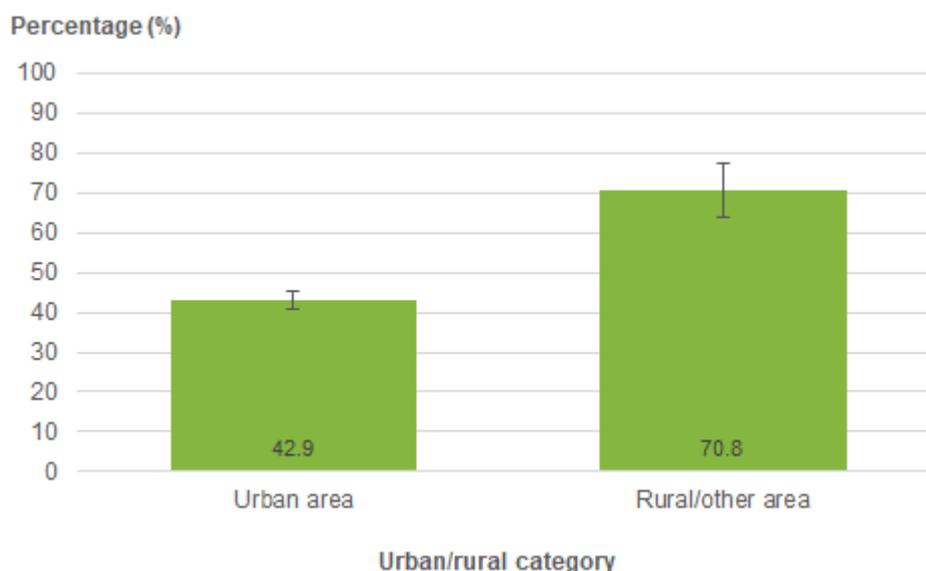
Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

Single parents and people living in rental homes were less likely to have enough water for three days

People living in rental homes were less likely to report they had enough water for three days (37.0%), compared with those living in owner-occupied households (51.6%) (Figure 151).

Figure 151: People living in households with enough water for three days, by housing tenure, (percentage among population aged 15+ years), 2021
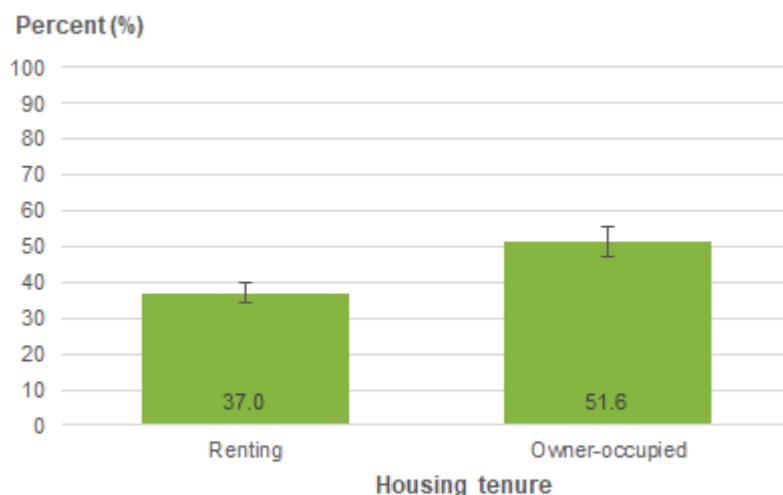
Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

In 2021, 31.7% of sole parents had enough water for three days. This was lower than the national rate of 46.9%.

People living in Wellington were more likely to have enough water for three days

Two in three people (64.0%) in the Wellington region lived in households with enough water for three days (Figure 152). By comparison, only 38.9% of people in the Auckland region lived in households with enough water for three days.

Figure 152: People living in households with enough water for three days, by geographical area, (percentage among population aged 15+ years), 2021

Percent (%)
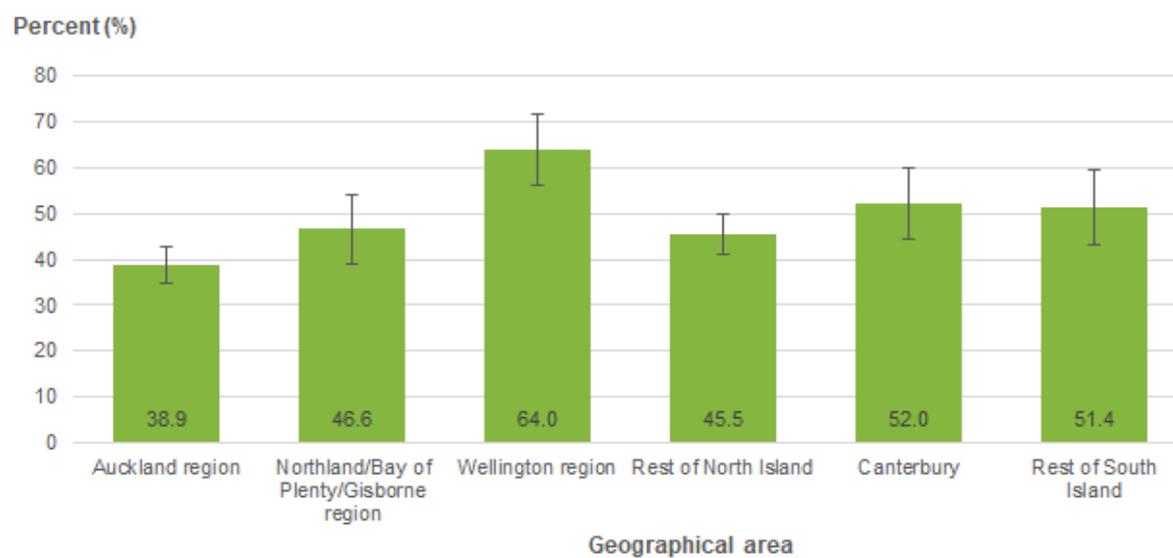
Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

14.5 People in households with a household emergency plan

Having a household emergency plan can help in a hazard event, such as a flood, extreme weather event or wildfire (or natural hazard such as earthquake or tsunami). A household emergency plan can help a household get ready for an emergency, know what to do, and prepare in advance (NEMA, 2024).

Indicator definition

This indicator shows people living in households with a household emergency plan. These data come from published statistics from the 2021 New Zealand General Social Survey. These statistics are representative of the total New Zealand population (aged 15 years and over). 95% confidence intervals are shown to reflect the uncertainty in estimates due to taking a sample from the population, and show the range that we are 95% confident the true estimate lies within.

Less than one third of people reported their household had a household emergency plan

In 2021, 30.9% (95% confidence interval 28.8–33.0) of people said their household had a household emergency plan (Figure 153).

Figure 153: People living in households with basic emergency preparedness, (percentage among population aged 15+ years), 2021
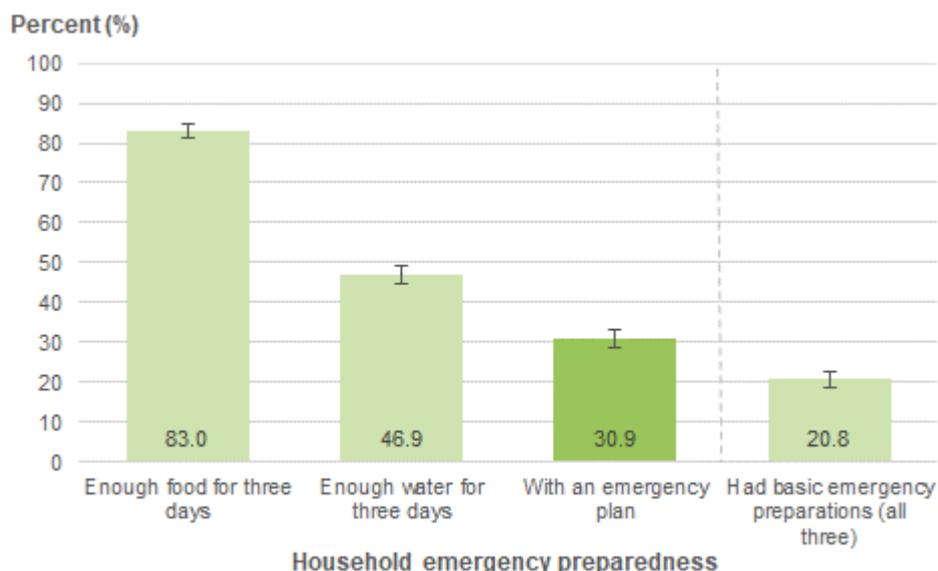

Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

People aged 45–64 years and 65+ years were somewhat more likely to have a household emergency plan than younger adults (Figure 154).

Figure 154: People living in households with a household emergency plan, by age group, (percentage among population aged 15+ years), 2021
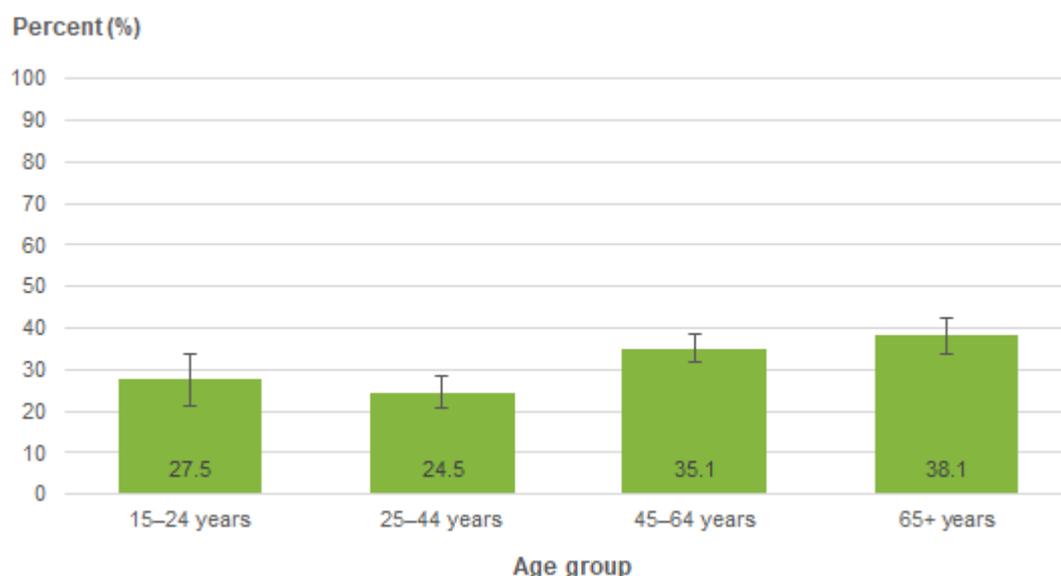
Percent (%)

Relatively low rates of having a household emergency plan across all ethnic groups

There were similar rates across all ethnic groups of people reporting that their household had a household emergency plan (Figure 155).

Figure 155: People living in households with a household emergency plan, by ethnic group (total response), (percentage among population aged 15+ years), 2021
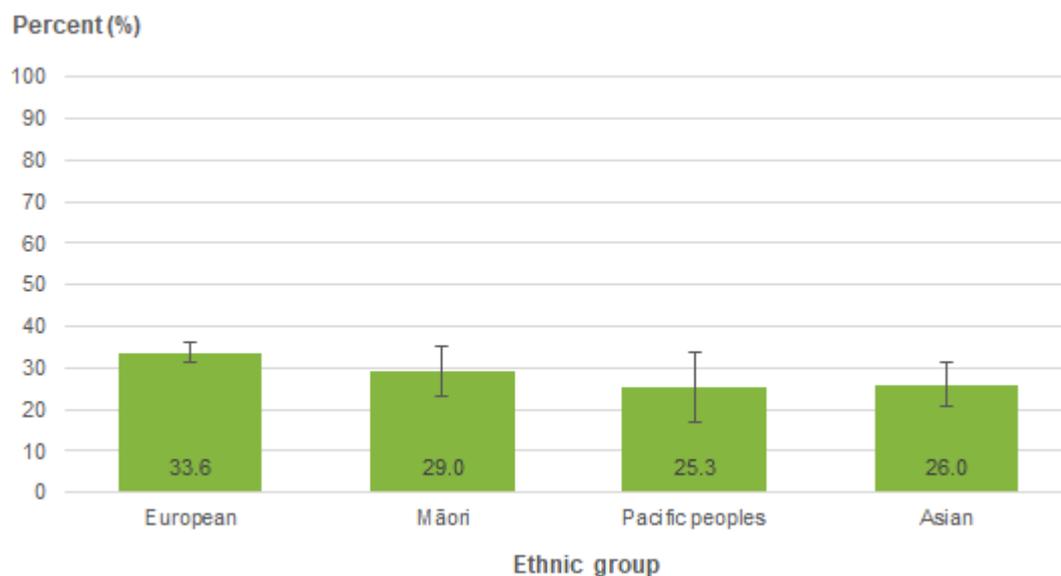
Percent (%)

## People living in rural areas more likely to have a household emergency plan

People living in rural areas were more likely to have a household emergency plan (40.6% of households), compared with people in urban areas (29.2%) (Figure 156).

Figure 156: People living in households with a household emergency plan, by urban/rural, (percentage among population aged 15+ years), 2021
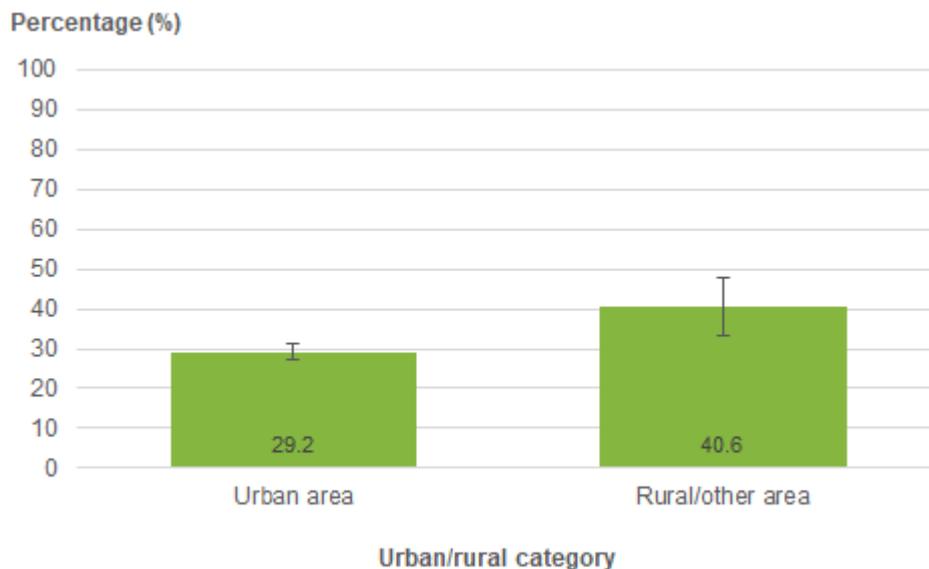
Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

People living in rental homes were less likely to have a household emergency plan

People living in rental homes were less likely to report they had a household emergency plan (23.9%), compared with those living in owner-occupied households (34.2%) (Figure 157).

Figure 157: People living in households with a household emergency plan, by housing tenure, (percentage among population aged 15+ years), 2021
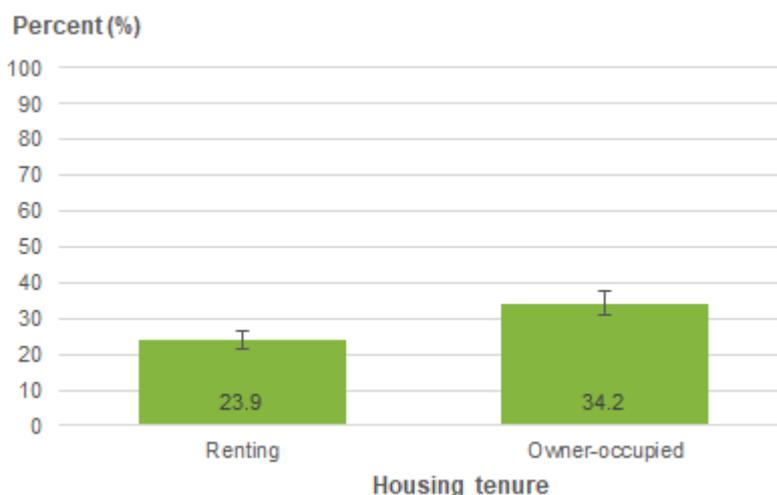
Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

One in four sole parents had a household emergency plan

In 2021, 26.2% of sole parents had a household emergency plan. This was slightly lower than the national rate (30.9%).

Wellington region has higher levels of having a household emergency plan

People living in the Wellington region were more likely to have a household emergency plan (46.7%) (Figure 158).

Figure 158: People living in households with a household emergency plan, by geographical area, (percentage among population aged 15+ years), 2021

Percent (%)

Geographical area	Percent
Auckland region	22.5
Northland/Bay of Plenty/Gisborne region	34.7
Wellington region	46.7
Rest of North Island	28.1
Canterbury	34.0
Rest of South Island	38.3
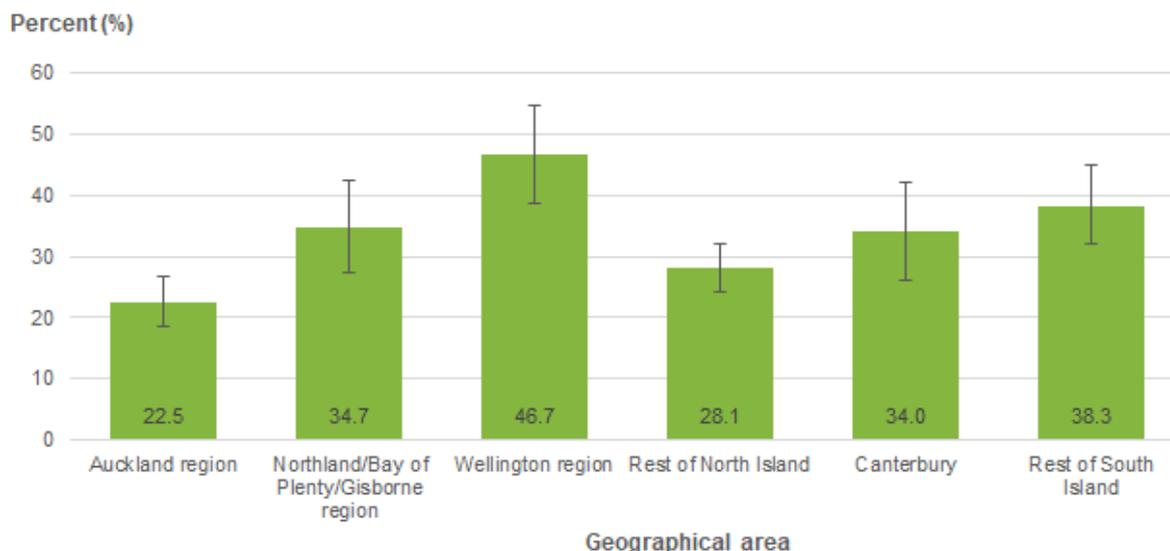
Note: 95% confidence intervals are shown.
Source: 2021 General Social Survey, Stats NZ (2022)

14.6 Children living in households where food runs out often or sometimes

Having enough food to cope with shortage is an important part of resilience to hazards (Wisner et al., 2012, NEMA, 2024). However, some households sometimes or often run out of food, due to a lack of sufficient money for food. 'Food security' refers to the ready availability of nutritionally adequate and safe foods, and access to this food. Households that experience food insecurity are likely to find it difficult to cope with food shortages during an emergency, and may need further assistance in a hazard event.

Indicator definition

This indicator shows the percentage of children aged 0–14 years living in households that run out of basic foods (such as bread, potatoes etc) due to lack of money, often or sometimes over the past year. This data comes from the New Zealand Health Survey. The question was answered by the child's parent or caregiver.

95% confidence intervals are shown to reflect the uncertainty in estimates due to taking a sample from the population, and show the range that we are 95% confident the true estimate lies within.

One in five children live in households where food runs out often or sometimes

In 2022/23, 21.3% of children aged 0–14 years lived in a household where food runs out often or sometimes in the past year. This represented an estimated 206,000 children.

This percentage has changed over the past few years, but the 2022/23 rate was similar to rates in 2014/15 and 2015/16.

Figure 159: Children living in households where food runs out often or sometimes in the last 12 months, by year (unadjusted prevalence), 2012/13–2022/23

Percent (%)

[Bar chart showing percentages by year: 2012/13: 24.1, 2014/15: 22.6, 2015/16: 22.1, 2019/20: 20.0, 2020/21: 14.9, 2021/22: 14.4, 2022/23: 21.3. Years 2013/14, 2016/17, 2017/18, 2018/19 have no data.]

Year

Notes: 95% confidence intervals are shown. The 2020/21 and 2021/22 New Zealand Health Surveys were impacted by COVID-19 disruptions (eg smaller sample sizes and/or lower response rates) (Ministry of Health, 2021, Ministry of Health, 2022), so should be interpreted with caution.
Source: New Zealand Health Survey – Annual Data Explorer 2022/23 (Ministry of Health, 2023)

More than one in three Māori and Pacific children live in households where food runs out often or sometimes

Māori and Pacific children had high rates of living in households where food runs out often or sometimes (35.1% of Māori children and 39.6% of Pacific children) (Figure 160).

Figure 160: Children living in households where food runs out often or sometimes in the last 12 months, by ethnic group (total response) (unadjusted prevalence), 2022/23

Percent (%)

[Bar chart showing percentages by ethnic group: Māori: 35.1, Pacific: 39.6, Asian: 12.3, European/Other: 18.0]

Ethnic group (total response)
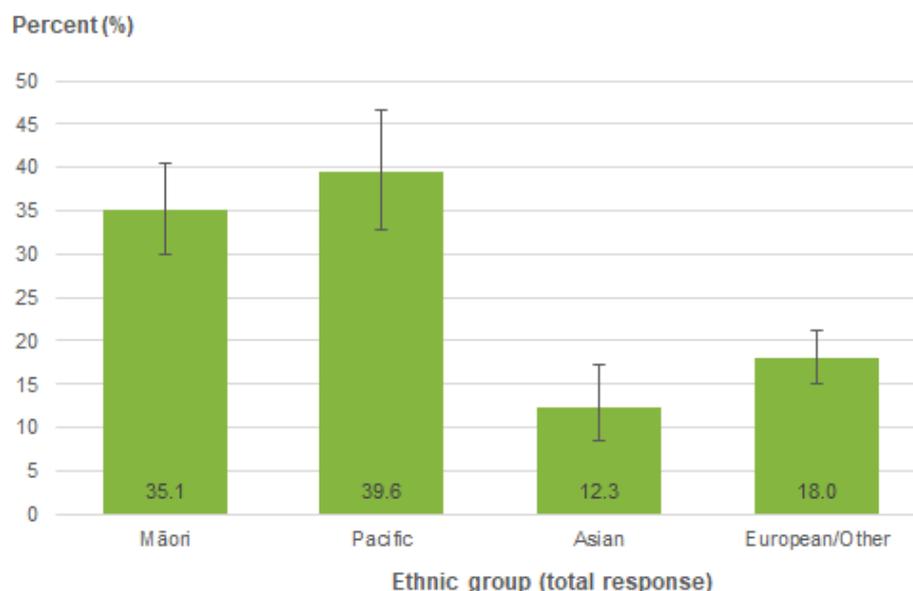
Notes: 95% confidence intervals are shown. Total response ethnic groups are shown (where everyone is included in all ethnic groups they identified with), so ethnic groups cannot be directly compared as they may be overlapping.
Source: New Zealand Health Survey – Annual Data Explorer 2022/23 (Ministry of Health, 2023)

Table 16: Children living in households where food runs out often or sometimes in the last 12 months, by total response ethnic group, 2022/23 (unadjusted prevalence and estimated number)

Ethnic group (total response)	Prevalence (%, 95% confidence interval)	Estimated number of children affected
Total	21.3% (18.9–23.9)	206,000
Māori	35.1% (29.9–40.5)	94,000
Pacific	39.6% (32.8–46.6)	62,000
Asian	12.3% (8.4–17.2)	24,000
European/Other	18.0% (15.0–21.3)	112,000

Note: 95% confidence intervals are given in brackets. Numbers will add to more than the total, due to total response ethnicity (where everyone is included in every ethnic group they report).
Source: New Zealand Health Survey – Annual Data Explorer 2022/23 (Ministry of Health, 2023)

Running out of food was much more common in more deprived areas

Children living in the most deprived areas (NZDep2018 quintile 5) were much more likely to live in households where food runs out due to lack of money often or sometimes (36.1%) compared with children living in the least deprived areas (5.5%) (Figure 161).

Figure 161: Children living in households where food runs out often or sometimes in the last 12 months, by socioeconomic deprivation (NZDep2018 quintile) (unadjusted prevalence) , 2022/23
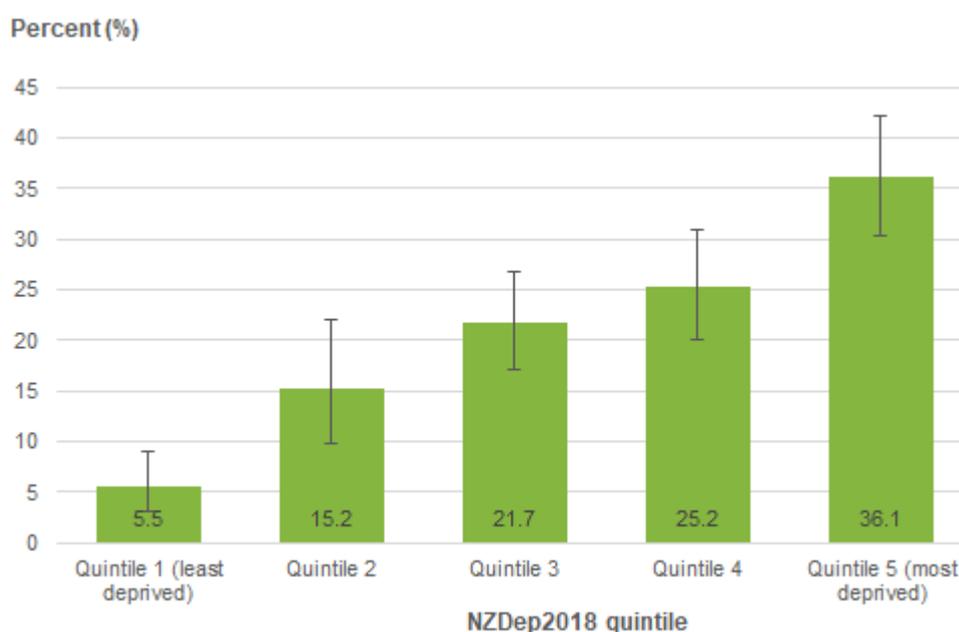
Notes: 95% confidence intervals are shown.
Source: New Zealand Health Survey – Annual Data Explorer 2022/23 (Ministry of Health, 2023)

Disabled children were much more likely to live in households where food runs out often or sometimes

Disabled children were much more likely to live in households where food runs out often or sometimes (35.0%) compared with non-disabled children (19.5%) (Figure 162).

Figure 162: Children aged 5–14 years living in households where food runs out often or sometimes in the last 12 months, by disability status (unadjusted prevalence), 2022/23

Percent (%)
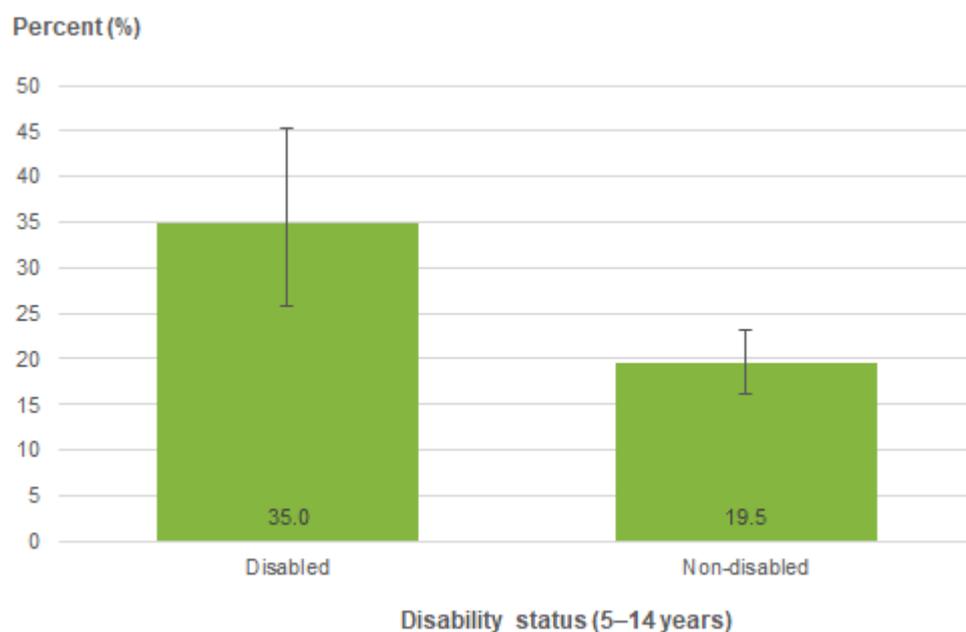
Notes: 95% confidence intervals are shown.
Source: New Zealand Health Survey – Annual Data Explorer 2022/23 (Ministry of Health, 2023)

14.7 Children living in households which use food grants or food banks

Having enough food to cope with shortage is an important part of resilience to hazards (Wisner et al., 2012, NEMA, 2024). 'Food security' refers to the ready availability of nutritionally adequate and safe foods, and access to this food.

One aspect of food insecurity is households needing to use food grants or food banks when they do not have enough money for food. Households that need to rely on food grants or food banks are unlikely to have enough food to cope with shortage in an emergency, and may need further assistance in a hazard event.

Indicator definition

This indicator shows the percentage of children aged 0–14 years living in households which used food grants or food banks due to lack of money, often or sometimes over the past year. This data comes from the New Zealand Health Survey; the question was answered by the child's parent or caregiver.

95% confidence intervals are shown to reflect the uncertainty in estimates due to taking a sample from the population, and show the range that we are 95% confident the true estimate lies within.

About 14% of children live in households which use food grants or food banks because of lack of money

In 2022/23, 14.4% of children lived in households which used food grants or food banks because of lack of money, often or sometimes in the past year. This represented an estimated 139,000 children.

This percentage has been relatively similar over the past ten years (Figure 163).

Figure 163: Children living in households that used food grants or food banks often or sometimes in the last 12 months, by year (unadjusted prevalence), 2012/13–2022/23


Notes: 95% confidence intervals are shown. The 2020/21 and 2021/22 New Zealand Health Surveys were impacted by COVID-19 disruptions (eg smaller sample sizes and/or lower response rates) (Ministry of Health, 2021, Ministry of Health, 2022), so should be interpreted with caution.
Source: New Zealand Health Survey – Annual Data Explorer 2022/23 (Ministry of Health, 2023)

Many Māori and Pacific children live in households that need to use food grants or food banks due to lack of money

Māori and Pacific children had relatively high rates of living in households which used food grants or food banks because of lack of money. About 25% of Māori children lived in households which used food grants or food banks often or sometimes, and 34.0% of Pacific children (Figure 164, Table 17).

Figure 164: Children living in households that used food grants or food banks often or sometimes in the last 12 months, by ethnic group (total response) (unadjusted prevalence), 2022/23
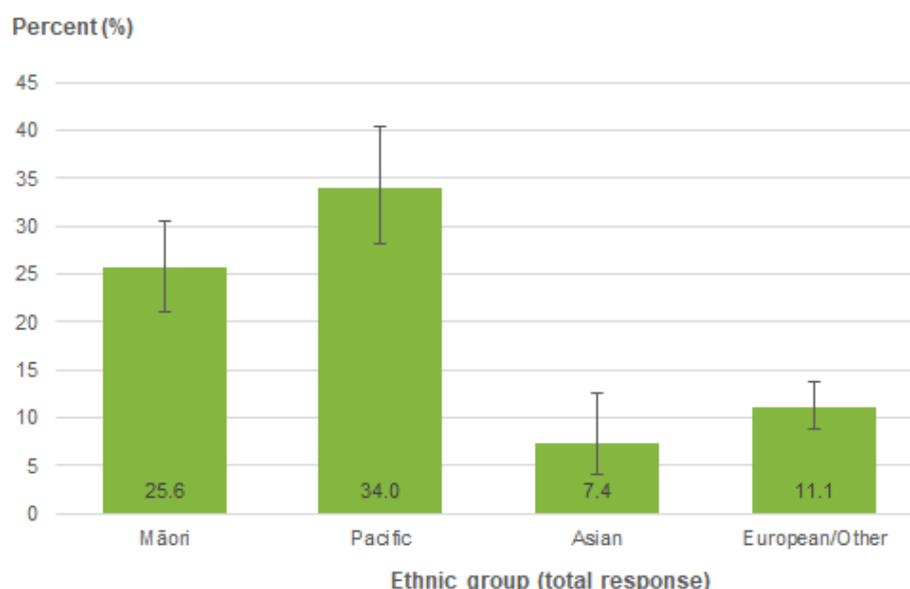
Notes: 95% confidence intervals are shown. Total response ethnic groups are shown (where everyone is included in all ethnic groups they identified with), so ethnic groups cannot be directly compared as they may be overlapping.
Source: New Zealand Health Survey – Annual Data Explorer 2022/23 (Ministry of Health, 2023)

Table 17: Children living in households that used food grants or food banks often or sometimes in the last 12 months, by total response ethnic group, 2022/23 (unadjusted prevalence and estimated number)

| Ethnic group (total response)	Prevalence (%, 95% confidence interval)	Estimated number of children affected
Total	14.4% (12.4–16.7)	139,000
Māori	25.6% (21.1–30.6)	69,000
Pacific	34.0% (28.1–40.3)	52,000
Asian	7.4% (4.0–12.5)	15,000
European/Other	11.1% (8.9–13.7)	69,000

Note: 95% confidence intervals are given in brackets. Numbers will add to more than the total, due to total response ethnicity (where everyone is included in every ethnic group they report).
Source: New Zealand Health Survey – Annual Data Explorer 2022/23 (Ministry of Health, 2023)

One in three children in more deprived areas lived in households which used food grants or food banks

Children in the most deprived areas (NZDep2018 quintile 5) were much more likely to live in households that used food grants or food banks often or sometimes (31.9%), compared with children in the least deprived areas (1.7%).

Figure 165: Children living in households that used food grants or food banks often or sometimes in the last 12 months, by socioeconomic deprivation (NZDep2018 quintile) (unadjusted prevalence), 2022/23

Percent (%)

[Bar chart with values by NZDep2018 quintile:
Quintile 1 (least deprived): 1.7
Quintile 2: 9.1
Quintile 3: 13.1
Quintile 4: 13.5
Quintile 5 (most deprived): 31.9]
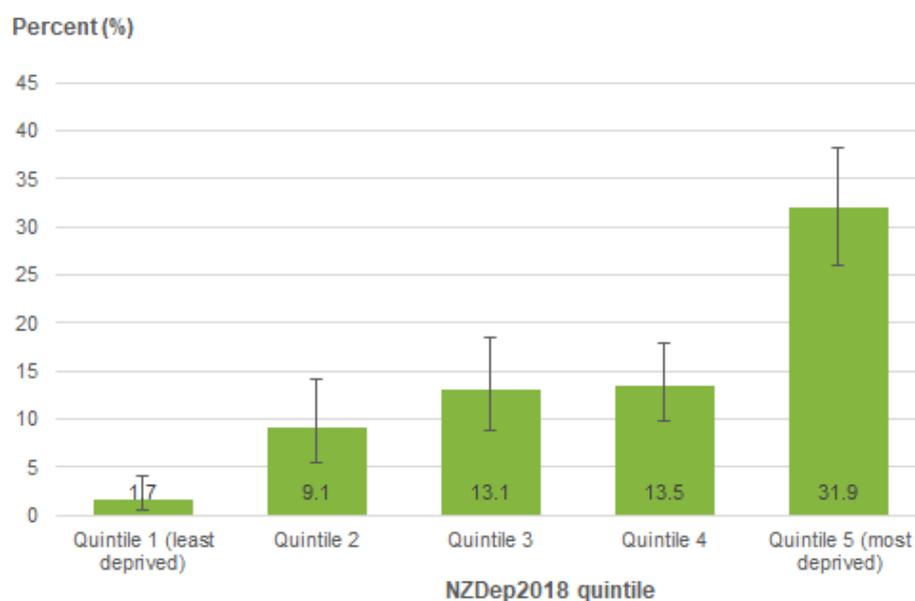
Notes: 95% confidence intervals are shown.
Source: New Zealand Health Survey – Annual Data Explorer 2022/23 (Ministry of Health, 2023)

Disabled children were much more likely to live in households which used food grants or food banks

Disabled children were much more likely to live in households that used food grants or food banks (28.4%) compared with non-disabled children (12.1%) (Figure 166).

Figure 166: Children aged 5–14 years living in households that used food grants or food banks often or sometimes in the last 12 months, by disability status (unadjusted prevalence), 2022/23

Percent (%)

[Bar chart by disability status (5–14 years):
Disabled: 28.4
Non-disabled: 12.1]
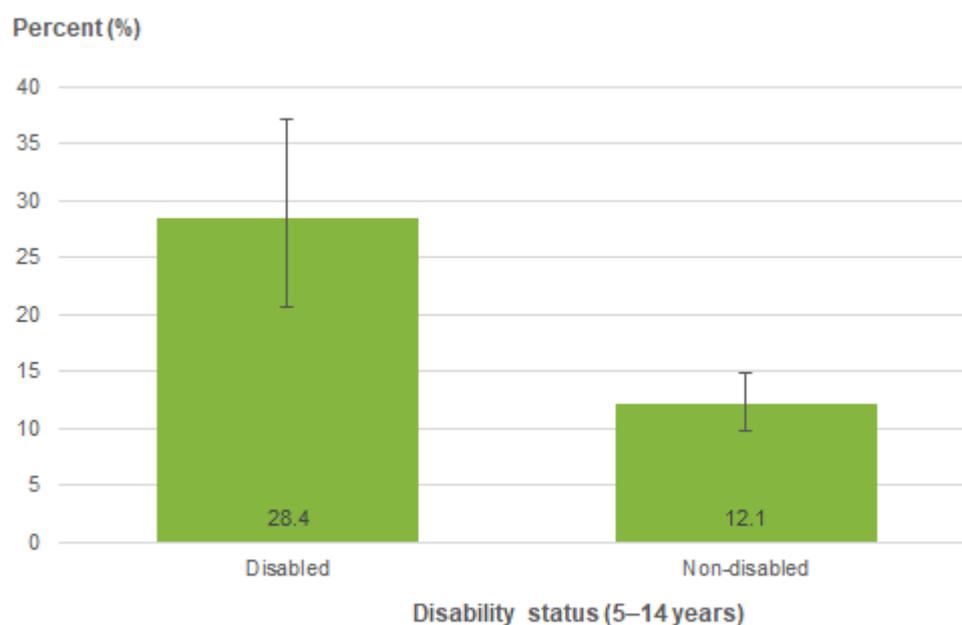
Notes: 95% confidence intervals are shown.
Source: New Zealand Health Survey – Annual Data Explorer 2022/23 (Ministry of Health, 2023)

14.8   Dwellings with no access to safe running water

Having safe, secure and healthy housing with basic amenities is important for resilience to climate-related hazards. Water is essential for survival, particularly having safe drinking water, as well as for sanitation and hygiene (WHO, 2019). People living in dwellings without access to safe running water are more vulnerable, as they do not have safe drinking water available even in non-disaster times.

In urban areas, drinking water is generally provided through reticulated (piped) water supplies. In rural areas, households are more likely to rely on rainwater tanks and/or groundwater.

Indicator definition

This indicator shows dwellings reported to have no tap water that is safe to drink, as a percentage of all occupied private dwellings. This question was asked for the first time in the 2018 Census, so no time series are currently available.

These data are self-reported by dwelling occupants. It is not known whether these dwellings have no access to running water, or whether people did not trust the safety of the tap water they had access to. Data from 2023 will allow for comparisons over time, to note any changes.

At least 48,000 dwellings did not have access to safe running water in 2018

In 2018, 3.2% of dwellings did not have access to safe running water. This represented an estimated 48,768 dwellings (out of 1,529,901 dwellings stated). However, this number should be treated as a lower bound, due to missing data for some dwellings.

Results by territorial authority

In 2018, some territorial authorities had a higher percentage of dwellings with no access to safe running water. These included:

- Buller District (12.1% of dwellings)
- Chatham Islands (11.1%)
- Ruapehu District (8.9%)
- Hurunui District (7.5%)
- Hastings District (7.2%)
- Horowhenua District (6.7%)
- Tararua District (6.1%)
- Waimate District (5.8%).

Figure 167: Percentage of dwellings with no access to safe running water, by territorial authority, 2018
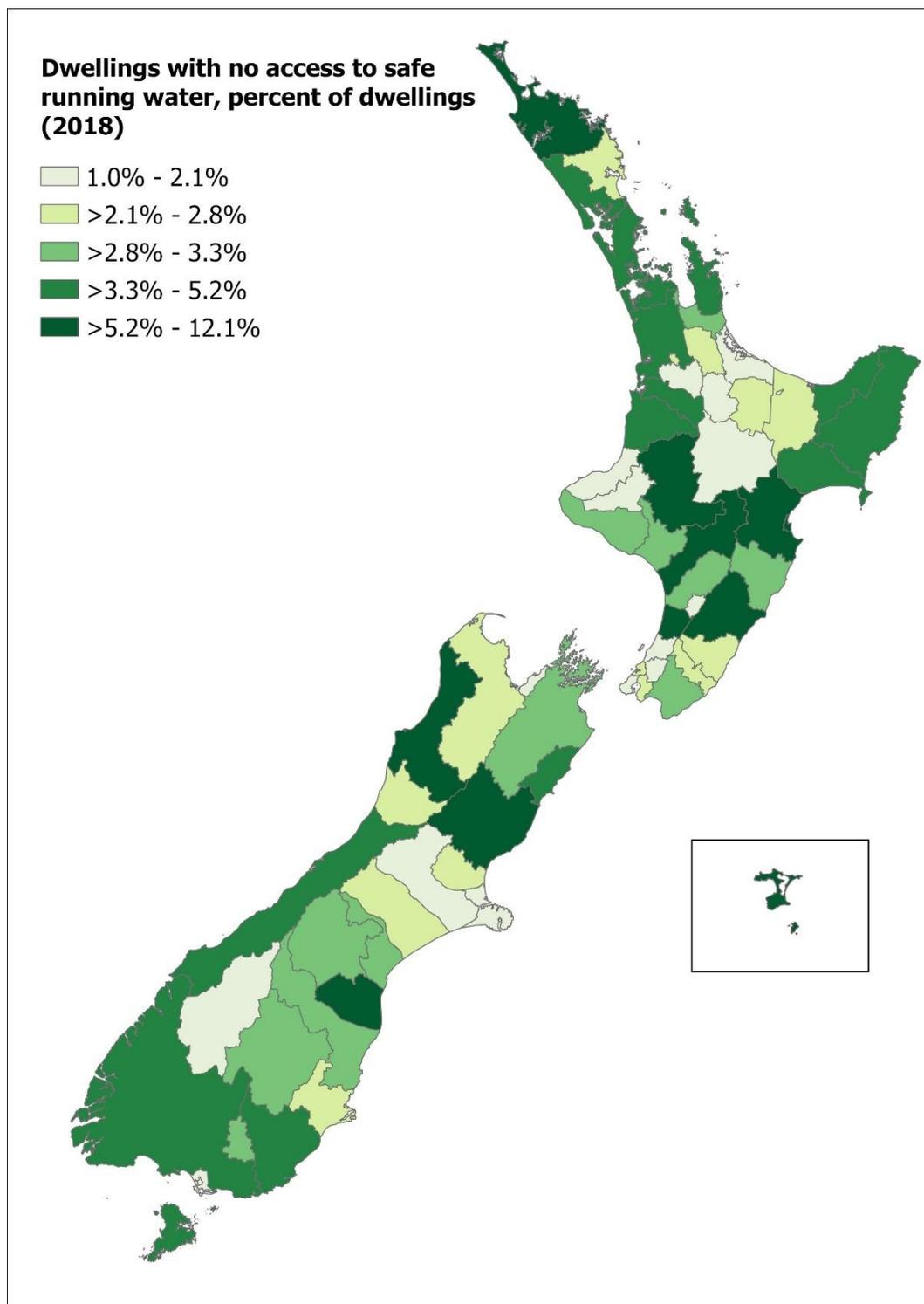
Source: New Zealand Census of Population and Dwellings

14.9 Dwellings with no access to a fridge

Having safe, secure and healthy housing with basic amenities is important for resilience to climate-related hazards. Having a fridge allows people to keep food at a safe temperature for eating, and to keep medications chilled when necessary. People living in dwellings without access to a working fridge may be more vulnerable, as it may be difficult to ensure food safety even in non-disaster times.

Indicator definition

This indicator shows dwellings reported to have no access to a refrigerator, as a percentage of all occupied private dwellings. This question was asked for the first time in the 2018 Census, so no time series are currently available.

At least 48,000 dwellings did not have access to a fridge in 2018

In 2018, 3.2% of dwellings did not have access to a fridge. This represented an estimated 48,471 dwellings (out of 1,529,901 dwellings stated). However, this number should be treated as a lower bound, due to missing data for some dwellings.

Results by territorial authority

In 2018, some territorial authorities had a higher percentage of dwellings with no access to a fridge. These included:

- Chatham Islands (6.2% of dwellings)
- Hamilton City (4.7%)
- Westland District (4.6%)
- Rotorua District (3.9%)
- Ōtorohanga District (3.8%)
- Auckland City (3.8%)
- Buller District (3.8%)
- Ruapehu District (3.7%).

Figure 168: Percentage of dwellings with no access to a fridge, by territorial authority, 2018
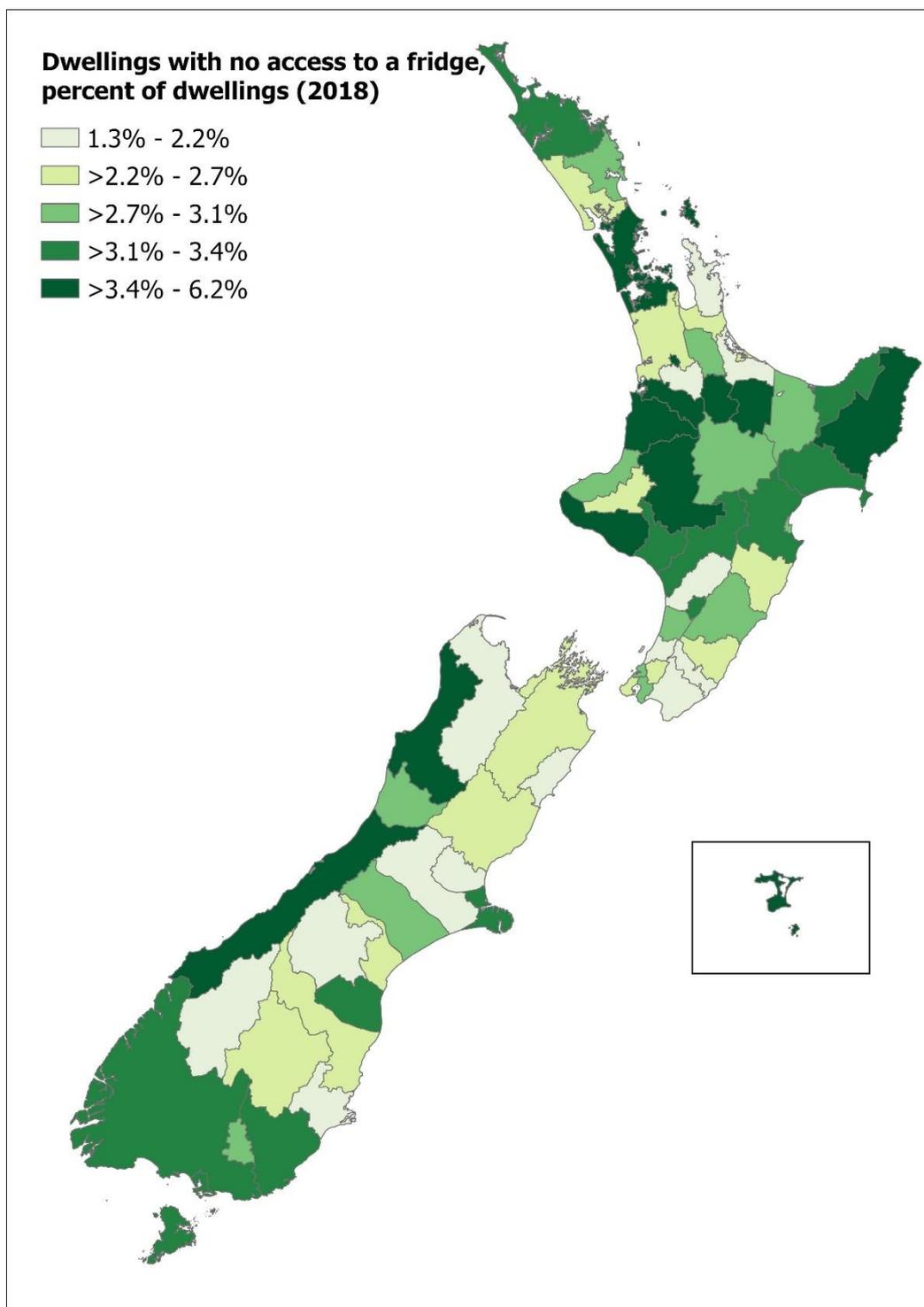
Source: New Zealand Census of Population and Dwellings

14.10 Dwellings with no electricity

Having safe, secure and healthy housing with basic amenities is important for resilience to climate-related hazards. Having electricity allows people to use a range of equipment related to resilience, including fridges, heat pumps, fans, air-conditioners, computers, chargers for electronic devices and mobile phones, and lights. People living in dwellings without electricity may be more vulnerable, as it may be difficult to have those aspects of life that help resilience.

Indicator definition

This indicator shows dwellings reported to have no access to an electricity supply, as a percentage of all occupied private dwellings. This question was asked for the first time in the 2018 Census, so no changes over time are currently available.

It should be noted that the 2018 Census was mainly an online form for the majority of the population, which may have been difficult for people to fill in if they lived in dwellings with no electricity. Therefore, numbers are likely to be an undercount.

Over 26,000 dwellings did not have access to electricity in 2018

In 2018, 1.7% of dwellings did not have access to electricity. This represented an estimated 26,226 dwellings (out of 1,529,901 dwellings stated). However, this number should be treated as a lower bound, due to missing data for some dwellings.

Results by territorial authority

In 2018, some territorial authorities had a higher percentage of dwellings with no access to electricity. These included:

- Chatham Islands (7.4% of dwellings)
- Westland District (2.7%)
- Far North District (2.6%)
- Auckland City (2.4%)
- Ōpōtiki District (2.3%)
- Waitomo District (2.3%)
- Buller District (2.3%)
- Ōtorohanga District (2.3%)
- Wairoa District (2.2%).

Figure 169: Percentage of dwellings with no access to electricity, by territorial authority, 2018
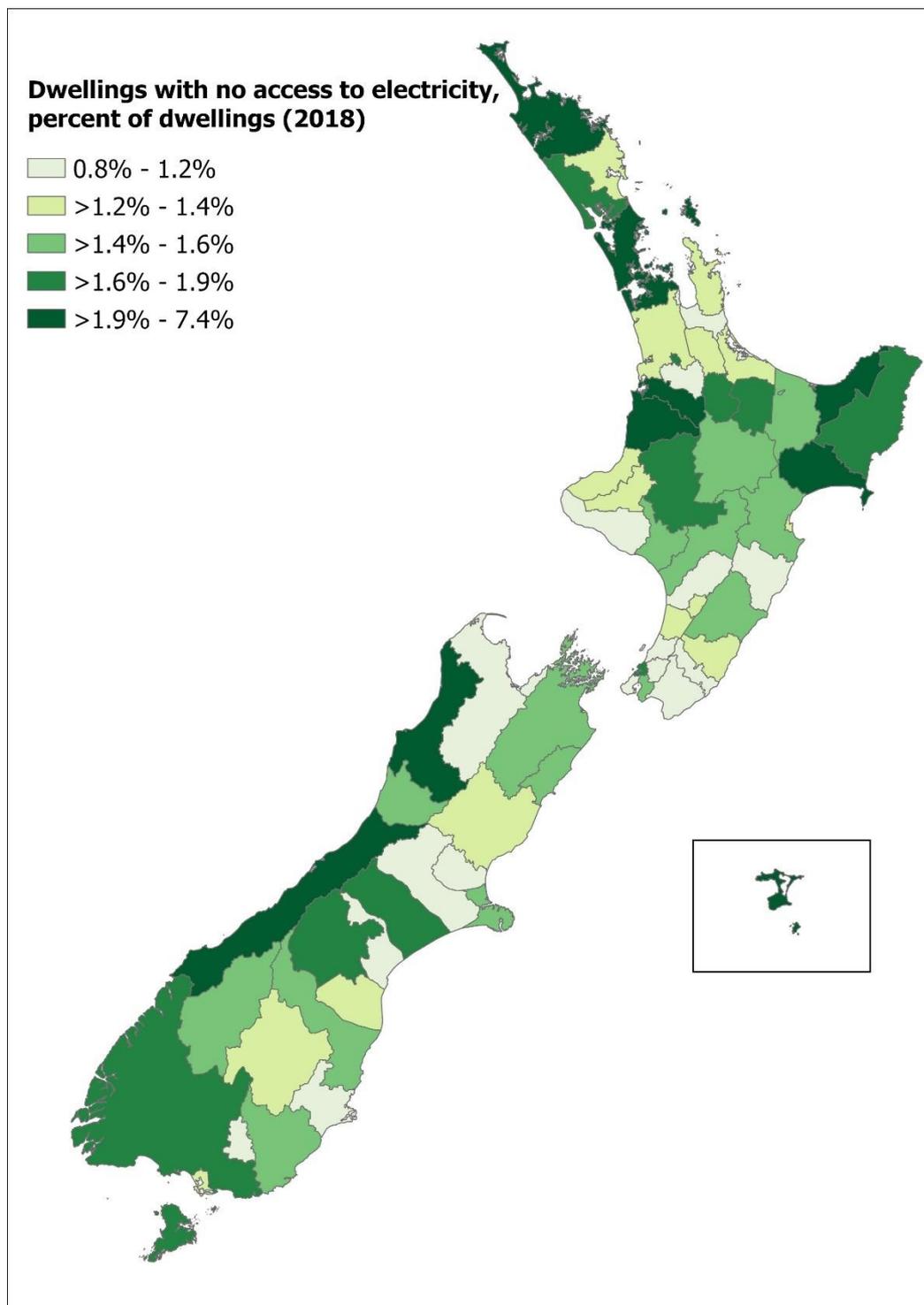
Source: New Zealand Census of Population and Dwellings

15 Decision-making and participation

This section presents social vulnerability indicators relating to decision-making and participation.

15.1 Overview

Good decision-making, and participation in decision-making, is important for resilience

Decision-making and leadership, including people's ability to participate in and influence decision-making, plays an important role in resilience. This includes working closely and partnering with local iwi and hapū in the area, and engaging with vulnerable population groups in an area, to ensure that their needs are listened to and met. People without access to or involvement in decision-making are likely to be left out of the process, and not have their needs listened to or fully met.

Effective leadership is important when coordinating emergency management during and after a disaster. Having leadership structures and strong networks already in place can play an important role in resilience during a disaster.

Inclusive decision-making helps resilience

Being inclusive in decision-making helps to build resilience and ensure that people's needs are met. Partnership and collaboration between local iwi, councils, government and CDEM groups can build and strengthen resilience.

People without involvement in decision-making are likely to feel left out of the process. They are unlikely to have their needs listened to or fully met. These are often marginalised groups, such as minority ethnic groups, Indigenous peoples, refugees, disabled people, and the homeless (Gamble et al., 2016, Li et al., 2023). These groups may have experienced structural disadvantage and discrimination, and may not have a strong voice in decision-making (Li et al., 2023).

New Zealand's National Disaster Resilience Strategy states that:

> Engaging with, and considering the needs of, any people or groups who have specific needs or who are likely to be disproportionately affected by disasters, is critical. Not all New Zealanders, or those who work, live, or visit here, will have the same capacity to engage, prepare, or build resilience. It is important that the needs of all people are accounted for, including how to best enable, empower, and support people to achieve good outcomes. Inclusive and participatory governance of disaster resilience at all levels is an important objective. This includes the co-development of clear vision and plans, building capability and capacity, and ensuring coordination. Partnerships, networks, and coalition approaches are crucial (MCDEM, 2019).

At the individual level, self-efficacy and autonomy are important for making people feel like they have a sense of control over their situation. People also need to be able to access services and resources, and not be excluded or have major barriers to accessing these.

Decision-making and impacts can occur at multiple stages and levels

Decision-making impacts can occur at all stages of addressing the risks relating to climate change, including risk reduction activities (eg infrastructure upgrades), readiness (eg emergency planning and preparedness), response activities during a hazard event or disaster (eg sharing weather updates, evacuation activities, accessibility of emergency shelters), recovery efforts (eg potential red-zoning of areas), and adaptation planning and activities.

Decision-making and resilience can occur at many levels, including individual and household, iwi/hapū, CDEM groups, local government (council staff and Councillors), central government (MPs and Ministers), and everything in between (MCDEM, 2019). For example:

- individuals, family/whānau, households
- communities
- businesses and organisations
- iwi and hapū
- cities and districts (local government)
- CDEM response
- central government / national.

Social vulnerability indicators related to this dimension

It is relatively difficult to get quantitative local-level data for social vulnerability indicators relating to individuals/households and their participation in decision-making. Political participation is one measure relating to governance and policy that has been previously included in social vulnerability indicator sets. Political participation can include measures relating to voter turn-out, poor political representation, and percentage of the electorate voting in municipal elections (Li et al., 2023). However, this dimension of social vulnerability can be supplemented with other qualitative information (such as the quality of local networks and inclusiveness in decision-making, partnerships with local iwi).

This section presents the following indicator:

- Voting participation in local body elections

15.2   Voting participation in local body elections

Participating in voting is part of the democratic process and is a way for individuals to have a voice in the decision of who sits on their local council, and therefore to influence decision-making at the local council level. Voting participation can be a measure of community involvement and engagement.

Indicator definition

This indicator shows residential voter turnout in the local body elections. This is defined as the number of residential voters (ie residents who voted), among residential electors (contested wards only) (ie residents who were eligible to vote in contested wards), for the city council and district council elections. Data came from the local authority election statistics from the Department of Internal Affairs.

Only two in five eligible residential voters voted in the last local body elections

In 2022, 40.9% of the eligible residential population voted in the local body elections. This was slightly lower than the 2016 (42.3%) and 2019 (42.2%) local body elections.

Figure 170: Residential voter turnout (%) at the local body elections (2007–2022)
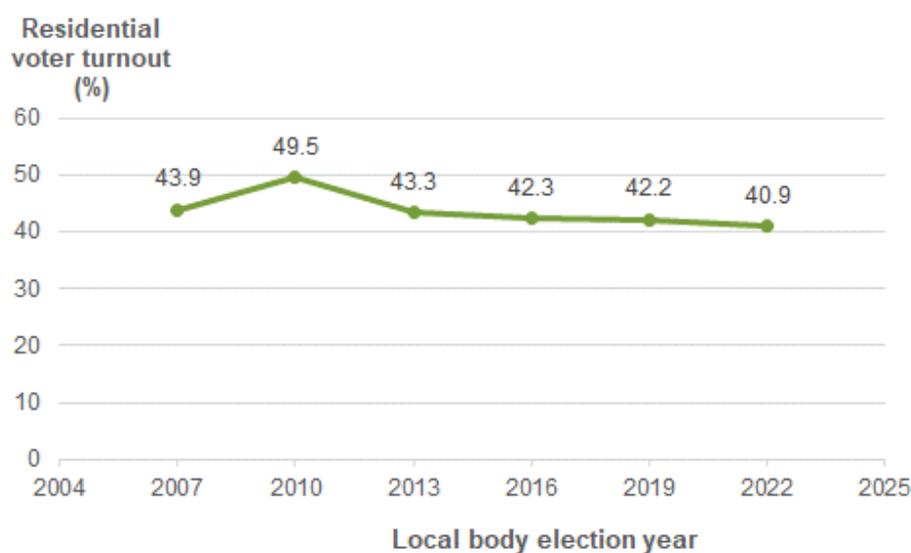
Source: Department of Internal Affairs

Results by territorial authority

In 2022, some territorial authorities had a lower percentage of eligible voters who voted in the 2022 local body elections. These included:

- South Taranaki District (27.6% of eligible voters)
- Hamilton City (29.3%)
- Waikato District (32.2%)
- Hastings District (33.7%)
- Auckland City (35.2%)
- Porirua City (37.3%)
- Western Bay of Plenty District (37.4%)
- Palmerston North City (38.5%)

- Whangarei District (40.0%).

Figure 171: Percentage of eligible voters who voted in the 2022 local body elections, by territorial authority, 2022
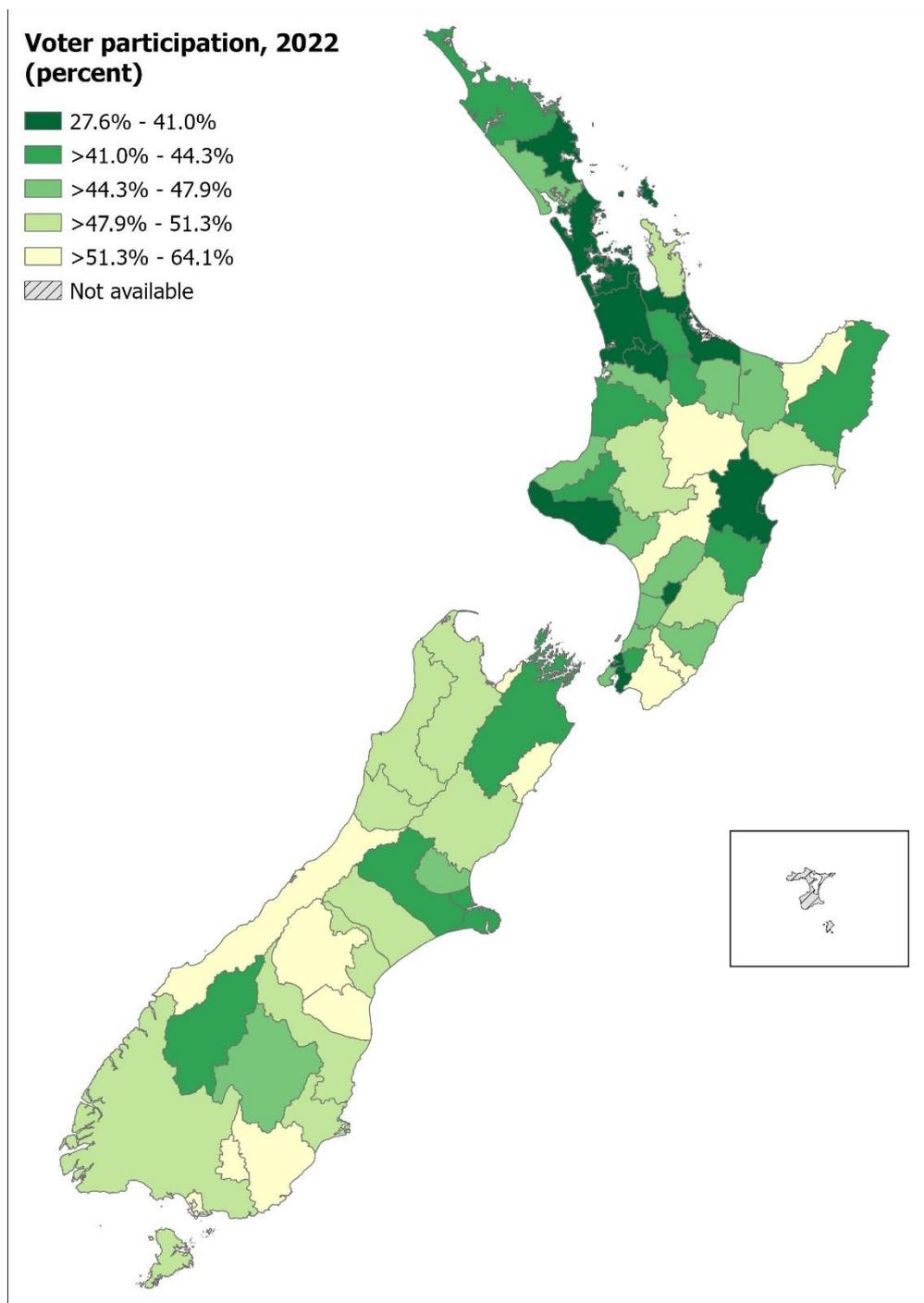
Source: Department of Internal Affairs

16 Occupation

This section presents social vulnerability indicators relating to occupation.

16.1 Overview

People in certain occupations may be more vulnerable to the impacts of climate-related hazards, for example, through being more likely to be exposed to climate-related hazards.

People working in primary industries

People working in primary industries (agriculture, forestry and fishing) rely on natural resources for their livelihood. Therefore, they are more vulnerable to extreme weather events, such as floods, extreme storms, wildfires, droughts and heatwaves, due to increased exposure. Droughts can have major negative impacts on agriculture, and the resulting financial stress can lead to mental health impacts for farmers.

People who own and/or are responsible for animals (such as farmers) may put their life in danger in order to rescue animals. They may also be less likely to evacuate, or may have more difficulties in evacuating.

Healthcare workers and first responders

Healthcare workers are at higher risk of exposure to floodwaters and hazardous situations, and therefore higher risk of physical and psychosocial impacts. People who have a family member involved in the response may also be indirectly affected.

Healthcare workers and first responders can also be an asset during a flood or hazard event, particularly in isolated areas.

Other occupations that may be more vulnerable

People in other specific occupations may also be more vulnerable to the impacts of climate-related hazards. These include:

- **People working outdoors** (such as construction workers, road workers) – as they may be more exposed to extreme heat and heatwaves
- **People working in service industries** (such as hospitality) – as their jobs may be more vulnerable if extreme weather events affect the tourist industry for a long time afterwards

Future social vulnerability indicator sets may be able to include these indicators.

Social vulnerability indicators related to this dimension

Key indicators in this section include:

- Primary industry workers (among people aged 15+ years)
- Primary industry workers (among employed people aged 15+ years)
- Healthcare and social assistance workers (among people aged 15+ years)
- Healthcare and social assistance workers (among employed people aged 15+ years)

16.2   Primary industry workers

People working in primary industries (agriculture, forestry and fishing) rely on natural resources for their livelihood. Therefore, they may be more exposed to extreme weather events, such as floods, extreme storms, wildfires, droughts and heatwaves, as well as having more to lose. People who own or are responsible for animals (such as farmers) may put their life in danger in order to rescue animals during a disaster. They may also be less likely to evacuate, or may have more difficulties in evacuating.

Indicator definition

This indicator shows people aged 15+ years who worked in primary industries (agriculture, primary industry, and fisheries). The information relates to the industry for the main job held by an individual, and refers to where people live.

This indicator is presented both among the total population aged 15+ years, and among employed people aged 15+ years, to show the contribution to employment in an area.

About 6% of employed adults work in a primary industry

In 2018, about 143,000 adults aged 15+ years worked in a primary industry (Figure 172). This represented 3.8% of the population aged 15+ years in 2018, and 5.9% of employed people aged 15+ years.

Figure 172: Number of people working in the primary industries in New Zealand, 2006, 2013, 2018
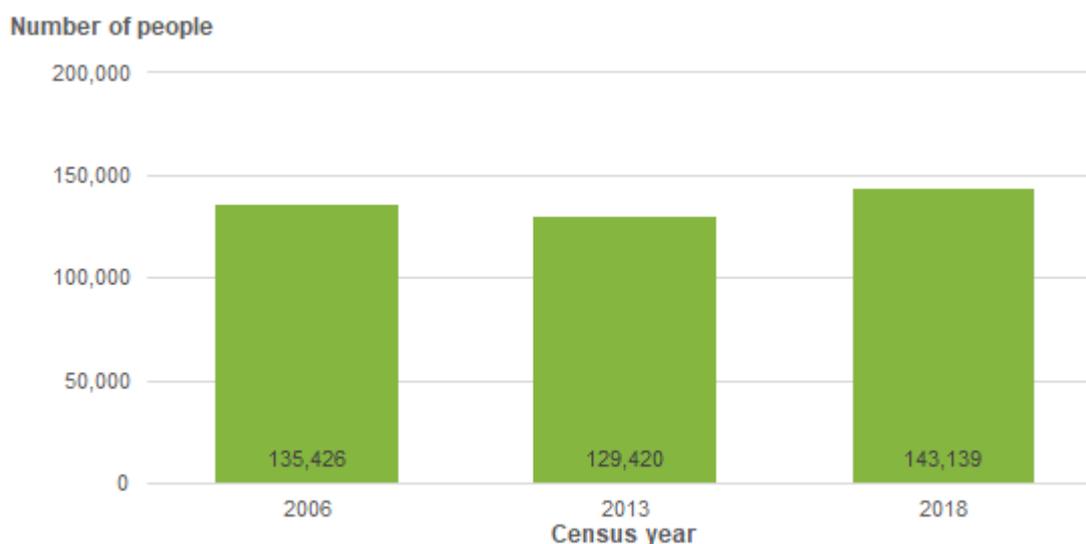
Number of people

Census year	Number
2006	135,426
2013	129,420
2018	143,139

Source: New Zealand Census of Population and Dwellings

Among all adults aged 15+ years, people working in primary industries represented 3.8% of adults in 2018, similar to 2013, but a decrease from 2006 (4.6%) (Figure 173).

The percentage of employed adults who work in primary industries has decreased from 6.8% in 2006, to 5.9% in 2018. This is a continuation of similar trends over the past few decades. In 1951, almost 20 percent of the workforce worked as an agriculture, forestry or fishery worker (Mulet-Marquis and Fairweather, 2008).

Figure 173: Percentage of the population working in the primary industries in New Zealand (among employed population aged 15+ years, and total population aged 15+ years), 2006, 2013, 2018
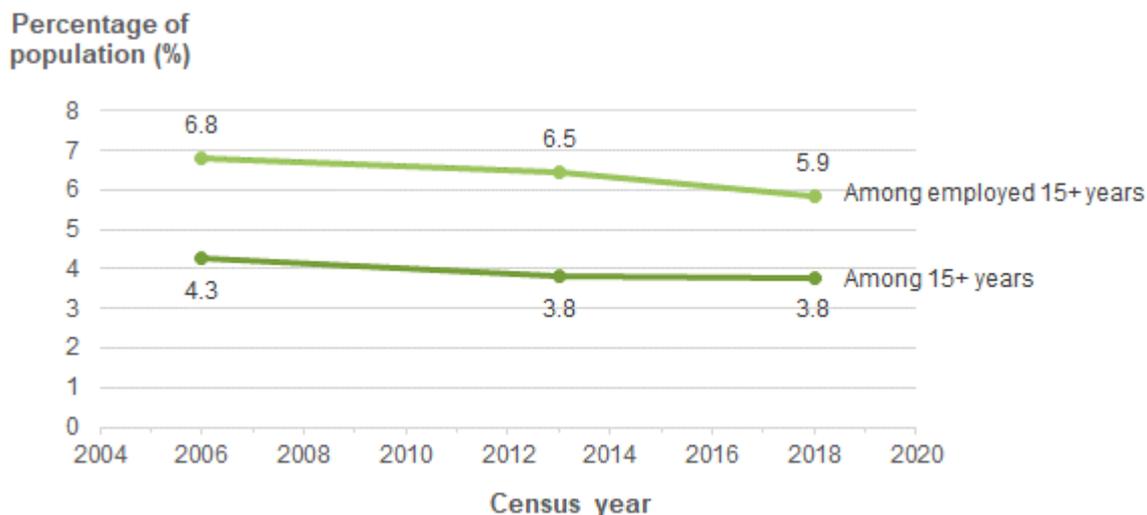
Source: New Zealand Census of Population and Dwellings

Results by territorial authority

Some territorial authorities have a higher percentage of adults aged 15+ years who were employed in primary industry at the time of the 2018 Census. These territorial authorities were mainly in rural areas. They include:

- Southland District (28.8% of people aged 15+ years)
- Waimate District (23.7%)
- Chatham Islands Territory (22.3%)
- Ōtorohanga District (22.2%)
- Hurunui District (22.0%)
- Clutha District (21.8%)
- Central Hawke's Bay District (17.7%)
- Mackenzie District (17.3%).

Figure 174: Percentage of people aged 15+ years working in primary industries, by territorial authority, 2018
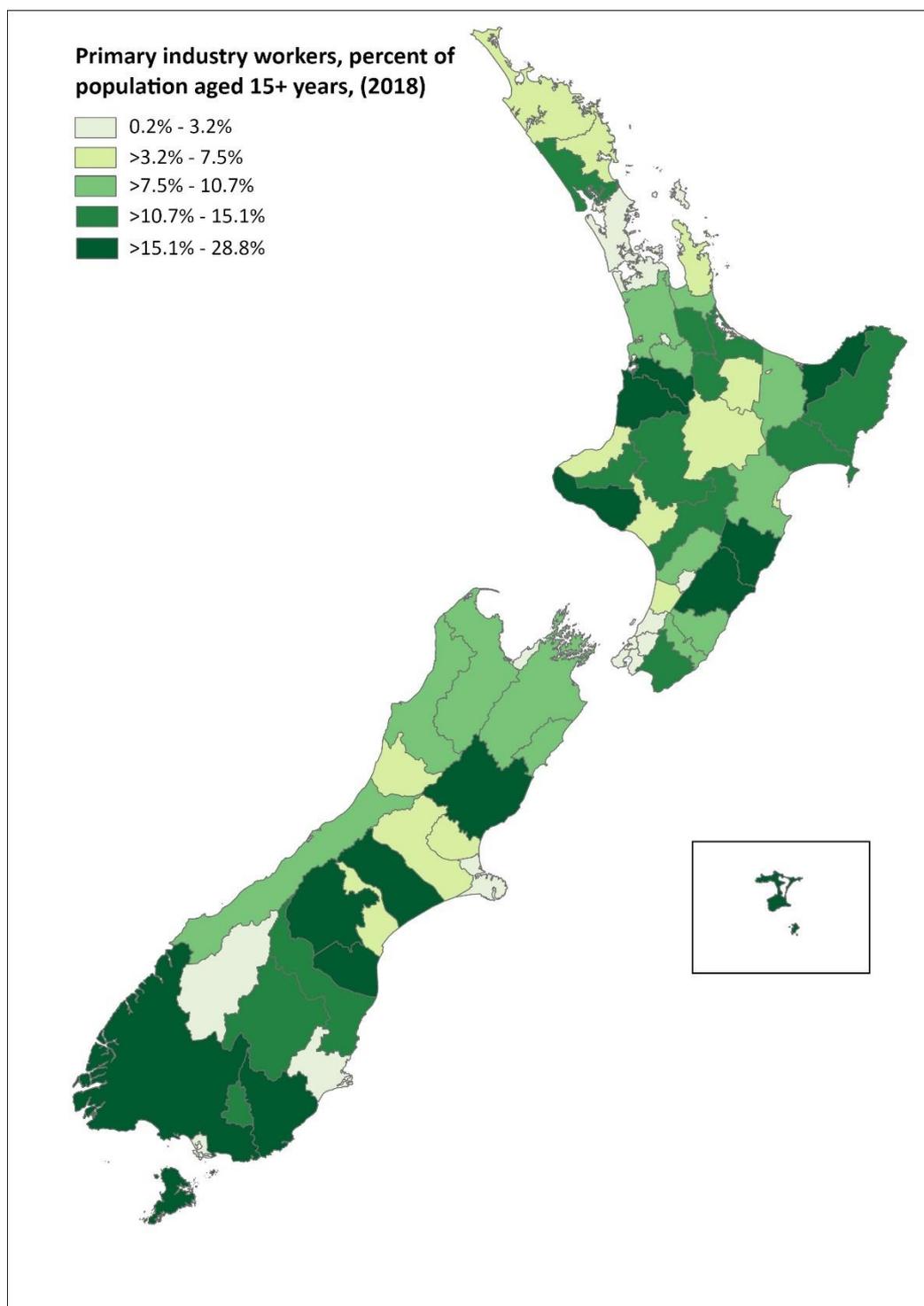
Source: New Zealand Census of Population and Dwellings

Climate-related hazards can have a large impact on people's livelihoods. The higher the percentage of the working population who work in primary industries, the harder hit the population is likely to be after a climate-related hazard event. Among the employed population aged 15+ years, the following territorial authorities had a high percentage of the employed population working in primary industries:

- Southland District (38.9% of employed population aged 15+ years)

- Waimate District (37.8%)
- Ōtorohanga District (33.1%)
- Clutha District (31.8%)
- Hurunui District (31.5%)
- Chatham Islands Territory (28.9%)
- Tararua District (27.5%)
- Central Hawke's Bay District (26.9%).

Figure 175: Percentage of employed people aged 15+ years working in primary industries, by territorial authority, 2018
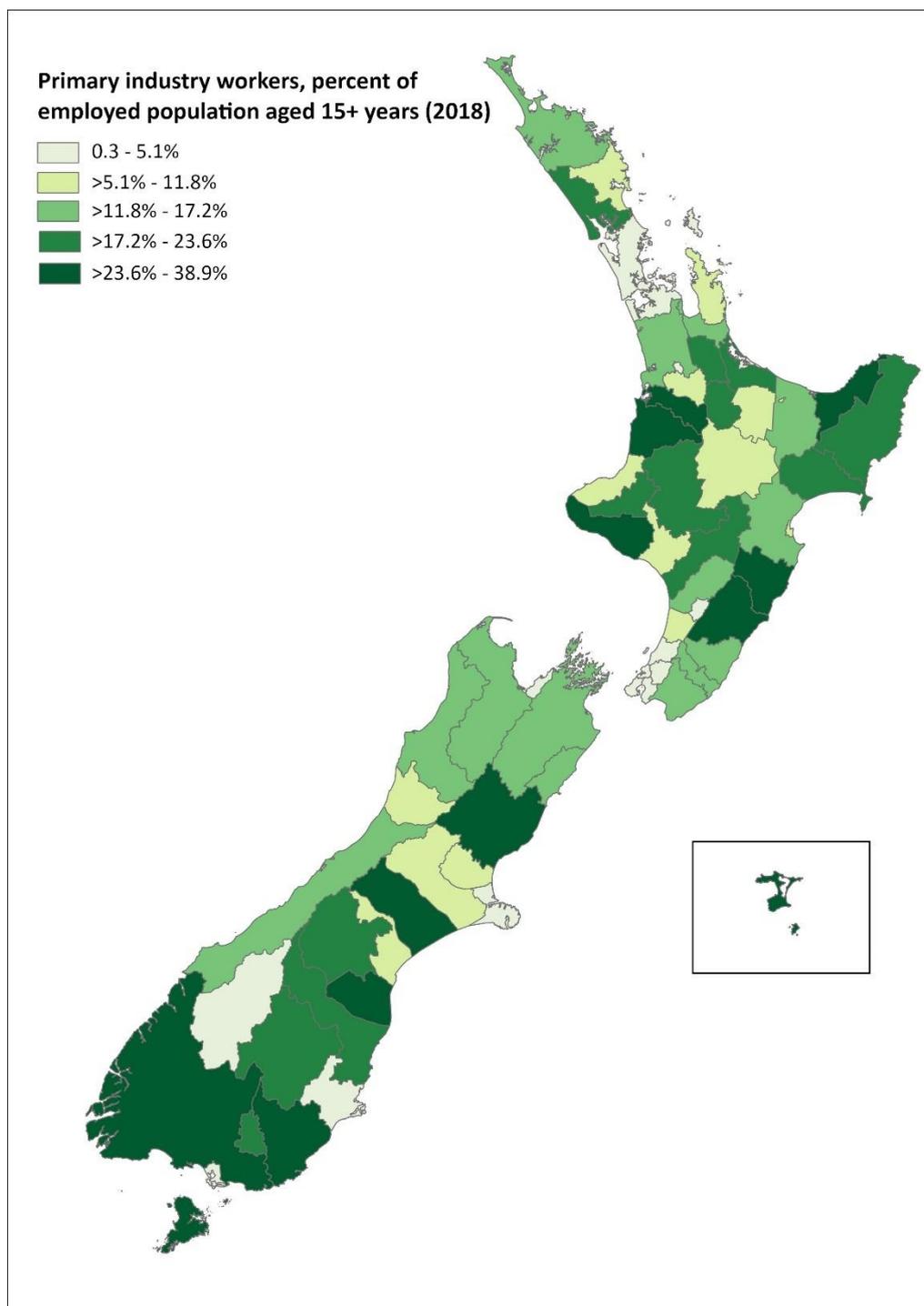
Source: New Zealand Census of Population and Dwellings

16.3 Healthcare and social assistance workers

Healthcare workers and first responders may be more vulnerable to health and wellbeing impacts during and/or after a disaster, as they are more likely to be exposed to the hazard (such as floodwaters, which carry health risks), as well as being at higher risk of psychosocial impacts. Additionally, these workers are likely to be required during a disaster to provide caregiving services for others; this may leave them less able to protect their own property and/or look after their family.

Indicator definition

This indicator shows people who work in the Health Care and Social Assistance industry, among the Census usually resident population aged 15 years and over. The information relates to the industry for the main job held by an individual, and refers to where people live.

This indicator is presented both among the total population aged 15+ years, and among employed people aged 15+ years, to show the contribution to employment in an area.

Almost 10% of employed adults work in the healthcare and social assistance industry

In 2018, 232,128 adults aged 15+ years worked in the healthcare and social assistance industry (Figure 176). This represented 6.1% of the population aged 15+ years in 2018, and 9.5% of employed people aged 15+ years.

Figure 176: Number of people working in the healthcare and social assistance industry in New Zealand, 2006, 2013, 2018
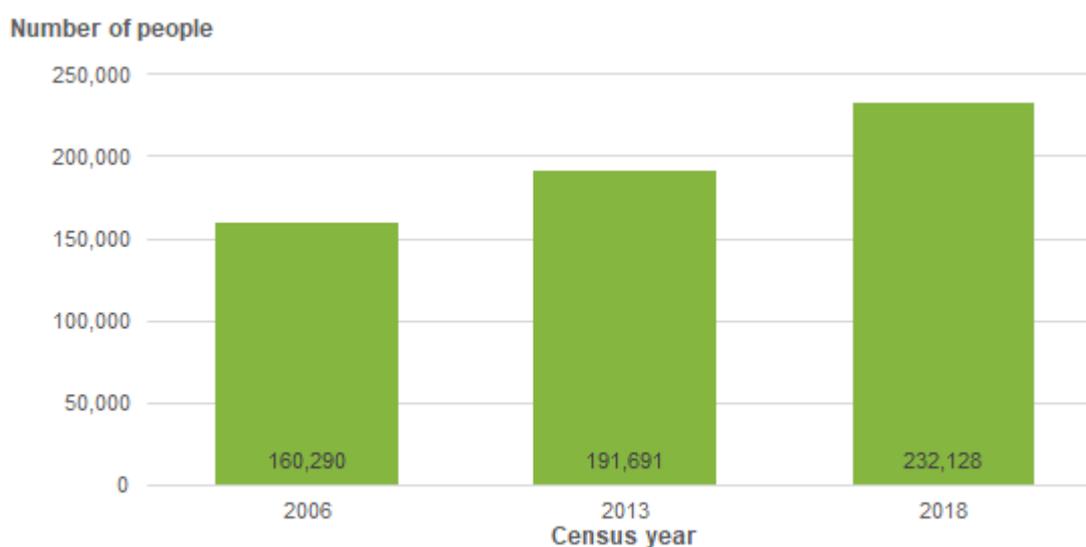
Source: New Zealand Census of Population and Dwellings

Among all adults aged 15+ years, people working in the healthcare and social assistance industry in New Zealand represented 6.1% of adults in 2018, an increase since 2013 (5.7%) (Figure 177). The percentage of employed adults who work in the healthcare and social assistance industry has increased from 8.1% in 2006, to 9.5% in 2018.

Figure 177: Percentage of the population working in the healthcare and social assistance industry in New Zealand (among employed population aged 15+ years, and total population aged 15+ years), 2006, 2013, 2018
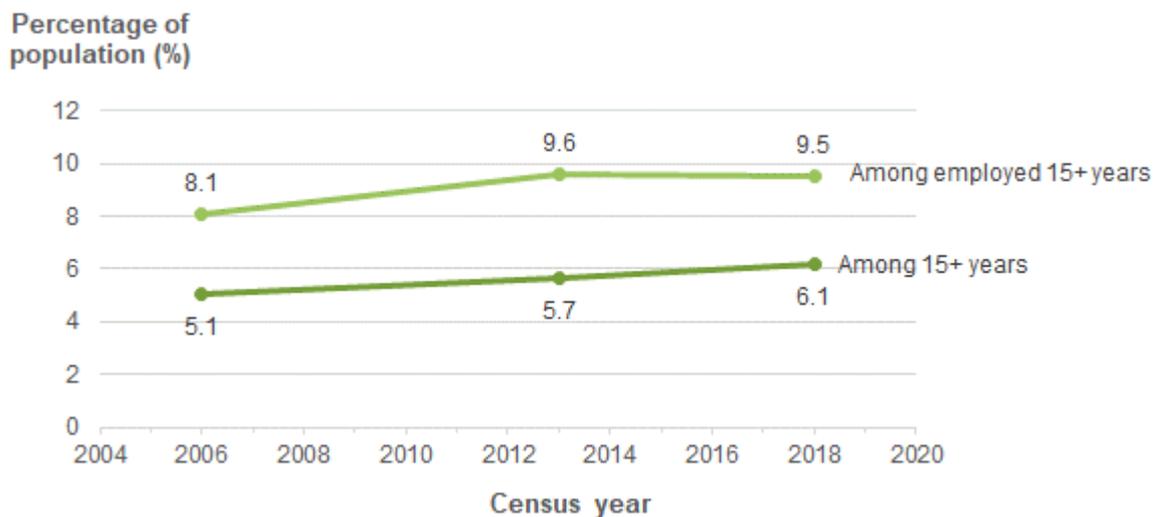
Source: New Zealand Census of Population and Dwellings

Results by territorial authority

Some territorial authorities have a higher percentage of adults aged 15+ years who were employed in the healthcare and social assistance industry at the time of the 2018 Census. These territorial authorities include:

- Whangarei District (8.3% of people aged 15+ years)
- Whanganui District (8.3%)
- Dunedin City (8.2%)
- Hamilton City (7.8%)
- Masterton District (7.7%)
- Palmerston North City (7.7%)
- Nelson City (7.6%)
- Invercargill City (7.6%).

Figure 178: Percentage of people aged 15+ years working in the healthcare and social assistance industry, by territorial authority, 2018
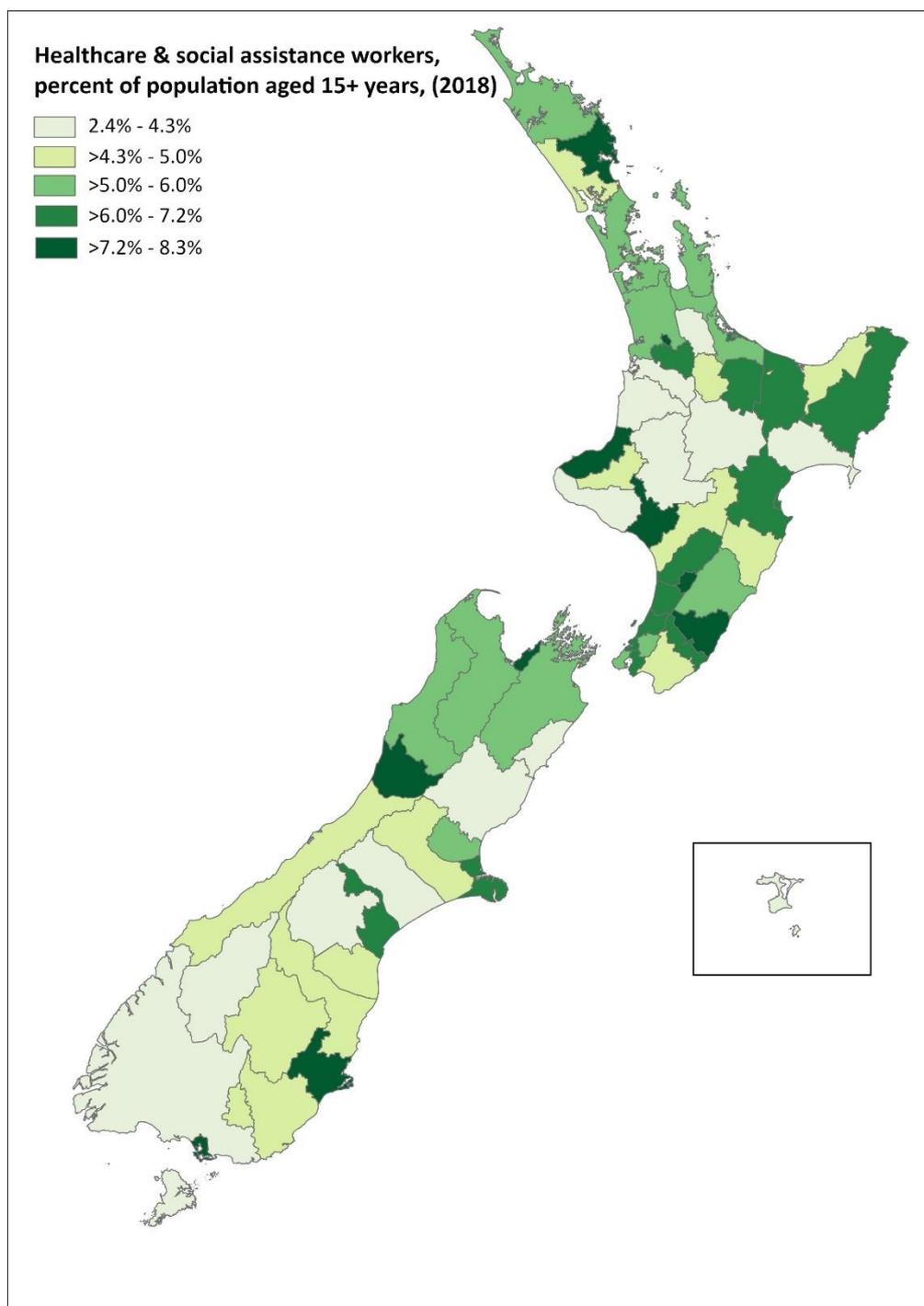
Source: New Zealand Census of Population and Dwellings

Climate-related hazards can have a large impact on people's livelihoods. The higher the percentage of the working population who work in healthcare and social assistance, the larger the occupationally-exposed population might be after a climate-related hazard. Among the employed population aged 15+ years, the following territorial authorities had a high percentage of the employed population working in the healthcare and social assistance industry:

- Whanganui District (14.7% of the employed population aged 15+ years)
- Whangarei District (13.9%)

- Dunedin City (13.7%)
- Horowhenua District (13.4%)
- Masterton District (12.6%)
- Hamilton City (12.2%)
- Palmerston North City (12.2%)
- Nelson City (12.1%).

Figure 179: Percentage of employed people aged 15+ years working in the healthcare and social assistance industry, by territorial authority, 2018
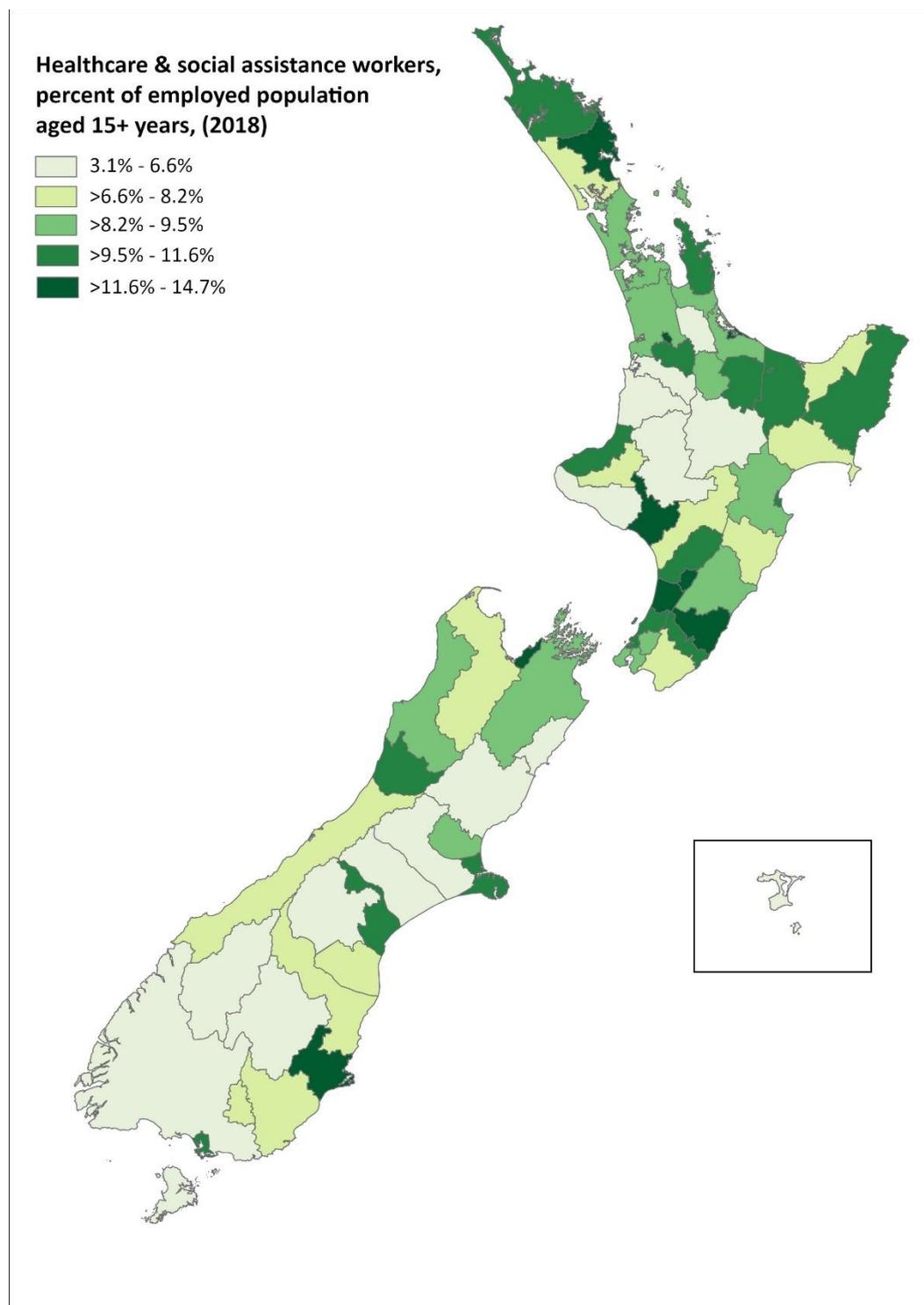
Source: New Zealand Census of Population and Dwellings

17 Discussion and limitations

17.1 Overall findings

Climate change is likely to have a range of adverse impacts on New Zealand, including sudden-onset disasters such as floods, extreme storms, wildfires, heatwaves and droughts. Climate-related hazards are likely to have unequal impacts, with vulnerable populations most affected. Understanding which populations are vulnerable to climate-related hazards, and where, provides critical evidence to inform decision-making.

This report has presented New Zealand's first suite of social vulnerability indicators for climate-related hazards. It provides evidence of changes in vulnerability over time, and across New Zealand and population groups. The report gives a broad picture of social vulnerability of individuals and households in New Zealand.

This report shows the baseline social vulnerability of New Zealand to climate-related hazards. These results can inform decisions on disaster risk reduction and climate change adaptation activities.

Social vulnerability is multi-dimensional

Our results show that New Zealand's population vulnerability to climate-related hazards can arise due to a range of reasons, including age, health and/or disability status, poverty, social isolation, lack of awareness of hazards and/or ability to access information, inadequate housing, lack of emergency preparedness, and being left out of the decision-making process.

The New Zealand social vulnerability dimensions and indicators presented align with those from other social vulnerability indicator studies (Li et al., 2023), including those focussed on climate-related hazards such as flooding (Rasch, 2016, Tapsell et al., 2002), heatwaves (Joynt and Golubiewski, 2019), wildfires (Davies et al., 2018, Palaiologou et al., 2019), as well as for pandemics (Fallah-Aliabadi et al., 2022) and disasters in general (Atyia Martin, 2015, Cutter et al., 2003, Flanagan et al., 2011). Furthermore, many of the indicators are consistent with vulnerable groups identified by the IPCC (IPCC, 2023). At the individual and household level, the framework can provide a useful structure for understanding the different dimensions of social vulnerability to hazards, and can guide supplementation of indicator data with more qualitative data. Furthermore, the results suggest the framework is relevant across a range of hazards, particularly sudden-onset hazards, which is valuable for disaster risk reduction and adaptation.

Key themes emerging

Some key themes emerged from this monitoring of the social vulnerability indicators. Firstly, results show that at individual and household level, many people in New Zealand may struggle to prepare for, cope with, or recover from and/or adapt to climate-related hazards. For example, people who do not have financial resources, who live in rental housing, or who are unable to access information and/or services, will find it more difficult to cope with and adapt to climate-related hazards. In these circumstances, additional support (for example at a community, local council or national level) may be necessary in order to support these population groups.

Secondly, population and demographic changes are also likely to influence vulnerability and risk. For example, the New Zealand population continues to grow and diversify. We also have an ageing population, with more people over 65 years of age, and many households with an older person living alone. Additionally, about a fifth of the New Zealand population are children, who are more vulnerable to climate-related hazards. These patterns and changes mean that considering the needs of older adults and children will be increasingly important in the future, as well as their exposure to hazards.

Thirdly, New Zealand is becoming more ethnically diverse, with increases in the Māori, Pacific, Asian and MELAA (Middle Eastern/Latin American/African) populations since 2013. Additionally, a small but growing percentage of the New Zealand population are recent immigrants, and about 2% of the total population does not speak English. There is evidence to suggest that some ethnic groups (particularly Māori and Pacific peoples) may also disproportionately experience other vulnerabilities, such as financial and housing vulnerabilities. This suggests that ethnic groups are important to consider for disaster risk management, including disaster risk reduction measures, emergency preparedness, and in response and recovery phases, as well as inclusive planning and decision-making.

Housing is a key issue that increases vulnerability, with household crowding, living in rental housing, and damp and mouldy dwellings common throughout New Zealand. Furthermore, some aspects of housing may be exacerbated by climate-related hazard events, resulting in future vulnerability. For example, damp and mouldy housing can be caused by flood events, and household crowding may be a result of temporary and/or permanent displacement. Household emergency preparedness is consistently low, with a relatively small proportion of households being prepared for emergencies. Food insecurity and poverty likely plays into this, as well as other factors. With extreme weather events likely to be more frequent and intense with climate change, household emergency preparedness will become increasingly important.

Additionally, some populations may experience vulnerabilities across multiple dimensions of social vulnerability, such as older people living alone, and people with limited income living in poor quality housing. This intersectionality of vulnerability may have a cumulative impact and result in people having increased vulnerability. Some key population groups that experienced multiple and/or substantial vulnerabilities according to our indicators included children, older adults, Māori, Pacific peoples, Middle Eastern/Latin American/African (MELAA), people with disabilities, people with chronic health issues and/or mental illness, people living in areas of higher socioeconomic deprivation, people living in rental housing, and single parents.

Local context matters

Risk is influenced by the hazard, exposure, and vulnerability. Country-level statistics on social vulnerability provide the national bigger picture of population vulnerability to climate-related hazards. However, regions and lower levels of geography (such as councils, Auckland local board areas, and communities/neighbourhoods) may be differently impacted by climate-related hazards and adverse effects. In every region, there will be socially vulnerable people who need to be considered in planning, preparedness and adaptation work.

Understanding the specific vulnerability and needs of local communities will be vitally important in ongoing climate change resilience and adaptation work. The information about vulnerable populations in this report can be overlaid with climate-related hazards in each

region, to understand the risks associated with climate-related hazards in each region. While this work has not been carried out explicitly for this report, the following are a few examples of regions that may have higher risks:

- **Far North**: may experience heatwaves, extreme storm events, drought; it also has populations with higher levels of vulnerability in some dimensions, and some parts of the region are geographically isolated.

- **Auckland**: may experience heatwaves, extreme storm events; Auckland also has high population numbers and high population density (so more people affected), as well as more vulnerable populations (particularly in South Auckland) and ethnic diversity, so it is important to consider the needs of these populations.

- **Thames-Coromandel and Hauraki:** may experience extreme storm events, and some parts are at risk of isolation; these districts have an older population, and higher percentages of households with an older adult living alone, and people not in the labour force.

- **Tairāwhiti and Wairoa**: may experience heatwaves, extreme storm events, drought; some parts of these regions have populations experiencing higher levels of socioeconomic deprivation and poor-quality housing, and some parts are also geographically isolated.

- **West Coast region**: may experience heavy rainfall and flooding; these districts tend to have an older population, with higher levels of socioeconomic deprivation, and some dwellings not having basic amenities such as safe drinking water.

Vulnerability and exposure can also differ substantially at the local level. Having local-level vulnerability data is valuable for understanding risks for local communities, and providing evidence for risk reduction measures and planning. The results presented in this report are supported by social vulnerability indicator data at Statistical Area 2 (SA2) level (which represents neighbourhoods) as well as Auckland local board area, so that the indicator data can be used at a local level.

Inequities for Māori and Pacific peoples

The results from this assessment clearly demonstrate inequities in social vulnerability to climate-related hazards for Māori and Pacific peoples. While these groups have resilience through social networks and community-level measures, individuals and households experienced disadvantage across a range of measures, particularly the financial and housing aspects. While ethnicity is not a specific social vulnerability indicator (as ethnicity itself does not make someone vulnerable), the evidence here suggests that existing socioeconomic inequities experienced by the Māori and Pacific ethnic groups (as well as ethnic minorities such as Middle Eastern/Latin American/African, MELAA) make it likely that these groups will be disproportionately affected by climate change impacts.

In particular, Māori have the right to equitable outcomes (eg health outcomes) under Te Tiriti o Waitangi (Ministry of Health, 2019a), and a key aspect of the Government's long-term climate change adaptation strategy is upholding the principles of Te Tiriti (Ministry for the Environment, 2022). Māori have much resilience to natural hazards and disasters, including through Te Ao Māori, mātauranga Māori, cultural values and practices, strong networks and connections within iwi and hapū, and marae (Chen et al., 2021, Phibbs et al., 2016). However, Māori experience a range of inequities, including socioeconomic deprivation,

financial hardship, poor quality housing, household crowding, homelessness, and food insecurity. This mirrors the experience of other countries, where Indigenous populations are often more vulnerable due to marginalisation and/or structural disadvantage (Johnson et al., 2022, Li et al., 2023). These inequities impact on Māori hauora, as well as impacting vulnerability and resilience to climate-related hazards.

Additionally, the Māori economy relies heavily on natural resources. With a higher percentage of the Māori population living in rural areas, Māori may be more exposed to climate-related hazards such as drought and extreme weather events. Pacific peoples tend to live in major urban areas in New Zealand, and are therefore likely to be more exposed to heatwaves, and poor air quality, as well as extreme weather events.

Improving resilience will have co-benefits

Using the information on the social vulnerability indicators to improve resilience can also influence and improve health and wellbeing more generally. In particular, some social vulnerability indicators represent direct issues that can be improved through policy, programmes and actions. These include indicators relating to:

- **housing** – including rental housing, household crowding, damp and mould, basic amenities, homelessness

- **money/financial resources** – income levels, food insecurity, sole parents, unemployment

- **household emergency preparedness** – households with enough food for three days, households with enough water for three days, households with an emergency plan, children in households experiencing food insecurity

Improving these issues would have direct health co-benefits, such as through healthier homes, financial resources to afford necessities such as housing, food and insurance, as well as household emergency preparedness for a range of disasters, including earthquakes and other natural hazards. Furthermore, some climate change mitigation measures have health co-benefits, such as active transport and public transport to reduce carbon emissions also improving people's physical activity levels and reducing air pollution (Howden-Chapman et al., 2015). Additionally, improving population health through reducing modifiable risk factors (such as tobacco use, alcohol use, poor diet, physical inactivity and excess body weight), as well as through healthier environments, would have long-term benefits for population health (Health New Zealand - Te Whatu Ora, 2024), resulting in a healthier, more resilient population.

The importance of reducing exposure to climate-related hazards

Given that risk is a function of exposure as well as vulnerability, these results highlight the importance of reducing exposure to climate-related hazards, particularly for the most vulnerable population groups. Using the social vulnerability framework as guidance, the following locations are important in terms of social vulnerability and/or resilience:

- schools and early childhood education centres (ECEs)
- aged care facilities, rest homes and retirement villages
- marae
- health services (primary health care centres, pharmacies, hospitals, maternity and birthing units)

- Civil Defence Centres and Community Emergency Hubs (these are often schools and/or marae)
- emergency services facilities
- community facilities
- visitor accommodation
- social housing.

These point locations may relate to both resilience and vulnerability; for example, schools have a vulnerable population (children), but are also an important community network and may act as Civil Defence Centres and/or Community Emergency Hubs during disasters. If these locations are in high hazard zones (such as flood hazard zones), there are increased risks to human health. Risk reduction measures may include:

- using land use planning, for example, by putting limits on where sensitive activities can be located in relation to hazard zones (Beban and Gunnell, 2019)
- infrastructure upgrades, such as flood protection works
- having emergency preparedness plans in place for locations in hazard zones.

On-going monitoring of population vulnerability

Population vulnerability levels can change over time, depending on where the population lives and the circumstances they are experiencing. Climate-related disasters can also result in further population vulnerability and can adversely affect resilience in a region. The results in this document could be updated in future with 2023 Census data, to reflect the current vulnerability of the population more accurately, and identify any changes over time or area. Updated data would also provide local-level data for local councils and other agencies, for understanding social vulnerability within hazard zones in their district.

17.2   Limitations

The indicators presented in this report have some limitations.

Data is mostly for 2018

The data presented in this report is mostly for the year 2018, as the 2018 Census was the latest data available for most indicators. Data from the 2023 Census were not yet available at the time of writing this report, except for high-level population counts; full Census results are likely to be released from October 2024 onwards. This means that the results in this report may not fully reflect changes in population vulnerability since 2018. Since 2018, New Zealand has experienced a number of large issues, including the COVID-19 pandemic and societal responses to this pandemic (such as border closures).

While these social vulnerability indicators are mostly only for 2018, they are likely to reflect a similar picture in 2024, unless there is good reason to suggest that changes may have taken place. For example, it could be expected that cellphone and internet coverage may be improved since 2018, given recent broadband rollouts in New Zealand. Additionally, some indicators seem to be particularly volatile depending on economic cycles, such as unemployment and immigration. The 2023 Census will allow for updated statistics for the social vulnerability indicators for New Zealand, and can build on the baseline provided in this current report.

Indicators may not reflect community-level resilience

The indicators have primarily been selected to show individual-level and household-level resilience, and may not reflect all aspects of community-level resilience. Some key aspects not included in these indicators include access to health services (such as primary care and hospitals), access to transportation (such as public transport), access to green and blue space, infrastructure resilience, social networks and communities, inclusive planning and decision-making, and community emergency preparedness. Additionally, community groups and neighbourhoods may have strong resilience and support networks, which are difficult to capture nationally and at a local level. A good example is the resilience of iwi and hapū, which can play an important and vital role in disaster resilience and response (Kenney and Phibbs, 2015). Nonetheless, neighbourhoods where there are more people living in poverty are less likely to have resources to share, so the individual- and household-level indicators are still valuable and relevant.

Some aspects of social vulnerability not fully captured in the indicators

Even at the individual- and household-level, there are some aspects of social vulnerability that are not fully captured in the indicators. Some issues are due to difficulty finding data to measure the dimension of social vulnerability adequately. Additionally, the 2018 social vulnerability indicators did not include the full set of indicators identified in 2013, due to poor data quality and low response rates for the 2018 Census.

Health and disability status are two aspects that are difficult to measure at a local level, and would benefit from indicators being developed. Physical and mental health status, and disability, play an important role in people's vulnerability and susceptibility to the impacts of climate change. The national-level results presented in this report suggest that the prevalence of mental health issues is increasing in New Zealand, and that chronic diseases are a particularly important consideration for older adults. Linked administrative health data, as well as disability data from the 2023 Census on activity limitations and the 2023 New Zealand Disability Survey, could be investigated to supplement future indicator sets.

It was also difficult to measure household emergency preparedness at the local level. Sample survey data from the New Zealand General Social Survey and New Zealand Health Survey were used to plug this gap at the national level for the purposes of this report. The downsides of sample survey data is that regional analysis is difficult and/or regional estimates have large uncertainties. At the local level, proxies can be used (such as NZDep, sole parents, and living in rental housing) to show areas where households are less likely to have emergency preparedness.

Decision-making was another dimension where quantitative data is difficult to find. We have incorporated voting participation at the territorial authority level, however it is acknowledged that this is not a full representation of this dimension. At the local level, this dimension could be supplemented with local data, including qualitative information on participation with key population groups (eg local iwi, the disability sector).

The dimension about having enough money could be usefully supplemented with measures around household income (such as low equivalised household income). Additionally, information on insurance coverage would be highly relevant, although may be difficult to source due to commercial sensitivity.

While the main population demographics are covered in the indicator dataset, other social vulnerability indicator sets internationally often include females as part of the indicator set; in

the New Zealand context, this aspect could be included as a separate breakdown for indicators in future. Furthermore, more detailed ethnicity information could be valuable for emergency response and recovery in future. Additionally, some indicators specific to certain climate-related hazards could be included in any future updates (such as outdoor workers, who may be more exposed to extreme heat).

Data quality issues for 2018 Census

A key limitation of these social vulnerability indicators were the data quality issues with the 2018 Census, which had a lower-than-expected response rate. For some Census variables, Stats NZ were able to supplement data collected using Census forms with additional data (such as administrative data, 2013 Census data and/or imputation) to improve the data quality. For other indicators, no additional data sources were available, so the indicator simply had missing data.

The missing data is problematic in some senses, as it is more likely to be vulnerable population groups who were missed out of the Census. The change of Census methodologies in 2018 (to use additional data sources for some variables) may have affected comparisons over time, as different methods can give different results. For Census variables where 2013 Census data were used as an additional data source, changes over time may be more difficult to discern. Furthermore, Census response rates were much lower for Māori and Pacific peoples, which affects representation of these ethnic groups in the Census. The heavy reliance on the internet for completing the Census may have also impacted variables such as access to the internet.

The impacts of the low response rates for the 2018 Census were assessed for the social vulnerability indicators during the implementation of the 2018 social vulnerability indicators. For indicators with missing data, we used logical bounds to show the impact of the missing data on percentage. Generally, this showed that the percentage for a range of social vulnerability indicators were unlikely to be much lower, but had the potential to be much higher. Where the data quality was considered too poor, we did not produce the indicator. This has limited some measures.

Comparisons by ethnic group

There were some challenges in presenting indicator data by ethnic group, due to the availability of data only by total response ethnic group. Ideally, non-overlapping groups would be used for comparisons (eg sole European as comparison group), as comparing overlapping total response ethnic groups is not a valid comparison (McLeod et al., 2023). However, the main aim of this report was not to compare and report on inequities, but to monitor indicators. Future work could improve on this approach.

Individual-level indicators, not an index

For the social vulnerability indicators, we have produced a suite of separate indicators, rather than a single index. While there are benefits of having a single index value for an area, it is difficult to combine such different social vulnerability dimensions into a single meaningful index. Indices can be fraught, as they depend largely on data availability and indicator selection, as well as weighting of indicators. Additionally, having missing data for one dimension may influence the index so that it is not fully representative. Separate indicators also have the benefit of showing specific reasons for population vulnerability, which can guide future actions.

Future work could consider a summary measure such as an index, if all dimensions are adequately presented. Another option is to create a measure of multiple vulnerability at the individual level, using linked data (such as from the Integrated Data Infrastructure, IDI). People with multiple vulnerabilities are more likely to be highly vulnerable, and knowing areas where there is a higher percentage of people with multiple vulnerabilities could show areas of high priority for adaptation and resilience work.

17.3 Conclusion

Social vulnerability indicators are valuable for identifying potentially vulnerable populations who are likely to be more affected by a climate-related hazard. This report has identified a range of indicators related to social vulnerability to climate-related hazards in New Zealand. Overall, at individual and household level, many people in New Zealand may struggle to prepare for, cope with, recover from and/or adapt to climate-related hazards. Some of the key factors related to people's vulnerability include limited financial resources, poor quality and/or inadequate housing, low household emergency preparedness, chronic illness and/or disability, and older and/or younger age, among others. The results of this report can inform both disaster risk reduction and climate change adaptation activities in New Zealand.

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Appendix 1: Indicator metadata

Table A1 presents details and indicator definitions for each specific social vulnerability indicator.

Table A1: Information about specific social vulnerability indicators

ID	Indicator name	Years available	Source	Geography available	Description	Numerator	Denominator	Notes
Population indicators								
UR	Census usually resident population	2006, 2013, 2018	2018 Census - Individual part 1 table	SA1, SA2, TA, ALB, DHB	Census usually resident population count	Census usually resident population	n/a	
households	Number of households	2006, 2013, 2018	2018 Census - Households table	SA1, SA2, TA, ALB, DHB	Total households in occupied private dwellings	Number of households	n/a	
popdensity	Population density (people per sq km)		2018 Census - Individual part 1 table, and Stats NZ geographic information	SA2, TA, ALB, DHB	Number of people per square kilometre	Census usually resident population	Land area (in square kilometres)	
urbanrural	Urban-rural classification		2018 geographic files	SA1, SA2	Stats NZ Urban Rural Indicator classification (major urban areas, large urban areas, medium urban areas, small urban areas, rural, water)			A list of urban areas (major urban areas, large urban areas, medium urban areas, small urban areas) is provided in Appendix 3.
rural	Rural population (including inlets and inland water)		2018 geographic files and Census usually resident population	TA, ALB, DHB	Census usually resident population living in rural or water areas (ie outside of urban areas), based on Stats NZ Urban Rural Indicator classification	Usually resident population living in rural or water areas (summed over SA2s)	Usually resident population	
european	European ethnic group (total response) (among total population)	2006, 2013, 2018	2018 Census - Individual part 1 table	SA1, SA2, TA, ALB, DHB	Ethnic group (grouped total responses), for the census usually resident population count	European	Total people stated	
maori	Māori ethnic group (total response) (among total population)	2006, 2013, 2018	2018 Census - Individual part 1 table	SA1, SA2, TA, ALB, DHB	Ethnic group (grouped total responses), for the census usually resident population count	Māori	Total people stated	

ID	Indicator name	Years available	Source	Geography available	Description	Numerator	Denominator	Notes
pacificpeoples	Pacific peoples ethnic group (total response) (among total population)	2006, 2013, 2018	2018 Census - Individual part 1 table	SA1, SA2, TA, ALB, DHB	Ethnic group (grouped total responses), for the census usually resident population count	Pacific Peoples	Total people stated	
asian	Asian ethnic group (total response) (among total population)	2006, 2013, 2018	2018 Census - Individual part 1 table	SA1, SA2, TA, ALB, DHB	Ethnic group (grouped total responses), for the census usually resident population count	Asian	Total people stated	
melaa	Middle Eastern / Latin American / African (MELAA) ethnic group (total response) (among total population)	2006, 2013, 2018	2018 Census - Individual part 1 table	SA1, SA2, TA, ALB, DHB	Ethnic group (grouped total responses), for the census usually resident population count	Middle Eastern / Latin American / African (MELAA)	Total people stated	
Indicators about children								
u5y	Children aged 0-4 years (among total population)	2006, 2013, 2018	2018 Census - Individual part 1 table	SA1, SA2, TA, ALB, DHB	Age in five-year groups, for the census usually resident population count	0–4 years	Total people	
u15y	Children aged 0-14 years (among total population)	2006, 2013, 2018	2018 Census - Individual part 1 table	SA1, SA2, TA, ALB, DHB	Age in broad groups, for the census usually resident population count	Under 15 years	Total people	
schoolage	Children aged 5-14 years (among total population)		2018 Census - Individual part 1 table	SA2, TA, ALB, DHB	Age in five-year groups, for the census usually resident population count	(5–9 years + 10–14 years)	Total people	
HHchild0-4y	Households with at least one child aged 0-4 years (among total households stated)	2013, 2018	2018 Census, requested data	SA2, TA, ALB, DHB	Households with youngest child aged 0–4 years, among all households stated	Households with at least one child 0–4 years	Total households stated	Some missing data; information on data quality is available.
HHchild0-14y	Households with at least one child aged 0-14 years (among total households stated)	2013, 2018	2018 Census, requested data	SA2, TA, ALB, DHB	Households with youngest child aged 0–14 years, among all households stated	Households with at least one child 0–14 years	Total households stated	Some missing data; information on data quality is available.
Indicators about older adults								
o65y	Older adults aged 65+ years (among total population)	2006, 2013, 2018	2018 Census - Individual part 1 table	SA1, SA2, TA, ALB, DHB	Age in broad groups, for the census usually resident population count	65 years and over	Total people	

ID	Indicator name	Years available	Source	Geography available	Description	Numerator	Denominator	Notes
o75y	Older adults aged 75+ years (among total population)	2006, 2013, 2018	2018 Census, requested data	SA2, TA, ALB, DHB	Age in five-year groups, for the census usually resident population count	(75–79 years) + (80–84 years) + (85 years and over)	Total people	
o85y	Older adults aged 85+ years (among total population)	2006, 2013, 2018	2018 Census - Individual part 1 table	SA1, SA2, TA, ALB, DHB	Age in five-year groups, for the census usually resident population count	85 years and over	Total people	
single65overHH	Households with older adult (65+ years) living alone (among total households stated)	2013, 2018	2018 Census, requested data	SA2, TA, ALB, DHB	Usual resident aged 65 years and over, in one-person households in private occupied dwellings	One-person households with a person aged 65+ years	Total households stated	Some missing data; information on data quality is provided. Occupied private dwellings include independent self-care units in retirement complexes, but excludes non-private dwellings such as hospitals and institutional complexes (Stats NZ, 2021).
Indicators about health								
u1y	Pregnant women (proxy indicator used, of babies aged 0 years) (among total population)		2018 Census, requested data	SA2, TA, ALB, DHB	Age by sex, for the census usually resident population count (note this indicator is a proxy for pregnant women)	Babies aged less than one year (0 years)	Total people	
Indicators about having enough money to cope with crises and losses								
NZDep2018	NZ Index of Socioeconomic Deprivation (NZDep2018) deciles (1 = least deprived, 10 = most deprived)	2006, 2013, 2018	Atkinson et al (2019)	SA1, SA2	New Zealand Index of Socioeconomic Deprivation 2018 (NZDep2018), which is based on the following 2018 Census variables: no access to the internet at home; receiving a means-tested benefit; low-income households; unemployed; no qualifications; not living in their own home; living in a single parent family; crowded households; living in dwellings that are always damp and/or always have mould greater than A4 size	NZDep2018 decile (1 = least deprived 10% of small areas in NZ, 10 = most deprived 10% of small areas in NZ)	n/a	

ID	Indicator name	Years available	Source	Geography available	Description	Numerator	Denominator	Notes
unemployed	People who were unemployed (among 15+ years)	2006, 2013, 2018	2018 Census - Individual part 3a table	SA2, TA, ALB, DHB	Work and labour force status, for the census usually resident population count aged 15 years and over	Unemployed	Total people stated (among those aged 15+ years)	
nolabourforce	People who were not in the labour force (among 15+ years)	2006, 2013, 2018	2018 Census - Individual part 3a table	SA2, TA, ALB, DHB	Work and labour force status, for the census usually resident population count aged 15 years and over	Not in the labour force	Total people stated (among those aged 15+ years)	
singleparentHH	Single parent households (among total households stated)	2013, 2018	2018 Census, requested data	SA2, TA, ALB, DHB	Household composition for households in private occupied dwellings: households with one-family households with a single parent family	Households with one parent with child(ren)	Total households stated	Some missing data; information on data quality is provided.
nocar	Households with no motor vehicle (among total households stated)	2006, 2013, 2018	2018 Census - Households table	SA2, TA, ALB, DHB	Number of motor vehicles, for households in occupied private dwellings	No motor vehicle	Total households stated	Some missing data; information on data quality is provided.

Indicators about social connectedness

ID	Indicator name	Years available	Source	Geography available	Description	Numerator	Denominator	Notes
onepersonHH	One-person households (among total households stated)	2013, 2018	2018 Census, requested data	SA2, TA, ALB, DHB	Usual residents in one-person households in private occupied dwellings	One-person households	Total households stated	Some missing data; information on data quality is provided.
immigrant	Immigrant arrived in past year (among total population)	2006, 2013, 2018	2018 Census - Individual part 1 table	SA2, TA, ALB, DHB	Counting the overseas-born usually resident population, years since arrival in New Zealand	Less than one year	Total population, excluding those with 'years since arrival' not stated	
immigrant01	Immigrant arrived in past 0-1 years (among total population)	2006, 2013, 2018	2018 Census, requested data	SA2, TA, ALB, DHB	Counting the overseas-born usually resident population, years since arrival in New Zealand	(Less than one year) + (1 year)	Total population, excluding those with 'years since arrival' not stated	

Indicators about knowledge, skills and awareness of hazards

ID	Indicator name	Years available	Source	Geography available	Description	Numerator	Denominator	Notes
nomobile	Households with no access to a mobile phone (among total households stated)	2006, 2013, 2018	2018 Census - Households table	SA2, TA, ALB, DHB	Access to telecommunication systems, for households in occupied private dwellings	(Total households stated) - (Access to a cellphone / mobile phone)	Total households stated	Some missing data; information on data quality is provided.

ID	Indicator name	Years available	Source	Geography available	Description	Numerator	Denominator	Notes
nointernet	Households with no access to the internet (among total households stated)	2006, 2013, 2018	2018 Census - Households table	SA2, TA, ALB, DHB	Access to telecommunication systems, for households in occupied private dwellings	(Total households stated) - (Access to the internet)	Total households stated	Some missing data; information on data quality is provided.
noenglish	People who do not speak English (among total population)	2006, 2013, 2018	2018 Census - Individual part 1 table	SA2, TA, ALB, DHB	Languages (total responses), for the census usually resident population count.	(Total people stated) - (None, eg too young to talk) - (English)	(Total people stated) - (None, eg too young to talk)	This data comes from a Census question where people are asked to tick all the languages in which they can 'have a conversation about a lot of everyday things'. The indicator reports those who did not tick English.
Indicators about safe, secure and healthy housing								
rented	Households living in rental housing (among total households)	2006, 2013, 2018	2018 Census - Households table	SA2, TA, ALB, DHB	Tenure of household, for households in occupied private dwellings	Dwelling not owned and not held in family trust	Total households stated	
crowdedhh	Crowded households (needing 1+ bedrooms) (among total households stated)	2006, 2013, 2018	2018 Census - Crowded households table	SA2, TA, ALB, DHB	Households that were crowded (needing 1+ bedroom according to the Canadian National Occupancy Standard), for households in occupied private dwellings	Households that were crowded (needing 1+ bedrooms)	Total households stated	Some missing data; information on data quality is provided.
crowdedhh_people	People living in crowded households (needing 1+ bedrooms) (among total population stated)	2006, 2013, 2018	2018 Census - People in crowded households table	SA2, TA, ALB, DHB	People living in households that were crowded (needing 1+ bedroom according to the Canadian National Occupancy Standard), among people in households in occupied private dwellings	People living in households that were crowded (needing 1+ bedrooms)	Total people stated	Some missing data; information on data quality is provided. Stats NZ notes that 2013 and 2018 are not fully comparable, as alternative data sources were used to provide information on number of bedrooms where this information was missing in

ID	Indicator name	Years available	Source	Geography available	Description	Numerator	Denominator	Notes
								2018. For more information, see Stats NZ (2020a)
damp	Dwelling sometimes or always damp (among total dwellings stated)	2018	2018 Census, Dwellings table	SA2, TA, ALB, DHB	Dwelling dampness indicator, for occupied private dwellings	(Always damp) + (Sometimes damp)	Total dwellings stated	Some missing data; information on data quality is provided.
severedamp	Dwelling always damp (among total dwellings stated)	2018	2018 Census, Dwellings table	SA2, TA, ALB, DHB	Dwelling dampness indicator, for occupied private dwellings	Always damp	Total dwellings stated	Some missing data; information on data quality is provided.
mouldy	Dwelling sometimes or always mouldy (A4 piece of paper sized mould) (among total dwellings stated)	2018	2018 Census, Dwellings table	SA2, TA, ALB, DHB	Dwelling mould indicator, for occupied private dwellings	(Mould over A4 size always) + (Mould over A4 size sometimes)	Total dwellings stated	Some missing data; information on data quality is provided.
severemould	Dwelling always mouldy (A4 piece of paper sized mould) (among total dwellings stated)	2018	2018 Census, Dwellings table	SA2, TA, ALB, DHB	Dwelling mould indicator, for occupied private dwellings	Mould over A4 size always	Total dwellings stated	Some missing data; information on data quality is provided.
Indicators about having enough food and water to cope with shortage								
nosafewater	Dwellings with no access to safe running water (among total dwellings stated)	2018	2018 Census, Dwellings table	SA2, TA, ALB, DHB	Access to basic amenities, for occupied private dwellings: dwellings that do not report having access to 'tap water that is safe to drink'	Total stated - 'tap water that is safe to drink'	Total dwellings stated	Some missing data; information on data quality is provided.
nofridge	Dwellings with no access to a working fridge (among total dwellings stated)	2018	2018 Census, Dwellings table	SA2, TA, ALB, DHB	Access to basic amenities, for occupied private dwellings: dwellings that do not report having access to a refrigerator (that is in working order)	Total stated - 'refrigerator'	Total dwellings stated	Some missing data; information on data quality is provided.
nopower	Dwellings with no electricity (among total dwellings stated)	2018	2018 Census, Dwellings table	SA2, TA, ALB, DHB	Access to basic amenities, for occupied private dwellings: dwellings that do not report having access to electricity supply	Total stated - 'electricity supply'	Total dwellings stated	Some missing data; information on data quality is provided.
Indicators about decision-making and participation								

ID	Indicator name	Years available	Source	Geography available	Description	Numerator	Denominator	Notes
voter_turnout	Residential voter turnout in the Local Authority Elections (among residential electors on the roll)	2013, 2016, 2019, 2022	Local Authority Election Statistics, Department of Internal Affairs	TA	Residential voter turnout, defined as the number of residential voters divided by the number of residential electors on the roll in contested areas, in the local authority elections	Number of residential voters	Number of residential electors on the roll (contested wards only)	
Indicators about occupation								
healthcare15y	People working in the health care and social assistance industry (among 15+ years)	2006, 2013, 2018	2018 Census, Individual part 3a table	SA2, TA, ALB, DHB	Counting the employed census usually resident population aged 15 years and over, industry (ANZSIC06 V1.0) by usual residence address	Health Care and Social Assistance	Total people stated (among census usually resident population aged 15+ years)	
healthcare15y emp	People working in the health care and social assistance industry (among employed 15+ years)	2006, 2013, 2018	2018 Census, Individual part 3a table	SA2, TA, ALB, DHB	Counting the employed census usually resident population aged 15 years and over, industry (ANZSIC06 V1.0) by usual residence address	Health Care and Social Assistance	Total people stated (among employed census usually resident population aged 15+ years)	
primaryind15y	People working in the primary industries (among 15+ years)	2006, 2013, 2018	2018 Census, Individual part 3a table	SA2, TA, ALB, DHB	Counting the employed census usually resident population aged 15 years and over, industry (ANZSIC06 V1.0) by usual residence address	Agriculture, Forestry and Fishing	Total people stated (among census usually resident population aged 15+ years)	
primaryind15y emp	People working in the primary industries (among employed 15+ years)	2006, 2013, 2018	2018 Census, Individual part 3a table	SA2, TA, ALB, DHB	Counting the employed census usually resident population aged 15 years and over, industry (ANZSIC06 V1.0) by usual residence address	Agriculture, Forestry and Fishing	Total people stated (among employed census usually resident population aged 15+ years)	

Appendix 2: Previous social vulnerability indicators and related work

Table A2 gives information about selected previous social vulnerability indicators and related work internationally and in New Zealand.

Table A2: Summary of international social vulnerability indicators and indices

Name	Reference	Country	Method	Description	Topics of variables	Comments
Social Vulnerability Index (SoVI)	Cutter et al. (2003)	United States (county-level)	Created an index, using statistical methods	Created a single index by reducing 42 variables to 11 key variables (using principal components analysis and weighted variables). Developed for the United States, at the county level. Used in other countries.	Personal wealth, age, density of built environment, single-sector economic dependence, housing stock and tenancy, race, ethnicity, occupation, infrastructure dependence.	Variables were a mix of demographic characteristics, built environment, and infrastructure characteristics. Including built environment and infrastructure indicators may have led to an urban bias. The index used the American concepts of race and ethnicity.
Medical vulnerability index (MoVI)	Cutter	United States		Identified aspects of health that make people more vulnerable to natural hazards. Covered physical health needs, psychological health needs, healthcare access, and health system capability.	Disability and low health perception, chronic illness and medical dependence, limited healthcare access, dialysis dependents, domestic violence propensity, special needs institutions, alcohol abuse, drug abuse, mental health, developmental disability.	
Cologne flood vulnerability indicators	Birkmann et al. (2013)	Cologne, Germany	Created indices, using conceptual approach	Identified indicators for vulnerability to assess the social dimension towards floods. Using MOVE framework, derived indices for flood exposure, susceptibility and lack of coping capacity, then combined into overall social vulnerability index.	Number of people living in flood-prone areas, percentage of people able to evacuate themselves and others without external help (estimated based on age structure per household and information about invalids, people with experience with floods.	Combined indicators into exposure index, susceptibility index (unable to evacuate themselves and others), and lack of coping capacity index (based on previous experience with flooding).
Social determinant of vulnerability framework	Atyia Martin (2015)	International; implemented in Boston, United States	Identified key indicators, using analysis of literature (grounded theory approach)	Identified key interrelated social factors relating to people having disproportionate exposure to risk, and a decreased ability to avoid or absorb potential losses. Adverse outcomes included injury/illness/death, displacement, property damage/loss, loss of employment, access to services, domestic violence.	Children, older adults (65+ years), people with disabilities, chronic and acute medical illness, social isolation, low-to-no income, people of colour. Also found following indicators were important: women, less than high school diploma, limited English proficiency, renters, lack of vehicle.	
Urban Municipality Flood Vulnerability Index	Rasch (2016)	Brazil	Created index, using statistical analysis (factor analysis and an additive model)	Identified about 26 indicators, and created an index	Age (<15, 65+ years), disability, health, education, household income, owner-occupied homes, not working, access to mobile phone, TV, radio; land use plan indicating flood-prone areas, risk plan for environmental hazards; presence of slums, tenements, informal settlements; preparedness for floods, distance of area to primary road, access to cars, housing quality, household size, location of dwellings, population density, piped drinking water, sewage disposal system	
Social Flood Vulnerability Index (Flood Hazard Research Centre)	Tapsell et al. (2002)	United Kingdom	Created an index, using equal weights to sum to an index	Identified range of indicators, and created an index.	Financially deprived people (as defined by the Townsend Index, which uses unemployment, overcrowding, non-car ownership, non-home ownership), long-term sick, single parents, elderly (75+ years).	

Name	Reference	Country	Method	Description	Topics of variables	Comments
Social vulnerability index for disaster management	Flanagan et al. (2011)	United States	Created an index for four social vulnerability domains, and overall	Identified 15 indicators across the following domains: socioeconomic status, household composition and disability, minority status and language, housing and transportation. Used percentile-rank across all census tracts in the US for each variable, added together to get indices. Tested a case study for Hurricane Katrina deaths and displacement.	Individuals below poverty line; unemployed; per capita income; people with no high school diploma; 65 years and older; people aged 17 years or younger, people aged 5+ years with a disability, percent male or female householder with no spouse present and with children under 18, minority groups, people aged 5+ years who speak English less than 'well', multi-unit structures, mobile homes, household crowding, no vehicle available, people in group quarters (correctional institutions, nursing homes, college dormitories, military quarters)	Categorised indicators by domains. Useful ideas about practical implementation of social vulnerability indicators for disaster management, and included feedback from key users.
Social vulnerability indicators for earthquakes	Kwok (2016)	New Zealand	Based on literature	Identified a set of social vulnerability indicators for earthquakes in New Zealand. Adapted from SoVI 2006-2010 (Cutter) and previous indicator sets. Also identified sets of indicators for civil defence practitioners, health practitioners, and RiskScape. Focussed mainly on earthquake-related deaths as the health outcome of interest	Poverty (people living in poverty, households with no cars, female-headed households, renters, unemployment, low educational attainment, employment in service industry, children living in married couple families); wealth (median house value, household income, per capita income); race and ethnicity (non-European, limited English proficiency); elderly (households receiving superannuation, people aged <5 or 65+ years, median age); gender (female, female participation in work force); care dependency, medical disability, healthcare access (people living in nursing and skilled-nursing facilities, people with disabilities, hospitals per capita.	No data sources were identified for these indicators, and the indicators were not implemented (ie no data sources were identified, and no indicator definitions or data outputs were created). The study used the United States conceptualisations of race and ethnicity, which may not be as relevant in the New Zealand context.
Vulnerability assessment – Hutt Valley case study	Khan (2012)	Hutt Valley, New Zealand	Comparison of indicators, indices	Used 38 proxy indicators to compare different vulnerability assessment approaches, including: NZDep2006; an index based on principal components analysis; composite vulnerability indices using weighted and unweighted variables; specific vulnerability indicators	Proxy indicators cover demographics (population distribution, crowding, gender, age, disability and migration), social (family type, education, language, ethnicity) and economic (income, source of income, employment, occupation, housing condition, communication) Specific indicators included elderly, disabled, single parents, Māori, Pacific Asian	Found that the different vulnerability assessments showed different spatial patterns (eg focussed on economic vulnerability). Suggested using different vulnerability assessments to get a comprehensive view.
New Zealand Index of Deprivation (NZDep2013)	Atkinson et al. (2014)	New Zealand		Created a small-area index of socioeconomic deprivation for New Zealand, based on nine variables from the 2013 Census. Mostly used in the health sector, and validated against smoking status. Previous versions of the NZDep have included 1991, 1996, 2001 and 2006.	Having no access to the internet at home (< 65 years); receiving a means-tested benefit (18-64 years); living in equivalised households with income below an income threshold; unemployed (18-64 years), having no qualifications (18-64 years), not living in own home, living in single-parent family (< 64 years), living in crowded households, having no access to a car	Helpful at giving a single snapshot picture of the socioeconomic deprivation of a small area (meshblock or census area unit). Difficult to deconstruct the index, to determine which key factors are driving deprivation in an area. The predecessor, NZDep2001 (from the 2001 Census) has previously been trialled as a proxy social vulnerability indicator for earthquakes (Paton et al., 2006).
New Zealand Indices of Multiple Deprivation	Exeter et al. (2017)	New Zealand	Conceptual approach – indicators selected for theoretical ability to measure an aspect of relative deprivation	Recently developed as indices for the social sector, covering seven domains of deprivation.	Employment Income Crime Housing Health Education Geographical access	Developed and published at 'data zone' scale (intermediary scale created between meshblock and area unit).

Name	Reference	Country	Method	Description	Topics of variables	Comments
New Zealand Index of Neighbourhood Social Fragmentation	Ivory et al. (2012)	New Zealand	Used nine census variables and principal components analysis	Index developed to measure neighbourhood-level social fragmentation, using Census data.	Less sharing of norms and values: fewer school-aged children, more recent immigrants (< 1 year), more non-NZ language speakers; less place attachment (less home ownership, less residential stability, more single-person households, fewer married adults, more non-family households; fewer social resources (fewer long-term residents (>15 years)	Developed using 1996 and 2001 Census data, and does not appear to have been updated since then.
Resilience Index New Zealand	Pearson et al. (2013)	New Zealand	Statistical analyses	This index was constructed as an index of health resilience to deprivation.	'Resilient' areas defined as neighbourhoods with high levels of socioeconomic deprivation (based on NZDep) but lower-than-expected mortality.	This study found some neighbourhood characteristics were associated with resilient factors. However, no underlying framework or conceptual model was used to identify resilience.
New Zealand Resilience Index (NZRI) - Trajectories toolbox	Stevenson et al. (2018)	New Zealand (ongoing project)		Currently creating a composite index of place-based resilience to natural hazards. Based on a multi-capital model, with the index divided into 6 capital-based sub-indices: community, economic, social, built environment, natural environment, institutional	Engaging in voluntary work, lived in current area for 5+ years, total hospital discharges by DHB per 1000 population, number of industries (ANZIC codes for businesses) represented in an area, resident population not employed in the primary sector, working fulltime, has post=-high school education, equivalised household income, infrastructure independency systemic resilience metric, percent of commercial buildings that meet at least 34% of new building standard, percent change in natural land use between 1990 and 2012, percent registered historic sites damaged/destroyed since 2000, percent completeness of hazard planning from district plans, number of hospital beds per 1000 people, average distance to designated Community Emergency Response Centre, Number of emergency shelters per 1000 people, percent of households with emergency water for three days.	Indicators selected from a literature review and indicator bank of more than 1000 indicators; thematic content review used to identify topics; 15 indicators selected from these. Index designed to summarise resilience at the small-area (CAU) level, and to provide comparisons between areas and across time. The NZRI is referred to in MCDEM's proposed National Disaster Resilience Strategy.
Auckland Heat Vulnerability Index	Joynt and Golubiewski (2019)	New Zealand	Conceptual approach and	This index was constructed for the Auckland region, using 10 variables, many based on 2013 Census data.	Ten variables: New Zealand Indices of Multiple Deprivation (IMD), one-person households, rental tenure, residents over 65 years, children under 5 years, English language skills, household rent burden, Māori and Pacific populations (as a proxy for health indicators relating to susceptibility to heat), percentage of green cover; occupation health risks were also mapped (farm, forestry and garden workers; construction and mining labourers)	Included Māori and Pacific populations as proxy for health indicators. Used 2013 Census data, and only implemented for the Auckland region.

Source: Mason et al. (2019)

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Appendix 3: Urban/rural categories

The following tables list the urban areas from the 2018 Urban Rural Indicator (IUR) used in this report.

Major urban areas	Large urban areas	Medium urban areas
Auckland	Whangarei	Pukekohe
Hamilton	Hibiscus Coast	Cambridge
Tauranga	Rotorua	Te Awamutu
Lower Hutt	Gisborne	Tokoroa
Wellington	Napier	Taupo
Christchurch	Hastings	Whakatane
Dunedin	New Plymouth	Havelock North
	Whanganui	Feilding
	Palmerston North	Levin
	Upper Hutt	Waikanae
	Porirua	Paraparaumu
	Nelson	Masterton
	Invercargill	Blenheim
		Richmond
		Rangiora
		Kaiapoi
		Rolleston
		Ashburton
		Timaru
		Oamaru
		Mosgiel
		Queenstown

Small urban areas					
Kaitaia	Clarks Beach	Matamata	Eltham	Takaka	Geraldine
Kaikohe	Waiuku	Putaruru	Hawera	Wakefield	Temuka
Kerikeri	Tuakau	Katikati	Patea	Brightwater	Pleasant Point
Opua	Pokeno	Omokoroa	Raetihi	Hope	Twizel
Moerewa	Huntly	Te Puke	Ohakune	Motueka	Waimate
Paihia	Ngaruawahia	Ngongotaha	Marton	Westport	Waikouaiti
Kawakawa	Raglan	Turangi	Bulls	Reefton	Brighton
Hikurangi	Te Kauwhata	Ohope	Taihape	Runanga	Balclutha
Ruakaka	Kihikihi	Kawerau	Ashhurst	Greymouth	Milton
One Tree Point	Otorohanga	Edgecumbe	Foxton	Hokitika	Alexandra
Dargaville	Te Kuiti	Murupara	Foxton Beach	Amberley	Cromwell
Mangawhai Heads	Taumarunui	Opotiki	Shannon	Woodend	Wanaka
Warkworth	Coromandel	Wairoa	Otaki	Pegasus	Arrowtown
Snells Beach	Whitianga	Clive	Otaki Beach	Oxford	Arthurs Point
Wellsford	Thames	Waipawa	Paekakariki	Darfield	Lake Hayes
Helensville	Tairua	Waipukurau	Pahiatua	West Melton	Gore
Riverhead	Whangamata	Dannevirke	Carterton	Prebbleton	Mataura
Kumeu-Huapai	Ngatea	Woodville	Greytown	Lyttelton	Winton
Waimauku	Paeroa	Waitara	Featherston	Diamond Harbour	Bluff
Muriwai	Te Aroha	Oakura (New Plymouth District)	Martinborough	Lincoln	Te Anau
Waiheke West	Waihi	Inglewood	Picton	Leeston	Riverton
Beachlands-Pine Harbour	Waihi Beach	Stratford	Renwick	Rakaia	
Maraetai	Morrinsville	Opunake	Kaikoura	Methven	

Appendix 4: Heatmap of 2018 social vulnerability indicator data by territorial authority

See attached pdf: *Social Vulnerability Indicators for New Zealand 2018 (SVI2018): Heatmap of percentages, by territorial authority (TA)* (published December 2021).

Datasets for the 2018 social vulnerability indicators

Data for the 2018 social vulnerability indicators are freely available online at https://www.ehinz.ac.nz/social-vulnerability/social-vulnerability-indicators-for-2018/. Data are available as:

- heatmaps by territorial authority and Statistical Area 2 (SA2), and for each region
- Excel datasets
- online interactive maps (Story Map).