Te Weu me Te Wai

Research into health and wellbeing impacts of adverse weather conditions

Report for Ministry of Health | Manatū Hauora

Peer-Reviewed, July 2024

Prepared by Waipapa Taumata Rau | the University of Auckland,
Te Weu Tairāwhiti, and Sustainable Hawkes Bay

Tauihu | Front Matter

Project Title	Research into health and wellbeing impacts of adverse weather conditions
Short Title	Te Weu me Te Wai
Study Registration	NZ Extreme Weather Research Database EWRB-P-1145
Suggested Citation	Laking G, Caddie M, Thorpe H, McClutchie J, Chaffey D, Maxwell H, Philip-Barbara H, Bell J, Horgan-Heke E, Langridge F, Exeter D, Eggleton K, Sing F, Egli V, Colbert J, Sluyter J, van der Werf B, Ikiua O, McCool J (2024). Te Weu me Te Wai | Research into health and wellbeing impacts of adverse weather conditions. Auckland: Faculty of Medical and Health Sciences, Waipapa Taumata Rau | the University of Auckland
Corresponding Author	George Laking, g.laking@auckland.ac.nz
Te Weu me Te Wai	Te Weu Charitable Trust ("Te Weu") is a community organisation based in Tairāwhiti focused on climate change and sustainable land use research and education. In Te Reo Māori, "weu" is a rootlet or fibre, individually a small thing, but in connection with the entire woodland ecosystem. This reflects the role of Te Weu as an organisation networking communities across Te Tairāwhiti. Matching this is "Te Wai", the chosen ingoa karanga for Waipapa Taumata Rau the University of Auckland. The word "wai" recalls the fluid nature of knowledge, and its ability to move through and sustain communities. The naming Te Weu me Te Wai also recalls the physical interaction between soil structure and water, that determines the stability of landscape under storm conditions. Together with Sustainable Hawkes Bay in Te Matau-a-Māui, Te Weu and Te Wai are the community-university partnership that undertook this project.
Cover image	View from Hautai Beach to Te Wharenaoao Point, East Cape (G Laking)

Mihimihi

E aku nui, e aku rahi, e aku whakatamarahi ki te rangi tēnei te mihi maioha ki a koutou.
Ki a rātau kua riro i te ringa kaha o aituā, haere, haere, haere atu rā.
Waiho ko te aroha ki a mātau.
Ki ngā hapori kua koha mai i o koutou wheako whaiaro, i o koutou akoranga, i tō koutou mamae, i tō koutou aroha ki tēnei rangahau, tēnā rā koutou.
E kore te puna aroha e mimiti mō koutou.
Tā Meri Ngāroto kōrero,
Hutia te rito o te harakeke
Kei hea te kōmako e kō?
Kī mai ki ahau
He aha te mea nui o te ao? Māku e kī atu
He tangata! He tangata! He tangata
Tēnā anō koutou i te taonga nui o te kōrero kia ora te tangata ki tēnei ao.

Nā Hiria Philip-Barbara te mihi nei, nā Te Weu me Te Wai tēnei te mihi.
Kei Te Tūranganui-a-Kiwa me Tāmaki Makau-rau, 31 Māehe 2024.
Tihei, Mauri Ora!

He Kupu Whakataki | Preface

Te Weu Tairāwhiti

Te Weu Charitable Trust was established in 2021 in an effort to help progress understanding, discussion and action around climate change and land use issues in Tairāwhiti. The founders weren't sure if there was a need for the Trust to exist as a catalyst, but as projects were developed and conversations happened around the region, there was a call from communities for more information on climate resilience and options for truly sustainable land use. Te Weu has brought together various teams to lead research and educational efforts over the past three years on topics like carbon farming and climate change planning tools for communities and land blocks, to deliberative democracy for climate adaptation, public policy submissions and events for researchers and residents.

The project this report presents the findings from was the largest Te Weu collaboration to date. The Trust was approached by Associate Professor George Laking from the University of Auckland in May 2023 and immediately reached out to key contacts in the region as well as Sustainable Hawkes Bay, an organisation with a purpose and goals closely aligned to those of Te Weu Charitable Trust. Sustainable Hawkes Bay Trust offers a broad array of services related to ecological and community wellbeing – they provided a huge amount of post-cyclone support across the region in early 2023. Sustainable Hawkes Bay were the perfect research partners and have done a brilliant job of collecting the voices of individuals, whānau and organisations across their region.

The project has had very tight timeframes since the funding was announced by Manatū Hauora | Ministry of Health. These have certainly presented challenges, both at the community level with small windows of opportunity to pull together two great teams of locals with the appropriate skills, networks, and experience – and at the university level where a range of personal and professional challenges needed to be navigated within the available timeframes for each project milestone.

The university team has had a number of members contributing to different parts of the project and we are particularly grateful for the role that Dr Victoria Egli played in the research design and the expert coordination of Ofania Ikiua, mostly

remotely from Niue! George has been an incredible project leader, calm under pressure, careful and always considerate, committed to the kaupapa at the very core and carrying a lot more than anyone should have to throughout the life of the project.

A fortuitous meeting in Makarika led to Prof Holly Thorpe joining the project and she has provided invaluable support, guidance, training and advocacy in all aspects of the research. We are grateful for the support from the University of Waikato, Te Pūnaha Matatini and her whānau for supporting Holly's involvement with this kaupapa.

The relationships between the University of Auckland and the local research teams in Tairāwhiti and Hawkes Bay were a critical aspect of the project kaupapa. The local research teams were working in communities that continue to be affected by the physical, social, psychological, economic and structural damage caused by Cyclone Gabrielle and, in Tairāwhiti, repeated extreme weather events. In this context, Josie McClutchie and John Bell played critical roles in managing the research process in Tairāwhiti and Hawkes Bay, respectively.

We are grateful to those who helped guide us, including local kaumatua, Ralph Walker, Pāpā Rau, in Tairāwhiti, and the local researchers who often drew upon their community knowledge and relationships. We are particularly indebted to those who participated in this project, trusting us, and generously sharing their stories so that others can learn from their experiences, and actions can be put in place to better prepare other communities across the motu.

In this way, pūrākau (storytelling) was at times therapeutic for our participants, but for all participants (and the research teams too) remembering and reflecting on their experiences during and after the cyclone was an emotional process. With the trust and generosity of our communities, a great responsibility was felt by the entire research team to ensure these deeply personal experiences were treated with the utmost care, and with a commitment towards local and national impact.

Research in post-disaster impacted communities necessitates care and sensitivity. In addition, rapid-fire research such as this required the local teams to engage in highly responsive and relational ethics of care at all times. Support from the two local host organisations along with University of Auckland staff was es-

sential in respectfully managing the emotional and cultural landscapes of the research.

In this way, the process of navigating power dynamics and building relationships has been critical to the completion of this research. As well as the findings and recommendations presented in this report, the mentoring and training of local researchers throughout the study is an important legacy of this project.

The numbers presented in the statistics drawn from Manatū Hauora data tell a sobering story of the impacts the Covid-19 pandemic and successive extreme weather events are having on the regions. While the loss of life during recent storms have been horrific and leave deep holes in the lives of the families and friends of those lost, we are also witnessing lives cut short by limited access to inadequate health services in a system chronically strained prior to the global pandemic and extreme weather events.

The inequalities so prevalent in our society are magnified in communities that have fragile roading infrastructure, long distances to see a medical professional, low levels of telecommunications access and very limited employment and educational opportunities. A survey of East Coast residents conducted a few months after the cyclones in 2023 found some residents planning to leave, but the vast majority were intending to stay. This commitment speaks to the hope and pakaritanga of residents shared by most of Hawkes Bay as well. This spirit of enduring grit and strength of character shines through in the stories captured in dozens of interviews that contribute the real colour – both the depth of sorrow and heights of optimism recorded in this report.

Waipapa Taumata Rau

On Sunday 12 February I was paddling a kayak in the rain at Lake Tarawera. Conditions were good for practicing rolls – which I still can't really do. There was a storm going on, but we seemed relatively sheltered by the bulk of Tarawera Maunga. On our return to Tāmaki Makaurau Auckland, the significance began to sink in, as we drove past road crews clearing downed trees and rockslides. Then we learnt of the catastrophe in Te Tairāwhiti and Te Matau-a-Māui Hawkes Bay.

E kore ngā kupu e taea ki te whakamanahau tōtika a ō mātou whanaunga kua patua i tēnā aituā. It is hard to find words to express our admiration for the people who weathered this storm. As academics in Tāmaki and citizens of Aotearoa New Zealand, we are hugely grateful to have been allowed to look in on events that happened, and to consider the ramifications for us all.

I am especially grateful to Manu Caddie taking on the project, and to the extraordinary team that stepped up alongside Te Weu. Working with Josie, Holly, Haley, Dayna, Hiria, Emma, and John has been an absolute privilege.

My journey with Waipapa Taumata Rau the University of Auckland picked up only in 2022. Prior to that I have been an oncologist with Te Pūriri o Te Ora Northern Region Cancer and Blood Service. I have been involved in the nexus between Climate and Health since at least 2008, as a member of OraTaiao, the New Zealand Claimate and Health Council. In 2023 as a newly appointed University Academic in search of a Principal Investigator role, I took on this one.

The year 2023 held its suprises for me personally (all better now!) and I had to take time out. I am super grateful to Ofania Ikiua, Jude, Dan, Kyle, and Victoria who carried things while I was away. We reconvened in 2024 with further help from Fiona L and Fiona S, and our data team of Will, Bert, and John.

Thank you to Barbara, Teja, and Anoma for managing finances. Thank you to Stacey, Dion, and the team from UniServices for prompting us to do this. Thank you to our sponsors at the Ministry of Health for believing in our capability. Thank you to the report's Reviewers for your helpful suggestions. Thank you again to our community partners, it has been awesome to see your capacity increase. Thank you most of all to the communities that trusted us to have a part, however small, in your healing. GL

Haepapa | Responsibilities

George Laking, Manu Caddie, and Judith McCool take overall responsibility for the final version of this report. The scientific writing team included George Laking, Manu Caddie, Judith McCool, Fiona Langridge, Dan Exeter, Kyle Eggleton, Victoria Egli, Fiona Sing, Holly Thorpe, Josie McClutchie, Emma Horgan-Heke, and John Bell. The starting concept was from George Laking and Manu Caddie. The study protocol was written by the researchers.

The qualitative research plan was developed by Victoria Egli with Holly Thorpe, Josie McClutchie, and George Laking. Te Tairāwhiti Community research team training was conducted by Holly Thorpe, Victoria Egli, and George Laking. Hawkes Bay training was by John Bell. Collection and analysis of qualitative data was by Holly Thorpe, Josie McClutchie, Dayna Chaffey, Haley Maxwell, and Hiria Philip-Barbara in Te Tairāwhiti, and by John Bell, Emma Horgan-Heke, Susie Chapman and Brooke Murphy in Hawkes Bay, with contributions from Victoria Egli and George Laking. The basis text for qualitative methods was written by Victoria Egli.

Development of the quantitative research plan, and collection and analysis of quantitative data was by Dan Exeter, George Laking, William Harrison, Jessie Colbert, John Sluyter, and Bert van der Werf. The cartographic analysis of driving times to services was done by Jessie Colbert and Dan Exeter. Topic expertise was provided by Kyle Eggleton in Rural Primary Care, and George Laking in Oncology. Text on the project experience was written by Ofania Ikiua and George Laking. Further contributions to the original bid were made by David Newcombe, Maran Muthiah, Sarah-Jane Paine, Andrew Jull, Kimiora Henare, Nina Scott, and Myra Ruka.

Tohutohu | Recommendations

In just a few months, our research team interviewed 143 survivors of Cyclone Gabrielle resident in Te Tairāwhiti and Hawkes Bay. At the same time, we considered 19.6 GB of Te Whatu Ora | Health New Zealand performance data. The insights and our reflections form the basis of these recommendations as to how systems must change, to reduce the risks from future such disasters. The scope of action includes the health system's vital roles in dissemination and advocacy across State services. Our vision of success for Disaster Risk Reduction has:

- Community empowerment,
- Health Services in the community, and
- Procurement for continuity

We also present suggestions for future research and audit, following our review of Te Whatu Ora performance data.

Community empowerment

This has been a project for and about communities in Te Tairāwhiti and Hawkes Bay. But not every community is empowered. People consistently told us their experience of the Cyclone and its aftermath was better, insofar as they could draw on community connections. We found many avenues to improved community health are not under direct control of the health system. In fact, many are and should be under primary control of communities. This implies a devolution of power towards communities. Responsibility for such devolution should begin with central government, that accepts overall control of the structures of public and private power:

1. **Local knowledge**: Raise awareness and train residents on how to prepare their home and community for all types of disaster that affect access to health and vital supplies.

2. **Local relationships**: Establish and maintain strong, trusting local relationships between (a) residents, (b) residents and community hubs, (c) community hubs and services, (d) services themselves. It is important to encourage connection to neighbours and local level information sharing.

3. **Local hubs**: Map and identify existing local hubs including marae, residents' associations, community organisations, and local service providers. Where community providers do not exist, work with community to establish new hubs. Fund, adequately resource, and work with local emergency hubs to form leadership networks.

4. **Local food and medicine**: Develop local food, water, and medication resilience plans to cover all residents for at least 14 days. Support longer term investment in regional food resilience plans.

5. **Local plans**: Develop local emergency healthcare continuity plans.

6. **Local support**: Everyone in the community must have a way to prepare for disasters. Not all whānau always have resources to do this. Some need additional resourcing and support to maintain access to essential nutrition, water, heat, shelter, and care.

7. **Local connections**: Community preparations must connect to larger scales of organisation and their resource pools. Effective community organisers should be rapidly identified and linked into polycentric governance network. Agency functions should be empowering of communities.

Health Services in the community

The main thing health services should now do to reduce disaster risk is increase their presence in the community. We repeatedly saw how prior connection into services was the best predictor for a favourable experience during and after the Cyclone. We also saw how loss of roading and communications could shut down access and therefore services, except where helicopters or other extreme options were resourced by agencies, community organisations, or residents themselves.

1. **Mental health**: There must be investment into weather- and climate-related mental health and wellbeing. Many who experience anger, grief, fear,

hopelessness, and anxiety are at risk of enduring mental ill-health. Little support has been available, even months after events, even though trauma is still being dealt with. Mental health support must see the acute and chronic effects of extreme weather events and climate change on community well-being. Approaches must be designed with and for the social, cultural, geographical, and gendered specifics of affected communities.

2. **Specialist services**: The health system must continue to take specialist services into community and rural and remote settings.

3. **Rural Health**: Rural health services already work as key community hubs when disaster happens. Urgent work is needed to resolve rural workforce issues, and invest in rural primary care infrastructure.

4. **Environmental health**: There is a need for education and community planning for more sustainable land use and future flood debris clearance (silt, large woody debris), including availability of personal protective equipment (PPE).

5. **Urban health**: rural communities and services are often more self-aware than their urban counterparts. Health and emergency services should build connections between urban residents, and have clear systems for checking on urban residences.

Procurement for continuity

Procurement is central to Sendai principles of investing for resilience and enhancing preparedness. The New Zealand Government Procurement Principles call agencies to plan ahead for provision of goods and services in an emergency. Despite significant adverse environmental, social, cultural and economic outcomes of disasters, current procurement policies under-emphasise emergencies. Neither do they refer to health.

1. **Communications**: Telecommunications procurement must be able to accommodate network outages. A fail-safe communication system is vital for health and communities.

2. **Power and water**: Community hubs, including rural primary care clinics must have provision for decentralised power generation and water supply.

3. **Medicines**: There must be robust planning for localised emergency supply, storage, and distribution of medication and medical supplies. Dispensing rules also need to be flexible in emergencies.

4. **Transport**: When roads failed during and after the weather events, it showed the need for robust transport and distribution systems. We recommend everyday access to four wheel drive (4WD) vehicles for rural primary care providers.

5. **Human Resource**: We must invest in support services for our health and caring personnel. Many health workers, emergency responders and emergency service providers were also severely impacted by the cyclone.

Future research and audit

1. **Geomapping**: Although we were not able to integrate mapping technology with Te Whatu Ora data in this project, we recommend continuing with such work. Maps can visually reveal geographical inequity. We predict they can be usefully used to track progress of measures for Disaster Risk Reduction.

2. **SA1 data**: We recommend Investigators be able to access SA1 data, the highest available resolution. Access to SA1 data permits mapping to be used to a fuller potential. We consider that privacy and related ethical considerations can be managed with careful attention to analytic protocols.

3. **Infrastructure data**: We recommend Investigators routinely incorporate data about infrastructure into their analyses of health system performance. For example, our work suggests that roading disruption and repair can be an important predictor of equity of access to health care services.

4. **Rural health**: We recommend the continued use of the GCH to track both need (e.g., increasing travel times) and system performance for people affected by geographical inequities. Further work can examine how rurality intersects with other priority populations and socio-demographic factors,

for example the impact for rural Māori, and the impact for rural areas with high levels of socioeconomic deprivation.

5. **Dedicated code-sets**: ICD-10 and DRG diagnostic code sets are routinely recorded as part of hospital admission, primarily for organisational financing. Alongside other hospital business intelligence, clinical codes can reveal patterns of service use according to particular health states. Although Ambulatory Sensitive Hospitalisation has not been specifically developed for the study of hospital performance after a disaster, we found it to be a useful indicator for this purpose. Another example of relevant codesets are those correlating with waterborne illness after flooding events. We recommend the Ministry develop equity metrics using these sources of routinely acquired health system data.

6. **Coding for function**: The ICF International Classification of Function is not part of the routine data take in New Zealand public hospitals. We went some way to developing a set of codes that could correlate with functional status. It is desirable to keep track of service utilisation by people according to functional capacity, alongside their personal identification of disability or otherwise.

7. **Statistical reporting tools**: We offer the visualisation and statistical reporting tools developed in this project as the basis for metrics to monitor equity. Using these tools, we were able to gain insights as to the performance of different health services across dimensions of time, space, and demographics. They can readily be developed with reference to New Zealand's National Collections.

8. **Value of National Collections**: We reiterate the major value of the New Zealand national Data Collections. They are a comprehensive source of health information for understanding equity of access and performance. The personnel who develop and maintain these data should be seen as having front line health care roles. They should be resourced to optimise and further develop the Collections.

Rārangi Take | Contents

Papakupu | Glossary Of Te Reo Māori

We thank Te Hikuwai Rangahau Hauora | Health Services Research Centre at Te Herenga Waka–Victoria University of Wellington who wrote the basis text for this glossary. We have reproduced it with modifications and additions for regional context.[1]

Āhua	Character, nature, condition, appearance
Ahungarua	Elderly
Ā-tinana	In person
Hapū	Division/s of wider Māori community/communities determined by genealogical descent; commonly regarded as a sub-'tribe/s', clan/s or kinship group/s comprising one or more extended whānau; primary political unit in traditional Māori society
Harakeke	Flax
Iwi	Largest groupings of Māori community determined by genealogical descent and associated with a distinct territory; commonly regarded as a 'tribe/s' comprising a number of hapū
Kairangahau	Researcher/s
Kairangahau Māori	Māori researcher/s
Kaitiaki	Trustee/s, minder/s, custodian/s, guardian/s, caregiver/s, steward/s
Kaitiakitanga	Guardianship, stewardship; trust
Kaiwhatu	Weaver/s
Kapu Tī	Cup of tea
Karanga	Formal call/s, ceremonial call/s of welcome to visitors onto a marae, or equivalent venue, at the start of a pōwhiri
Kaumātua/Pakeke	Respected Elder/s – male and female
Kawa	Marae protocol
Kōrero	Narrative/s, story/stories, account/s, discussion/s, discourse
Kotahitanga	Collective benefit; unity, togetherness, solidarity, collective action
Kuia	Elderly woman/women, grandmother/s, grandaunt/s, female Elder/s
Mahi	Work, job/s, employment, activity/activities, exercise/s, operation/s
Manaakitanga	Supportive hospitality, kindness; reciprocity; the process of showing respect, generosity, and care for others

Mātauranga	Knowledge, wisdom, understanding, skill
Pōwhiri	Ritual of encounter, welcome ceremony on a marae
Rangatiratanga	Authority, chieftainship
Raranga	Weaving
Tamaiti	Child
Tāmaki Makau Rau	Auckland
Tamariki	Children
Tane	Man
Tane Māori	Māori man
Tangihanga (tangi)	Funeral/s
Tangata whaikaha Māori	Māori with lived experience of disability (singular)
Tāngata whaikaha Māori	Two or more Māori with lived experience of disabilities
Te Ao Māori	The Māori world
Tāngata Tiriti	All non-Tāngata Whenua who have come to Aotearoa to live
Te Tangata Whenua	(Tangata Whenua, Tāngata Whenua) The first peoples of Aotearoa; Indigenous people; 'People of the land'
Tiakitanga	Guardianship, caring of, protection, upkeep
Tikanga	Correct procedure, custom, lore, method, manner, practice, protocol
Tikanga Māori	Correct Māori procedure/s, custom/s, lore/s, method/s, manner/s, practice/s and protocol/s
Tinana	Body/bodies
Tūpāpaku	Corpse/s, deceased, cadaver/s, deceased person's/people's body/bodies
Tīpuna	Ancestors (Eastern dialectical form)
Urupā	Burial ground/s, cemetery/cemeteries, graveyard/s
Wahine	Woman
Wāhine	Women
Wahine Māori	Māori woman
Wāhine Māori	Māori women
Wairua	Spirit/s
Wānanga	To meet and discuss, deliberate, consider
Whakamā	Shame, inadequacy, self-doubt, low self-esteem, embarrassment; being conscious of one's disadvantage; modesty, humility
Whakapapa	Genealogy, ancestry, origin/s, relationship/s
Whaikaha	Disabled
Whaikorero	Oration, formal speech-making, speech/es speeches usually made during a powhiri and other gatherings
Whānau	Extended family/families
Whānau Māori	Māori family/families

Whānau pani	Chief mourners, bereaved family – the relations of the deceased
Whanaungatanga	Obligations; relationship/s, kinship/s, sense of family connection

Whakapoto | Abbreviations

ACHI	Australian Classification of Health Interventions
ACS	Australian Coding Standards
AR-DRGs	Australian Refined Diagnosis Related Groups
CHBDC	Central Hawkes Bay District Council
eNHI	Encrypted National Health Index
EQ	Extremal Quotient
FENZ	Fire and Emergency New Zealand
GCH	Geographical Classification of Health
GDC	Gisborne District Council
GDP	Gross Development Product
HBRC	Hawkes Bay Regional Council
HDC	Hastings District Council
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems Tenth Revision, Australian Modification
IMD	Index of Multiple Deprivation
LABS	Laboratory Claims Collections
MBIE	Ministry of Business Innovation and Employment
MoH	Ministry of Health
NBRS	National Booking Reporting System
NCC	Napier City Council
NEMA	National Emergency Management Agency
NES	National Enrolment System
NIR	National Immunisation Register
NKI	Ngāti Kahungunu Iwi
NMD	National Minimum Dataset
NMDS	National Minimum Dataset
NNPAC	National Non-admitted Patients Collection
PHARMS	Pharmaceutical Information Database
PHO	Primary Health Organisation
PRIMHD	Programme for the Integration of Mental Health Data
RfP	Request for Proposals
RSE	Recognised Seasonal Employer
UN	United Nations
UNDRR	United Nations Office for Disaster Risk Reduction
WDC	Wairoa District Council

1. Timatanga | Genesis

1.1 Request for Research

Cyclone Event

Cyclone Gabrielle, communities, health and infrastructure

At the start of February 2023, Severe Tropical Cyclone Gabrielle formed in the Southwest Pacific.[2] Between 13 and 14 February it traversed Te Tairāwhiti | East Coast and Te Matau a Māui | Hawkes Bay, with disastrous consequences for both the land and its inhabitants (Figure 1.1). Many of the consequences exist in the realm of health. There was an immediate toll of trauma and fatality. Beyond that, disruption from the Cyclone revealed the interdependence of human health and community infrastructure. People's usual health needs did not go away, and communities had to rally to ensure these needs were met.

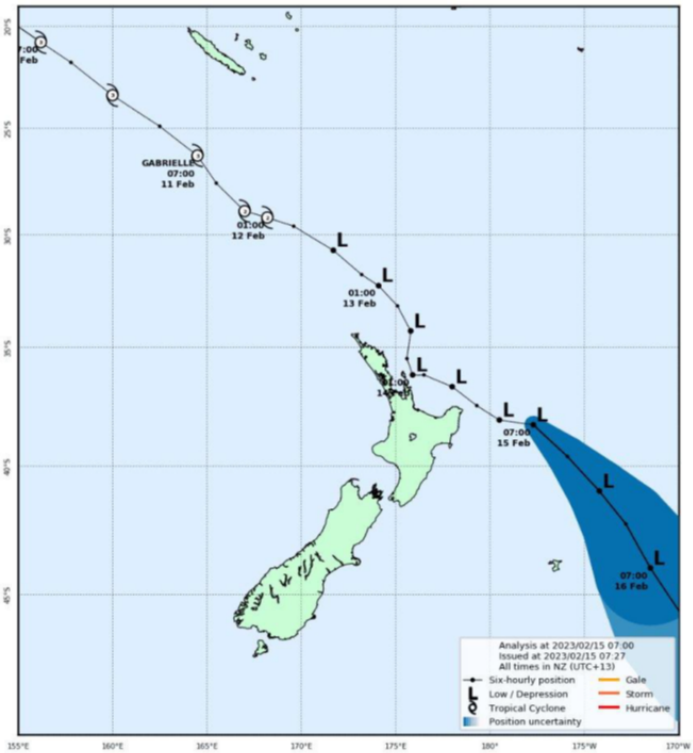


Figure 1.1: Cyclone Gabrielle at 0700, 15 February 2023

Ministry of Health call for research

On this background in April 2023 the Ministry of Health | Manatū Hauora requested proposals for research into health and wellbeing impacts of adverse weather conditions. The Ministry sought research that would contribute to Aotearoa New Zealand's disaster response knowledge base as outlined within the Sendai Framework for Disaster Risk Reduction 2015–2030.[3]

Beginning the Kōrerorero | Discussion

The Sendai Framework is an instrument of the United Nations Office for Disaster Risk Reduction, adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015. Sendai, known as Japan's City of Trees | Mori no Miyako, was extensively harmed by the 2011 Tōhoku earthquake and tsunami. It suffered a death toll in the thousands, with many more injured or homeless. In our report, the Sendai Priorities shape the first part of our Kōrerorero | Discussion.

Contracted Research Requirements

Requirements of the New Zealand Health Research Strategy 2017–2027

The Ministry also referred to the New Zealand Health Research Strategy 2017–2027. The Strategy wants research to lead to healthy futures for Māori and equitable outcomes for Pacific Peoples, to create a "vibrant research environment in the health sector," and to build and strengthen pathways for translating research findings into policy and health practice.

Ministry of Health requirements for this research

In its brief for this project on health and wellbeing impacts of adverse weather, the Ministry sought research that would advance knowledge about the inter-connections between health, wellbeing and community needs after a disaster, generate community-based knowledge, and include an analysis of some of the key health indicators used by the Ministry to fund, monitor and be accountable for the health system.

Health Indicators

The named indicators were maternity and first 1000 days, cancer screening and treatment, and people living with chronic health conditions including mental distress, illness and addiction.

Focus on priority populations and Māori partnership

The Ministry identified priority populations for study as Māori, regional (rural and urban), Pacific Peoples (including RSE Workers), disabled people, women, children, and rangatahi. It expected the research to be conducted in partnership with Māori communities and to have health outcomes for Māori as a primary focus.

The Ministry's requested outputs were:

Research outputs to be community-based and recommend both national and local actions

1. An in-depth analysis of key determinants (for example, economic and work, accommodation and housing, transport, whānau, history, place, social and cultural factors) impacting health and wellbeing of people and communities in the localities investigated during the study period.
2. A synthesis of the obtained community generated knowledge with the most current key Ministry health indicators of maternity and first 1000 days; cancer screening and treatment, people living with chronic health conditions including mental distress, illness and addiction for each of the priority populations listed above.
3. Description of national and localised actions which were effective in mitigating adverse health and wellbeing impacts, and potentially further health inequities occurring.
4. An articulated community view on likely medium and long-term health impacts from Cyclone Gabrielle and community recommendations for actions for the health system to address these, and the identified key health determinants for their locality.
5. Community generated metrics for monitoring of equity in health responses after a natural disaster.

Sequential logic of the outputs

We have organised the list of outputs so it follows a sequence analogous to the Sendai Priorities, starting with a description of the problem, evaluating performance in the response, and ending with recommendations for action and re-evaluation.

In this report our Discussion is completed by the nexus of research outputs and priority populations.

Completing the Kōrerorero | Discussion

1.2 Research Concept and Objectives

The project's overarching question was "How should New Zealand's health social and community systems be organised, in the context of a climate emergency?" With this in mind, we adopted questions put forward by the Ministry, namely:

How to organise social and community systems in a climate emergency?

1. What are the most significant contributors impacting health and wellbeing of people and communities residing in Tairāwhiti and Hawkes Bay following Cyclone Gabrielle?
2. How can this community experience be drawn on in the Cyclone recovery and future disaster risk responses and resilience?

Methodologically, our project combined acquisition of quantitative and qualitative knowledge, with integrative scholarship. Quantitative endpoints, especially as they related to health systems performance, supported analysis of Health Indicators. Access to five years of data from Health New Zealand | Te Whatu Ora, enabled us to compare the disruption from the Cyclone with that of the COVID-19 pandemic. Access to individual patient-level data meant we could also consider the equity dimension of health system performance.

Access to Health New Zealand quantitative performance data

Context and grounding for the quantitative was drawn from our qualitative work, recording experiences and insights of affected community members. These included affected whānau, health workers, and sectoral agencies and community organisations.

Qualitative data from community members

The integrative part considered how systems should be organised in light of Sendai Priorities. It combines the revelations of the Cyclone (about connections between health, wellbeing, public utilities / infras-

Integration with global experience

tructure, and community needs) with global experience of disasters both anthropogenic and natural.

The learning opportunity

All of us, both community and academics, have an interest in our shared systems and their organisation. Although previous thinking about organisation may have skirted the impact of changing climate, such a position is no longer tenable. On the other hand, catastrophes such as Cyclone Gabrielle offer both learning opportunity, and motivation for change.

Disruptive events can drive system change, but it has to be just

If our systems are to survive and thrive in the "new normal" of planetary disruption, including pandemics and climate emergency, our systems must change. External disruption gives the opportunity to restructure and re-organise our systems while they are still in motion. None of this can excuse the system's architects from a duty to bring about "just transition."

A shared understanding can aid community healing

In the cyclone's aftermath there is also a need for healing. An element of community healing is to reach a shared understanding what happened in the cyclone, and what it meant, and how in future such adversity can be avoided or minimised as similar events become more frequent and infrastructure damage more enduring. Such healing can restore not only community self-confidence, but also belief in the value of shared public institutions, and local ways of working.

Research must centre affected communities

All these things warrant study of the cyclone's effects on health and wellbeing, and implications for future practice. Moreover, they warrant a type of study that centres affected communities and puts community voices at the front of advocacy for change. These have been some of the central considerations in shaping of our work.

Our five objectives for the research; these shape our Arohaehae | Quality Appraisal

1. Quantitative: to describe the performance (both absolute and equity) of community health and health-adjacent systems in relation to Cyclone Gabrielle, compared to usual expectations in the second week of February.

2. Qualitative: to give voice to the lived experiences, interpretations, and reflections of a cross-section of community members who experienced the cyclone.

3. Integrative: to connect knowledge of legacy health and social systems with data from objectives one and two, to address the study objective.

4. Building Local Capacity: to build local research capacity and partnerships between community and academia.

5. Decolonising Methodology: to create a replicable approach whereby communities may generate their own scholarly capacity to support positive development in the face of adversity.

1.3 Community—Academic Collaboration

Te Weu me Te Wai: a community—academic collaboration

This project was conceived as a joint proposal by Te Weu Tairāwhiti Charitable Trust ("Te Weu") and Waipapa Taumata Rau ("Te Wai"), the University of Auckland. Te Weu led from the community side, and Te Wai partnered from the academic side.

Te Weu Tairāwhiti: researchers and actionists

Te Weu Tairāwhiti is a collective of local researchers and actionists focused on future risks and opportunities for Tairāwhiti. Prompted by the growing frequency and severity of major weather events, Te Weu seeks to help the Tairāwhiti region be well prepared, be ready to change its pattern of land occupation, and support those who do not have the option to move quickly and easily.

Te Weu: community and Mana Whenua-facing

The primary responsibility of Te Weu was to lead community and Mana Whenua facing elements, with a focus on engagement, leadership, and capability building. That included:

1. Engaging with whānau, hapū and iwi groups across project rohenga to establish terms of engagement, tikanga and common

goals for the research.

2. Establishing a network across Te Tairāwhiti me Te Matau-a-Māui of community representatives that could contribute to the kaupapa.

3. Guiding community participation in study co-design, monitoring and outputs.

4. Identification and engagement with community resources including community groups, agencies and key individuals.

5. Leading communication of project outputs with communities across project rohenga.

The primary responsibility of Te Wai was to lead the project's academic and Crown-facing elements, with focus on inquiry, scholarship, and dissemination. That included:

Te Wai: academic and Crown-facing

1. Writing a scientific project plan for purposes of co-design.

2. Cohesion of an academic network to address domains of inquiry.

3. Participation with community in study co-design.

4. Conduct of the study, with emphasis on community engagement and capacity-building.

5. Delivery of the completed report to the Ministry of Health, and dissemination of findings in formats accessible and engaging for communities of interest.

Budget allocations 51% Te Wai, 49% Te Weu

The project engaged Te Weu and Te Wai as a joint proposal, with Te Wai formally contracting to the Ministry and carrying 51 percent of budget. The remaining 49 percent of budget was subcontracted to Te Weu. Project governance was underpinned by a Memorandum of Understanding (MoU) between the two parties.

Sustainable Hawkes Bay / Sustaining Hawkes Bay Trust

For the Hawkes Bay part of this work, Te Weu contracted with our third partner, Sustainable Hawkes Bay. The Sustaining Hawkes Bay Trust works across Napier, Hastings, Wairoa and Central Hawkes Bay. Its focuses include educating and supporting people to build resilient communities, environment restoration, climate change adaptation and mitigation, advocacy for systems change, and climate disaster response. The Trust aims to support and grow the capacity of Hawkes Bay Communities to achieve community resilience, food sovereignty, climate adaptation / mitigation and environment restoration goals.

2. Whakapapa | Background

2.1 Theories of Health and Equity

Health and its Determinants

The WHO definition

The Constitution of the World Health Organisation defines health as

> "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[4]

Te Whare Tapa Whā

This definition was rebutted by Sir Mason Durie who re-conceptualised health from a Māori perspective as Te Whare Tapa Whā, the "Four-Cornered House."[5] Te Whare Tapa re-characterised the WHO's three dimensions and added a fourth, Te Taha Wairua, the spiritual aspect.

Taha Wairua, the spiritual in health

From a global perspective, Te Whare Tapa Whā is a reminder that spirituality is widely construed as relevant to health, and not necessarily explained by the biopsychosocial.[6] Even though it was excluded from the WHO definition, a spiritual aspect appears in numerous accounts of health.[7]

Meihana Model: determinants, dimensions, and direction for health

In Aotearoa New Zealand, the Meihana Model is a contemporary formulation that combines a dimensional definition of health with an account of its determinants (Figure 2.1).[8] The metaphor of a double-hulled ocean-going waka adds a sense of direction and dynamism. Although drawn from a Māori perspective, the Meihana Model has a logic that is accessible across cultures and settings.

Clinical Care explains at best 20% of health

The foregoing definitions are oriented towards people and families in a context that is often clinical. It should be kept in mind that 'health' occupies a larger dimension, and has a wider set of determinants than just clinical health care. Indeed, clinical care has been estimated to explain only around 20 percent of total health outcomes.[9] Other factors include the physical environment (10 percent) and health behaviours

Figure 2.1: The Meihana Model: Waka Hourua, Roma Moana, Hau e Whā

(30 percent). The most powerful factors are social and economic, that determine 40 percent of all health.

Ottawa Charter

The encompassing scope of health was recognised by the WHO in its 1986 Ottawa Charter for Health Promotion, that said:[10]

> "The prerequisites and prospects for health cannot be ensured by the health sector alone. More importantly, health promotion demands coordinated action by all concerned: by governments, by health and other social and economic sectors, by nongovernmental and voluntary organization, by local authorities, by industry and by the media. People in all walks of life are involved as individuals, families and communities."

Health In All Policies

The Ottawa Charter also identifies the prerequisites for health as "peace, shelter, education, food, income, a stable eco-system, sustainable resources, social justice and equity." The holistic view of health underpins the governance concept of 'Health in All Policies' that is referenced in New Zealand's 2023 Health Strategy.[11] It says:

> "Health in All Policies (HiAP) is a structured approach to working across sectors and with communities on public

> policies. It promotes trusting relationships and engages stakeholders to systematically consider the implications of decisions. HiAP seeks synergies to improve societal goals, population health and health equity."

Health as a marker of societal success

None of this is to say that health is necessarily the purpose of life or even of societies.[10] But it can help position health as a leading marker of societal success. A society's goals will be much more readily achieved to the extent that society is in a positive increasing state of health.

Ora Taiao

From a Māori perspective, it is not only human health that matters. The concept of Ora Taiao, Environmental Health, aligns with a key insight of practice in Rongoā traditional medicine. The total health of the ngāhere (forest) is indicative of the health of its individual parts. Human health cannot be considered apart from the health of the whenua, awa, rākau, kararehe, manu, ika, rānei.[12]

Health Equity

WHO definition of health equity

According to the World Health Organisation,

> "Health equity is defined as the absence of unfair and avoidable or remediable differences in health among population groups defined socially, economically, demographically or geographically."

Ministry's definition of health equity

The Ministry of Health develops this by saying:

> "In Aotearoa New Zealand, people have differences in health that are not only avoidable but unfair and unjust. Equity recognises different people with different levels of advantage require different approaches and resources to get equitable health outcomes."

Inequities stem from avoidable structural problems

As researchers we align with a baseline hypothesis that:

> "Health inequities are not about 'making bad choices', 'bad genes' or not accessing medical care. Health inequities usually stem from avoidable structural problems in our communities"(*Toi Te Ora Public Health*).

The links between community structure and health inequity have been widely developed, both in New Zealand and abroad.[13–16] From the perspective of Te Tiriti o Waitangi, as articulated by the Waitangi Tribunal, equity in health for Māori has been described as:

Waitangi Tribunal equity principle

> "The obligations that require the Crown to act fairly so that Māori were/are not disadvantaged. Where Māori have been disadvantaged, the Crown is required to take active measures to restore the balance."[17]

Treaty obligations for the practice of health extend into the Māori health research space[17] Māori health equity in the research space requires consultation with Māori, dissemination to a broader Māori audience, good relationships with Māori individuals and communities, Māori health research workforce development, and development of Māori theoretical spaces. These latter may be primarily Kaupapa Māori, or may be described as Kaupapa Māori-consistent, partnered, or adjacent.

Health research equity obligations

In health care, Irihapeti Ramsden developed Cultural Safety as a way of showing up and breaking down the imbalance of power between patients, whānau, and the providers of care.[18,19] As a path towards clinical governance, patient autonomy, and health equity, Cultural Safety resonates with the articles of Te Tiriti. Cultural Safety is the basis of a distinctively New Zealand approach to addressing power relationships in the realm of health.

Cultural Safety

2.2 The Sendai Framework

Whakapapa of the Sendai Framework: from the UN via Yokohama and Hyōgo

The Sendai Framework is the third in a series of international instruments that follow from UN General Assembly Resolution 44/236 of 22 December 1989 to "launch a far-reaching global undertaking for the 1990s to save human lives and reduce the impact of natural disasters." These instruments have sprung from the World Conferences on Disaster Risk Reduction, each in a city of Japan historically affected by earthquake (Yokohama 1994, Hyōgo 2005, Sendai 2015). Since 2005 the conferences have been coordinated by the United Nations Office for Disaster Risk Reduction (UNDRR).

Disaster risk reduction is cost-effective

The Sendai text asserts that disaster risk reduction is a cost-effective means of preventing future losses. International frameworks can help to raise public and institutional awareness, generate political commitment and catalyse stakeholder action. Even so, disasters took a heavy global toll across the years 2005–2015, with more than 700 thousand fatalities, over 1.4 million injured, around 23 million made homeless, and at least 144 million displaced. Disasters affected more than 1.5 billion people in some way, for a total economic loss exceeding $1.3 trillion. Harm was disproportionate for women, children, and people in vulnerable situations.

Disaster-related harms are major, and fall unevenly

The Sendai text notes that disasters are increasing in frequency and intensity. Many are made worse by climate change. Exposure of people and assets has grown faster than vulnerability has decreased, generating new risks and rising losses, especially at local and community levels. It is communities, households and small and medium-sized enterprises that are particularly affected by recurring small-scale and slow-onset disasters.

Sendai Framework Targets: health infrastructure, and early warning

The Framework sets seven global targets for reduction of disaster-related physical, human, and economic harm. Two are of specific relevance to our project, and we return to them in our Recommendations:

> "Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health

> and educational facilities, including through developing their resilience by 2030
> … [and] …
> "Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030." (p 12)

Defining hazard, vulnerability, and resilience

Three words often used in Disaster Risk are hazard, vulnerability, and resilience. The Hyōgo Framework defined hazard as: "A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation." Vulnerability was "The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards." Resilience was: "The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions."

Resilience and 'bouncing forward'

The Hyōgo-Sendai definition of resilience has been criticised for being retrograde, in that it "overlooks the tension between the capacity (or desirability) of 'bouncing back' to a pre-disaster state, compared to transformative and adaptive pathways, 'bouncing forward' and 'bouncing back better'."[20–23] This criticism is to some extent mitigated by Sendai's appeal in Priority 4 to 'build back better'.

Engineering versus social-ecological systems

Another criticism refers to Holling's distinction from 1973 between resilience in engineering versus social-ecological systems.[24] It has been said that "engineering resilience is useful in contexts requiring efficiency, constancy, certainty, and predictability, their opposites, persistence, uncertainty, unpredictability, and change, are far more relevant to disaster risk reduction, a field constantly confronted by uncertainty and the unexpected."[20,25,26] But we think this criticism of engineering is

nowadays mitigated by intervening decades of focus on chaos, complexity, and uncertainty.[27] The Sendai Framework says a disaster response should:

Disaster response should draw on multiple sources of knowledge

> "Ensure the use of traditional, indigenous and local knowledge and practices, as appropriate, to complement scientific knowledge in disaster risk assessment and the development and implementation of policies, strategies, plans and programmes of specific sectors, with a cross-sectoral approach, which should be tailored to localities and to the context." (p 15)

The four priorities

The Sendai Framework encompasses disaster prevention, mitigation, preparedness, response, recovery, and rehabilitation. It calls for focused action that meets four priorities:

Priority 1: Understanding risk

1. Understanding disaster risk, whereby:
   "Policies and practices for disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment."

Priority 2: Strengthening governance

2. Strengthening disaster risk governance to manage disaster risk, whereby:
   "Clear vision, plans, competence, guidance and coordination within and across sectors, as well as participation of relevant stakeholders, are needed."

Priority 3: Investing for resilience

3. Investing in disaster risk reduction for resilience, whereby:
   "Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as

well as the environment. These can be drivers of innovation, growth and job creation."

Priority 4: Preparedness and Building Back Better

4. Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation, and reconstruction, perceiving:
   "… the need to further strengthen disaster preparedness for response, take action in anticipation of events, integrate disaster risk reduction in response preparedness and ensure that capacities are in place for effective response and recovery at all levels. Empowering women and persons with disabilities to publicly lead and promote gender equitable and universally accessible response, recovery, rehabilitation and reconstruction approaches is key." (pp 14 ff)

Sendai 1: Understanding risk

Disaster-Related Risk

The Sendai Framework expresses disaster-related risk in terms of "vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment."[3] Cyclone Gabrielle was a climate-related disaster, that can be understood under the broader heading of climate and health. A New Zealand Government statement on wellbeing implications of Climate Change was published in 2020 by the Ministry for the Environment and Stats NZ.[28] It identified effects in domains of physical and mental health, recreation, material wellbeing, ecosystems, social and cultural relations, and engagement and governance.

Royal Society Te Apārangi 2017 statement

The Royal Society Te Apārangi earlier published its statement on Climate Change and Health in 2017.[29] This referred to eight 'building blocks' of health that faced disruption. They are Community, Well-Being, Water, Food, Air, Temperature, Shelter and Disease. Te Apārangi also referred in passing to "indirect social effects" from climate change, including disruption to health services. Their report did not further develop this point.

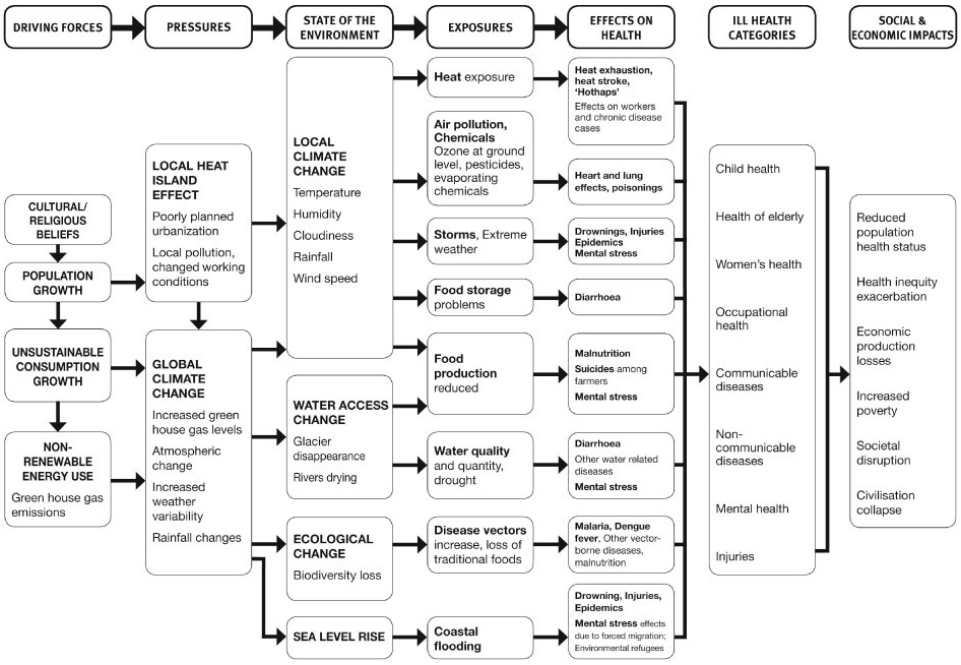


Figure 2.2: The DPSEEA Framework

Logic of the DPSEEA Framework

In 1995 Kjellstrom and Corvalàn at the WHO developed the DPSEEA Framework (Driver / Pressure / State / Exposure / Effect / Action)for considering Climate Change and Global Public Health (see Figure 2.2).[30] This logic model has been influential, although there are competing formulations.[31]

Missing logic

The pathway from climate event via systems disruption to generalised health failure is often mentioned in narrative accounts, if only in passing. For example the WEF says floods "make it difficult to seek out medical care, with roads impassable and vehicles, including emergency vehicles, often inoperable." But we have yet to see this link shown in published logic models, as for example the WEF adaptation of DPSEEA (Figure 2.3).[32]

Public understanding is a risk

A further element of risk is incongruence of ideation. Division at community level poses a significant risk to the success of diaster responses. In the recovery phase it will work against risk reduction. Contesting realities across responders and recipients are part of a larger crisis in popular acceptance of science, especially science about Climate

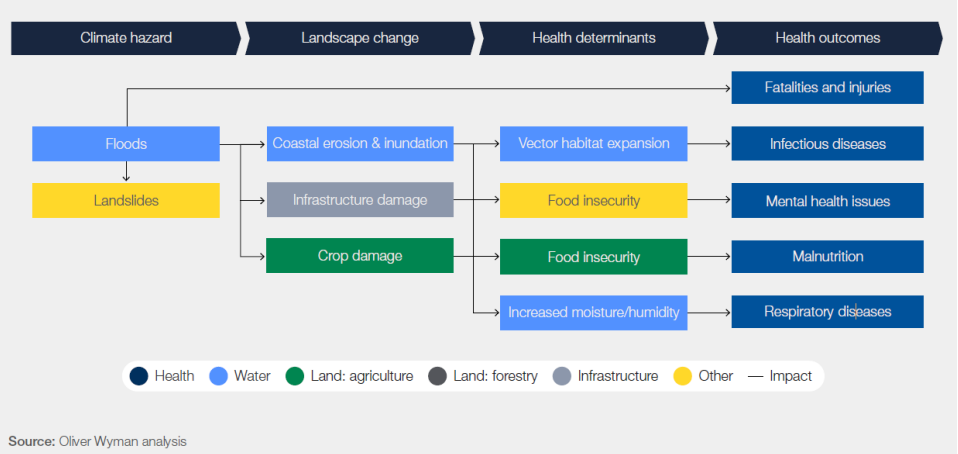


Figure 2.3: The WEF logic model

Change. The experience of an adverse event does not always lead to a change in risk preference. For example, researchers in Havelock found businesses were in general happy to return to the *status quo ante* of water supply, even after the Campylobacter contamination event.[33]

Sendai 2: Strengthening governance

Priority 2 and Article 1 of Te Tiriti

Poor governance in disaster response is often cited as a reason for failure. The Sendai Framework expresses disaster-related governance in terms of "vision, plans, competence, guidance and coordination within and across sectors, as well as participation."[3] Te Tiriti o Waitangi guarantees governance in Article 1, Kawanatanga. Sendai Priority 2 is thereby also a Treaty Priority. When disaster governance falls short for Māori, Article 1 is at stake.

Access to Public Finance Act

The recent Country Report for New Zealand gives an idea of governance shortfall as seen by UNDRR experts.[34] They note the absence of disaster and climate risks within Treasury's strategic frameworks under the Public Finance Act 1989.[35] That absence is bound to be a challenge for reports such as ours. There is no clear access to the Public Finance Act, a key legislative pathway for implementation.

Tension between central and local government

The UNDRR writers see tensions between central government

policies and local authority implementation, that they attribute to "decentralisation and high local autonomy." This wording would support Poterie's reading of a UNDRR proclivity for Statism.[36] At the same time, the UNDRR writers note "high reliance on public funding even in smaller, rural local government areas." They cite policy development guidelines from the (Department of Internal Affairs, 2019). We think dependence on central government paymasters is likely to work against decentralisation and local autonomy.

Priority 2 and Article 2 of Te Tiriti

Values of "decentralisation and high local autonomy" are well known amongst Tangata Whenua. They map to Tino Rangatiratanga, as guaranteed in Article 2 of Te Tiriti o Waitangi. When disaster governance strays from autonomy for Māori, Article 2 is at stake.

Priority 2 and Article 3 of Te Tiriti

There is also a point of connection between the Sendai Governance Priority and Treaty Article 3, Ōritetanga. Although Ōritetanga translates in the Te Aka Māori Dictionary to "Equality or Equal Opportunity," in Crown policy it is characteristically connected to Mana Taurite | Equity. Hapori Māori experience inequity across many domains, health and finances being good examples. Inequity is strongly linked with historical breaches of Te Tiriti. There exists a constitutional remedy, in the shape of the Waitangi Tribunal. Treaty Settlements promise to redress inequity, and reactivate Tino Rangatiratanga, the precondition for an effective constitutional relationship with the Crown.

Te Toa o Ngāi Māori

New Zealand needs strong Māori communities. After centuries of occupation, Māori know the whenua, and take a long-term view. Hapori Māori, including their Marae and Hauora, are a distinguishing feature of life in Te Tairāwhiti and Te Matau-a-Māui Hawkes Bay. Apart from tension within UNDRR as to Statist versus Communitarian leanings, the Sendai text calls on Governments to engage with Indigenous peoples. This is a theme picked up by Indigenous scholarship on Disaster Risk Reduction, community sustainability, and Climate Change Resilience.[37]

Public health institution policy

These observations about disaster risk governance and Te Tiriti o

Waitangi extend into the health sector. Māori scholars have identified a need for public health institution policy to include Māori and climate change.[38] A recent work found that:

> "Speaking to tāngata whenua (Indigenous Māori), District Health Board (DHB) employees, and subject matter experts (SMEs), it was clear that policy processes were *ad hoc* and problematically silenced consistent Māori input."

Causes of primary care inertia

In the case of rural primary care, inertia of clinical response has historicaly been attributed to many things, including:

- Inability of patients to access primary care by registration
- Failure to organise data at practice level as to the needs of the registered population
- Absence of disaster planning and training
- Lack of rural connectedness
- Lack of rural health workforce
- Lack of cohesion and communication between primary care and an urban-orientated health system response

Polycentricity in disaster response governance

In rural health literature, disaster response has been the basis of an appeal to polycentric governance.[39,40] Disaster responses under polycentricity should purposively seek out and foster emergent informal rural governance structures.[41] Such informal responses are commonly seen in the actions of 'zero-order responders', who are local citizens creating solutions in a formally unsupported way.[42] Beckham *et al*. refer to these local, rurally based first responders as 'community organisers', who have social capital and high levels of trust. The community organisers can also link to decision makers, where they can advocate for community need, influence resource allocation and disseminate knowledge.

Sendai 3: Investing for resilience

Resilience versus insurance

Preparation for risk has a cost, as any purchaser of insurance can attest. Insurance is subject to 'moral hazard', over-reliance on cover to the detriment of other preventative means. Due to the growing prevalence and scale of natural disasters, insurance is increasingly expensive or even unobtainable.[32] This incentivises investment for resilience.

WHO Framework and Ottawa Charter

The World Health Organisation has six building blocks in its framework for resilient health systems.[43] They are leadership, workforce, health information systems, essential medical products and technologies, service delivery (including preparedness and managing determinants of health) and financing. The Sendai Framework speaks of "public and private investment, structural and non-structural, economic, social, health and cultural resilience; innovation, growth and job creation."[3] The Ottawa Charter and Health in All Policies exhort us to avoid reducing health investment to merely the systems of health care.

Challenges for rural primary care

Literature attests to a significant shortfall in the New Zealand general practitioner workforce.[44] There is limited global evidence as to what models of rural primary care improve health outcomes.[45] An Australian synthesis of literature on typology of rural primary care models suggests the most important elements are:[46]

- Adequate funding
- Community participation
- Robust health information systems
- Multidisciplinary practice

Rural hospitals

One model present in both Te Tairāwhiti and Hawkes Bay is the rural hospital, that is connected to its community and that facilitates community-based care, including specialist care.[47] However, rural hospitals face challenges including limited funding (37.5% are community

Figure 2.4: Waipukurau Hospital in 2018. (G Laking)

owned), lack of enabling policy, and limited buy-in from an urban-based health system.[47] Communities are also still affected by traumas of a previous round of rural hospital disinvestment.

Investment in rural primary care

Proposed areas for investment in rural primary care resilience include:[48]

- Development of acute response strategies
- Interagency cooperation and training
- Long-term disaster planning
- Increased community engagement
- Population health approaches

The shortcomings of the legacy model are not unique to Te Tairāwhiti and Hawkes Bay. Previous research estimated that up to a third of rural

general practices in Aotearoa New Zealand would not be able to provide an initial response in an extreme climate event.[48]

Sendai 4: Preparedness and Building Back Better

Power and water

Priority 4 is a final pathway for the Sendai Framework. The WHO and UNDRR both emphasise the role of power, water, and comunications infrastructure in building disaster resilience. Decentralised generation, e.g. by photovoltaics, is desirable as a way to escape grid dependency while reducing emissions. Although now widely adopted in the Pacific, it is paradoxically less prevalent in the 'developed' nation of New Zealand.[49] Water is a basic requirement for hygiene and medical aid. It is politically contested, has previously been an acute problem in Hawkes Bay and is likely to be so again.[50]

Internet and the Cloud

Remote monitoring of high needs patients through the Internet of Things (IoT) shows promise in disasters, though is mostly dependent on power and internet.[51] So-called narrow band IoT avoids some of these dependencies by using low power batteries and narrower data bandwidth.[52] Primary health care has widely moved to cloud-based notes, but they depend on power and internet. Cloud-based records have advantages in disasters, including backups and safe physical location, but also depend on power and internet access.[53]

Supply chain

Production and supply of medicines carries a significant carbon footprint and is in need of reform.[54] Disruption of medicine supply is a global issue carrying significant risk of harm to health.[55] Medications require emergency supply and distribution plans for rural areas.[56] Drones have been proposed for medicines distribution but work is needed to harmonise regulatory frameworks for aviation and medicines.[57]

Relevance of procurement

Government procurement is of high relevance to disaster response, since it decides what public resources will be available in emergencies. The first Principle of procurement is to "Plan and manage for great re-

sults." The fourth Rule of procurement is to "promote broader environmental, social, cultural and economic outcomes." It does not mention health, even though health is clearly linked to all these outcomes. The Rules have priority outcomes, but none of these address resilience in disasters.

Procurement in emergencies

New Zealand Government Procurement offers guidance on relaxation of rules across three levels of emergency. These are Level 1: Immediate response, Level 2: Disaster relief, and Level 3: Post disaster reconstruction. Here is also the Government's reference to preparation, that says:

> "Your agency should plan ahead to allow for the provision of goods and services during an emergency or supply shortage. The level of planning should reflect the strategic importance of the good or service, the risk of an emergency and the cost of any contingency measures. Any contingency planning should be balanced, practical and fiscally responsible. You should consider making this process part of your risk management strategy."

Critique of Sendai texts

Sendai call for people-centred approaches

The Sendai text calls for 'people-centred' approaches that are inclusive and accessible. It exhorts Governments to

> "engage with relevant stakeholders, including women, children and youth, persons with disabilities, poor people, migrants, indigenous peoples, volunteers, the community of practitioners and older persons in the design and implementation of policies, plans and standards." (p 10)

Tension between 'top-down' language and community empowerment

A comparative textual analysis of the Framework alongside its predecessor documents perceived a shift away from community input and

towards technological advances.[36] Whereas the Yokohama Strategy described participatory community knowledge as of 'utmost' importance to characterise and mitigate disaster risk, the Sendai Framework portrays the community as 'aid recipients'. Local knowledge is re-packaged back to communities in the form of 'tailored risk information'. In this more critical reading,

Local communities know their own environments

> "The tone suggests that local communities are helpless and in need of externally-driven efforts to prepare for, cope with, and recover from natural hazards; such a position clearly neglects the widely acknowledged fact (in academia and official reports) that local communities have been interacting with their own environments for centuries, thus endowing them with a significant collective experience in risk reduction that is valuable to any DRR framework."

Polycentric governance

Such analyses highlight transactions of power between Government and community. They join to larger conversations on political themes including Individualism, Communitarianism, and Statism.[58] In the realm of health, appeals have been made to an idea of 'polycentric governance'.[39] Polycentricity involves assembling multiple organisations and individuals at different hierarchal levels. It loosens hierarchies of power, such that policy, knowledge and resources can be disseminated in a non-linear way. It supersedes 'monocentric governance', that was critiqued as neglecting the disempowered, such as rural and Indigenous communities.

Parallel to Te Tiriti o Waitangi Crown—Hapū relationships

Such political theorising resonates in Aotearoa in respect of Article 2 of Te Tiriti o Waitangi, its guarantee of Tino Rangatiratanga for Māori in the relationship with the Crown, and movements for constitutional reform. These are globally pervasive issues that form an unavoidable backdrop to our work.

2.3 Natural Disasters and Health

Climate Change drives extreme adverse weather

Adverse weather from cyclones manifests in coastal regions as heavy precipitation, strong winds, and storm surges.[59] At sea, cyclones generate high waves adverse for navigation and offshore structures. Cyclones inhabit a more nebulous category of extreme weather events, described in terms of rarity and extreme values of meteorological variables.[60] Examples include storms, floods, severe rain, heatwaves and droughts.

Global heating energises the atmosphere

Global heating has long been known to increase the incidence and severity of such events, due to atmospheric water and energy loading.[61] Anthropogenic climate change drives an increase in the destructive ability of weather both in New Zealand and globally.[62]

Anthropogenic Climate Change is a breach of planetary boundaries

Because of its defining effects on the biosphere, climate change has been identified as the primary risk to human health in the 21st century.[63] It is but one manifestation of breach of planetary boundaries, alongside biodiversity loss and extinctions, stratospheric ozone depletion, chemical pollution and the release of novel entities, ocean acidification, the freshwater cycle, land system change, nitrate and phosphate flows, and atmospheric aerosol loading.

The nexus between Climate Change and health, including spiritual health

Climate change and attributable extreme adverse weather are an enduring negative factor for community health and wellbeing.[64] This extends into dimensional concepts of health as put forward in the Meihana Model. In Te Ao Māori, a spiritual dimension ties in to kōrero about 'Matemate-a-one', an intuition that the whenua must receive the body after death.[65] Related intuitions appear in the notion of 'Solastalgia', grief for the loss of the land as it was.[66] 'Climate Fatigue' can describe the psychological overload of repeated negative future-state messages.[67]

Adverse weather drives ill-health

In New Zealand this is accentuated for those who live in economic deprivation, in coastal and rural communities, and in Māori and Pacific populations.[68] Extreme weather events amplify health vulnerabil-

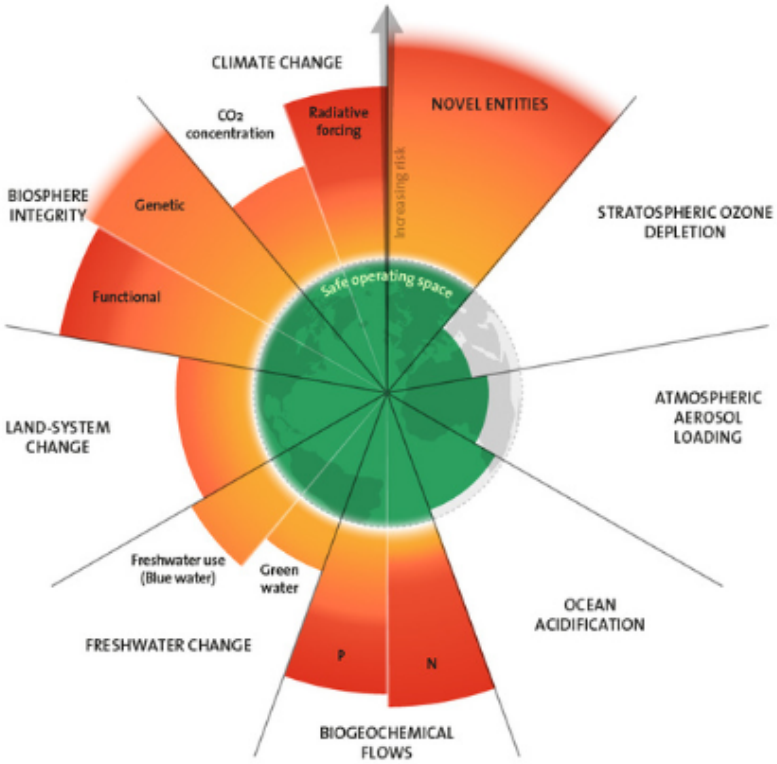


Figure 2.5: Planetary boundaries framework in 2023; Stockholm Resilience Centre

ities.[69] Many of these effects are mediated by disruption of services, damage to infrastructure, and displacement of communities.[70,71] The outcomes have been consistently adverse for community health in all its dimensions, in all affected settings.[69,72,73]

Harm from adverse weather is distributed unevenly

Extreme weather events may hit harder on those who are already vulnerable or marginalised, for reasons including socio-economic deprivation, rural location, ethnicity, gender, sexuality, disability and age.[74,75] Vulnerability factors for rural communities include restricted access to resources, geographic isolation, and reliance on primary industries.[76] Extreme weather can worsen health disparities among indigenous populations through reduced access to traditional places and foods, alongside pre-existing barriers in access to health care services.[77]

Vulnerability and resilience are not mutually exclusive

Notably, climate change is not always salient in the minds of affected

communities.[78] This might reflect its gradual onset, against a backdrop of enduring existential challenges. It is also important to note that systems, communities and societies are neither completely vulnerable nor completely resilient. Indeed, communities identified as vulnerable may be resilient in ways not open to the more advantaged.[79] Examples include cultural cohesion and access to natural resources such as hunting.[77]

How flooding harms health, especially mental health

In New Zealand, flooding is the most frequent natural hazard.[75,80] About two thirds of the population live in areas considered flood prone.[80,81] Immediate harms to rural communities from flooding are characterised by physical injury and interruption in access to health and social infrastructure. In the longer term, community health suffers from sustained economic loss and damage to housing, farmland and businesses. Much of this longer-term harm is in the domain of mental and spiritual health.[82,83] It is an active topic for mental health policy across the Pacific.[84,85]

Mental health harms of Canterbury Earthquakes

We have also learnt from New Zealand experiences of other natural disasters. A relevant prior example was the 2010 / 2011 Canterbury Earthquakes. These caused reductions in healthcare service capacity.[86] Although a longer-term adverse health effect could not be reliably detected, subjective distress and overall negative impact were greater in groups having the poorest baseline physical health.[87] A systematic review found the earthquakes were associated with widespread adverse effects on mental health, again unevenly distributed.[88] Longitudinal studies found a positive correlation between earthquake exposure and prevalence of mental disorder.[89]

Further adverse weather is forecast

New Zealand's previous extreme weather events give insight into both short- and longer-term impacts on community health and wellbeing. They form an important record, due to the expectation of future extreme weather as a result of climate change.[80,90]

Determinants of health under Climate Change

Pourzand et al reviewed New Zealand's climate change adaptation

policy, finding it "emphasises protection of health care facilities from climate extremes; there is insufficient attention paid to broader determinants of health."[91] Their review of climate-sensitive health risks corresponds to what has been known globally since at least 1995.[92] They find most of these risks are active or relevant in New Zealand (injury from heat waves, flooding, droughts, and fires; water-borne illness, vector-borne illness, food insecurity and the consequences of economic loss).

Australia-Pacific reports

Beyond New Zealand, there is substantial literature on health impacts of natural disasters. Examples from Australia include flooding and bushfires, and consider the experience of urban, rural, and remote communities.[93–95] Issues in the Pacific include storms, sea level rise, tsunamis, and eruptions.[96–99] There is much we can learn from the Pacific in terms of effective community response, often in the face of restricted resource.[100]

High visibility but lower power of Local Government

Disaster Response in New Zealand is a whole-of-Government function. Much of the response is under oversight of the Department of Internal Affairs (DIA). The DIA houses the Ministry of Civil Defence & Emergency Management, and the Local Government Commission. Much of the scientific response is led by the Ministry of Business, Innovation and Employment (MBIE). MBIE also control New Zealand Government Procurement. Although Local Government is highly visible in any response, in New Zealand it has less autonomy than in many other developed countries. Local government revenue accounts for just 10% of total combined government revenue.

UNDRR call for 'cross-cutting research'

New Zealand's most recent UNDRR update was filed in 2020, in the context of the COVID-19 pandemic. It described a profile of socio-economic vulnerabilities, including livelihood dependence, accessibility to health services, marginalisation, poverty, and homelessness. It called for 'cross-cutting research' to support a move towards a whole-of-society Disaster Risk Reduction and Climate Change Adaptation agenda that could be relevant from individual to national levels.

2.4 Te Tairāwhiti, Hawkes Bay, Gabrielle

Ko te Whenua: history and changing land use

At the start of Aotearoa, Māui fished up the North Island from Hikurangi Maunga in Te Tairāwhiti, in local tradition the resting place of his waka Nukutaimemeha. Subsequent waka including Nukutere, Tākitimu, Horouta, and Kurahaupō brought tāngata to the whenua of Te Tairāwhiti (East Cape, Poverty Bay) and Te Matau-a-Māui (Hawkes Bay). In the six centuries before European settlement, Māori defined a way of living sustainably in dispersed river catchments along more than 600 km of coastline. European settlement since the 1800s brought major changes to use of land and waterways, including draining of wetlands and a shift to farming on grass, with exotic forestry on the hillsides.[101]

Differences in structure of local government

Te Tairāwhiti is locally governed by a unitary body, the Gisborne District Council (GDC). By contrast, Hawkes Bay is governed by five entities. These are the Hawkes Bay Regional Council, Central Hawkes Bay District Council, Napier District Council, Hastings District Council, and Wairoa District Council.

Census 2018 data for Te Tairāwhiti and Hawkes Bay

In the 2018 census the population of the Gisborne Region rose to 47,517, with 34,527 residing in urban Gisborne (Statistics New Zealand, 2020). For Hawkes Bay it rose to 166,368, with 62,241 in Napier and 44,940 in Hastings. Te Tairāwhiti has New Zealand's highest proportion of Māori, nearing parity. The proportion of people living in areas of socioeconomic deprivation Quintile 5 exceeds 46 percent (versus 20 percent quintile prevalence for all of New Zealand). Compared to New Zealand, Hawkes Bay also has more Māori (28 vs 16.5 percent), and more living in higher socioeconomic deprivation (NZ Deprivation Quintile 5, 28 percent).

Health challenges of deprivation and reduced access

Communities of Te Tairāwhiti and Hawkes Bay face health challenges. Te Tairāwhiti has the country's highest rates of total morbidity and mortality, high rates of ambulatory sensitive hospitilisations, and the highest unmet need for health care such as cardiac and renal services. Determining factors for health in these regions include

community disempowerment, geography, and absence of many tertiary services. Additional factors include lower rates of immunisation, and higher rates of smoking and obesity. The arrival of the COVID-19 pandemic in 2020 deepened inequities, via increases in wealth inequality and housing precarity.[102]

Extreme weather as a regional feature

Extreme weather events are a further overlay on the health status of Tairāwhiti and Hawkes Bay.[103,104] Communities still deal with the aftermath of Cyclone Bola, 35 years prior.[105] In the immediate leadup to Gabrielle, the East Coast endured heavy rainfalls in March and April 2022, and Cyclone Hale in January 2023.

Economic cost of Gabrielle

To date, Cyclone Gabrielle has been the economically costliest tropical cyclone ever in the Southern Hemisphere, with total damages estimated to exceed $14.5 billion, almost 4 percent of New Zealand Gross Domestic Product (GDP) to March 2023.

Physical disruption of Gabrielle

The economics of the cyclone are a financial line in a larger story of environmental and social disruption. Lives were lost and thousands of people displaced and isolated. Productive lands were scoured, eroded, swept away or covered in silt. In Te Tairāwhiti over 74 of the 422 bridges in were lost or damaged, and 80 percent of the roading network was disabled. In Hawkes Bay the rain caused around 5.6 kilometres of breaches in the 248 kilometres stopbank network. There was comparable damage and disruption to housing, communications, water supply, power, and distribution of food and fuel. ACC report 2016 injury claims from Cyclone Gabrielle (from national data, including other regions such as Northland).

Threats to community viability

Much as external aid has been welcomed, it has its price in terms of tino rangatiratanga, the sense of community autonomy and self-determination. The viability of communities has been put into question, in lands occupied since the time of Māui. There is a need for healing and restoration.

For research to be healing, methodologies need to decolonise

One pathway to healing is via understanding of what happened in

the cyclone and after. Research can offer understanding in such domains as numerical accounting of what happened and when, and narrative reflection on the events and processes. That in turn can help affected communities rebuild, adapt, and even thrive in the face of future challenges. Such learnings can take on national and global value. But because research has historically also injured tino rangatiratanga, there is a need for decolonising methodologies.[106]

A pathway to co-design of research and policy recommendations

There is large global research energy for the nexus between health and extreme weather events.[64,98,107] Contributions from Aotearoa New Zealand have been characterised by a focus on health equity and community empowerment.[48,108–112] This reflects awareness of ethical duties in research towards traumatised populations.[113] We acknowledge the path taken in the Ministry of Health's post COVID-19 research, in which scholars and community co-designed research and policy recommendations in the aftermath of catastrophe.[1] Also relevant is a substantial literature on community development.[114]

COVID-19 and models of health care

The nexus between community and health care is by no means restricted to disaster risk reduction. Community integration, engagement, and co-design became a focus for development of the New Zealand health system, especially after the COVID-19 pandemic.[115,116] These things are also a focus for Hauora Māori.[117] A common theme is the need to overcome barriers to access, that have been intrinsic to legacy models of care.[118]

3. Tukanga | Methodology

3.1 Overview and Regulatory

Mixed-methods study

Te Weu me Te Wai was a mixed-methods study that acquired both quantitative and qualitative data. The quantitative study used a retrospective cohort design. The qualitative study involved single episode focus groups and single-participant interviews. Participants were purposively recruited based on a community mapping activity conducted by community members in each region. Study documentation is preserved in the Appendices to this report.

Iterative co-design with community

The study methods were developed through iterative co-design between Waipapa Taumata Rau, Te Weu Tairāwhiti, and Sustainable Hawkes Bay. The study protocol was developed through this transparent iterative process.

Ethical framework

We acknowledge ethical positions informing the protocol, including the New Zealand Government's guidelines for post-disaster research, the CARE principles for indigenous data governance, and scholarship on decolonisation of research methodology.[106,113,119] Within the terms of the Mana Raraunga Charter for governance of Māori data, Te Weu carries the Mana, and Te Wai carries the Mahi.[120]

AHREC and ethical approvals

The protocol was approved by the Auckland Health Research Ethics Committee (AHREC) on 10/10/2023 with reference AH26632. It remains valid through to 28/09/2026. Locality approval was obtained from Te Whatu Ora Hawkes Bay on 07/11/2023 and from Te Whatu Ora Tairawhtiti on 01/11/2023. Ngāti Porou Oranga gave approval for participants to join the qualitative arm of the study in November 2023.

3.2 Quantitative Methods

Positionality

Non-neutral ethical positioning of quantitative study

Quantitative study is not morally neutral, but reflects the positionality of the researchers.[121,122] Numerical data by their nature can be more readily abstracted out from the fabric of human experience and rendered ahistorical.[123] There is a risk they are brought back in service of regressive agendas.[124] Accordingly, we made our quantitative analyses in co-production with community research teams.[106] We also followed Stats NZ guidelines for redaction of microdata.[125]

Data Acquisition

Health New Zealand Data Services

With help from Health New Zealand | Te Whatu Ora Data Services, we accessed a complete set of anonymised data across six years for people domiciled in the Tairāwhiti and Hawkes Bay Health Districts. This comprised the primary health organisation enrollment records (PHO from start of series until April 2019, NES thereafter), and seven of the National Collections of health and disability information.

Large dataset

Table 3.1 summarises data sources and acquisition intervals. The data spanned 24 quarters of time, starting from 2017 Quarter 4, and continuing to 2023 Quarter 3. The request implied a return of several gigabytes of data. We prepared a database on University secure storage using Microsoft SQL Server 2022. Statistical analyses were conducted on data subsets using R versions 4.3.0 – 4.3.3.[126]

Health Contact Population (HCP)

We took the Health New Zealand | Te Whatu Ora Health Contact Populations (HCP) as our denominator. To be included in the HCP, a patient had to

- Be enrolled with a primary health organization operating in DHB of domicile 051 Tairāwhiti or 061 Hawkes Bay, or

Source	Start	End
PHO (previous enrolment system)	Jan 2018	Apr 2019
NES (current enrolment system)	Jan 2019	Jul 2023
NNPAC (outpatient and ED events)	Jul 2018	Jun 2023
NBRS (specialist referrals)	Jan 2019	Jul2023
NMD (publicly funded hospitalisations)	Jul 2018	May 2023
PRIMHD (referrals, activity days)	Jan 2019	May 2023
PHARMS (pharmaceuticals)	Jan 2019	Jun 2023
LABS (laboratory claims)	Jan 2018	May 2023
NIR (immunisations)	Jan 2019	May 2023

Table 3.1: Te Whatu Ora Data Sources and acquisition intervals

- Have at least one interaction we could observe in the data. Qualifying interactions were:
  - Receive a reported lab test
  - Be hospitalized
  - Get a recorded vaccination
  - Attend any outpatient appointment
  - Attend any reported mental health activity
  - Collect any dispensing

Health Service Utilisation and Census populations

A population comparable to the HCP has previously been defined in terms of Health Service Utilisation (HSU). This HSU was previously shown to exceed the Census population by 1 percent nationally (see Table 3.2; 2013 Census data were used).[127] Moreover, Te Whatu Ora National Collections Team advise us that the Stats NZ published Census population is an undercount, writing that:

> According to an as at 30 June estimate [Stats NZ] provided us, the combined population of the Hawkes Bay and Tairawhiti DHB regions in 2018 was 221,800, which is 3.7% higher than the census figure.

Location	HSU	2013 Census	Δ
All of New Zealand	4,266,789	4,242,051	+0.6%
Te Tairāwhiti	46,173	38,442	+17%
Hawkes Bay	149,259	138,078	+7%

Table 3.2: Health Service Utilisation Population exceeded 2013 Census Population[127]

In this work we have reproduced the publicly reported Census usually resident population from the Stats NZ website, "Age and sex by ethnic group (grouped total responses), for census usually resident population counts, 2006, 2013, and 2018 Censuses (RC, TA, SA2, DHB)." Our main purpose in reporting the Census figure is to illustrate how population counts may vary, depending on the method used.

Population structure

The difference (Δ) between HSU and Census populations exceeded the national average by 17 percent in Te Tairāwhiti, and 7 percent in Hawkes Bay. The population structure was mostly preserved across HSU and Census cohorts, with differences in absolute prevalence exceeding 1 percent only for All Other ethnicity (HSU: 72%, Census 64%), Asian ethnicity (HSU: 8%, Census 11%) and NZ Deprivation Decile 10 (HSU: 10%, Census: 8%; source: Zhao et al, Table 1[127]).

Population structure

We report HCP structure in terms of DHB of domicile, gender, age, prioritised ethnicity, deprivation quintile, and rurality. Geographic location is resolved at the level of StatsNZ Statistical Area 2 (SA2), 2023.

The GCH Geographical Classification of Health

Geocoding permits location data to be classified by area-level deprivation according to the Index of Multiple Deprivation (IMD) and its domains, or as rural or urban based on the Geographical Classification of Health (GCH).[128,129] The GCH is an Aotearoa New Zealand taxonomy designed to monitor health care variation between rural and urban areas. It has five levels, two urban and three rural, that reflect decreasing population size and increasing drive time from an urban centre.

Deprivation and rurality

We obtained data on the location of hospitals, general practises and pharmacies in the region. We calculated access to these amenities according to travel time and distance via the road network. This meant

we could also consider the community impact of road closures and diversions. Data were visualised by map overlays for drive time to GP and Pharmacy services, using methods developed by Paul Beere at the University of Canterbury.[130] With use of the GeoHealth Lab road network open source mapping data, we could resolve access at Statistical Area 1 level. We calculated Origin-Destination (OD) matrices using ArcGIS Pro.[131] We report the median drive time from SA1 2018 domicile to locations of service.

Classification at SA2 level

We classified the national collection data according to Ministry of Health concordance files assigning the IMD and the GCH. We used SA2 geographical units (similar in size to MOH Domiciles, with approximately 2,000 residents per unit) for mapping purposes, to highlight geographic variations in experience of the health system, and neighbourhood-level impacts of the adverse weather events.

Aggregation of R2 and R3 levels

For most analyses we aggregated data at R2 and R3 level. This analytic decision was made in light of the relatively small R3 population. R1 data were kept separate, due to an interaction with NZDep. In general, R1 domiciles represent more socioeconomically advantaged strata, for example those in "lifestyle blocks".

Handling of Time

Coarser time segmentation in primary analyses

To investigate the impact of adverse weather on health service activity, we segmented the dataset. This is shown in Figure 3.1, where the larger lighter bars show segmentation in the primary analysis, and the smaller darker bars show segmentation in the secondary analyses. In the primary analysis, segmentation was according to the dates:

1. 01/01/2020 to 30/06/2020: First phase of COVID-19
2. 01/01/2023 to 30/06/2023: Adverse Weather
3. 01/01/2018 to 30/09/2023, excluding (1) and (2): all other dates.

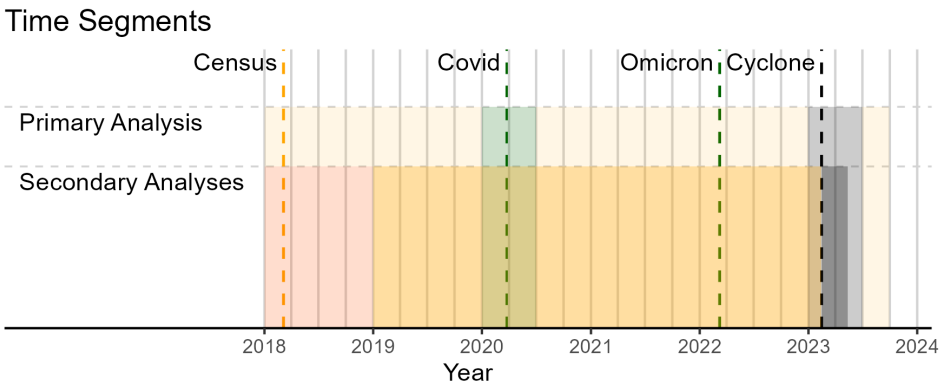


Figure 3.1: Segmentation of time in primary and secondary analyses

Since the primary analysis included quarter of the year as a co-variate, it could control for seasonality.

Landmark events: Census, COVID-19, Omicron, Cyclone

In Figure 3.1, vertical dashed lines plot landmark events:

- 06/03/2018: 2018 Census
- 25/03/2020: start of the first national COVID-19 Alert Level 4 restrictions
- 09/03/2022: peak of daily COVID-19 case counts in the Omicron outbreak
- 14/02/2023: landfall of Cyclone Gabrielle

Parsimony of models in secondary analyses

Secondary analyses did not address covariates as exhaustively. These were an exploration of data signal strength, as leads for future work. Accordingly, there is the chance our secondary results may be explained by

such features as structure of the analytic model, change in population, or seasonality.

Primary analysis

Hypothesised change in health system performance

The primary hypothesis was that we would see a detectable change in health system performance across the two quarters containing the Cyclone and its aftermath, 01/01/2023 to 30/06/2023. For controls we selected (1) the early COVID-19 segment 01/01/2020 to 30/06/2020, and (2) the remainder of the data from 01/01/2018 to 30/09/2023.

COVID-19 as a comparator

We were interested in the COVID-19 experience as a comparator example of disruption to health and social services. The rapid adoption and profound impact of pandemic restrictions at the start of 2020 seemed to offer a parallel to the experience of Adverse Weather. Moreover, we know many people were avoidant of hospitals during COVID-19 lockdowns, due to perceived risk of viral exposure.[132]

Ambulatory Sensitive Hospitalisations

We selected Ambulatory Sensitive Hospitalisations (ASH, implemented across all age groups) as a representative index of health system performance, with a focus on inpatient hospital activity. ASH is a set of discharge diagnosis codes that correlate with an admission being 'avoidable'. These are conditions that can be prevented or otherwise treated from the community. Chief among them are acute cardiovascular and respiratory events, and some communicable illnesses.

Rationale for study of ASH

We adopted ASH for study as it is routinely reported at a national level, and encompasses a wide range of diagnoses and ages. We hypothesised that independent of its role to assess quality of primary health care, ASH could have value as an overall index of inpatient hospital activity.

Regression analyses to account for covariates

A counter-hypothesis for attribution of changes in health system activity is that these could be explained by changes in covariates other than the impact of events such as COVID-19 and the Cyclone. We ad-

dressed this by means of a multivariate regression analysis. Explanatory covariates included age group, NZDep18 quintiles, DHB of domicile, GCH18, ethnicity, sex, quarter (reported as 'month'), year, and time segment (reported as 'event period'). Age group categories were 0–14, 15–24, 25–44, 45–64, 65–74, 75–84, and 85+. GCH18 categories were U2, R1, R2, and R3. Prioritised ethnicity categories were Māori, Pacific, Asian, and Other.

Multiple Poisson regression

We analysed ASH counts via multiple Poisson regression using the `lme4` package (Linear Mixed-Effects Models using 'Eigen' and S4) within the R statistical environment.[133] Log population offsets were applied. We employed a stepwise procedure for model optimisation, testing each variable and all second-order interactions. The final model was selected based on the Akaike Information Criterion (AIC). We chose the model with the fewest parameters within two points of the lowest AIC.[134]

Estimating likelihood the events had an impact

Following model fit, pairwise comparisons were computed using estimated parameters and covariance matrices, assuming multivariate normal distributions. Statistical significance was defined as a p value less than 0.05, with all p values considered 2-tailed.[135,136]

Secondary analyses

The Ministry's reporting requirements

Secondary analyses meant we could further explore hypotheses about the effect of adverse weather. These connected with the Ministry's interest in maternity, the first 1000 days of life, disability, cancer screening and treatment, and people living with long term conditions including mental distress, mental illness, and addiction.

Technical aspects of secondary analyses

The main vehicle for the secondary analyses is a univariate Poisson regression on event counts, offset by log population. The single independent variable is the Weather period. It is a conscious analytic decision to "cherry-pick" a period that starts with the Adverse Weather event. The selection of period increases sensitivity for detection of effect, at the price of reduced specificity. We report 95 percent Predic-

tion Intervals, that address overdispersion in count data.[137] We compare health system performance across subpopulations in terms of the pre- and post-Weather event rate ratios.

Strategy for secondary analyses

We take a five-step strategy in reporting secondary analyses:

1. Report denominator populations
2. Calculate indicator performance (numerators)
3. Report performance in post 14/02/2023 quarter
4. Plot numerators over time, and estimate trend for 14/02/2023 quarter
5. Compare observation with expectation

Our use of the Health Contact Population (HCP) means performance is likely to be biased upwards, due to attrition of the denominator when people are unable to access health services. The bias is to some extent attenuated by inclusion of the PHO-NES series, that gives a 3-year view of the HCP. We have not formally explored the magnitude of such bias.

Equity analyses

Our equity analyses consider the differential performance across populations identified by demographic and health status.

Populations

Flags for identification of subpopulations

We set up analytic flags against which populations of interest could be identified. In the case of first 1000 days, we could classify on age. In respect of health status, we referenced Te Whatu Ora clinical codes, including the International Statistical Classification of Diseases and Related Health Problems Tenth Revision, Australian Modification (ICD-10-AM), and the Australian Refined Diagnosis Related Groups (AR-DRGs). These definitions are shown in Table 3.3.

Table 3.3 Membership of sub-populations

Flag	Field	Criterion
Cancer	Specialty	Oncology M50–M54
	AR-DRG	Neoplasms Group R
	ICD-10	Malignant neoplasms C00–C97
Rural	Domicile	GCH Geographic Classification for Health; levels are U1, U2, R1, R2, R3; no Tairāwhiti or Hawkes Bay domiciles are U1.
Addiction	Specialty	Substance abuse Y40–Y48
	AR-DRG	Any Group V (Alcohol and Drug)
	ICD-10	Mental and behavioural disorders due to psychoactive substance use F10–F19
Long-term condit.	Specialty	Any of Endocrinology and Diabetology M20–M24, Cardiology M10–M14, Renal Medicine M60–M64 AND (due to imprecision of HSCs) previously associated with Clinical Codes E08–E13, I00-I99, I60–I69, M10
	AR-DRG	Diabetes K60; Stroke B70; Coronary Bypass F05, F06; Interventional AMI F10; Coronary Atherosclerosis F66; Unstable Angina F72
	ICD-10	Diabetes mellitus E08–E13, Diseases of the circulatory system I00–I99, Cerebrovascular diseases I60–I69, Gout M10

Flag	Field	Criterion
Loss of Function	AR-DRG	Dementia B63; Cerebral Palsy B65; Degenerative Nervous System Disorders B67; Multiple Sclerosis and Cerebellar Ataxia B68; Stroke and Other Cerebrovascular Disorders B70; Chronic and Unspecified Paraplegia/Quadriplegia B82; Cochlear Implant D01Z; Cystic Fibrosis E60; Chronic Obstructive Airways Disease E65; Interstitial Lung Disease E74; Amputation, Except Upper Limb and Toe F11; Skin Ulcers in Circulatory Disorders F64; Peripheral Vascular Disorders F65; Haemodialysis L61Z; Peritoneal Dialysis L68Z; Schizophrenia Disorders U61

International Classification of Functioning

We could identify only a limited prior literature relating ICD-10 codes to disability status. This was mainly in the realm of insurance reimbursement for disabling trauma. The reporting of disability status in health information is contested. Although many health systems routinely report the International Classification of Functioning, it is not part of New Zealand National Collections. Moreover, the ICF has an uncertain relationship with social concepts of disability.[138]

Loss of function

Accordingly for this project we constructed our own, non-validated set of ICD-10 codes as a proxy for loss of function. So long as the classifier remains investigational and not validated by members of the disabled community, we eschew the term 'disability'. We have not constructed a function-specific indicator of health system performance. Instead we have taken functional loss as a dimension of health system performance across the full set of indicators.

No access to Cancer Registry data

In this project we did not have access to Cancer Registry data. Construction of our cancer denominator was therefore restricted to NMDS diagnoses.

Challenges of working with National Collections

Health system indicators

Tables 3.4–3.7 set out technical specifications for indicators we explored. Some are pre-existing, others have been newly defined by us. The Health Quality and Safety Commission has published technical specifications for measurement of Health System Indicators, that the Ministry of Health has adopted in its reporting. It required creativity to extract health system indicator data from National Collections. The practicalities of the National Collections meant we had to modify most of these indicators to some form of proxy.

Technical issues posed by length of data series

By way of example, an antenatal blood screening standard depends on performance of a set of seven tests, ideally in the first trimester of pregnancy. We could infer pregnancy from an Obstetrics-coded discharge diagnosis in the NMDS. To identify the tests, we had to look back by up to 280 days in the Labs collection. However, the NMDS Events data given to us ended on 03/06/2023, just 105 days after the Cyclone. We could not clearly see the cohort who were in a first pregnancy trimester at 14/02/2023, as their obstetrics episodes had mostly not yet happened. We could mitigate this by looking at the performance of tests alone, on the presumption that many of these would have been done in an antenatal context. If test activity dropped, it would be reasonable to infer a corresponding drop in antenatal screening performance.

Decision to define sets of tests as occuring within one week

Further issues with understanding test activity related to the definition of a set of tests. This required analytical decisions, such as defining the temporal boundary of a set as any test performed within one week of another. This was by necessity an arbitrary decision, that remains open for methodological development. For example, one could study the growth in number of such sets as the window of eligibility is increased. In practice, a one week window retained temporal resolution for the adverse weather, while allowing for such aspects as laboratory shipment and processing.

Decision about completeness of standard

A related issue was where to set the standard for reporting of per-

formance. A strict definition of antenatal screening would require documentation of all seven blood tests. There are valid reasons why not all seven might be performed within one week of each other in clinical settings. For example, blood group and Rhesus status do not normally change during the life course. Likewise, Rubella immune status, once established, is seldom lost. For these reasons, these tests might be less likely to be repeated beyond the first pregnancy. An overly stringent definition would offer smaller event counts and be harder to interpret statistically. Therefore we decided to accept performance of at least three of the five more specific tests as evidence of antenatal screening.

Low visibility of surgical activity

Reflecting its complexity, operative surgical care is one of the health system outputs most vulnerable to disruption from external events. General surgical operative performance was only poorly visible to us from within the available data. We were however able to track the performance of Obstetric surgical admissions.

Maternity and First 1000 Days

Blood tests, immunisations, hospitalisations

For reasons discussed above, we constructed the maternity indicator around blood test performance. We excluded the subpopulation who had received a prescription for tenofovir. This antiretroviral drug is a mainstay of the treatment of HIV infection. It is a marker for monitoring with blood tests including HIV, Hepatitis B, and Syphilis, that overlap with the antenatal profile. In the case of the first 1000 days, we could look at completed immunisations, and ambulatory sensitive hospitalisations.

First antenatal screen	
Numerator	Number who completed at least three antenatal blood screening tests. The tests are: • Blood group and antibody screen • Rubella antibody status • Syphilis serology • Hepatitis B serology • HIV Although the full antenatal panel also includes complete blood count (CBC), and diabetes screening, we excluded these from the indicator due to lower specificity).
Denominator	Number of women in the HCP aged 15–50, excluding those on treatment with tenofovir.
Immunisation rates for children at 24 months†	
Numerator	Children enrolled on the national immunisation register (NIR) who were up to 1000 days of age and completed all age-appropriate immunisations
Denominator	Children in the HCP who were up to 1000 days of age
Ambulatory sensitive hospitalisations in first 1000 days	
Numerator	Number of hospital inpatient ASH events across age <5 years from the NMDS
Denominator	Children in the HCP who were less than 5 years of age

Table 3.4: Indicators for Maternity and First 1000 Days

† Per HQSC Technical Specification

Cancer screening and treatment

No direct data from the National Screening Unit

We could not look directly at performance of cancer screening, as we did not have access to data from the National Screening Unit. Although we had access to the Labs collection, this did not include data on cervical smear or HPV testing, nor on the faecal immunotesting used in bowel screening. Nor did we have access to radiological data by which to study breast imaging. Nonetheless, much of what we can see in the National Collections has implications for the successful performance of cancer screening.

Colonoscopy performance

We selected colonoscopy as an indicator of performance in screening for bowel cancer. The then Hawkes Bay District Health Board joined the National Bowel Screening Programme on 9 October 2018, and Tairāwhiti joined on 31 August 2020. The Australian Independent Hospital Pricing Authority identifies the ICD-10 Z12.1 for "Special screening examination for neoplasm of intestinal tract for malignant colon, rectal or colorectal neoplasm or nonmalignant neoplastic polyp, where no disease is detected or has ever been detected." The AR-DRG colonoscopy codes are G48A and G48B.

Cancer treatment supportive care

The PHARMS dataset allowed us to track dispensing of supportive care medicines as a marker of cancer treatment. These included pegfilgrastim used for bone marrow support, and the cancer-specific antiemetic drugs aprepitant. Public funding of access to these agents is restricted by Special Authority. SA1912 determines access to pegfilgrastim and specifies "... prevention of neutropenia in patients undergoing high risk chemotherapy for cancer ... ." SA0987 determines access to aprepitant and specifies "the patient is undergoing highly emetogenic chemotherapy and/or anthracycline-based chemotherapy for the treatment of malignancy." Both agents have been publicly accessible for more than a decade. Although many other community-dispensed medicines are used in supportive care of cancer, we elected to not study them due to their confounding utilisation in other conditions.

Bowel cancer screening	
Numerator	Number who had colonoscopy
Denominator	Number of HCP aged 60+ years; Māori aged 50+ years
Access to cancer supportive care	
Numerator	Number receiving pegfilgrastim and / or aprepitant
Denominator	Number of HCP with a cancer diagnosis
Access to community cancer pharmaceutical	
Numerator	Number receiving community cancer pharmaceutical
Denominator	Number of HCP with a cancer diagnosis

Table 3.5: Indicators for Cancer Screening and Treatment

Community pharmaceutical cancer treatments

Te Aho o Te Kahu | National Cancer Control Agency reported on funded cancer medicines available in New Zealand, including medicines dispensed in the community. Table 3.1 of their report 'Understanding the Gap' identifies these agents and their indications. We reproduce it in part at Table 3.6. Not all of the medicines were funded across the entire period of study. At least one medicine, methotrexate, has wide usage outside of cancer. We could reduce confounding with other conditions by requiring a cancer diagnosis in the denominator.

Long term conditions

Medicine	Funded Indication
Abiraterone	Prostate cancer
Alectinib	Lung cancer
Anastrozole	Breast cancer
Azacitidine	Myeloid leukaemias, Myelodysplastic syndrome
BCG (TICE strain)	Urothelial (bladder) cancer
Bendamustine	Lymphomas
Bicalutamide	Prostate cancer
Busulfan	No restriction on cancer type
Capecitabine	No restriction on cancer type
Chlorambucil	No restriction on cancer type
Cladribine	Hairy cell leukaemia
Cyclophosphamide	No restriction on cancer type
Cyproterone	No restriction on cancer type
Dasatinib	Leukaemias
Erlotinib	Lung cancer
Etoposide	No restriction on cancer type
Exemestane	Breast cancer
Fludarabine	No restriction on cancer type
Flutamide	Prostate cancer
Gefitinib	Lung cancer
Goserelin	Prostate cancer, Breast cancer
Hydroxyurea	No restriction on cancer type
Imatinib	No restriction on cancer type
Lapatinib	Breast cancer
Lenalidomide	Multiple myeloma
Letrozole	Breast cancer
Medroxyprogesterone	Breast cancer, Endometrial cancer
Melphalan	No restriction on cancer type
Mercaptopurine	No restriction on cancer type
Methotrexate	No restriction on cancer type
Nilotinib	Chronic myeloid leukaemi
Octreotide (long acting)	Neuroendocrine cancer (functional)
Olaparib	Ovarian cancer (second line)
Palbociclib	Breast cancer, Renal cell carcinoma
Sunitinib	Renal cell carcinoma, Gastrointestinal stromal tumour
Tamoxifen	Breast cancer
Temozolomide	Anaplastic astrocytoma, Ewing's sarcoma, Glioblastoma multiforme, Neuroendocrine cancer
Thalidomide	Multiple myeloma
Thioguanine	No restriction on cancer type
Venetoclax	Chronic lymphocytic leukaemia
Vinorelbine	No restriction on cancer type

Table 3.6: Community cancer medications funded in New Zealand (Source: Te Aho o Te Kahu)

Indicators for long term conditions

We could refer to PRIMHD, NMDS, Labs and Pharm collections to understand system performance for people with long term conditions including diabetes, mental health, epilepsy, cardiac, and respiratory diagnoses.

Complexity of Mental Health wait time calculations

We used the Te Whatu Ora document for calculating Mental Health and Addiction Services Waiting Times. As we were not able see contractual arrangments between service providers and responsible DHBs / Health Districts, we took the District of domicile as the presumptive funder for determining waiting times in each case. We also presumed that all clinical teams remained in service, noting that stand down of the target service is another criterion for out of scope referrals. We feel this is defensible, as we would expect referrals to a defunct service to be coded as out-of-scope (e.g., as "RI Referral declined – inability to provide services requested").

PRIMHD Activity Table starts at 01/01/2029

We would have to omit the first year of data from analysis of waiting times for mental health referrals, since referrals are out-of-scope if the person has accessed a service within the previous 12 months. We needed a year of lead-in time to confirm this criterion would be meet. Since the earliest Activity Start Date in the PRIMHD activity table data was 01/01/2019, we could not start the waiting time analysis until 01/01/2020.

Under-25s access specialist mental health†	
Numerator	Number of new clients aged under 25 seen within three weeks (PRIMHD, as per the Te Whatu Ora calculation)
Denominator	Total new clients aged under 25 (PRIMHD)
Ambulatory sensitive hospitalisations, age 45–64†	
Numerator	Number of hospital inpatient ASH events for 45–64-year-olds from the NMDS
Denominator	Domicile population for 45–64-year-olds based on Stats NZ population projections and age-standardised based on Stats NZ population estimates*
Acute hospital bed day rate†	
Numerator	Number of bed days for acute hospital stays using data from the NMDS
Denominator	Domicile population based on Stats NZ population projections*
Specific pharmaceuticals dispensing	
Numerator	Number of people with diagnosis dispensed medicine from corresponding relevant therapeutic group (PHARM)
Denominator	Number of people with diagnosis (from NMDS; diabetes, mental health, epilepsy, cardiac, respiratory)
Polypharmacy	
Numerator	Number of people dispensed 5 or more pharmaceuticals (PHARM)
Denominator	Number of people in HCP

Table 3.7: Indicators for Long Term Conditions

*We used subsets of the Health Contact Population as denominator

†Per HQSC Technical Specification

3.3 Qualitative Methods

Data Acquisition

Community research workforce

The qualitative study comprised single-participant semi-structured interviews and multi-participant focus groups. Participants were invited to report their experiences of the cyclone. Inquiry focused on the performance of health and health-adjacent systems. Data was acquired primarily by a community workforce, based from Te Weu Tairāwhiti and Sustainable Hawkes Bay.

Ethical approved eligibility criteria

Ethical approval included people resident in Te Tairāwhiti me Te Matau-a-Māui on 13 February 2023 who were aged 16 or more years at the time of consent to participate. The approval granted by the Auckland Health Research Ethics Committee (AHREC) excluded vulnerable groups, being people with intellectual disability, active major mental disorder, prisoners, and people aged less than 16 years at the time of consent. The study languages were English and Te Reo Māori.

Building local capacity

A central aspect of the project was to build local researcher capacity. Activities of researchers in training included design of the sampling strategy, collection of data, coding of transcripts, contribution to the analysis, and presentation back to community. The local knowledge and relationships of the researchers were integral to project success.

Community research training hui

We held a two-day community research training hui 04–05/09/2023 in Gisborne. It was attended by 11 community researchers, from Te Weu Tairāwhiti Trust, Sustainable Hawkes Bay, and Pōrangahau. Training addressed all aspects of the study protocol, including project kaupapa, procedures for obtaining informed consent, and qualitative interview and focus group techniques. Senior researchers led practice interview sessions. Further training topics included researcher wellbeing when interviewing participants who have experienced trauma, and procedures for handling and storage of confidential research data.

Researcher pastoral care

The training prioritised time for whakawhanaungatanga and sharing of kai. Researcher pastoral care continued during the phase of data collection, with debriefings especially where interviews and focus groups had covered traumatic content.

Trauma-informed approach to research

Recognizing that many in the community continued to be emotionally, financially and physically impacted by repeated weather events, researchers adopted a trauma-informed approach, with an ethic of care in all interactions with participants. At all times, the team prioritised participant emotional and cultural safety and wellbeing. Tikanga and other relevant practices were observed in all interactions between study personnel, participants and communities.

Population sampling frame

Research participants were selected though community researchers' networks. The population sampling frame included:

- Small and large business owners
- Marae committees / trustees
- Farmers and forestry workers
- Health professionals – maternity care, aged care, mental health and addiction services, ED and ambulance services, GPs, pharmacists, and community/iwi health service providers
- Pacific community members
- RSE workers
- Disabled community representatives
- High health needs representatives
- Other groups across different age and geographic groupings

Purposive sampling

Figure 3.2: Community Mapping (H Thorpe)

Purposive sampling balanced representation by demographic attributes including age, gender, ethnicity, educational status, rurality, sexuality, and health and disability status.

Rural communities

Specific involved rural communities included Matawai, Whātātūtū, Te Karaka, Ormond, Wairoa, Puketapu, and Pōrangahau.

The importance of connections and relationships in community research

Drawing upon our connections and relationships was important in ensuring participants felt safe and supported throughout their participation in this study, and that their stories would be treated with utmost care and respect. In Te Tairāwhiti the project kaumatua (Ralph Walker aka Pāpā Rau) played an important role in facilitating contacts and connections with potential participants.

Te Tairāwhiti recruitment mapping

Researchers in Te Tairāwhiti undertook a mapping activity to shape recruitment, as shown in Figures 3.2 and 3.3.

Hawkes Bay 'Snowball' sampling

In Hawkes Bay the research team used a 'Snowball sampling' concept that drew on the researchers' existing relationships and networks,

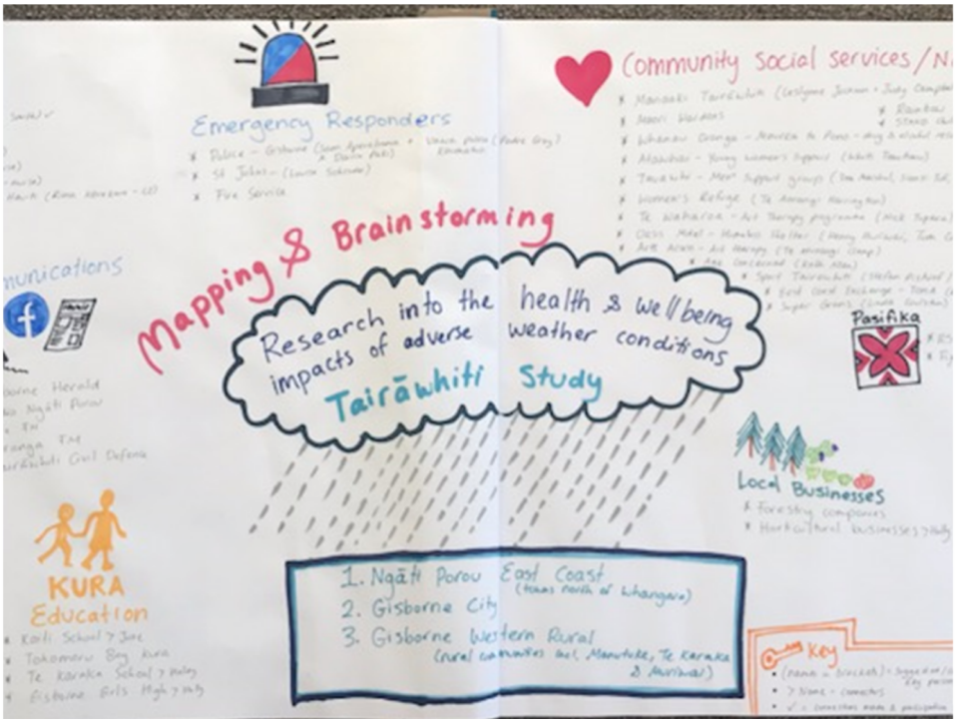


Figure 3.3: Detail of Tairāwhiti Participant Recruitment Map (H Thorpe)

following up with participant connections and recommendations.

Focus group sampling

Community organisations had freedom to conduct either interviews or focus groups, based on their knowledge of the study population.

Focus groups were drawn from:

- Health Providers ('Group 1') and
- People Representing Communities and Community Organisations ('Group 2')

Interviewee sampling

Interviewees were drawn from:

- Cyclone / Disaster Responders ('Group 3'),
- People Representing Communities and Community Organisations not included in Group 2 ('Group 4'), and
- People Moderately or Severely Impacted by Cyclone Gabrielle and Other Recent Weather Events ('Group 5').

Permission to recruit workplace focus groups was gained by informed consent of managerial staff.

Manager informed consent for workplaces

We generated region-specific Participant Information Sheets (PISs) and Consent Forms (CFs) for interviews and focus groups. Potential participants were contacted by researchers via email, telephone, or personal approach in the community. In addition to consenting paperwork, potential participants were given a one-page resource that outlined arrangements for study data management, entitled "What happens to my data?" These resources were also specific to each region, and for focus groups and interviews.

Participant Information Sheets and Consent forms

Participants were given at least 24 hours to consider the information sheet, before offering written informed consent. Participants were free to withdraw at any time, without having to give a reason. Participants were offered a koha of up to $100 for their time and expense. The incidental burden to participants was minimised since travel was generally by the researchers. Interview and focus group guides were adapted to meet community needs, based on input from community researchers.

Time to decide, freedom to withdraw, and koha for participants

Data Management

Figure 3.3 outlines study protocols for data management. The focus groups and interviews were preserved in audio recordings on a handheld USB device. Interviewers transferred physical recording media to their Community Lead. The Community Lead uploaded the audio file onto University of Auckland cloud storage. Recordings were professionally transcribed into written form.

Recording, transcription, and storage of audio data

Interview participants were offered at least 14 days in which to check and amend or withdraw their transcript and recording. Due to the infeasibility of identifying individual contributions, we could not offer this check to Focus Group participants.

Interview participants could review transcripts

Following acceptance of transcripts, University personnel trans-

Transfer to secure storage

ferred data from cloud storage to the University of Auckland secure drive.

Post-study data stewardship

The total data in post-study stewardship includes both qualitative and quantitative sets, accompanying documentation, annotations, and other secondary information. Primary source data will be held on a secure University of Auckland server for up to 10 years, through to 31/03/2033. We are required to "ensure that the originating indigenous community and/or individual(s) have the primary interest as guardians over Indigenous Knowledge [acquired as part of the project]." This applies to the entire qualitative data set and the quantitative data from Māori.

Te Weu controls long term access to qualitative data

In the long-term arrangement, Te Weu and Sustainable Hawkes Bay control access to the qualitative data set and relevant additional information. Te Weu and Sustainable Hawkes Bay researchers will have leadership involvement in any further analyses of qualitative data beyond 31/03/2024.

Analysis

Phenomonomographic analysis

In keeping with decolonisation of methodology, qualitative analyses were developed in co-production between university and community.[106] All data were entered into NVivo V.25 for coding and analysis.

Preliminary analyses during data collection

Preliminary analyses were made as data are acquired, to guide the community research team towards completion of data collection.[139,140]

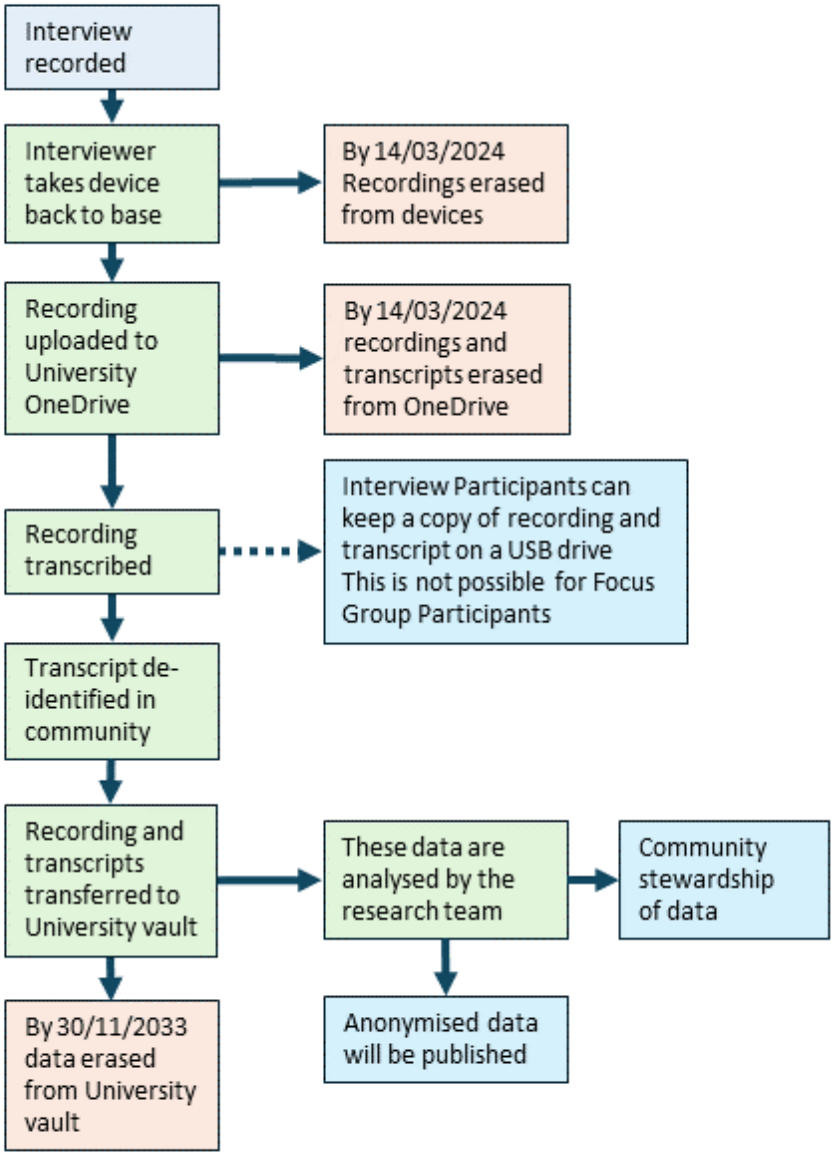
Development of both deductive and inductive codes

Upon completion of data collection, the qualitative research team held a full day hui to reflect on transcript content and nominate thematic codes. We were able to capture both insider and outsider perspectives, as well as input from both study regions. Alongside inductive code development, we used the research objectives and contracted outputs as overarching deductive codes.

First coding phase: development of themes

In this first coding phase, we used large sheets of coloured card-

Figure 3.4: Data management protocols



board and marker pens to document and organise groupings of themes and codes. The local research team further refined the code during an analysis hui, and then during the first two days of coding as new subthemes were identified.

Second coding phase: analysis

In the second coding phase, the community researchers within each region (those involved as interviewers and focus group facilitators) analysed the transcripts from their community.

Analysis by community teams

In Tairāwhiti transcript analysis training hui occurred on 10/01/2024, followed by twice weekly drop-in sessions. Community researchers further refined codes and developed a plan for work with with multiple coders. To the extent possible, each researcher coded the transcripts they facilitated. This way each researcher held responsibility for their interviews / focus groups through the full process, from collecting the data, to checking and anonymising transcripts to coding and analysis.

Continuous updating of analytic framework

During this process of transcript review, the analytic framework was continually updated by addition and removal of codes. This was important to respect both the voices of participants, and interpretations made by the community team.

The care taken in community coding

It was important the analysis was done by community researchers, in their communities of study. In Te Tairāwhiti the local team used pen and paper to code more than 1500 pages of transcripts, with cross-checking from at least one other team member. Although a slow and careful process, it was important that every transcript was treated with respect and care, and every participant's story was given full and dedicated attention.

Application of give-way rule

Community researchers and partners provided guidance in domains including Tikanga Māori, Mana Tangata Whaikaha, Pacific cultures, and Mana Takatāpui. Where there was disagreement over interpretation of data, the 'give-way' rule would be applied.[141] "Give Way" was first introduced by Airini and colleagues as a rule

Figure 3.5: The local team in a coding hui (H Thorpe)

> ... applied during the analysis of transcripts in particular when the project team discussed the categorisation of critical incidents from Māori or Pasifika participants. We anticipated there would be times when we would not reach consensus. Where this happened we would note the range of views in the discussion, and then "give way" to the researchers who held the Māori or Pasifika expertise, depending on the ethnicity of the participant.

Such "giving way" corresponds to a Māori concept of Mana Whakamārama (explanatory power) for participant experience as residing within the participants' communities.[142]

Third coding phase: review of selected quotes

In the third coding phase, the research team uploaded quotes into Google Docs folders. This gave another opportunity to engage with the words and sentiments of each participant. There followed a further stage of thematic analysis.

Generation of community reports and community roadshow

Figure 3.6: Dissemination Hui in Gisborne, 14 February 2024 (H Thorpe)

Following completion of coding, Te Tairāwhiti and Hawkes Bay synthesised their data into report form. The regional reports were then synthesised into an overarching set of findings. The team from Te Weu disseminated their results to Tairāwhiti communities during a travelling roadshow and symposium held in February 2024, coincident with the 1-year anniversary of Cyclone Gabrielle. By this point we could see a significant gain in community research capacity.

4. Kitenga | Findings

4.1 Quantitative Findings

Overview of Quantitative Analysis

Big data

The total uncompressed volume of data obtained from Health New Zealand | Te Whatu Ora was 19.6 GB. The dataset readily met the 'Volume' and 'Variety' definitions of 'Big Data'. The computational load of data preparation and analysis was significant. For example, selection of an optimal multivariate regression model in R required three days of processing time.

Health Contact Population

Comparison of populations: Quarterly HCP, Census

The Census population for Te Tairāwhiti and Hawkes Bay on the 6 March 2018 summed to 213,885 (see Figure 4.1, orange dot). The Health Contact Population (HCP) for the first quarter of 2018 at 204,698 fell short of this figure by 4 percent. We can infer that 96 percent of the census population of Te Tairāwhiti and Hawkes Bay had contact with the health system in Quarter 1 of the year 2018. Due to accumulation of the HCP over time (see Figure 4.10), this ratio would show an upwards tendency in following years.

1.3% annual growth in HCP

The quarterly HCP increased from 204,698 at the time of the 2018 Census, to 217,841 at the time of the Cyclone (blue line), for an average annual growth of 1.3 percent in a log-linear model (purple line). Figure 4.1 also shows our projection from the Census population (dotted orange line), in the event it were to grow at the same rate as the HCP. The projection for Te Tairāwhiti and Hawkes Bay on day 1 of the Cyclone was 227,239 (black dot). Note the y-axis on Figure 4.1 does not include zero.

Stats NZ predictions

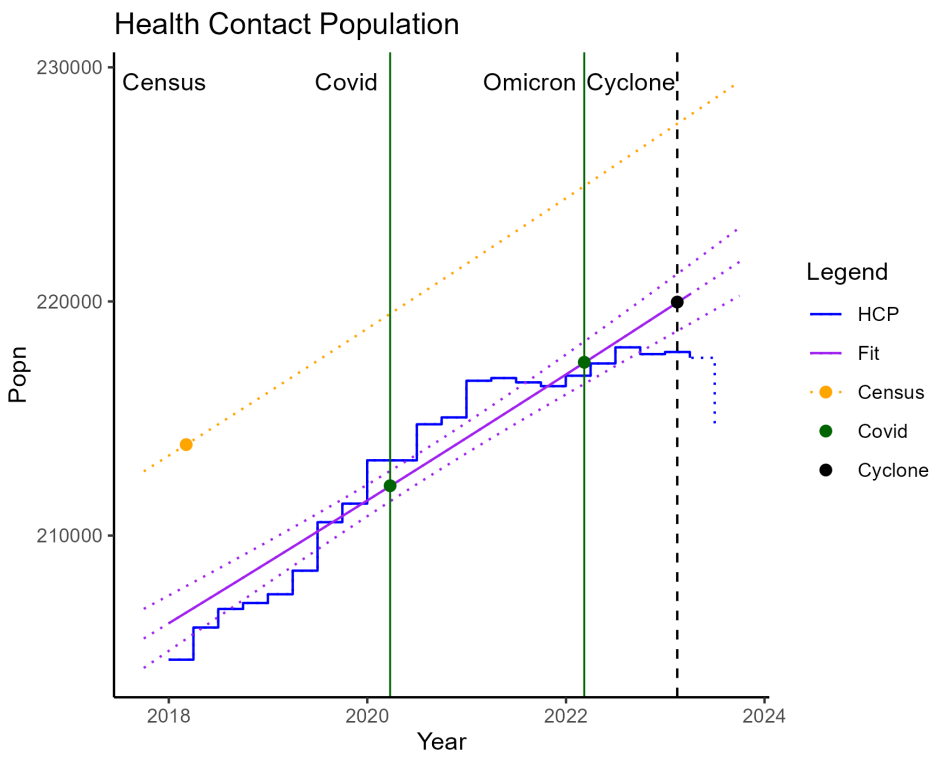


Figure 4.1: Health Contact Population 2017–2023 (y-axis truncated)

Stats NZ has published its own predictions for population of the Gisborne, Wairoa, Hastings, and Central Hawke's Bay districts, and Napier city. Stats NZ estimates total populations of 221,770 on 30/06/2018, and 233,590 on 30/06/2023. We have not further explored the relationships between our HCP counts, Census night counts, and Stats NZ predictions.

HCP increase during COVID-19

We note a relative increase in HCP across the years 2020 and 2022, manifest in Figure 4.1 as an upwards bulge in the HCP curve. A possible contributor to this could be an increase in health system contact events, for example via COVID-19 immunisations, or health care support following infection. We have not explored these possibilities further. The undulating trajectory of the HCP lends support to the idea of non-linear population change across the interval of study.

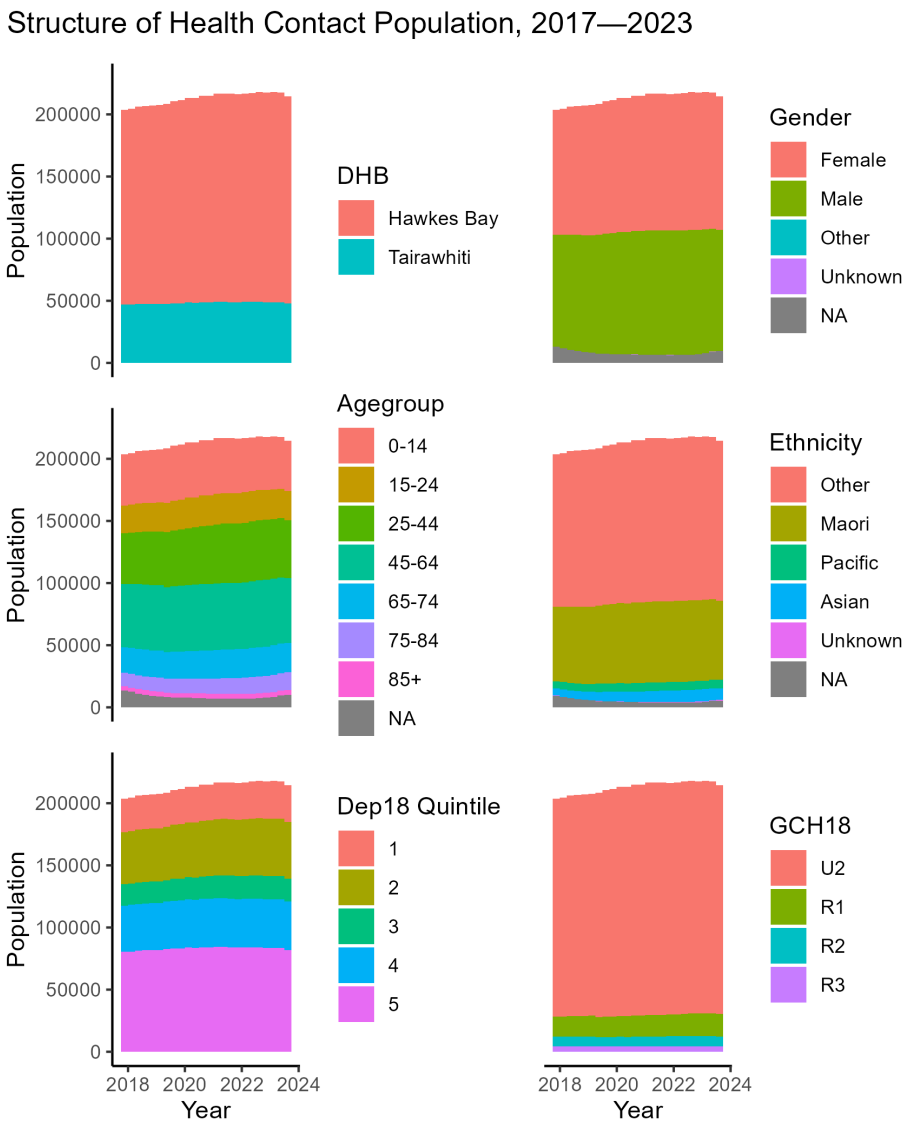


Figure 4.2: Structure of Health Contact Population 2017–2023

Population Structure

DHB of domicile, gender

Figure 4.2 shows socio-demographic characteristics of the HCP population across 24 successive quarters from Q4 2017 to Q3 2023. This includes DHB of domicile, gender, age, ethnicity, NZDep2018 quintiles, and GCH2018. In 2023, 77.5 percent of the HCP was domiciled in the Hawkes Bay DHB region, and 22.5 percent in Te Tairāwhiti. 52.4 percent of the Tairāwhiti and Hawkes Bay HCP was recorded as male, and 47.5 percent as female. Notably, average annual growth in the Tairāwhiti HCP was relatively low, at 0.78 percent, compared to 1.4 percent for Hawkes Bay.

Missing data coded as NA

Data on age, gender, and ethnicity were not available for all HCP entries. This reflects incomplete recording in the source datasets. Where data were missing, we coded them as 'NA'.

Age and ethnicity

In Figure 4.2 20.2 percent were aged 0–14 years. There were just over 10 percent for each decade through to age 74, then 6.7 percent aged 75–84, and 2.2 percent were aged 85 or more. The largest ethnic group was European at 58.8 percent, with 31.2 percent Māori, 3.3 percent Pacific, 4.6 percent Asian, and 2.0 percent Other.

Deprivation and rurality

Compared with the 2018 Census national reference, the Tairāwhiti and Hawkes Bay population was weighted towards lower socioeconomic area-level deprivation quintiles. Deprivation prevalences were quintile 1 at 13.8 percent, quintile 2 at 21.1 percent, quintile 3 at 8.5 percent, quintile 4 at 18.1 percent, and quintile 5 at 38.4 percent. By definition the New Zealand-wide prevalence of a quintile is 20 percent. The bulk of Tairāwhiti and Hawkes Bay populations (85.8 percent) remains regional-urban U2, and is concentrated in the Hastings / Napier area. Tairāwhiti has a higher proportion of R2/3-coded domiciles, at 7.5 percent versus 5.4 percent for Hawkes Bay.

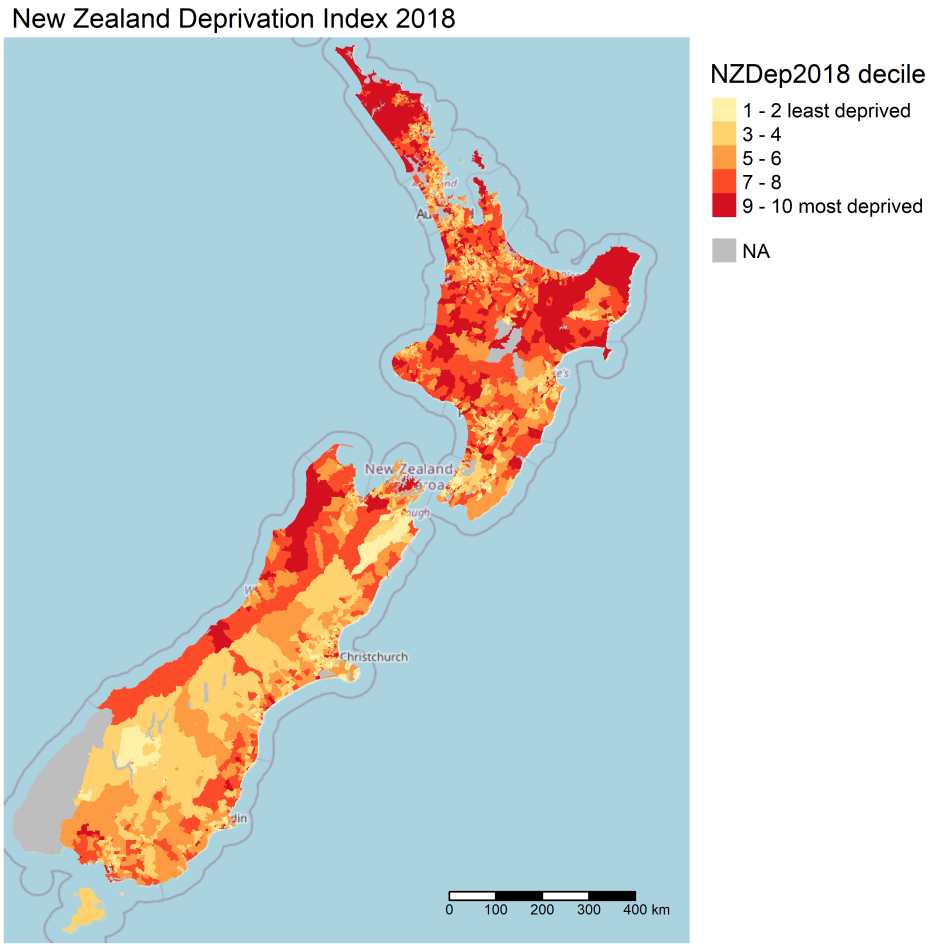


Figure 4.3: New Zealand deprivation in 2018

Geospatial data

Comparison with Census 2018 population

Figure 4.3 is a New Zealand-wide map for 2018. It shows that a higher proportion of the Tairāwhiti population lives in areas of high socioeconomic deprivation. By contrast in Central Hawkes Bay, more people live in areas of lower deprivation.

Proximity to GPs

Table 4.1 shows that over three quarters of the population in the study area normally have less than 5 minutes travel time to their nearest GP. About 6000 people (2.7 percent) live at least 30 minutes from a GP, with just over 200 people (0.1 percent) needing to travel for more than 90 minutes.

Times

Table 4.1: Travel times to GP

Time (min)	SA1	SA1%	HCP	HCP%
$\leq$5	1013	76.7	166038	77.6
5–10	149	11.3	24849	11.6
10–30	107	8.1	17091	7.9
30–60	41	3.1	5097	2.3
60–90	8	0.6	663	0.3
$\geq$ 90	2	0.2	216	0.1

SA1: number of SA1 areas, HCP: total Health Contact Population within area

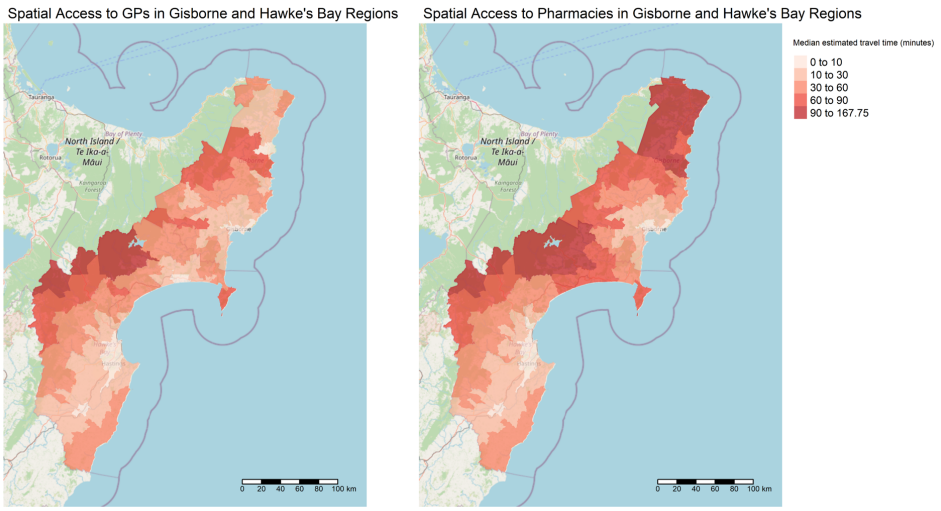


Figure 4.4: Travel Times to GP and Pharmacy

Geography of access

Figure 4.4 shows geographic variation in access to services across the study area given the status of the road network as it was prior to 14/02/2023. The darker the red shading, the more time taken to travel to each service. As one might expect, areas that are more rural have worse access into health services.

Implications for roading disruption

Given the damage to the roading infrastructure during the adverse weather events, we sought to obtain information about the roads that were closed due to inundation. We were unsuccessful in obtaining a network file that encapsulated these impacts. Due to the sparsity of al-

ternative roading, there remains a strong inference of increases in travel time beyone one hour for the many people affected by road damage. We think this offers helpful context for what people told us about transport and travel in the qualitative phase of our research.

Statistical Areas

Frustratingly, available domiciliary data from the National Collections was restricted to Statistical Area 2 (SA2), a lower level of resolution than SA1. Accordingly, we were not able to further integrate these mapping analyses into our report.

Primary analysis

Forest plots of event rate ratios

Our primary analysis hypothesised the Cyclone had a detectable effect on the event rate for ASH across all age groups. The optimal model included two-way interaction terms for age group, DHB of domicile, NZDep18 quintile, GCH18, ethnicity, gender, quarter, year, and time segment. We present results as event rate ratios, in forest plot format. As shown in Figure 3.1, numerator data for ratios labelled 'Covid' are drawn from the 01/01/2020 to 30/06/2020 quarter. Numerator data for ratios labelled 'Weather' are drawn from the 01/01/2023 to 30/06/2023 quarter. Denominator data are drawn from the whole series 01/01/2018 to 30/09/2023, minus Covid and Weather quarters.

Figure 4.5 shows the primary finding of a significant reduction in ASH events during the 6 months of 2020 that included the COVID-19 Level 4 Alert, but not during the 6 months of 2023 that included the Adverse Weather.

Figure 4.6 shows the effects of COVID-19 on ASH differed by age. Possible reasons for children could include increased respiratory hospitalisations. Possible reasons for older ages could include isolation policies that were more stringent for the elderly, leading to reduction in hospital attendances, including ASH admissions.

Figure 4.7 shows increasing ASH admissions across the U2 / R1 / R2

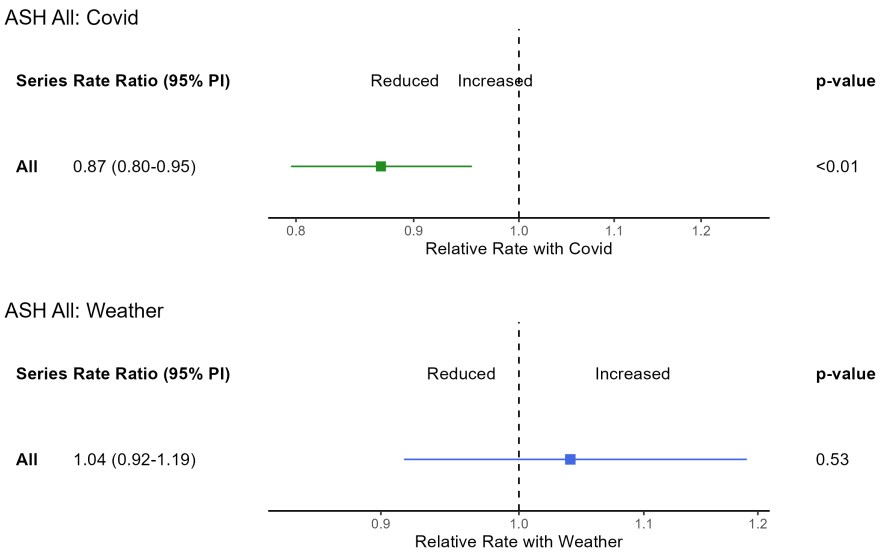


Figure 4.5: Primary Analysis: COVID-19 suppressed ASH events

demographic sequence, but reduced ASH admissions in the R3 demographic. Although the R3 observation may be attributed to the chance, it might plausibly also relate to disrupted hospital access with loss of road transport. Conversely, the U2 / R1 / R2 sequence may reflect increasingly stressful experiences of rural communities, prompting an increase in hospitalisations. Although the R2 datapoint reaches statistical significance, interpretations must still be made with caution on account of multiple statistical comparisons to increase the likelihood of Type 1 (false positive) error.

Figure 4.8 shows no association between ASH admissions and depivation quintile across the weather event. ASH was suppressed across COVID-19 for some quintiles, but with no pattern. Although statistical significance was achieved for Quintile 2, the result remains uncertain as this accounted for only 8.5 percent of the population.

We did not see trends in the interaction with Adverse Weather for DHB of domicile, NZDep18 or gender. Interestingly, an increased ASH rate did reach significance for Asian prioritised ethnicity. We have not been able to make an interpretation for this finding, that merits further exploration. One possibility includes higher quality data acquisition for

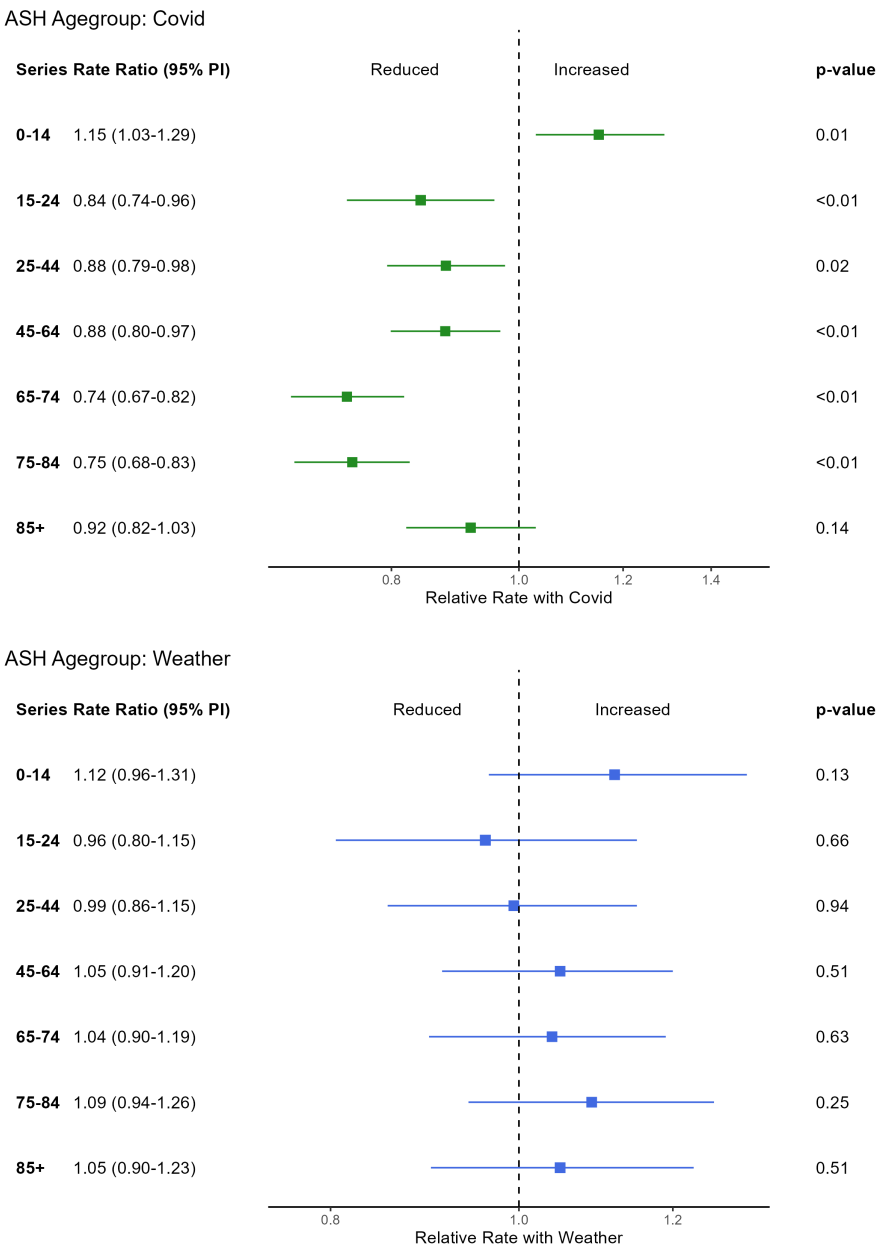


Figure 4.6: COVID-19 effects differed by age

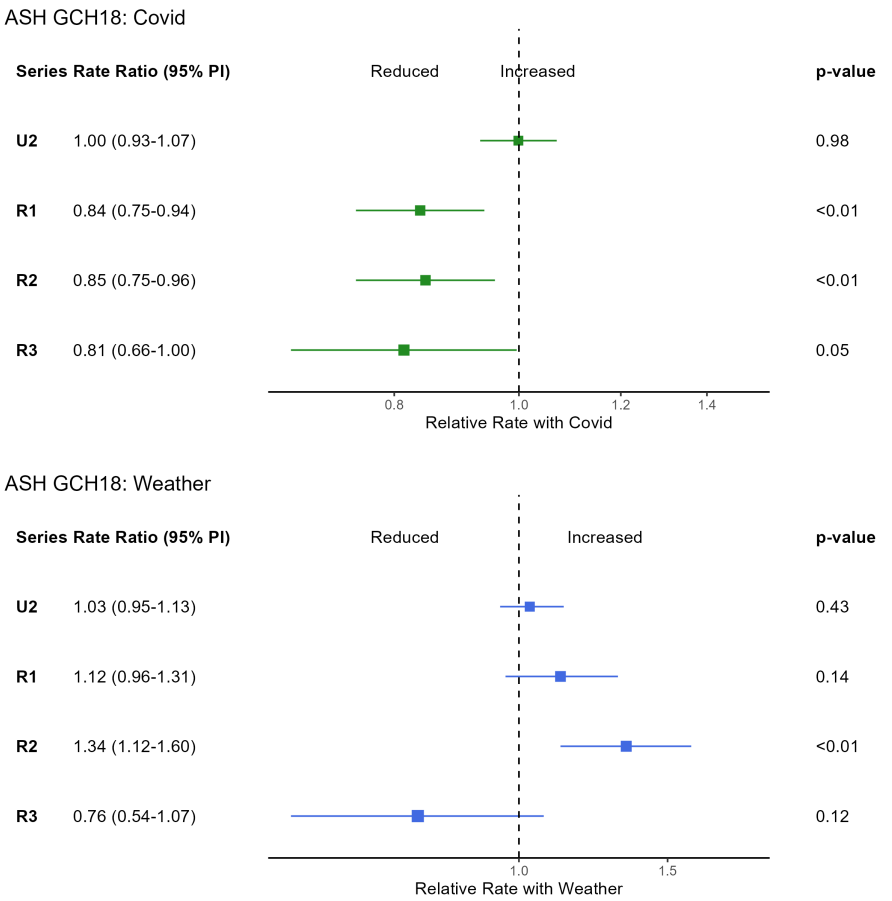


Figure 4.7: Effects by rurality

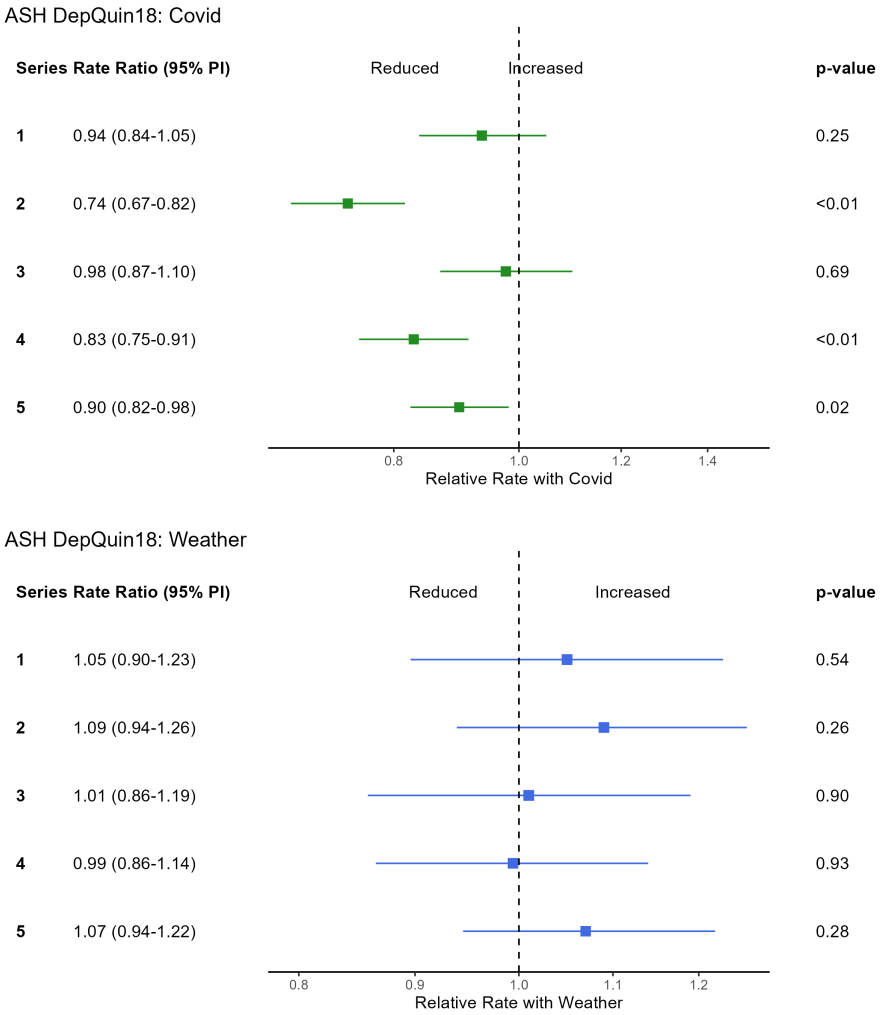


Figure 4.8: Effects by deprivation

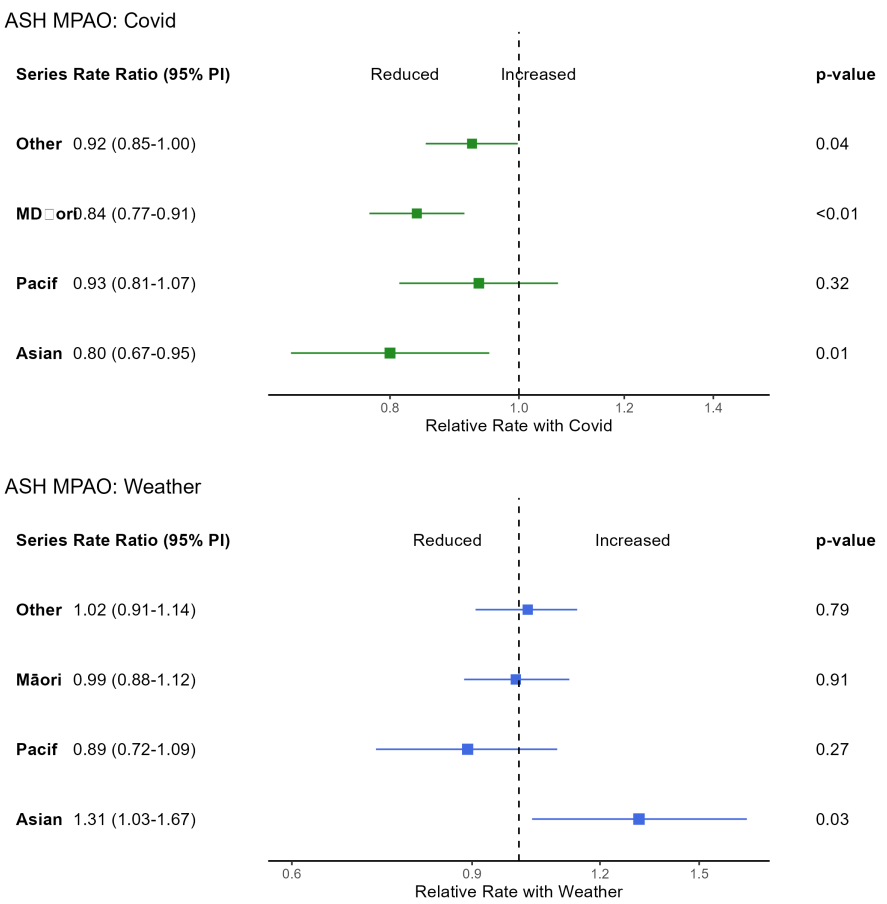


Figure 4.9: Effects by ethnicity

this demographic.

Comment on reliability of Primary Analysis

Relatively insensitive composite endpoint

ASH is a composite endpoint that includes over 20 different outcomes, categorised into groups including respiratory, dental, dermatological gastro-intestinal, cardiovascular, and other. It remains possible the composite endpoint is masking differences that could be revealed in a disaggregated analysis. We know of specific exposures that increased during and after the adverse weather, for example physical contamination of soil and water. These could plausibly lead to higher rates of dermatological or gastro-intestinal events, that might be masked by a

reduction in patients presenting with other ASH-specific outcomes.

Constraint of time segmentation

Time segmentation may also have obscured results in our primary analysis. We included all events from the first half of 2023 within the Adverse Weather time segment, even though the Cyclone did not make landfall until day 45 of the year. On the other hand, the decision about segmentation might be said to reduce analytic bias, by avoidance of 'cherry-picking' of intervals. It also reflected computational constraints in view of the large model. This opens a case for secondary analyses that may achieve greater temporal precision and thereby increased sensitivity to possible effects of the weather.

Secondary analyses

Populations and scope

Due to analytical considerations, and small numbers, secondary analyses in this study must be viewed as hypothesis-generating. Also for reasons of feasibility, we had to defer a subset of these analyses, namely under 25s access to specialist mental health services, the acute hospital bed day rate, specific pharmaceuticals dispensing, and polypharmacy.

Identification of denominator populations

Table 4.2 shows denominator populations as they were in the first quarter of 2023. Figure 4.10 tracks these across the six years of the series. It is logarithmic on the y-axis. All populations grow across the series, with the exception of Mental Heath clients aged under 25 years, and First 1000 Days. Growth in the mid-range band of populations (Long Term Conditions, Cancer and Functional Loss) largely represents accrual of cases into the database across the study period, rather than an actual increase in numbers. The 6 years have still been short in relation to survival time with these diagnoses.

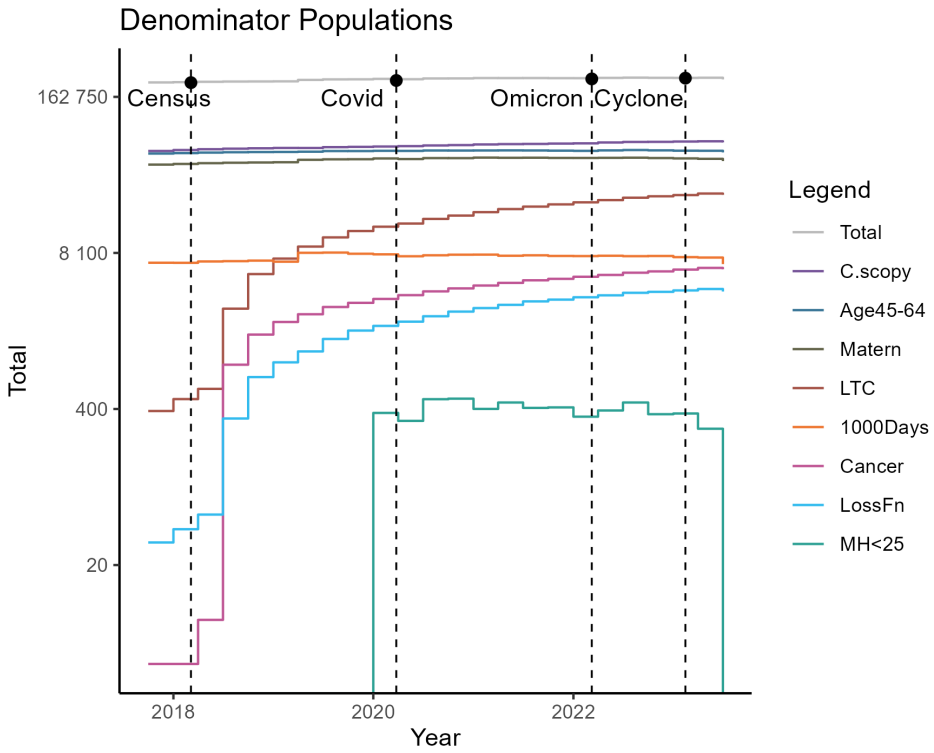


Figure 4.10: Denominator populations for indicators (NB log y-axis)

Group	Q1 2023
Total in Health Contact Population	217841
Eligible for bowel screening	63253
Population aged 45–64	53542
Women aged 15–50, HIV negative	46616
Cardiovascular Long term Conditions	22597
Children aged 0–1000 Days	6599
Diagnosis of cancer	5347
Diagnosis of Loss of Function	3579
New Mental Health Clients aged < 25	322

Table 4.2: Denominators for secondary analyses

Note on interpretation of charts

Indicators of health system performance

We present data reporting health system performance in Te Tairāwhiti and Hawkes Bay across the six years from 2018 to 2023. Included in this are figures, starting at Figure 4.11, that track performance against indicators using data from the National Collections. For our technical specifications of these indicators, refer back to text in Section 3.2, expecially Tables 3.4–3.7. Section 3.2 gave more detail on some of the challenges of working with National Collections to construct these indicators.

Understanding weekly performance counts

The stepped red line in each figure is the weekly count of performance of the indicator. In the case of Figure 4.11, as stated in Table 3.4, each step is the number of people who completed the third test in an ante-natal blood screening panel. The purple line is the univariate Poisson regression on the event rate, for the three months from 14/02/2023 to 13/05/2023. The dashed lines are the 95 percent Prediction Interval on the regression.

Selection of model reflects analytic purpose

Most of the figures for count data show a step in the Poisson regression at the date of the Cyclone. Some of this step is an artefact of the univariate model, insofar as segregation at the date of 14/02/2023 is a classical 'cherry-picking' of time window. Examination of the data in the stepped red line often suggests a change in slope starting months in advance of the weather. This puts a caveat on use of univariate regressions to support causal inference. With this caveat, we justify our analytic decision in terms of understanding the *differential* change in system performance with the extreme weather event, across population subgoups.

Secondary analyses explore differential impact of weather

To develop our understanding of the differential impact of the weather, we also show forest plots such as Figure 4.12. These report change in rate of health system events, before and after the Cyclone. They compare overall system performance, with that in populations defined by deprivation, rurality, gender, ethnicity, and functional status. This series of figures follows on from subgroup reporting in the Primary

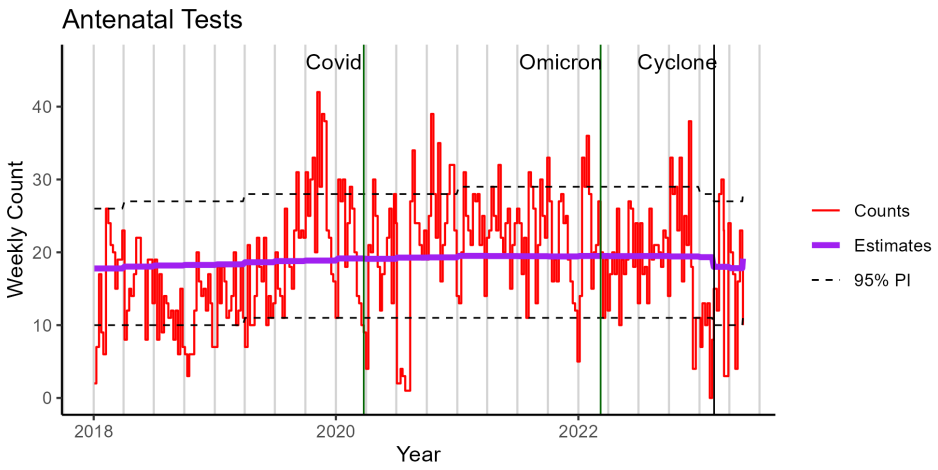


Figure 4.11: Antenatal Blood Screening: counts

	All	HB	TT	Mao	Pac	Dep5	R2.3
Rate	2	2.5	0.41	2.1	3.5	2.8	0.33
Count	233	222	11	88	15	137	2
Denom	46392	35743	10649	16421	1694	19451	2457

HH: Hawkes Bay, TT: Tairawhiti, Mao: Maori, Pac: Pacific, Dep5: 2018 Deprivation Quintile 5, R2.3: 2018 GCH R2/R3

Table 4.3: Antenatal Screening after the Weather

analysis.

Tabulated numbers for the Cyclone quarter and baseline comparator

Finally, we also show numbers in tabular form, as in Table 4.3. The main role of these tables is to report the size of analytical subgroups across the Cyclone quarter 14/02/2023 to 13/05/2023. The subgroups include HH: Hawkes Bay, TT: Tairawhiti, Mao: Māori, Pac: Pacific, Dep5: 2018 Deprivation Quintile 5, R2.3: 2018 GCH R2/R3, and LOF: the function-impaired cohort. The column 'All' reports values for the total population during the Cyclone quarter. The row 'Rate' reports annualised percentage rates of performance of the indicator. These rates are estimated as 4 times the ratio of the rows 'Count' and 'Denom'. The row 'Count' shows the total count of events during the Cyclone quarter. The row 'Denom' shows data for denominators during the Cyclone quarter.

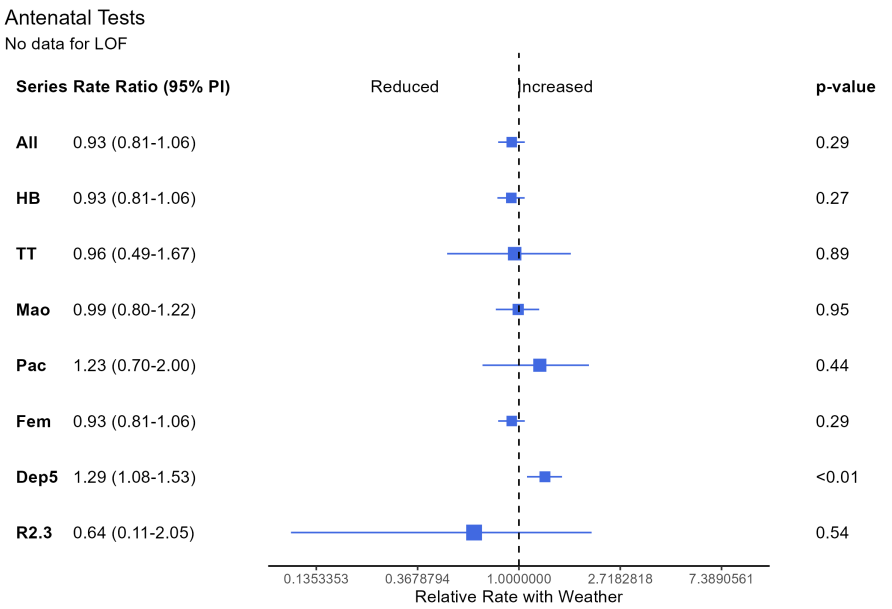


Figure 4.12: Antenatal Blood Screening: forest

Maternity: Antenatal Screening

Count of tests a week

Figure 4.11 shows the weekly count of people completing the third blood test in a set of five that are relevant to antenatal screening. The tests are Blood Group including Rhesus, Rubella immune status, Syphilis, Hepatitis B, and HIV. The population is restricted to women aged from 15 to 50 years, and excludes those receiving tenofovir (a marker for treatment for HIV, a confounding indication for these tests). Each test had to be done within a 1 week window of the other.

Apparent shortfall in testing in Tairāwhiti

Table 4.3 reports counts of tests by subgroup. The baseline was a mean of 245 of these panels completed quarterly, for a rate of 2.1 percent of the Denominator population per year. In the quarter starting 14/02/2023, the total rate and count stayed about the same, at 2 percent and 233. However we saw a decline in Te Tairāwhiti (TT), where only 11 panels were completed, for an annual rate of 0.41 percent. Likewise we discovered only 11 panels amongst the GCH18 R2 and R3 cohort, to imply an annual rate of 0.41 percent. Figure 4.12 reveals the challenge of assigning statistical significance to these findings. Even so,

they recommend themselves as topics for a closer look in quality assurance. Our starting hypothesis is that the data are true, and there is a difference in the rate of ante-natal testing at Health District level.

Maternity: Tenofovir prescribing

Small number on tenofovir

For comparison, in Figure 4.13 we found an average count of 39 women aged from 15 to 50 who were dispensed tenofovir in each quarter, of whom only 1.8 had the test panel in each quarter. The small number is unlikely to have been a confounder. The year 2021 is of interest as it shows a doubling in count of tenofovir prescriptions. We are grateful to Reviewers from Te Whatu Ora who pointed out that during the COVID-19 lockdown, "Pharmac changed the dispensing rules so that a person could only get 1 month's supply at a time (instead of 3 months)." This explanation could be further explored by studying dispensing at a per-patient level.

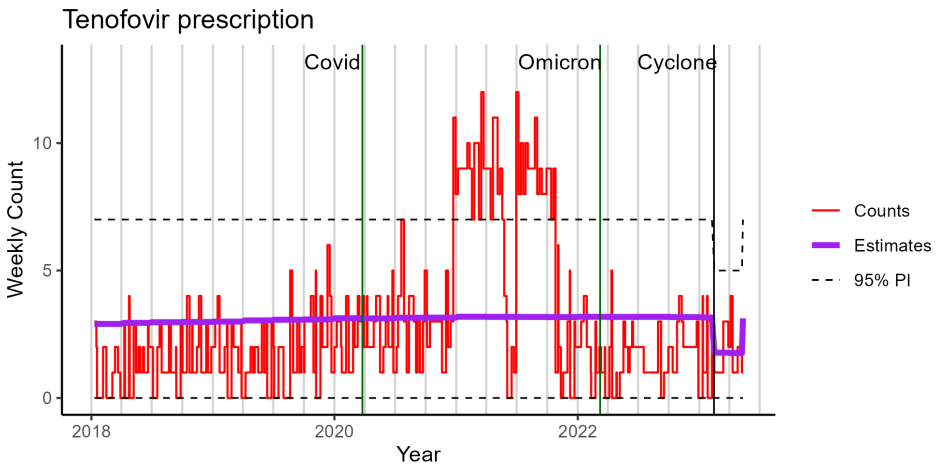


Figure 4.13: Tenofovir prescription counts

Maternity: Obstetrics procedures

Infeasibility of evaluating on obstetric events

As noted above, the early termination of our dataset meant we could not evaluate performance of antenatal lab testing at the time of the Cyclone, in relation to the subsequent obstetric events. We found that obstetric events followed performance of blood screening tests by a median of 204 days. The count of obstetric admissions (Figure 4.14) remains of interest, as it was our best indicator of surgical activity. Although the forest plot at figure 4.15 must be interpreted with caution, it does suggest a greater decline in obstetric admission for the GCH18 R2 and R3 populations after the Cyclone. This could accord with disruptions to road transport, noting the long drive times from rural domiciles seen in Table 4.1. The main caution is small numbers. As Table 4.4 shows, there were just 48 event counts on which to base this inference.

Delay in recording of Birthing Unit data

We are grateful to Te Whatu Ora Reviewers for offering the further possible explanation that \begin{quote} “drops in obstetric events in 2023 might be due to the birthing units. Their data isn’t reported by the DHB (or TWO now), and come to us uncoded. As such, they take much longer to get into the database (i.e. 2023 is not yet complete for maternity events). Depending on when the data was supplied, there may be some events missing.” \begin{quote} As noted by the Reviewers,

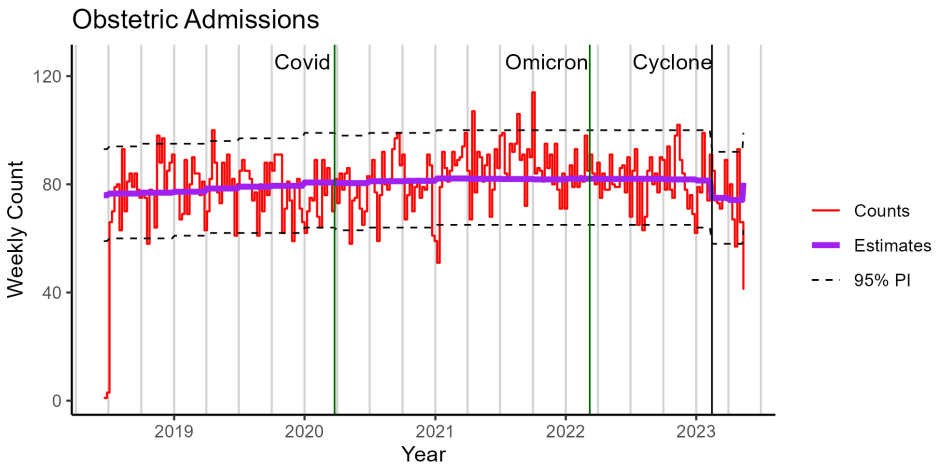


Figure 4.14: Obstetric admissions: counts

	All	HB	TT	Mao	Pac	Dep5	R2.3
Rate	8.4	8.4	8.2	10	13	10	7.8
Count	970	751	219	422	56	508	48
Denom	46392	35743	10649	16421	1694	19451	2457

HH: Hawkes Bay, TT: Tairawhiti, Mao: Maori, Pac: Pacific, Dep5: 2018 Deprivation Quintile 5, R2.3: 2018 GCH R2/R3

Table 4.4: Obsteric Procedures after the Weather

this explanation could be evaluated by a check of event counts by facility.

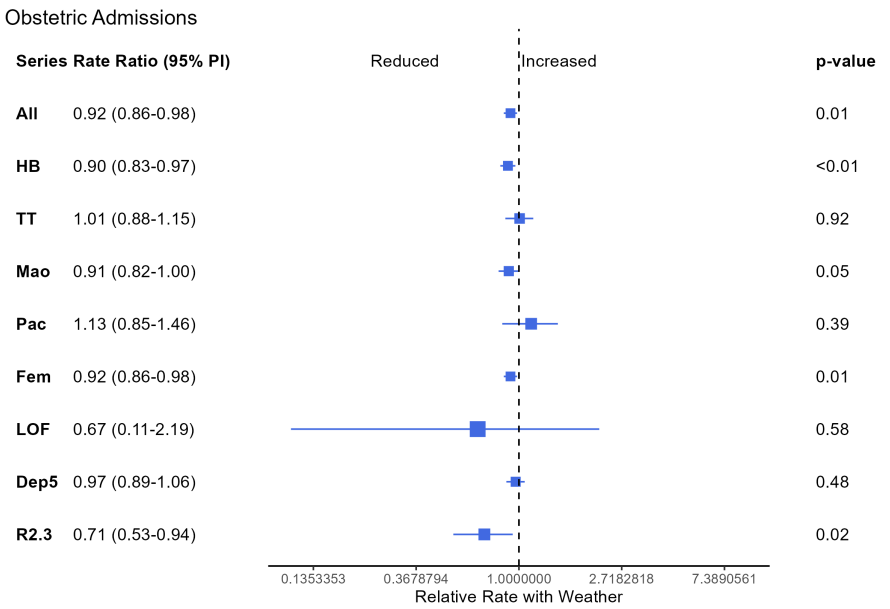


Figure 4.15: Obstetric admissions: forest

Maternity: Obstetrics procedures in screened subset

Experience for those receiving quality care

Figure 4.16 suggests an increase in obstetric admissions after the Cyclone, for those who also had antenatal blood screening. We could hypothesise this is a population receiving a closer level of care, who might be more likely to be admitted. None of the subgroups reach significance in the forest plot Figure 4.17. Table 4.5 shows that it all hinges on small counts.

	All	HB	TT	Mao	Pac	Dep5	R2.3
Rate	1.6	2.1	0	1.5	3.5	1.7	0
Count	189	189	0	60	15	83	0
Denom	46392	35743	10649	16421	1693	19451	2457

HH: Hawkes Bay, TT: Tairawhiti, Mao: Maori, Pac: Pacific, Dep5: 2018 Deprivation Quintile 5, R2.3: 2018 GCH R2/R3

Table 4.5: Obstetrics Procedures in screened population

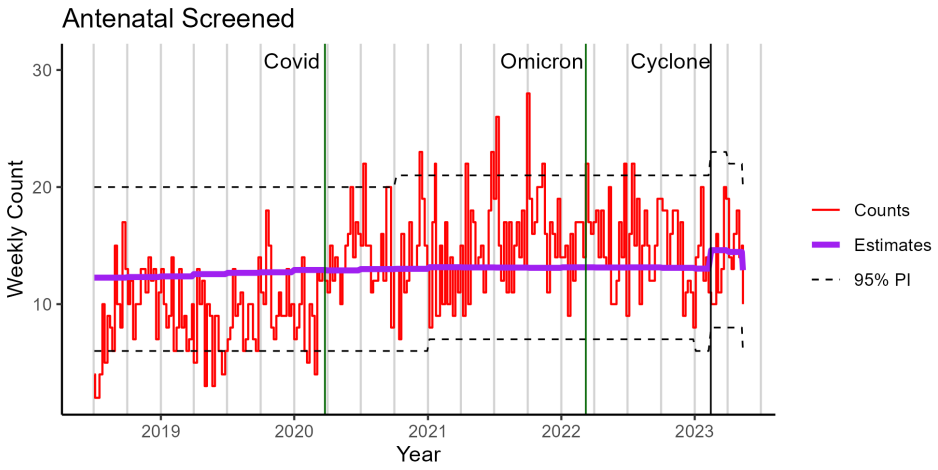


Figure 4.16: Obstetric screened admissions: counts

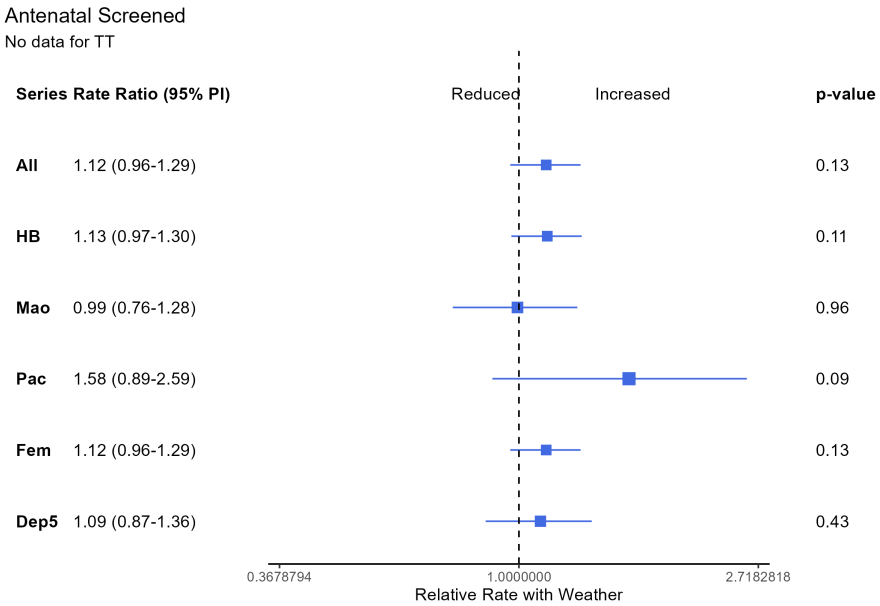


Figure 4.17: Obstetric screened admissions: forest

Two year immunisation milestone

Figure 4.18 shows the time course of children achieving the 24 month immunisation milestone. These were marked positive in the LAST_DOSE_COMPLETE_FLAG in the National Immunisation Register, and were aged two years plus 0–3 months. At the start of Quarter 2 in 2019 there is a step up in population denominator. This is likely an artefact of the adoption of the new National Enrolment System at that time.

Table 4.6 shows the 24 month immunisation milestone was achieved for a total of 542 out of 709 total children in the series, a proportion of 76 percent. In the post-Cyclone quarter this fell to 74 percent. For comparison, the national average in the three-month reporting period ending 31/12/2023 was 81.0 percent. Our results that include the immediate post-Cyclone period are slightly lower than those published by Te Whatu Ora for the period April to June 2023. These showed milestone percentages for Hawkes Bay of 79.1 percent, and Tairāwhiti of 71.7 percent.

Immunisation rates fell after the Cyclone

Figure 4.19 shows a relatively consistent drop in immunisation activity after the Cyclone across all populations. We excluded the subset meeting our Loss of Function diagnoses, due to small numbers in this agegroup (n = 11). There was a trend towards greater fall in immunisation in Te Tairāwhiti and for GCH18 R2 and R3 populations. Reflecting the small numbers, these trends mostly do not reach statistical significance.

	All	HB	TT	Mao	Pac	Dep5	R2.3
Percent	74	75	70	63	80	68	63
Count	541	410	131	209	26	239	30
Denom	741	552	189	335	32	354	47

HH: Hawkes Bay, TT: Tairawhiti, Mao: Maori, Pac: Pacific, Dep5: 2018 Deprivation Quintile 5, R2.3: 2018 GCH R2/R3

Table 4.6: Immunisation complete for children aged 0–1000 days

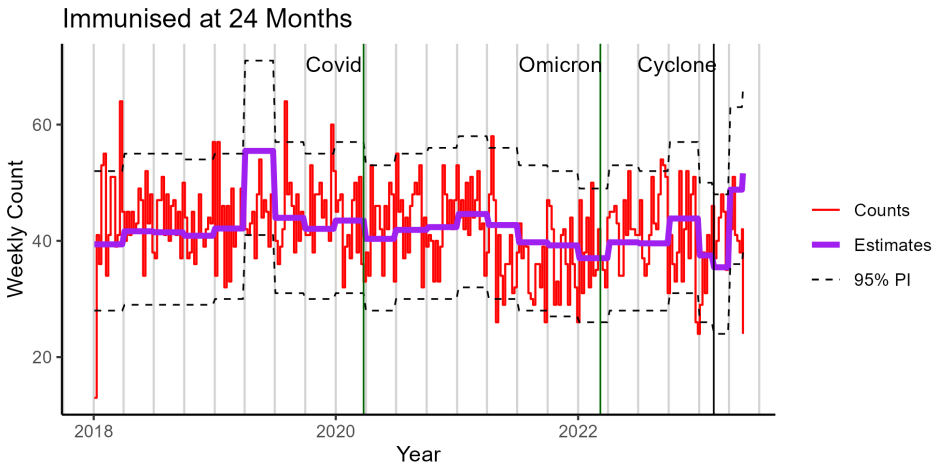


Figure 4.18: Immunisations at two years: counts

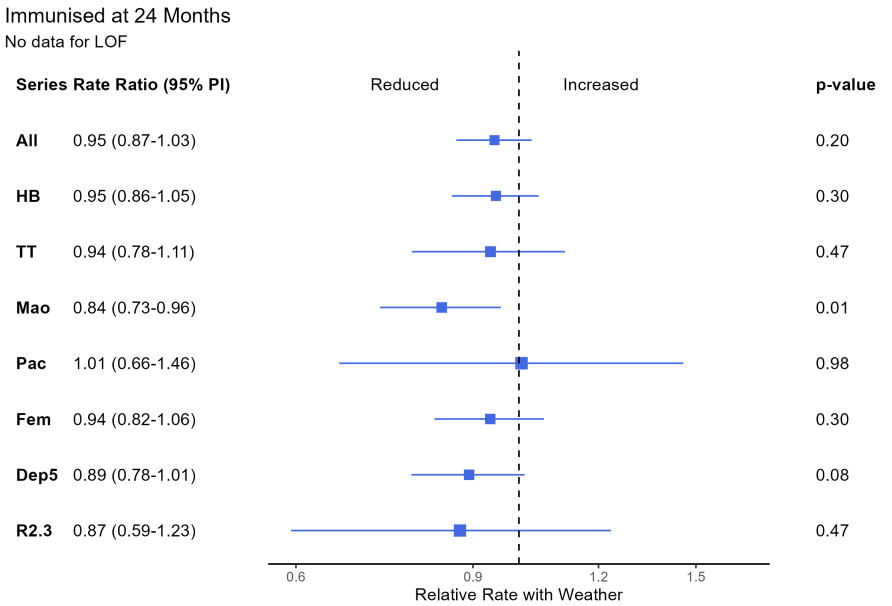


Figure 4.19: Immunisations in the first 1000 days: forest

Child health: ASH ages 0–4

Te Whatu Ora Clinical Performance Metrics report annualised ASH admission rates for children aged under 5 years across April to June 2023 as 5.3 percent for Tairāwhiti and 7.9 percent for Hawkes Bay. Our Table 4.7 shows that we under-estimate these figures as 2.8 and 3.2 percent respectively. We have not been able to find a reason for this issue. So far as we can tell from review of our methods, we adopted the published definition of ASH for this age group, and we did not restrict our analysis to a *per-child* rate of admissions. We propose to investigate further and correct this in a revision.

Figure 4.20 shows there are between 2 to 11 ASH admissions for this age group in each week. The univariate regression suggests an increase in the rate in the immediate post-Cyclone interval. Figure 4.21 shows this increase is consistent across all groups. Pacific children have a higher prevalence in absolute terms, but the small numbers do not reach statistical significance.

	All	HB	TT	Mao	Pac	Dep5	R2.3
Rate	3.1	3.2	2.8	3.7	8.8	3.2	2
Count	99	76	23	52	14	50	4
Denom	12899	9601	3298	5600	639	6213	798

HH: Hawkes Bay, TT: Tairawhiti, Mao: Maori, Pac: Pacific, Dep5: 2018 Deprivation Quintile 5, R2.3: 2018 GCH R2/R3, LOF: Function-impaired cohort

Table 4.7: ASH admissions in children aged 0 to 4 years

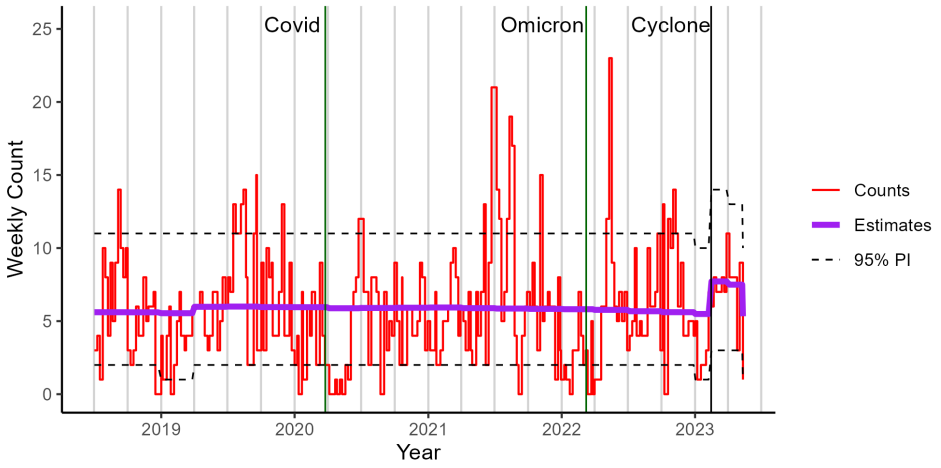


Figure 4.20: ASH admissions, age 0 to 4 years: counts

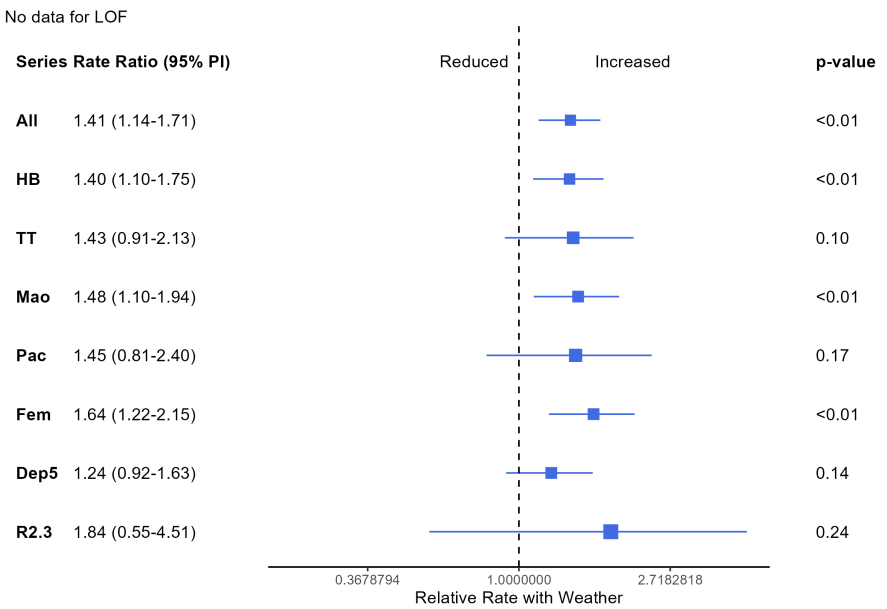


Figure 4.21: ASH admissions, age 0 to 4 years: forest

Cancer: Colonoscopies

Figure 4.22 suggests a fall in colonoscopy activity in the lead up to the Cyclone quarter, with increase starting from around the date of the Cyclone. It is hard to relate this profile to the Cyclone itself. The numbers in Table 4.8 are driven by Hawkes Bay, where an increase achieves significance. In contrast, 4.23 shows a significant decrease in activity in Tairāwhiti, as in rural R2 and R3 domiciles. We have yet to correlate this information with reports from providers.

	All	HB	TT	Mao	Pac	Dep5	R2.3
Rate	2.6	3	1.1	1.7	1.1	1.9	0.84
Count	405	366	39	68	2	100	9
Denom	63292	49251	14041	16026	737	20972	4298

HH: Hawkes Bay, TT: Tairawhiti, Mao: Maori, Pac: Pacific, Dep5: 2018 Deprivation Quintile 5, R2.3: 2018 GCH R2/R3

Table 4.8: Colonoscopy activity

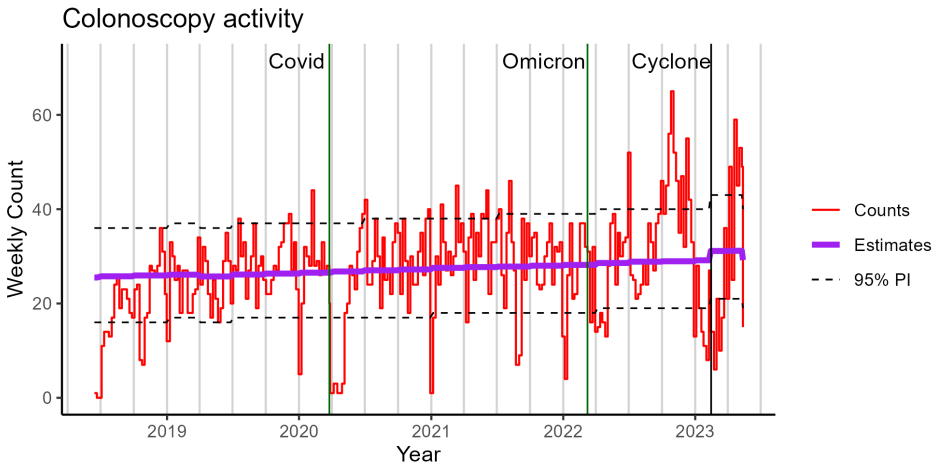


Figure 4.22: Colonoscopy: counts

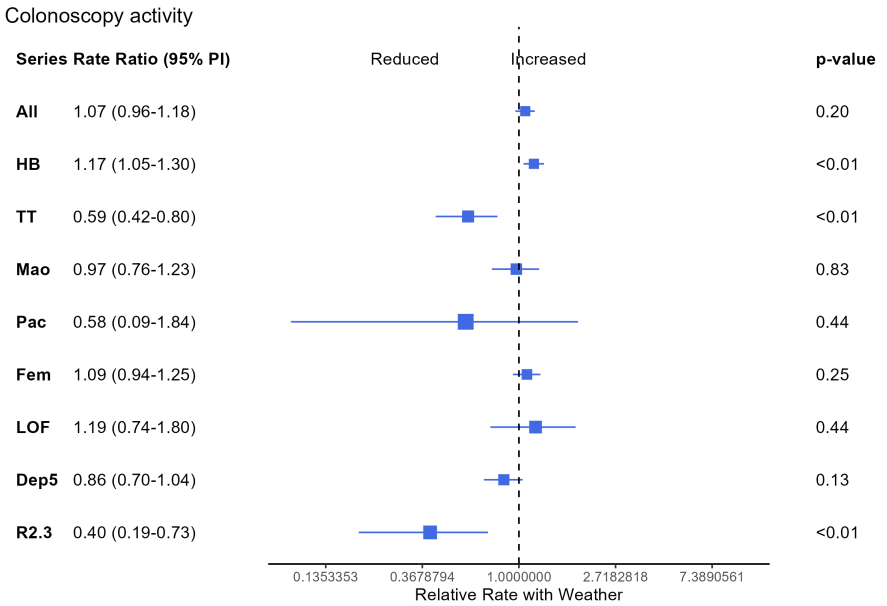


Figure 4.23: Colonoscopy: forest

Cancer: Supportive medications

Figure 4.24 shows a steady rise in cancer population prevalence over time, as new cases are identified from the NMDS series. There is a drop in supportive medicine dispensing across the Cyclone months. Figure 4.25 shows the decline is generalised. Table 4.9 shows a markedly lower level of dispensings in Tairāwhiti. It is important to note that Counts are per dispensing. Individual patients may have multiple dispensings. Therefore rates per person could in principle exceed 100 percent.

Possible artefact of record-keeping

It is possible the apparent fall in dispensing is an artefact of reduced data entry into the PHARMS collection. In our qualitative study (*q.v.*) we learnt of record-keeping challenges faced by dispensing Pharmacists and Doctors. In many cases they were obliged to fall back on paper records and Physician Supply Orders. This is a finding that would merit further investigation and review.

Table 4.9: Access to cancer supportive care

	All	HB	TT	Mao	Pac	Fem	Dep5	R2.3
Rate	16	21	3.7	20	11	19	13	21
Count	222	208	14	51	2	131	59	15
Denom	5417	3885	1532	1023	75	2736	1860	291

HH: Hawkes Bay, TT: Tairawhiti, Mao: Maori, Pac: Pacific, Dep5: 2018 Deprivation Quintile 5, R2.3: 2018 GCH R2/R3, LOF: Function-impaired cohort

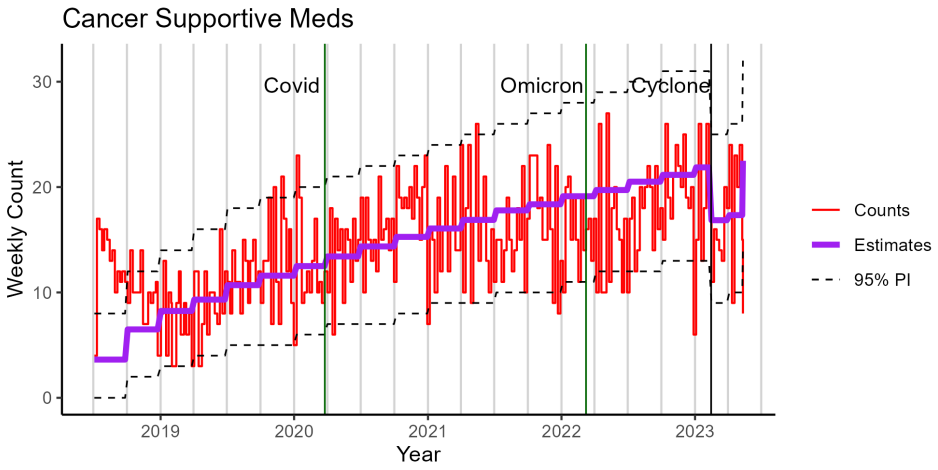


Figure 4.24: Cancer supportive medications: counts

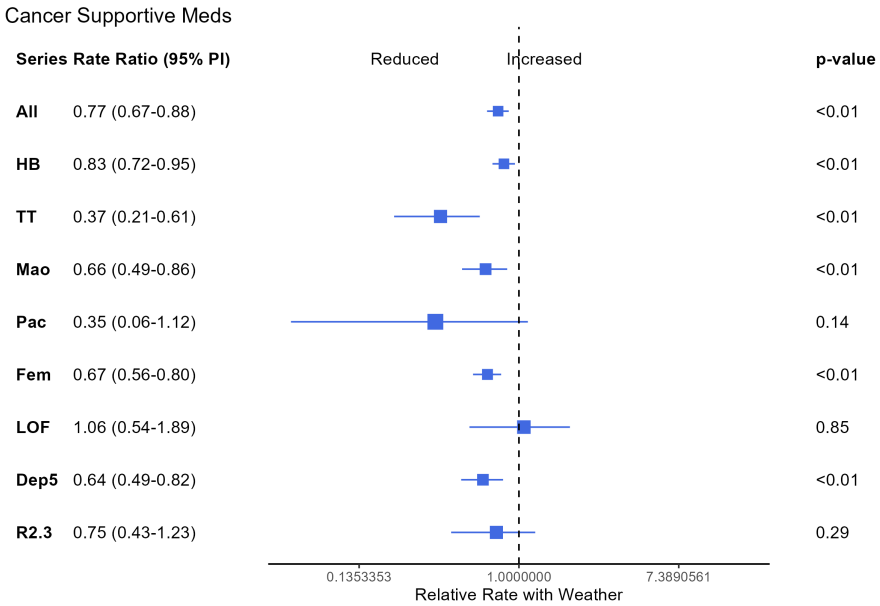


Figure 4.25: Cancer supportive medications: forest

Cancer: Commmunity cancer pharmaceuticals

Figure 4.26 shows a similar profile to the supportive care series, with larger absolute numbers. In the forest plots Figure 4.27 interestingly the decline is not evident for Māori, Pacific, or people with loss of function diagnosed. Table 4.10 suggeststhe numbers are large enough to be convincing.

	All	HB	TT	Mao	Pac	LOF	Dep5	R2.3
Rate	160	170	130	270	190	170	170	170
Count	2136	1652	484	683	36	136	786	127
Denom	5417	3885	1532	1023	75	327	1860	291

HH: Hawkes Bay, TT: Tairawhiti, Mao: Maori, Pac: Pacific, Dep5: 2018 Deprivation Quintile 5, R2.3: 2018 GCH R2/R3, LOF: Function-impaired cohort

Table 4.10: Access to community cancer pharmaceuticals

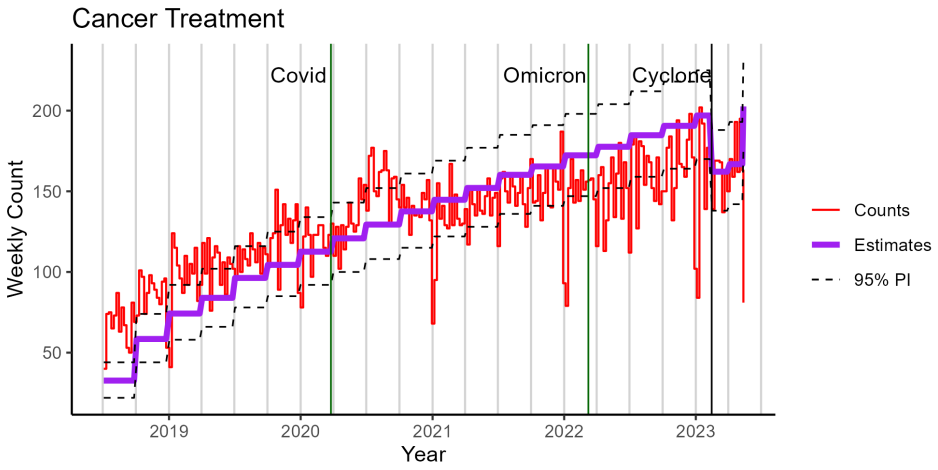


Figure 4.26: Cancer pharmaceuticals: counts

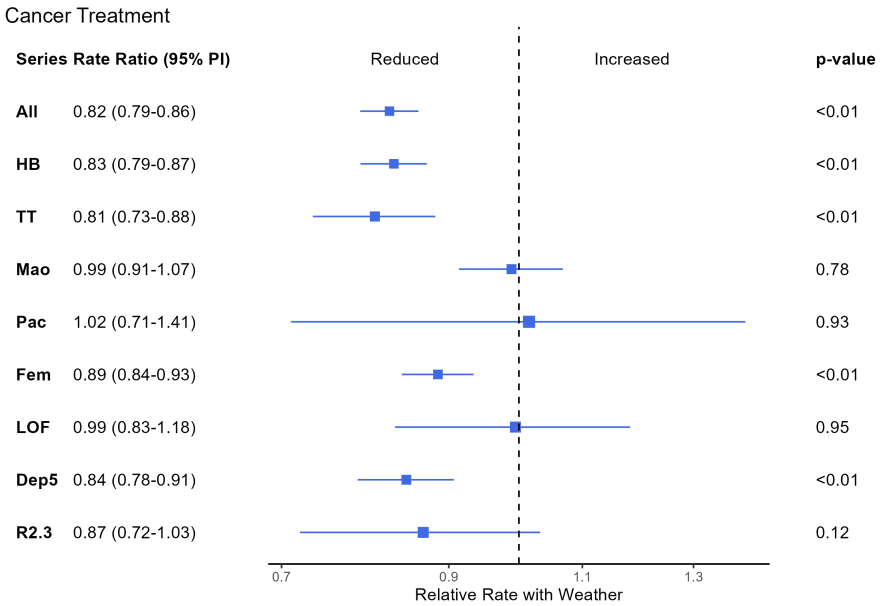


Figure 4.27: Cancer pharmaceuticals: forest

Ambulatory sensitive hospitalisations, age 45–64

This was our univariate analysis on ASH, restricted to the age 45 to 64 cohort. Compatible with the Primary Analysis, Figure 4.28 shows a flat regression curve across the whole series. No subgroups reach significance in the forest plots Figure 4.29. Table 4.11 ASH rates are around 1.9 percent per annum. This is again under-estimates the Te Whatu Ora Clinical Performance Metrics, that have rates of 4.9 and 4.1 percent for Tairāwhiti and Hawkes Bay for the April to June 2023 Quarter.

	All	HB	TT	Mao	Pac	Dep5	R2.3
Rate	1.9	1.9	2	3	2.3	2.6	1.7
Count	256	197	59	101	8	119	13
Denom	53417	41873	11544	13334	1372	18247	3090

HH: Hawkes Bay, TT: Tairawhiti, Mao: Maori, Pac: Pacific, Dep5: 2018 Deprivation Quintile 5, R2.3: 2018 GCH R2/R3

Table 4.11: Ambulatory sensitive hospitalisations, age 45–64

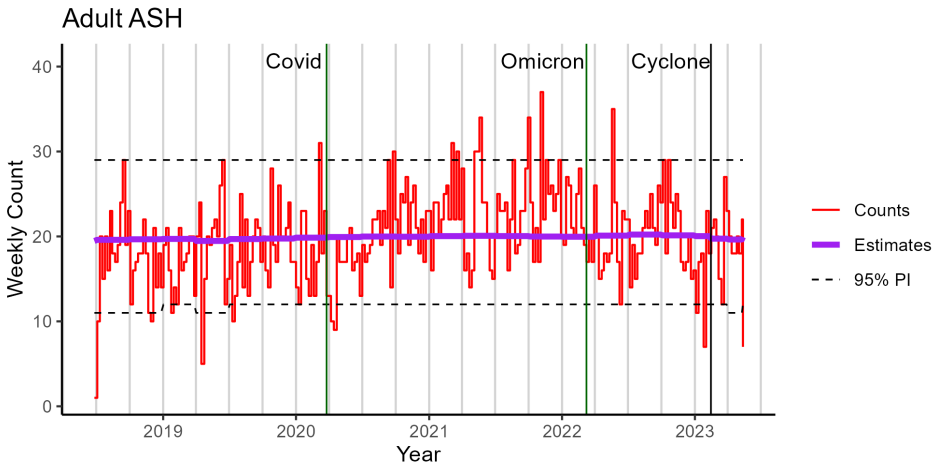


Figure 4.28: ASH age 45 to 64: counts

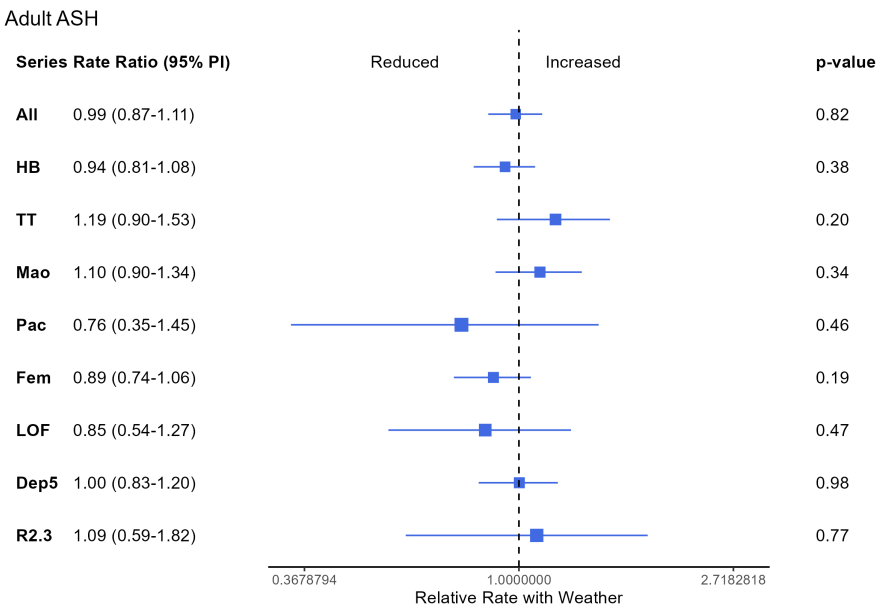


Figure 4.29: ASH age 45 to 64: forest

4.2 Qualitative Findings

4.2.1 Summary of Findings

Overview

The quotes from 143 participants fell into 5 themes

In Te Tairāwhiti, researchers conducted 6 interviews and 22 focus groups for a total of 77 participants. In Hawkes Bay there were 54 interviews and 3 focus groups for a total of 66 participants. Metasynthesis of Hawkes Bay and Te Tairāwhiti datasets generated five themes and seventeen subthemes. These form the structure of our results. We also consider points of difference between the regions. The presentation of each theme is followed by supporting quotes. The quotes are but a small part of the wealth of experiential data recorded.

1. Theme One: 'Health Systems'
    - Ko Te Toa o Ngāi Māori | Māori Excellence
    - Pacific Health
    - System Issues
    - Making Do
    - Health Staff
    - Rural Health
2. Theme Two: 'Personal Health'
    - Ā-Tinana | Physical
    - Ā-Hinengaro | Psychological
3. Theme Three: 'People At Risk'
    - Ahungarua, Hauora, Whaikaha | Age, Health, Disability
    - Ngā Tamariki me Ngā Rangatahi | Children and Young People
    - Māori

- Pacific

4. Theme Four: 'Activating Communities'
    - Wā Kapu Tī | The Power of a Cup of Tea
    - First Responders
    - Communities Take the Lead
5. Theme Five: 'Action Stations'
    - Whakaaweawe Hanganga | Property Impacts
    - Local councils, Civil Defence
    - Preparedness, Response, and Recovery
    - Climate Change is Here

Te Tairāwhiti

A report of findings from Te Tairāwhiti is available on request to the authors.

1. The community still has widespread mental health effects (i.e., sleep disruption, anxiety, depression) associated with repeated extreme weather. Rain anxiety and climate fatigue are new phenomena affecting many across the region. Mental health remains culturally stigmatised and there is not enough support.

Rain anxiety and climate fatigue

2. Māori still experience trauma and sadness after loss and destruction of whenua, awa and moana. In many places, road closures have made it difficult to return to marae.

Māori experience trauma

3. Community hubs (i.e., marae, schools, volunteer fire stations) were a vital support for community health and welfare during the State of Emergency. They kept up this support for many weeks, often at their own expense. This highlights the importance of resourcing and equipping community hubs.

Community hubs are vital

4. Women in many roles (i.e., local government, marae, iwi health providers, school principals, non-profits and social service) showed highly responsive leadership. Aspects included deep community knowledge, relationships, organisational skills, compassion, and empathy. Wāhine Māori (e.g., at marae and schools) were innovative leaders. They expressed cultural values of aroha and manaakitanga. Some women leaders (particularly in local government) faced greater personal abuse, at cost to their own health and wellbeing.

Significant role of women

5. Due to outages of power and communications, organisations and communities had to find new ways to connect and work together. They had to apply their limited resources towards those most in need. Their effectiveness depended on relationships of trust.

Need brings innovation

6. Both community and health professionals acknowledged the health system in Te Tairāwhiti had long been underfunded. The system struggled to meet health needs of communities at high levels of socio-economic deprivation, geographic isolation and inequity. Repeated extreme weather since COVID-19 has made community health needs worse. Providers and infrastructure are wearing out.

The health system struggled

7. Extreme weather, especially Cyclone Gabrielle, revealed significant gaps in the health system. Gaps exist for those with high health needs, disabilities, elderly, and who live in rural, remote and isolated communities. Some services, especially for young people, have had less uptake since 2023.

Health system gaps persist

8. Māori health providers were highly responsive and innovative in support of complex health needs in Gisborne City, and in rural, remote and isolated communities.

Hauora Māori are a success

9. Community voices reveal inequities in resourcing and support (i.e., evacuation, health, recovery). Rural, remote and isolated

Resourcing is inequitable

communities and families were often overlooked.

10. Non-health related systems (i.e., roading, housing, communication, water, work) bear directly on community health and well-being. People felt governance and decision making should move out of official silos and into the community. National and regional governance should be more respectful of local knowledge, connections and relationships.

Empower communities for health

11. The direct experience of weather made many residents more interested in future effects of climate change. People want to know what can be done for the environment right now. They see an urgent need for more resilient and sustainable systems. They called for investment in both health and non-health (i.e., roading) systems.

Desire to adapt to Climate Change

12. Local organisations, staff and volunteers worked tirelessly to protect, support and provide for their communities. This was often without resourcing, and went on for months after the February event. The toll on leaders, staff and volunteers revealed a need to 'care for the carers'.

Who cares for the Carers?

13. The response to Cyclone Gabrielle depended on co-ordinated collaborative efforts between agencies, organisations, community, and Iwi groups. The most successful of these could call on pre-existing relationships of trust. Those in leadership called for greater coordination and more effective relationships between local and national agencies.

We need relationships of trust

Hawkes Bay

A report of findings from Hawkes Bay is available on request to the authors.

1. The people directly affected by the cyclone suffered extreme and enduring mental trauma. They told us of the loss of homes and

The cyclone cast a shadow of fear

assets, loss of livestock and pets, and loss of connection to family history and the past. Their plans for their future, and control over their lives, income and livelihood, all seemed doubtful. Many had altogether lost hope. These feelings were made worse by the thought that it could happen again at any time, and the fear they might be forgotten about and abandoned.

2. Loss of communication confounded the efforts of regional leadership to coordinate response and recovery. Whānau, neighbours and communities were left to assess and respond to their own needs. Those that already had a strong physical focal point (e.g., a marae or a tavern) generally did this well. Those without such a strong focus often struggled.

The value of a physical community centre

3. Initial confusion as to the severity of the cyclone's impact delayed evacuations and some response efforts, putting lives at risk.

Baseline information was key

4. People already at risk, (for example those with disabilities, mental health issues, other medical conditions or living in poverty) were often severely impacted. Factors included a lack of stored resources (food, fuel, cash to buy essentials), disconnection from essential supports (eg. family, carers, counsellors, pharmacists, health providers, foodbanks), equipment and supply dependencies (e.g. motorised mobility aids, medication), and high subjective stress on disruption of normal routine.

It was worse for people already at risk

5. People already connected to the health system (e.g., receiving treatment, needing regular medication) generally had their needs met albeit with some disruption. People often struggled to have health needs met if they were not already connected to the system.

Prior connection to the health system was an advantage

6. Health providers and emergency responders often neglected their own needs due to a strong sense of duty to others. This impacted their personal mental health, relationships, and security.

Carers often neglected self-care

It led to feelings of regret, resentments, and burnout.

7. Lack of coordination in the recovery sometimes saw multiple organisations offering similar services in the same community. Such redundancies wasted resource and could lead to inconsistent messaging.

Redundancies in services

8. Silt and contaminants were a health hazard that caused an increase in respiratory problems. This was especially so during early remediation. At that time, people did not know of the danger, and did not use suitable personal protective equipment.

The risk of silt

9. People were greatly distressed by inability to check on the wellbeing of whānau and friends. This distress ramified out beyond those directly impacted. It was often seen in responders and health providers.

Worries about loved ones

10. Many health providers had to rapidly find creative ways to maintain continuity of service and supply, while still complying with rules and regulations.

Creative ways around rules

11. Health providers had divergent views about the system. Some felt it essential to adhere to usual practices and procedures. Others thought the normal rules must give way in time of need. Some expressed both views at different times.

To defend or change the system?

12. Many health providers and community workers are concerned about late psychological morbidity, that may not show up until after mental health support is no longer available.

Late psychological morbidity

13. Although many health providers and responders felt supported by their organisations during the emergency, after business returned to normal they felt forgotten. Grievances included disputes over payment for work in the emergency, and non-recognition of enduring or later-onset issues such as PTSD and burnout.

Support needs of health workers

14. Some people and communities struggled to understand the enormity of the event. They had expectations about services and support that simply could not be met. Health providers and community volunteers often had to limit access to services and resources. In doing so, they were sometimes met with abuse, that jeopardised their effectiveness.

Managing community expectation

15. Not all evacuation centres were suitable. Some lacked facilities, were culturally inappropriate or physically hazardous. It sometimes seemed that evacuated people were simply dropped off at the nearest elevated place. There seemed to have been limited evacuation planning or organisation.

Evacuation centre issues

16. Most RSE workers had English as a second language. They often felt confused, anxious, and isolated. On being evacuated, they could not find out what was happening or what to do. Many felt abandoned by their employers. On this background, some RSE workers took actions that put their own lives at risk.

Experience of RSE workers

17. Without doubt, the responders (professionals, volunteers and neighbours) who risked their own lives were seen as the heroes of this tragedy. They worked tirelessly at all hours to rescue people trapped by the floodwaters. They prevented what would otherwise have been a far greater disaster and loss of life. The health, wellbeing, and rehabilitation of Hawkes Bay has been driven by people in communities and neighbourhoods. They organised and mobilised during the emergency response and later recovery, and are the ones who will determine the long-term impacts of the Cyclone. To all those people, a huge THANK YOU from everyone else.

Responders were the heroes

Selected Quotes

Quotes Pointing to Recommendations

"I do think it would be useful to have more idea about, and I don't know how this could be, like after it happened to have someone or something guide you. You know, I talked about a bit of this at [Friend]'s, to guide you through the process. Or even to inform you of this has happened so this is going to be the process." (*Female, Impacted Person, Hawkes Bay*) "I think, so the things we needed as a community were number one, first and foremost, well ahead of everything else was decisions. So have a framework in place for someone to make a decision and give them the authority to make that decision. Because everyone in these bureaucracies just won't take ownership, won't take responsibility in case it comes back to bite them in the arse. So they have to have people there that have got the commonsense and the authority to just make decisions and get stuff happening. The other things they can do, find, just have resources, or access to resources quickly and get them where they need to be quickly. So fuel, water, generators, they're probably the three most important things, so whether they do that…. Yeah, no there were containers everywhere, no we were watching them floating down the river. But if you've got a secure place to put one, and put generators, and water purifiers, and all that sort of stuff, tools and have those in key places in key communities. So that if they're cut off, as we were, we can access with some immediacy, you know? Get power up so we can then get communications up –" (*Male, Impacted Person, Hawkes Bay*)	*Improve coordination*

For additional quotes, see Chapter 8.

4.2.2 Theme 1: Health systems

Here we present results from both Tairāwhiti and Hawke's Bay related to the theme of Health Systems. Subthemes include Māori Excellence (Ko Te Toa o Ngāi Māori), Pacific Health, System Issues, Making Do (and improvising), Health Staff, and Rural Health.

Ko Te Toa o Ngāi Māori | Māori Excellence

Leadership of effective Hauora

In their best examples, Hapori and Hauora Māori were pivotal in leading, coordinating and navigating support during and after the State of Emergency. This echoed their efforts during the COVID-19 pandemic. Effective Hauora showed exceptional dedication and preparedness, responding swiftly to extreme weather events with robust planning and provisions.

Organisational memory and connections

Drawing on lessons from past crises, effective Hauora innovatively met health and social needs. They maintained access into services by helping with transport and communication. Their ability to connect rural communities with marae and social agencies meant that people at risk had prompt service. Such initiatives not only addressed immediate needs but also recognised and prioritised community wellbeing in itself. Cyclone Gabrielle has spurred action to set up more sustainable and resilient support systems for urban, rural, and remote communities.

Responsive leadership

Hauora Māori showed responsive leadership. They leveraged knowledge and relationships to collaborate with key partners and agencies. They prioritised staff health and wellbeing, offering support to mitigate the toll of crisis response.

Pivotal role of marae

The study shows the pivotal role of marae in providing support across cultural backgrounds during and after community crises. Marae showcased leadership, offering social, emotional, and practical assistance. Iwi and hapū showed leadership and innovation in community recovery, addressing needs such as health, housing, and social support. At the same time, there were reports of Marae not having resources to provide for the volume and needs of people seeking their help.

Need for cultural safety in collaborations

Frustrations over insufficient support led some more remote communities to establish their own systems. This underscored the need for cultural safety and competency in collaboration across organisations. It showed the importance of recognising and addressing the unique iden-

tities and needs of different communities during emergencies.

Pacific Health

Dedicated and prepared providers

Pacific communities and health providers were similarly pivotal to Māori in support across the Cyclone. The same themes emerge of dedicated and prepared providers, who could responded swiftly and nimbly. Effective organisations promoted community wellbeing, showed responsive leadership, and prioritised staff wellbeing.

Value of Pacific organisations (pages 177, 191)

In the Pacific community, churches and their nationwide networks gave support during crisis events. They drew on faith to activate cultural resilience. Local Pacific organisations were crucial sources of help, despite the strain on their resources and personnel. Participants from Pacific youth organizations, Pacific Trusts, and Pacific churches reported organisational under-capacity relative to need.

Immigration issues

The cyclone showed up disparities in residency status and exposed flaws in immigration policies. This has prompted calls for assistance to Pacific workers, especially those within the RSE scheme. Workers, employers, regulators, and the community as a whole should have greater clarity as to obligations and requirements imposed by the scheme.

Partnerships with Māori

Despite these challenges, Pacific communities have shown unity and support. They have made stronger connections and partnerships, especially with Māori, where marae have served as vital support hubs.

System Issues

System overloading

Cyclone Gabrielle exposed significant risk in the healthcare system. In both Te Tairāwhiti and the Hawkes Bay, systems struggled to meet complex social and health needs made worse by the extreme weather and background under-resourcing. Mental health services were overwhelmed, adding trauma for staff.

Infrastructure challenges

Despite the challenges, health professionals went beyond expectations to ensure people in need could access high quality care. Prioritisation and coordination of services was confounded by infrastructure challenges such as lack of communication, electricity, water, and roading. Many staff could simply not get to their place of work. This raised concern about the ability to manage mass injuries and casualties. Although communities were fortunately spared mass casualty events, they remain a possibility in the event of other foreseeable disasters, for example earthquake, wildfire, and destructive winds.

Centre / periphery relationship

Privilege given to centralised healthcare sometimes lead to feelings of dissatisfaction and neglect in more peripheral communities. Communication with rural, remote, and isolated communities was seen as essential for continuity of care. In pursuit of this aim, Gisborne Hospital hosted twice-daily boardroom meetings with health professionals, Civil Defence, and other key personnel. The effiency and effectiveness of this process has been a topic of ongoing reflection.

Hospitals' challenges

In Tairāwhiti, Gisborne Hospital faced perceptions of being underresourced. This was reported by both the community and health care workers. It suggests a need for review of hospital communications and resource allocation. In Hawkes Bay many services, including Emergency Care, are concentrated at Hastings Hospital, but bridge failures made it inaccessible for many. A temporary emergency department was set up at a medical centre in Napier and staffed by available personnel, many of whom usually worked at Hastings but could not get there.

Ensuring medicines access (pages 195,202)

Pharmacists and GPs have professional obligations to coordinate prescriptions and access to medications. They faced challenges such as loss of communication networks, failure of digital records, and loss of land access into communities. The inflexibility of rules and regulations around eligibility for funded dispensings made for another layer of frustration.

Challenge of locating patients (page 244)

It took significant effort to locate patients in the community. Many

had evacuated or moved from their usual address because of flooding or the threat of flooding, or because they wanted to be closer to friends and whānau. Also, phone and email communications were not working, due to communication network outage or physical loss of devices in flooding. Resources were stretched to coordinate services for high-needs patients. Coordination of patient access to specialist services such as dialysis, cancer surgery, and chemotherapy, has remained a challenge many months after the event. In Te Tairāwhiti, this has reflected disruption to roading and housing, and administrative backlogs, that continued months after the event.

Provider needs affected capacity (page 187)

Pharmacists, Iwi health providers, GPs, and nurses told of the need for cash to buy essentials such as fuel to maintain continuity of service. For example, in the absence of cash to pay for fuel, pharmacists were not able to make community deliveries of medication. Like everyone impacted by the weather, health providers had to care for their own families. Time spent sourcing essentials for their own whānau reduced time available to address community health needs. It was hard for general practices to maintain work rosters, when staff were also impacted personally. Many staff were themselves adapting to infrastructure breakdowns, especially communication and road access. We heard positive feedback about the response from GPs, alongside the frustrations of compromised access.

General practice challenges

Dilemma of system protection versus change (page 201)

The cyclone compounded existing challenges and exposed fragilities and exhaustion in a system already affected by COVID-19. Extreme weather events worsened inequities of access to medical and health services. Health providers were confronted with new challenges for service prioritisation. Opinions sometimes differed on maintaining usual system priorities, versus adapting to get things done efficiently.

Reprioritisation examples (page 193)

For example, Hospice services had to prioritise pain relief ahead of services such as grief counselling and cultural support. Community health clinics had to prioritise immediate mental and physical health support, ahead of immunisation and contraception. Some cut-off com-

munities were no longer accessible for home visits. They either had to substitute with phone consultations, once communications were available, or relocate to be closer to services.

On-site leadership was key

The positive intention of health provider organisations was not in general questioned. The on site presence of empowered, proactive leaders to manage continuity of services was deemed crucial for decision-making and coordination. This was especially so during the time of transport and communications failure. During the emergency in Hawkes Bay, some organisations awaited formal requests before offering assistance. This had both benefits and drawbacks. Although it could reduce on-the-ground confusion and reduplication of efforts, it could also mean material delay in support. Success depended on the quality of pre-existing relationships and the extent to which organisations had agreed emergency plans in place. By contrast in Te Tairāwhiti, we heard of health providers doing what they felt best to respond to community need, but with the worry during comunications outage that their actions might not comply with rules and regulations.

Confusion of multiplicity

There was concern as to duplication and inconsistent messaging when multiple providers were in the same area. This was especially seen with mental heath services in some communities. Hawkes Bay participants told us that in some settings, weeks after the event, "it was almost a case of different providers competing for patients." This could lead to inconsistent messaging, with "one provider telling someone they were depressed and needing counselling and possibly medication … another provider telling the same person they were angry, had every right to be so, and were definitely not mentally ill" (*Community Researcher, Hawkes Bay*).

Making Do

Four wheel drives as vehicles of care (page 187)

Health providers had to make do with available resource. Without access to electronic records, staff often fell back to pen and paper. Trans-

porting nurses, medication, and patients was difficult, especially in remote areas. Four wheel drives became essential vehicles of care. Helicopters were extensively used for critical cases like chemotherapy and dialysis. This was especially so in the coastal part of Te Tairāwhiti. Even so, it took time to stand up helicopter services, and much coordination was required. During the emergency, some people were missed entirely due to gaps in systems. The methods used in this project have not permitted us to further quantify the associated burden of harm.

Key roles of General Practitioners and Pharmacists (pages 198,195)

General practitioners coordinated with other agencies, for example specialist care, to provide local continuity of service. They helped to get medications to isolated patients (via helicopter or ATV), and to evacuate patients needing hospital or specialized care. They faced delays in response. Pharmacists also played a crucial role in improvising to personally deliver prescriptions in the face of communication breakdowns and stock shortages. Some pharmacies made regular deliveries to high needs patients, for example people with mental health and addiction problems.

Coordination in the absence of telecommunications

Pharmacists had to borrow 4WDs, or accompany Council staff, First Responders, and roading contractors. Coordination with nurses, labs, pharmacies, Civil Defence, and flight crews was critical during the State of Emergency, further underscoring the need for robust telecommunication networks. During the telecommunications outage, much communication was achieved by physical movement of staff to enable face-to-face meeting. In Te Tairāwhiti, twice-daily meetings in the boardroom at the hospital were critical for coordination of regional staffing and resourcing.

The value of a 'trust period'

Pressures of compliance with rules and regulations highlighted the importance of a 'trust period', to give flexibility to local organisations.

Health Staff

Overload on staff (page 184)

Healthcare workers showed great dedication during and after the State of Emergency to support their communities. This was often despite personal challenges such as uncertainty around the wellbeing and location of whānau, or damage and loss to homes and belongings. Many worked overtime due to reduced staffing. Transport to the workplace could carry personal risk and stress, especially in rural areas, where hazards included flooding, washouts, slips, fallen trees, unstable land and trees, and submerged obstacles.

Organisational care (pages 235,218,236)

Some organisations prioritised staff well-being with support such as debriefing. In other places, staff felt their extra effort went underacknowledged, leading to exhaustion. There was concern about the longer term impact on staff recruitment and retention, where regional systems are starting from a baseline of workforce undercapacity. Publicity about the dangers and impacts of adverse weather in the region is likely to further undercut recruiting prospects. Some newly arrived health workers said they were rethinking their decision, as this was not the 'lifestyle' they had been told of.

Dedication of nurses

Nurses, in both the hospital and the community, took on extra roles and responsibilities, often to the neglect of their own needs. Such support could include:

- Staying at work overnight to cover shortages, often due to challenges of transportation
- Helping to shovel silt
- Taking on extra tasks and shifts so a colleague could attend to personal and family issues
- Hospital staff using their skills in community settings, when not able to access their usual workplace
- Helping colleagues retrieve possessions from flooded homes
- Providing emotional support

In Hawkes Bay, a hospital nurse living in an area cut off by flooding became the sole qualified health provider in the community. This became a round the clock role until road access was restored and the nurse could return to work at the hospital. The community role and expectations remained ongoing and to some extent taxing at a personal level, yet not recognised by the employer.

Staff support needs (pages 204,205)

In Hawkes Bay, many staff found access to professional support helpful for their own recovery. Others felt exploited, undervalued, or forgotten by the system. Once the situation had normalised, some managers appeared to forget about the exceptional service given during the time of need. In one report, a staff member who worked 24 hours without relief to cover for colleagues who could not make it into work was told this 'overtime' had not been pre-approved, was seen as 'volunteering', and would not be recognised by the system. In other cases, petrol vouchers given to help with transport for extra duties were later deducted from pay.

Rural Health

"Like wartime without the bombs"

Rural health providers continue to show resilience and dedication to their communities, often working long hours under demanding conditions. For example the rural hospital at Te Puia kept operating without water, power, or communications for up to 10 days. Staff slept on floor squabs at work overnight, and worked by torchlight. They used generators until they ran out of fuel. One referred to the situation as being "like wartime without the bombs."

Recovery by farmers

Farmers played a crucial role in clearing roads and restoring access using their own equipment. Recovery efforts for the farming community involved distinct phases, focusing on restoring farming operations, rehabilitating land, and rebuilding infrastructure essential for agriculture. These efforts had the consequence of restoring access into affected communities. The roading network is the key means by which people

with health needs, physically connect with health providers. Disruption to roading was a major barrier to delivery of health care. While council-funded roading contractors reinstated arterial routes, many rural roads were deprioritised. Were it not for farmers clearing these smaller roads, their communities would have remained without access to health services.

Innovative means of access

Infrastructure failure meant that providers faced challenges of communication and access into communities. Bridge failures, landslips, and outages of power, water, and telecommunications compounded difficulties faced by rural communities. With loss of road access, transport of staff and supplies depended on alternatives such as helicopters, ATVs, sometimes even horseback, boating, or hiking through bush and farmland. Such initiatives were usually made after the fact in the face of need, for example by individuals, whānau, farmers, and commmunity organisations (e.g. a jet boat club). We did not learn of formalised prior planning for such situations between health providers and communities.

The challenge of rules versus trust

Not all patients with high or specialised needs could receive timely attention, sometimes to their frustration. Rules and regulations seen as obstructive of community needs were an enduring tension for rural first responders and health providers. In Te Tairāwhiti, we heard about frustrations with repeat prescription rules. With telecommunications down, GPs and pharmacies were unable to check patient records for evidence of repeat prescriptions. Although regulatory requirements might be satisfied when people produced their expended pharmaceutical packaging, many of those displaced from their homes did not have access to such evidence.

Separation of whānau

In coastal Te Tairāwhiti, health providers felt their decisions about patient transport and evacuation were not always respected or supported by centralised agencies, even when based on local knowledge of needs and capacity. In one distressing scenario, a woman was transported to Hawkes Bay for breast cancer surgery. It was not however possible for whānau to make the same journey, either alongside her or

independently. This whānau reported the strong perception that their concerns had not been considered in their mother's treatment and relocation plan.

Selected Quotes

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"We've got different iwi liaisons that kicked into gear and steered everyone in the right direction in that regard as to who did what" (*Male, Responder*) "But they had people that were volunteers in the wharekai. They had trestles set up and they had people going through, sorting out from babies to toddlers, right through. Then went over to the marae and they had the same setup at the supermarket. You were given a trolley, literally a trolley, ... And you had that and you started at the beginning. Right, okay, how many children have you got? Two, okay. Does your little one need nappies? Yes. So they put on nappies, they put on pull ups, 'cause our boy, he wets at night. And so they were putting those on there. Wipes, clothes. That would've been pretty much straight away, set up straight away." (*Female, Impacted Person*)	"….whatever presented, we just kicked in and responded. We sort of set up our kind of systems and processes just to kind of make sure things were pretty lean and efficient. We had our own, our kaimahi that were impacted so there was no expectation about them coming to work. And then leaned into whatever needs sort of came through the door or the comms and it was normally like face to face at that stage… We put BAU [business as usual] to the side and so staff knew that, yes, we would respond" (*Wahine Māori, Iwi Health 1*) "I mean, this is our backyard and to not respond would be doing our whānau a big disservice big time. But we're around and we always have to front our whānau. So we weren't gonna let up." (*Wahine Māori, Iwi Health 1*) "We have new diesel storage and, for our generator, we've got a new generator, so yeah we've upgraded heaps of stuff, yeah. So I guess in some ways the cyclone's been generous like that. You know stuff needed upgrading before that and in some ways it just brought that whole thing forward." (*Wahine Māori, Iwi Health 2*)	*Ko Te Toa o Ngāi Māori: Iwi and Marae leadership*

For additional quotes, see Chapter 8.

4.2.3 Theme 2: Personal health

Here we present results from both Tairāwhiti and Hawke's Bay related to the theme of Personal Health. It is further divided into headings of the Physical (Ā-Tinana) and the Psychological (Ā-Hinengaro).

Ā-Tinana | Physical

Toxic exposures

There were significant health challenges to residents of rural and isolated areas in the post cyclone clean-up. Many people worked on their own for long periods, leading to physical and emotional exhaustion. Some had respiratory and skin infections, attributable to exposure to polluted silt and other hazards. Challenges of sanitation exposed people to the risk of gastroenteritis. There were concerns about the exacerbation of respiratory illness in the community and for those with other chronic health states. We heard there was little public information as to risks, including for those with pre-existing respiratory or chronic illness. When people in Hawkes Bay started cleaning up, they did so without personal protective equipment and without safety briefing as to the hazards of silt, including exposure to sewage, agricultural chemicals, and hydrocarbon products.

Personal care and hygiene

People in both Te Tairāwhiti and Hawkes Bay highlighted the importance of clothing, personal care, and menstrual hygiene products for those evacuated from their homes. It was often women leaders of schools and marae who made sure of access to these items.

Ā-Hinengaro | Psychological

Solastalgia

Physical and human losses from Cyclone Gabrielle have brought stress, anxiety and trauma to those directly impacted, as well as to frontline staff and volunteers. Many report high and enduring stress, anxiety,

and grief, alongside a shortfall of mental health support. Participants expressed symptoms of Solastalgia | Matemate-ā-one, spiritually intensified grief over loss of ancestral land and culture, and inability to return home. This was especially manifest where there had been loss and damage to urupā.

Economic challenge and survivor guilt

Some hundreds are still without permanent housing, often perpetuated by insurance deadlock. The stress of navigating insurance and local authority process is compounded in the real world by road and bridge closures and unstable land. Economic challenges are acute for those involved in industries of farming, horticulture, and forestry. Some have experienced survivor guilt, that seems to interact negatively with pre-existing mental health issues.

Precarious situation of volunteers

First responders often lacked welfare checks or psychological support. Volunteers faced stress and uncertainty, and a feeling that their training had been inadequate for the needs of work. Providers observed increased symptoms of aggression, domestic violence, social isolation and disconnection. Such symptoms have often been manifest as post-traumatic stress. These experiences have been mirrored across the community.

Mental health in the community (page 135)

Community members reported an ongoing mental health burden, manifested in symptoms such as panic attacks, depression and anger. 'Rain anxiety' is a new, persisting, and widely reported manifestation. Mental health coping strategies varied, from self-medication with alcohol through to mutual support networks. Although a range of organisations offered mental health support (including Te Whatu Ora, Counsellors in private practice, Red Cross, Community NGOs, Churches, GPs, Maori Health providers, Farmstrong, Rural Support Trust), people reported uneven access. Also, although some did not feel ready to access formal support, it was uncertain as to how long such support might be available. Many communities have drawn on their own resources to process grief, trauma and stress. Māori and Pacific communities highlighted the importance of connection, and practices of spiritual and cul-

tural recovery. We heard of Iwi health providers offering culturally-responsive forms of trauma recovery and support.

Selected Quotes

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"And my four year old now actually suffers from a lot of nightmares. Like the rain, that's really big for him. He's like, to the point where it puts him in flight mode. Like, he hasn't come out of it and relaxed, even though its been a while now. He's gotten a bag ready to go if we need to go in the car now, he's quite a clever little boy, but it's sad for me that he's always stuck in that mode. And, like, every time it rains he has to come and find me. So I tell his dad, 'just let him talk it out because telling him to stop being silly and not do it is bad. So he's got him a bag to go every time, which is quite sad but quite good at the same time" (*Female, Impacted Person*)	"I don't think we're talking enough about the stress and the anxiety that people feel when it rains. I feel it. I watch the weather in a way, I mean I've always taken notice of the weather, but now its become quite ingrained. It's more of a need to know that the coast is clear, you know, that it's not another hit. And I worry about children and I worry about older people… and it doesn't matter whether you're on a hill or on the flats, everybody's affected but affected differently. I think that there's a whole level of stress here that nobody's talking about." (*Wahine Māori, Social Recovery Leader*)	*Ā-Hinengaro: Rain anxiety*

For additional quotes, see Chapter 8.

4.2.4 Theme 3: People at Risk

Here we present results from both Tairāwhiti and Hawke's Bay related to the theme of People at Risk. We address Age, Health, and Disability

(Ahungarua, Hauora, me te Whaikaha), Children and Young People (Ngā Tamariki me Ngā Rangatahi), and the experience of Māori.

Ahungarua, Hauora, Whaikaha | Age, Health, Disability

Psychological harm of disruptions to routine

At-risk community members faced significant challenges from disrupted daily routine, both during and after the cyclone. Psychological distress has persisted, with prolonged physical displacement, isolation and disruption caused by failure of roads, extended insurance processes, land instability, and (especially in Te Tairāwhiti) subsequent weather events. A year after the cyclone, there are still people in temporary accommodation, and waiting for settlement of insurance claims. Some have settled into a 'new normal' but others feel they are marking time without power to control their destiny. Psychological adverse efffects have been especially apparent for mental health and addiction patients. We heard of increased anxiety leading to adverse behaviours including anger, refusing medication, abandonment of accommodation, rough sleeping, and loss of contact with the system. We heard of people with disabilities and chronic illnesses being overlooked in evacuations and follow-up supports. Examples included:

Mental health and addiction

Disability and long term conditions

- Separation from carers
- Electric mobility devices losing power
- Loss of medication (e.g., morphine) for infusion pumps
- Loss of sanitary products (e.g., incontinence pads)
- Extended waits for dressing changes.

Risks of relocation

Evacuations posed particular difficulties for the elderly, and for people with disability and chronic illness. Beyond the initial challenge of relocation, people often found themselves disconnected from usual supports. Communication breakdowns and limited transport further in-

creased risk, leaving some waiting extended periods for assistance. Pre-existing conditions by their nature made it harder to access new resources and support. The outcome was a period of heightened personal risk, and extended subjective isolation.

Ngā Tamariki me Ngā Rangatahi | Children and Young People

Emotional state and motivation

Children and young people continue to have cyclone-related stress and anxiety. Despite these challenges, grassroots coordination was found effective in providing necessary aid. Schools played an important role in emotional and social support. Young people are often highly motivated to volunteer in support of whānau and communities.

Māori

Risks and strengths for Māori

Māori communities reported being at increased risk in the emergency, due to background health inequities and flawed support systems. In Cyclone Gabrielle, challenges were compounded by loss of telecommunication, that reduced health service provision, including access to health records. For example, 2-factor authentication failed during cellular network outagse. Even with these challenges, local Māori organisations were often able to fill gaps. Hapori provided connection and support for each other, often drawing on deep cultural and historical knowledge.

Need for systematic coordinated response

The numerous specific needs of communities was seen to reveal a need for systematic and coordinated emergency response. Community members valued communication, accessibility, and culturally appropriate support networks. Disruptions in professional support and external resources were to be expected during emergencies, especially for more remote communities. Local communities therefore sought to build capability to provide basic care, including adequate stocks of medical supplies.

Pacific

Pacific communities reported comparable challenges to Māori in terms of inequity and systems shortcomings. Pacific organisations and communities felt able to mitigate these challenges in a similar way. They were also able to draw on their own experiences with cyclones in the Pacific region.

Relevance of Pacific experience (page 219)

The socially precarity of RSE workers has underscored the need for cultural competency and empathy. RSE workers were at risk of immigration- and employment-related injustice. We heard of concerns about loss of wages, loss of work, visa insecurity, doubt as to entitlements, loss of ability to remit to family in the home country, and accommodation that was unsuitable or unprepared for utilities outages. In Hawkes Bay, RSE workers told us that fear of exposure of immigration status became a barrier to access to medical and health services. Community organisers sometimes found it difficult to help RSE workers due to language barriers. In one instance, a group of RSE workers was 'dropped off' at a community evacuation point, but started wading back through flood waters to the accommodation they had just been rescued from, in the belief they must retrieve their passports or be deported.

Exposure of RSE workers (page 228)

Selected Quotes

Quotes from 'People at Risk' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Oh we're lucky that we speak the language and they were very shaken up. They were quiet. We gave them a deck of cards I have in my car, so we went and got the cards just so, you know, they weren't talking. They were dressed in other, they were dressed in women's clothes, a few of them because they just picked up whatever they could find at the Hastings centre that they were taken to. Real shaken up." (*Hawkes Bay*) "A lot of them went home, eventually went home. Yeah, just the sheer case of almost dying would contribute to the traumatic, you know, mental, well took a toll on them mentally." (*Male, Pacific Community Organisation*)	"…I have children in Kiribati, so when the storm happened, I was worried in case there is anything happened with me. …We all had the same problem at that time, they all needed to contact their family" (*Kiribati RSE Worker*) "…they didn't know when they were gonna get paid. They haven't been paid for the two weeks prior to the cyclone and then, you know, post-cyclone. I mean, let's say six to eight weeks post-cyclone, they were still fighting to get their money." (*Samoan-Māori Woman*) "…it's a whole lot of that visa status stuff and what they thought and they were entitled to and not entitled to. And then the fear of not being able to get anything and then, oh it was pretty gross." (*Samoan-Māori Woman*)	*Pacific: RSE workers*

For additional quotes, see Chapter 8.

4.2.5 Theme 4: Activating Communities

Here we present results from both Tairāwhiti and Hawke's Bay related to the theme of Activating Communities. Included in this theme are The Power of a Cup of Tea (Wā Kapu Tī, as so many people said to us); First Responders; and examples of Communities Taking the Lead.

Wā Kapu Tī | The Power of a Cup of Tea

Importance of connection

The importance of connection, relationships and manaakitanga (kindness) at all levels was a significant theme in the crisis response. These connections were crucial for providing support, fostering resilience, and protecting mental health.

The simple act of listening

At the community level, the simple act of listening and being present, was powerful in offering comfort and solace. Participants repeatedly talked of the power of a cup of tea. Trust and relationships were cited as key factors in the effectiveness of response. They highlighted the value of strong community bonds. Such a relational approach was essential for organisations and their leadership to gain the trust of community partners.

Challenges of isolation

The challenges of isolation persisted for some communities, especially in the months of recovery. As much as communities needed their own connections, they saw a need for robust systems and support structures to be in place during times of crisis.

First Responders

Multiple duties of First Responders

First responders faced extraordinary challenges during the cyclone response. Power outages, communication failures, and extensive damage to roads all hindered their ability to work. Many responders had to manage multiple personal and professional roles in the community. They reported heightened stress and anxiety, made worse by inability to contact their own families.

Well-being of responders and volunteers

Persistent challenges in staffing showed the need to prioritise well-being of responders and volunteers through rostering and support. A disconnect between volunteers and formal response services showed a need for civilian volunteers to have clearer roles and structured support. The data show wide variation in organisational performance.

Role of Police

Police worked closely with communities to ensure safety and pro-

vide support. They managed security concerns and kept a visible presence at community hubs. Iwi liaisons were crucial role to connecting Police and cultural leaders, so strengthening relationships within communities. Community hubs such as marae had a vital role in facilitating responder communication and resource distribution.

Helicopter ambivalence

As much as helicopters were essential for rescue and deliveries, their usage triggered mixed emotions. Reflecting the high visibility of helicopter activity, some people felt neglected while others felt unfairly prioritised. In Te Tairāwhiti there was concern about delay in helicopter deployment on 14 February. Although we have not had confirmation of this from aviation services, community members said helicopters were unable to fly on February 15 due to power outages affecting operation of fuel pumps. Separate from the accuracy of this information, it illustrates the unease resulting from disrupted communications, that has lead to doubts about the adequacy of efforts to evacuate and assist.

The positive side for responders

Regardless of the difficulties, responders found purpose in their contributions to the response. Despite the adversity, there were positive outcomes and moments of resilience.

Communities Take the Lead

Crucial role of community hubs

Local community knowledge and relationships proved invaluable in understanding and supporting communities during and after the cyclone. Community hubs including Marae, churches and schools, played a crucial role in the response. They were often led by women. The hubs provided essential services, information, resources, and emotional support to affected communities. Communities rallied to support at-risk groups. They were often proactive in locating people in need who had not necessarily sought help or support. Communities showed care and compassion for each other, checked in on family, friends and neighbours. Many kept volunteering into the longer term.

Community solidarity

Community solidarity was evident in the post-cyclone cleanup ef-

forts, with significant volunteer support from businesses, local, and national groups. In many cases, communities took charge of evacuations, rescues, and support efforts. This was particularly in valley communities like Waimatā, Tupāroa, and Ūawa in Te Tairāwhiti. These communities showed their self-sufficiency and resilience. The experience of seeing people come together to support one another offered feelings of pride in the community, and hope for humanity.

Response of NGOs and churches

Non profit social service organisations and NGOs responded to the demand for support in communities, working in collaboration with community hubs. Some churches, Pacific community groups and organisations accommodated displaced RSA workers, underscoring the importance of networks. High value was placed on respect for residents' privacy, dignity, and wishes while avoiding further harm or distress.

Challenges of workload and environment

Staff reported working long hours and with tedious and unreasonable compliance expectations, considering the lack of communication and technology, and volume and urgency of demands. There were challenges in managing and caring for recovery volunteers, especially burnout and fatigue from working long hours for extended periods.

Differing perceptions of severity

We learnt of disagreement (the aforementioned "incongruence of ideation", (page 34)) as to the severity of the event, risks and needed actions. For example in Te Tairāwhiti people told us they made assessments with reference to past events such as Cyclone Bola. In Hawkes Bay, many people who awoke to utilities outages did not at first appreciate the event's actual scale, leading to delayed community mobilisation. This was not helped by some initial media comment suggesting there had been an over-reaction to heavy rain.

Resourcing challenges

There were issues with local, regional, and national government support and resource allocation for community hubs, particularly marae. The call on resources was often felt to be inequitable and subject to community politics. Processes of application for reimbursement, both from the State and from insurers, were described as frustrating

and difficult. There were challenges with managing the volume and type of donations. Many fell back on their own resources (kai, fuel, finances) to address need. Some communities felt that Iwi-led initiatives, where available, were more responsive and could rally action and support that government agencies did not offer.

Selected Quotes

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"When people are emotional they need that person that, they need a good person that they can go to and vent, and, you know they can build a rapport with. Have a bit of a relationship with, when different people are coming in." (*Male, Responder*)	"would have whānau just turn up and all they wanna do is someone to talk so or a cuppa tea. Pretty basic manaaki aye, they want a cuppa tea and someone to talk to. That's huge, and that's mental health. And a lot of people with mental health were also coming in very distressed." (*Tāne Māori, Not-For-Profit Org Leader*) "I didn't realise how traumatised we were aye, until we've had to talk about it. I think it was more anger and frustration about what wasn't going on to help people." (*Wahine Māori, School Leader, City*) "...that was the worst night of my life, he was quite shellshocked. ...I had to stop at one of the neighbours, and I had dark glasses on, and he said are you all right? I said no I'm not. ... he said do you want a cup of tea? I said no, I just need someone to talk to and a little moment together" (*Wahine Māori, Rural*)	*Wā Kapu Tī: Listening and talking*

For additional quotes, see Chapter 8.

4.2.6 Theme 5: 'Action Stations'

Here we present results from both Tairāwhiti and Hawke's Bay related to the theme of 'Action Stations'. This theme touches on property impacts (Ngā Whakaaweawe Hanganga); the role of Local councils and

Civil Defence; Preparedness, Response, and Recovery; and awareness of the connection between Global Heating and adverse weather.

Whakaaweawe Utauta | Property Impacts

Infrastructure's role in health

Cyclone Gabrielle caused major infrastructure failures. Disruptions to communications, roading, and essential services, have had repercussions on community health and wellbeing. People feel it will be crucial to remediate infrastructure and to improve coordination among agencies.

Communications breakdown

Communication breakdown was a cause of immediate distress and challenge. It hindered emergency response coordination and health service delivery. Many felt there was insufficient warning for evacuation. People remote from the affected area felt stress and guilt for being unable to support their loved ones. There was some success with improvised alternatives. Questions arose about equitable access to communication tools and funding. In a least one case, community access to a key resource (a satellite phone) depended on direct intervention by a person of national influence. The experience reaffirmed the importance of communication channels across agencies for effective emergency preparedness and response efforts.

Roading is a humanitarian issue

Road damage not only posed logistical challenges but had pronounced effects on community wellbeing. Residents in remote communities felt disconnected and marginalised. They perceived road repair schedules as a personal reflection of their community's value. Disruptions in transportation has hindered access to healthcare and other essential activities, creating stress and uncertainty. We heard calls to reconceptualise road infrastructure as a humanitarian issue, in view of its link to community health and wellbeing via access to services.

Challenges from power and water

Disruptions to power and water further compounded challenges. Water outages had significant health and hygiene implications, complicating clean-up and recovery efforts. Leakage of sewage and contami-

nants resulted in health issues for residents. Power disruptions blocked access to personal finances and groceries. Closure of urupā and cemeteries due to raised water tables in Te Tairāwhiti affected tangihanga and funerals for weeks and months after the cyclone.

Evacuation centres under-prepared

In Hawkes Bay, we heard that some people were injured due to improperly prepared or equipped evacuation centres. This was primarily falls due to steep steps, lack of ramps, and absence of lighting. Most of these were centres that had been set up impromptu. Facilities such as marae, schools, churches and community halls had not been assessed for suitability and safety for evacuation use. In several cases facilities were without heating, increasing the risk of hypothermia for those who were already wet and cold.

Local Councils, Civil Defence

Anger and frustration

The response to Cyclone Gabrielle was the focus of significant community frustration and anger towards local councils and Civil Defence.

GDC in the public eye

Tairāwhiti communities had mixed opinions towards their District Council. Some felt that rural and remote coastal communities were overlooked in favour of Gisborne City. Others commended staff who kept working under difficult conditions. Frustrations were made worse by delays in receiving support or approval from Wellington. Representatives from the Council described negative feedback from community relating to perceived errors or inaction.

Dissatisfaction with Hawkes Bay local authorities

In Hawkes Bay the overwhelming feedback was dissatisfaction towards the five councils and civil defence. Many felt they had been left unprepared by lack of Civil Defence warnings prior to the cyclone. Much community disappointment in the response focused the destruction and disruption caused by failed riparian stopbanks.

Challenges of working in Civil Defence

Civil Defence volunteers were primarily community members with additional responsibilities. They report facing significant challenges without adequate psychosocial support. There were calls for profes-

sionalisation of Civil Defence to better respond to increasing extreme weather events and to alleviate the burden on volunteers.

Local leadership burnout

In the face of public critique, leaders of local government and social organisations reported burnout and inadequate support. Greater collaboration, communication, and investment in community-level Civil Defence leadership were deemed necessary to build resilience for future events.

Plea for resources

A high value was placed on equitable distribution and continuous presence of resources and assistance across affected communities. The altered landscapes and ongoing recovery needs remain significant concerns.

Preparedness, Response and Recovery

Factors relevant to preparedness

Preparedness varied across the community, generally as the inverse of deprivation. Evacuations were affected by such factors as prior planning, needs of elderly, the disabled, livestock and pets, and access to information. Many communities felt information about who should evacuate and when was not clearly communicated, leading to confusion and delays. Communities often took the lead in their own evacuation and support efforts, showing self-sufficiency and resilience. There was a recognised need for increased social support and welfare checks in the aftermath of extreme weather.

Food security

Food security was an issue. Issues with infrastructure, especially power, led to challenges around storage and distribution. Many generators ran out of fuel during the week without power. Deprivation was a negative predictor of the ability to keep extra food in preparation for disasters.

Failure of warning systems

In both regions, lack of both household and community preparedness, and failure of warning systems, contributed to residents feeling unprepared and anxious. Absence of Civil Defence alerts led to discounting of natural warning signs, leaving many shocked by the cy-

clone's eventual severity. Local communities became rescuers, overcoming access challenges with locally available resources such as ATVs and boats that were in normal everyday usage. Telecommunications issues further isolated affected rural areas, compounding difficulties in accessing essential services like power and clean water.

Environmental health risks

Environmental impacts, such as silt and debris in waterways, posed a health risk for traditional sources of kai. There was a shortfall in information about domestic management of risks around contaminated food. People felt this was a responsibility for the authorities.

Stress on public order

Concerns for safety grew, as the crisis persisted. We were told of an increase in civil disobedience and crime, including conflict over resources and incidents of looting. These threats were compounded by reduced access to cash and petrol, and were a further cause of psychological distress. Residents took proactive measures to establish security measures and deter potential looters. This included neughbourhood communication, community watches, and communication with police.

Longer term impacts and questions

Longer term impacts continue to play out. Active issues include loss of livelihoods, recovery of housing, and access to insurance payouts. Many people continue in precarious accommodation away from the families, schools and work. The farming, forestry and horticulture communities have faced significant job-losses and high levels of uncertainty and unpredictability. The expected increase in adverse weather events, and deleterious effects on critical infastructure, raises concerns as to communities' future. In Te Tairāwhiti, many communities have been affected by repeated extreme adverse weather events, with loss of road access to isolated places, and inundation of those in coastal or riparine areas.

Climate Change is Here

A feeling of adaptive urgency

In both regions there was a sense of need to acknowledge and respond to Climate Change. Some were frustrated with delay in efforts to re-

spond and plan, in view of the substantial time we have known about the issue. The number of adverse weather events in Tairāwhiti in recent years drives a feeling of adaptive urgency. Many expressed a desire to do more for the environment, in such areas as land-use, and beach and river clean ups. This was consistently described as another aspect of care for people's wellbeing.

Selected Quotes

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"The second thing was access. We had a number of major bridges in Hawkes Bay that got blown out and we had a number of minor bridges, so rural bridges if you like, on rural roads, which were also destroyed as well as massive slips and washouts. We had a situation where the opportunity to hop in your ute and drive from your farm to go to town to get your groceries was gone." (*Male, Community Organisation*)	… roading is a humanitarian issue, people don't see it like that. They see it as more of a, like a nice to have, it's not like a fundamental lifeline for people to live their lives. It's like you should be grateful you have a road…. (*Wahine Māori , Local Government*) I still haven't been home. When you say "hoki ki o maunga" we can't "hoki ki o maunga" we can't go back to our mountains, we can't go back to our rivers. And if we're going to, if there's a hui on it's like hmm, am I gonna get stuck up there, you know? It's huge, the impact that the weather has on the coast especially, yeah. (*Wahine Māori 1, Gisborne City*)	*Whakaaweawe Hanganga: Roading – isolating, Access, Wellbeing, it's a humanitarian issue, can't go home*

For additional quotes, see Chapter 8.

4.2.7 Points of Difference

Urban weighting in Hawkes Bay

In the main, there was thematic concordance in the data across Te Tairāwhiti and Hawkes Bay. Both regions lost many bridges, 32 in Hawkes Bay and 54 in Tairāwhiti. In Hawkes Bay this cut off Hastings Base Hospital from major parts of its catchment, including the city of Napier and substantial settlements in Wairoa and the Central Hawkes Bay. Thus the disaster in Hawkes Bay had a more urban profile compared to Te Tairāwhiti where it was more rural.

Repeating issues in Te Tairāwhiti

Te Tairāwhiti has been hit repeatedly, not only by Cyclone Gabrielle, but also by Cyclone Hale and other subsequent heavy rain events. People in Te Tairāwhiti report a greater sense of exhaustion and awareness of a repeating problem. Other aspects specific to Te Tairāwhiti include its more relatively remote East Coast, and more prevalent challenges of forestry management and waste.

Perceptions and experience of local government

Hawkes Bay participants who commented on local government and Civil Defence were in general critical. Although such sentiments were also expressed in Te Tairāwhiti, our team was also able to interview participants from local government. This gave a lens on the experience of the public servants who, are also human beings and members of their communities. Council staff reported having to contend with critique, blame and sometimes anger and abuse.

Issues with RSE terms and conditions

Interviews with RSE workers revealed a need for both employers and Immigration New Zealand to ensure RSE workers are both prepared for and supported during a disaster. Many were without food or emergency supplies in their short-term accommodation. In the absence of independent transport, they were reliant on employers coming to them with information and resourcing. In some cases, employers were not seen until days after the event. RSE workers needed clarity needed as to the public support they receive during an emergency, and the roles and responsibilities of employers.

Strength of Hauora Māori and Wāhine Māori in Te Tairāwhiti

Strong Hauora Māori health providers and community support in Te

Tairāwhiti, along with the leadership of women and specifically Wāhine Māori leaders, were crucial in the response and recovery. However, women leaders often endured an extra burden of negativity, underscoring their own need for support and recognition. The resilience and adaptability of nurses and the often invisible leadership of women are notable findings in these contexts. These strengths were reported across diverse roles as mothers, parents, carers, and leaders of local organisations in governance, social service, schools and marae. Many women in leadership roles showed heightened levels of care, compassion and emotional labor for their families and communities.

Gender-based abuse and intersectionality

We recorded instances of gender-based abuse towards women in health and community provider roles. We also perceived intersectionality whereby additive factors such as ethnicity, age, immigration, and social status have further heightened the prevalence of abuse of some staff. Participants told us of variability across organisations in the extent to which they considered the safety of their staff during times of emotion and stress.

Selected Quotes

Gender Quotes from Te Tairāwhiti
"If it wasn't [us], and we had two males there, they would never have got the abuse we've had and the treatment that we've had from some of our own, never, ever. I have no doubt in my mind that being woman has also made us an easy target" (*Wahine Māori, Leadership Role, City*)

For additional quotes, see Chapter 8.

5. Kōrerorero | Discussion

5.1 Integration of research findings with global literature

The cross-cutting nature of Sendai Priorities

Our project acquired a large body of data by interview of people from affected communites of Te Tairāwhiti and Hawkes Bay. We also have information from Health New Zealand | Te Whatu Ora, recording interactions with Health Contact Populations across 2018 to 2023. Before moving to final outputs, we want to integrate the study results with a global literature. This connects with the Ministry's interest in the UNDRR Sendai Priorities, as noted in Section 2.2.

All four priorities are relevant

Many of our research findings map to all four Sendai priorities. For example, participants told us of a "shortfall in information about domestic management of risks around contaminated food, and felt this was a responsibility for the authorities." This statement helps us understand a risk (contaminated food, Priority 1), has a message for authority (responsibility to inform, Priority 2), suggests an investment for resilience (cost of informing, Priority 3), and contributes to preparedness (better management of risk, Priority 4). It makes sense to start with a closer look at Sendai itself.

Sendai 1: Understanding risk

Disruption of societal organising systems

We previously referred to logic models for the link between climate and health (Figures 2.2 and 2.3) .[30,31] A less developed aspect of these models is the ability of weather events to bring all activities, including health-related ones, to a standstill. It happens, as our research participants told us, via disruption of societal organising systems. It is one reason why, for example, cancer may be a significant part of the suite of climate-induced health outcomes. It is a relevant and important consideration for Sendai Priority 1, Understanding Risk.

Participants told us of systems risk

Apart from the aspect of disruption to systems, testimony we heard aligns with global statements on the link between climate change and

health. But it is a big 'apart'! Almost all testimony touched in some way on disruption to essential systems, that make up the fabric of society. Therein lies a significant part of the health dimension of disaster risk. Fortunately we also heard a lot to suggest how such risk could be mitigated.

Sendai 2: Strengthening governance

Tension between central and local government

Corresponding to the recent UNDRR Country Report, our intervewees reported shortfalls in local implementation of Civil Defence.[34] At the same time, interviewees tended to look to *central* rather than local government for funding of longer term arrangements. The tension between central and local is an aspect of New Zealand culture that has been reviewed in the governance literature.[143]

Coordination starts with relationships

A recurring point made by interviewees was a need for improved *coordination* of the disaster response. We think the seeds for improved coordination can be found in commmunities that have high-quality relationships. An example is marae that have local knowledge of their people, including their locations and needs. Such communities are primed to engage effectively with the next larger scales of organisation. The same logic applies across successive scales, including central Government. For this reason in our view, "decentralization and high local autonomy" is to be encouraged. It is a precondition for organised reengagement at larger scale.

Priority 2 and Article 2 of Te Tiriti

In some locations, Article 2 of Tiriti could be said to have weathered the Cyclone pretty well. There were many examples of Māori communities exercising Tino Rangatiratanga with good effect for their people. On the other hand, autonomy also depends on resourcing. The Article 2 experience for Māori would probably have been better if there were not such high background levels of deprivation. Hapori Māori, with their Marae and Hauora, are a distinguishing feature of life in Te Tairāwhiti and Te Matau-a-Māui Hawkes Bay. Our interviewees attest to their ef-

fectiveness in mitigating the Cyclone's impact.

Pacific knowledge

Similarly, New Zealand's disaster risk governance should open the door to Pacific knowledge. Māori see a continuity of values with Pacific whanaunga. Pacific communities are strongly established in this country. Pacific people have direct relevant knowledge of risk reduction and response to extreme weather events and other natural disasters. This is recognised by the Ministry for the Environment in its National Adaptation Plan for Climate Change. Māori and Pacific knowledge is already in this country, and offers the UNDRR's sought-after "vision, plans, competence, guidance and coordination within and across sectors, as well as participation." In this context we would urge the Government to strengthen Pacific leadership in governing and policy decision-making.

Local knowledge in rural health

Community strength is not a sole preserve of Māori and Pacific but is also a consistent finding in rural areas. Our Participants agreed that rural individuals, communities and primary care providers knew their own needs. This included knowledge of individual patients with critical needs, knowledge of broader community needs, and practical knowledge to overcome barriers to access.

Top-down governance

The Cyclone revealed a tendency on the part of those in power to discount such local knowledge. The health system response to the disaster manifested as a top-down approach, driven by government agencies from urban settings. Agency decisions reflected agency priorities, not those of the community. Local knowledge was either not acted on or not sought. This became more apparent, the further the remove from the centre of power. It was especially apparent for rural communities and for Māori communities.

Sendai 3: Investing for resilience

WHO Framework for resilient health systems

The WHO resilience Framework (leadership, workforce, health information systems, essential medical products and technologies, service delivery (including preparedness and managing determinants of

health), and financing is relevant to what we heard from our participants. Within rural primary health, interviews revealed challenges with the legacy model of care. In noting the sometimes critical reports we heard people, it is important to differentiate between the positive intent of health workers, and the system they inhabit.

Little proactive outreach by services

Many patients have complex needs, requiring specialised input from both secondary and primary care. Yet services varied in the level of proactive outreach to these patients. Generally it was individuals in communities that identified patient needs and advocated for action. Responses were from whānau members, other community members, or from health workers and nurses embedded in the community. A notable exception was the response by community pharmacists, who worked through informal networks to deliver medication to patients. Another exception was cancer chemotherapy, that managed to continue through the period of disruption (page 193). We identified the *model of care* as a key determinant of a service's ability to proactively engage with individual responses.

Predictors of success

The limited global literature and our own findings suggest a need for improved health service financing, governance, and model of care. Success will depend on deeper rural community engagement, expansion of the rural primary care workforce, and systematic planning for future disasters.

Sendai 4: Preparedness and Building Back Better

The essentials

Our participants told us of experiences with power, water, transport, communication, monitoring care, record-keeping, and the medical supply chain. In keeping with the Sendai texts that prioritise women, we also heard a consistent positive message about the role of women in society.

Power and water

1. Many rural settings had access to emergency petrol and diesel generation. Use was limited by fuel supply, especially in rural hospitals. Participants went to great lengths to capture and conserve water, including filling baths, and not flushing toilets. Some groups of women with access to tank water would volunteer to do others' washing at their own homes.

Vehicles

2. Capable vehicles, including 4WDs and ATVs, facilitated access to locations that had been cut off by road failure. Continuity of service in rural primary care often depended on ATVs provided externally by local people. Although there exist precedents for supply of 4WDs from Health New Zealand | Te Whatu Ora to rural medical centres, it is not universal.

Communication

3. A minority of primary care settings had satellite internet, satellite phones, and radio transmitters. The backup systems must be networked across all groups needing to communicate, including the health service, first responders, and communities.

Cloud-based records.

4. Participants often reported lack of access to electronic records. People fell back on pen and paper, despite its limitations in transfer and backup.

Leadership of women

5. Women in various roles across the community (i.e., local government, marae, iwi health providers, school principals, non-profits and social service) showed highly responsive leadership in the cyclone response. It was shaped by their deep community knowledge, relationships, organisational skills, compassion, and empathy. In particular, wāhine Māori leaders (e.g., marae, schools) demonstrated innovative leadership, shaped by cultural values of aroha and manaakitanga. Our findings reinforce Sendai statements about the positive role of women in disaster preparedness and recover.

5.2 Research Outputs

Sequential logic of the outputs

This section addresses the Ministry's contracted research requirements, as noted in Chapter 1 at 1.1. We start with a description of the problem, then move to evaluation of the response, and end with recommendations for action and monitoring.

Determinants of Health

Determinants of health during and after the Cyclone

Our work further reveals how health may be determined by climate, in its manifestation as adverse weather. We consider health determinants under headings of direct physical effects, whānau, history, place, sociocultural, accommodation, transport, economy including work, and organisation of the Cyclone response.

Silt and contaminants

Participants told us of their experience handling silt and contaminants, especially in Hawkes Bay. This lead subjectively to an increase in respiratory problems. It was especially so during clean-up efforts. At that time people were unaware of the danger so did not wear appropriate PPE. Although we were not able to resolve a corresponding signal about respiratory admissions in our quantitative dataset, we identify this as a topic meriting further study.

Gisborne water pipe failure

Storm water load had hydrological consequences. In Tairawhiti, where land slippage broke the Gisborne water pipe in ten places.[144] The network suffered damage to about 100 km out of 285 km total. This rapidly and comprehensivley revealed the vulnerability of water distribution. For 45 days, Gisborne was dependent on supply from its emergency plant at Waipaoa.

Waterway contamination

Waterways were contaminated by entry of untreated wastewater. People told us how they lost use of the rivers and ocean for recreational activities. Waka ama paddlers and surfers reported increased skin infections, with risk persisting for months after the event.

Inability to check in on loved ones

People reported distress in the phase without telephone or internet communication, because they could not be sure of the wellbeing of whānau and friends. It was a significant issue for those who were otherwise relatively spared in direct terms. It also affected first responders and health providers.

Mental trauma of loss and fear

Dimensions of personal loss weighed heavily on people's mental wellbeing. This included loss of homes and assets, loss of connection to family history and the past, loss of pets and livestock, loss of plans for the future, a sense of lost control over the life course, and loss of income and livelihood. Alongside these feelings, participants told us of fears about their future, about the ability to ever recover, that they might be soon forgotten about and abandoned, and that the event could happen all over again in a few short years.

Matemate-a-one

Māori continue to experience trauma and sadness associated with the loss and destruction to their whenua, awa and moana, and the difficulty of returning to their marae in many parts of the region due to roading.

Relationships of trust

Relationships of trust can be identified as a key positive determinant of health. Apart from direct benefits for mental wellbeing, they increased the ability of organisations and communities to deal with communications and power outages. The ability to find new ways to connect and collaborate, share limited resources, and respond to those most in need, all depended on prior relationships of trust. Similarly, people already advantaged by prior connection into the system did better than those at the margins or who had vulnerabilities.

A community focal point

Leadership and coordination of regional responses was markedly constrained by outages of communication. It was left to whānau, neighbours and individual communities to assess local needs and respond. Localities generally did this well, if they had a strong focal point such as a marae, tavern, or community hall. Those without a strong focal point generally struggled.

The price of duty

Health providers and emergency responders often neglected their own needs consequent on a sense of duty. This often had consequences for their own mental health and relationships. It could lead to burnout, regrets and resentment.

Sketchy accommodation

Not all evacuation centres were suitable for the purpose. Some lacked facilities and exposed people to physical hazards and culturally inappropriate situations. Many participants felt that evacuated people were simply dropped off at the nearest 'high point', and that there was no evacuation planning or organisation.

'Non health-related systems'

Study participants identified a strong link between community wellbeing and such so-called 'non health-related systems' as roading, housing, communication, water, and work.

Disorganisation and confusion increases risk

Initial confusion as to the severity of the cyclone's impact delayed evacuations and some response efforts, increasing people's exposure to risk. During the recovery, lack of coordination sometimes saw reduplication of community services by multiple organisations. This diverted resource from areas of need, and could further increase confusion.

Synthesis with Indicators

Safety of RSE workers

The wellbeing of Registered Seasonal Employment (RSE) workers emerged as a significant concern in the study. It was a strong negative example of the importance of being integrated into local community. Most RSE workers have English as a second language. The experience of rescue and evacuation was often disorientating. Many felt let down and abandoned by their employers, confused, anxious and isolated. In this context, some workers were exposed to unaceptably elevated personal risk, for example in escape from subnmerged buildings. The workers themselves showed resilience and inventiveness in the face of adversity. We would like to see greater attention paid to their welfare, that is especially jeopardised in an emergency.

No finding on maternity or child health

We did not identify performance shortcomings in maternal or child health in this study. The possibility of a false negative finding cannot be excluded. For example, we may have missed information on account of the ethical restriction that meant we were not permitted to interview children. This is therefore a limitation in our study.

Continuity of cancer services

One of the remarkable findings was the ability of the cancer treatment service to continue to provide care to people receiving chemotherapy. This may reflect a more community-integrated organisation of specialist services in the regional centres. For example in Gisborne there is no cancer specialist who is permanently on site. The service is run by senior nursing staff, who have extensive prior operational and relational connections across the health service and into the community.

Ambulatory Sensitive Hospitalisations

After correction for population structure, we did not find a significant difference in Ambulatory Sensitive Hospitalisations (ASH) across the time of the Cyclone. This is in contrast to the COVID-19 pandemic, when incidence of ASH significantly fell. Both the pandemic and the adverse weather imposed restrictions on physical access to hospitals. In both settings there was also an element of public awareness that hospital services were under pressure. As noted previously, in the pandemic there was the added dimension of hospital avoidance.[132] Moreover, the pandemic restrictions continued for a longer time. These factors could work to explain a detectable suppression in ASH activity across the pandemic but not across the Cyclone.

Late mental health consequences

Access to primary mental health and addiction services has been disrupted across the Cyclone and recovery. An even larger issue that was repeatedly mentioned is the expected increase in demand for services due to the weather's late mental health consequences.

Disability and telecommunication

Many people living with disability told us of the discomfort, fear, and stress of the adverse weather, especially when they were living without other people at home. Loss of communication was a particular issue, as it connected to a fear of being forgotten.

Effective Actions

It is important to exercise care when addressing the topic of what went well during and after the Cyclone. For those who continue to suffer, a focus on the positives risks trivialising the impact of the event. Even so, we can identify some things that have mitigated the harm caused.

Collaborative organisational networks

We learnt of extensive collaborative networks forming between different organisations. At the centre of these were health providers such as GPs, pharmacies, and Iwi health organisations, and community hubs such as marae and schools. The networks extended, to varying degress, into Civil Defence and Council, and local non-profits. These synergies often had their start with pre-existing informal networks and relationships. They are now more formalized, with confidence of the ability to work together in support of communities at the next emergency. Many of these groups and organizations identified the need for collaboration rather than competition as a key learning.

Recognition of need as trigger for action

In Tairāwhiti, we heard of powerful relationships between and within communities that surfaced through acknowledgement of the needs of others, combined with awareness of capacity to support. For example, we heard how the Cyclone prompted new relationships between Pacific and Māori communities. Although it caused major strain, the Cyclone also spurred powerful examples of community care, compassion and social cohesion. These offer exemplars of the way in which models of health care could be re-shaped for better resilience.

Performance of community responders

Participants were consistently positive about the responders, both professional and civilian, who rescued people trapped by floodwaters. There was comparable praise for those communities and neighbourhoods who mobilised their organisation during the response and recovery.

Preparation of local leadership

The Cyclone has spurred many local groups and organisations to rethink their systems and preparations. This has been seen amongst schools, marae, health providers, non-profits, businesses, and govern-

ment agenices.

Standing up local food systems

People in Te Tairāwhiti told us of innovation in local food systems. This included harvesting from community gardens, with distribution by community hauliers, and organisation from non profits.

Reset of specialist services

The experience of isolation from essential centralised services prompted significant post-event reconfigurations of care in the community. For example, chemotherapy infusional treatment is now permanently available in Wairoa. At the same time, Ngāti Porou Oranga (NPO) has started a shuttle service for health appointments in Gisborne City. These changes are expected to increase resilience in the event of future adverse weather.

The resilience of radio

Radio showed its standout resilience from amongst communication methods. Participants told us that the work of "Bevan from More FM" was especially positive for morale in Tairawhiti. The importance of radio as a community resource was recognised in a local Museum display.

6. Tohutohu | Recommendations

The Health System has a wide reach

Here we recommend health system actions to address health determinants and impacts from Cyclone Gabrielle (Section 1.1). The scope of action is not only what is under the health system's direct control. As per the Ottawa Charter, we also address the health system's vital role in dissemination and advocacy towards health-adjacent systems. It is important to recognise that preparedness is not limited to flooding but must also extend to earthquakes, vulcanism, tsunamis, and hurricane force winds. These additional emergency events would require substantial increase in capacity, exceeding that needed for a flood.

How systems need to change

In just a few months, our research team interviewed 143 survivors of Cyclone Gabrielle resident in Te Tairāwhiti and Hawkes Bay. At the same time, we considered 19.6 GB of Te Whatu Ora | Health New Zealand performance data. The insights form the basis of our recommendations as to how systems must change, to reduce the risks from future such disasters. Our vision of success for Disaster Risk Reduction has:

- Community empowerment,
- Health Services in the community, and
- Procurement for continuity

6.1 Community empowerment

This has been a project about communities

This has been a project for and about communities in Te Tairāwhiti and Hawkes Bay. But not every community is empowered. People consistently told us their experience of the Cyclone and its aftermath was better, to the extent they could draw on community connections. We found

many avenues to improved community health are not under direct control of the health system. In fact, many are and should be under primary control of communities. These are the people who endured the weather, and who are recovering from it at the same time as they prepare for the next event. Communities can be known by their residents, their organisations, and their local businesses and providers of health and social services.

Centre communities to mitigate power imbalance

We previously applied a Te Tiriti o Waitangi analysis within the Sendai Framework (see 2.2). Te Tiriti makes guarantees to Tangata Whenua in realms of Kawanatanga, Tino Rangatiratanga, and Ōritetanga. Similar to Cultural Safety in health care, a Tino Rangatira principle mitigates the imbalance of power between Crown and Māori. The same point is reiterated in the Sendai call for people-centred approaches that are inclusive and accessible.

Not every community is empowered

Our qualitative findings include a theme of Activating Communities, with subthemes including the Power of a Cup of Tea, the actions of First Responders, and instances where Communities Took the Lead. People consistently told us their experience of the Cyclone and its aftermath was better, to the extent they could draw on strong community connections. But we also heard it is not universal. Some communities have been hurting, and indeed hold a question as to their longer-term viability.

The health-adjacent is important for health

Here are some more specific recommendations to put communities at the centre, along with suggestions for how they might be actione and who would be responsible. Most of the recommendations are not under direct control of the health system. We are confident that they will work towards improved community health and wellbeing, even when there is not a disaster happening. Also, these are things that *ought* not to be under direct control of the health system, rather they should be under primary control of communities:

Learn about the whenua

1. **Local knowledge**: Raise awareness and train residents on how to prepare their home and community for all types of disaster that affect access to health and vital supplies.

Build connections

2. **Local relationships**: Establish and maintain strong, trusting local relationships between (a) residents, (b) residents and community hubs, (c) community hubs and services, (d) services themselves. It is important to encourage connection to neighbours and local level information sharing.

Identify leading community organisations

3. **Local hubs**: Map and identify existing local hubs including marae, residents' associations, community organisations, and local service providers. Where community providers do not exist, work with community to establish new hubs. Fund, adequately resource, and work with local emergency hubs to form leadership networks.

Ensure layered systems of resilience

4. **Local food and medicine**: Develop local food, water, and medication resilience plans to cover all residents for at least 14 days. Support longer term investment in regional food resilience plans.

Preprare individuals and households

5. **Local plans**: Develop local emergency healthcare continuity plans.

Resource equitably

6. **Local support**: Everyone in the community must have a way to prepare for disasters. Not all whānau always have resources to do this. Some need additional resourcing and support to maintain access to essential nutrition, water, heat, shelter, and care.

Connect communities at larger scales

7. **Local connections**: Community preparations must connect to larger scales of organisation and their resource pools. Effective community organisers should be rapidly identified and linked into polycentric governance network. Agency functions should be empowering of communities.

6.2 Health Services in the community

Access depends on infrastructure

The main thing health services should now do to reduce disaster risk is increase their presence in the community. We repeatedly saw how prior connection into services was the best predictor for a favourable experience during and after the Cyclone. We also saw how loss of roading and communications could shut down service access. One of the positive outcomes has been greater deployment of specialist services outside of regional centres.

Expected community mental health need

Integration of health services into the community is at least as relevant to everyday care as to emergencies. The community is where health happens, where people meet their challenges, and where they find their strength. Communities especially told us they expect a long surge of mental health and wellbeing need in the adverse weather's wake. Our health service needs to be there to receive it.

More specific recommendations addressing health service community integration are:

Plan for an increase in mental health need

1. **Mental health**: There must be investment into weather- and climate-related mental health and wellbeing. Many who experience anger, grief, fear, hopelessness, and anxiety are at risk of enduring mental ill-health. Little support has been available, even months after events, even though trauma is still being dealt with. Mental health support must see the acute and chronic effects of extreme weather events and climate change on community wellbeing. Approaches must be designed with and for the social, cultural, geographical, and gendered specifics of affected communities.

Improve everyday access

2. **Specialist services**: The health system must continue to take specialist services into community and rural and remote settings.

Adopt rural health services as community hubs

3. **Rural Health**: Rural health services already work as key community hubs when disaster happens. Urgent work is needed to resolve rural workforce issues, and invest in rural primary care infrastructure.

Prepare for contaminated silt and food

4. **Environmental health**: There is a need for education and community planning for more sustainable land use and future flood debris clearance (silt, large woody debris), including availability of personal protective equipment (PPE).

Connect town and country

5. **Urban health**: rural communities and services are often more self-aware than their urban counterparts. Health and emergency services should build connections between urban residents, and have clear systems for checking on urban residences.

6.3 Procurement for continuity

Procurement is central to Sendai Principles

As noted above (2.2), procurement is central to Sendai principles of investing for resilience and enhancing preparedness. The New Zealand Government Procurement Principles make a similar call to agencies to plan ahead to allow for provision of goods and services in an emergency. Despite the significant adverse environmental, social, cultural and economic outcomes of disasters, procurement does not currently make emergency planning a stated priority. Neither does it refer to health.

Procurement can actualise Health in All Policies

Our work shows the relevance of many 'non-health' or 'health-adjacent' systems to community health and wellbeing. Examples are infrastructure for transport, communications, power, and water. In the absence of these things, the health system grinds to a halt. Funding and organisation of these other systems is beyond the direct control of those who work in health. Because procurement is done by all agencies, it is an ideal prospect not only for disaster planning, but also to realise the Otttawa Charter and its notion of Health in All Policies.

Health System can learn from Procurement

Many people working in health told us of the stress they experienced managing resources in the face of need and uncertainty. We feel stress might be reduced if current Emergency Procurement guidance were more widely adopted in the health system. This could support greater trust by budget-holders towards those more directly involved in the response. It is a recurring theme across all imbalances of power, from national to regional to local and community.

Everyday systems must be resilient

For the sake of health, we recommend the profile of disaster planning be elevated in procurement. Everyday systems should be able to get people through a disaster and its aftermath. Improved preparedness will require building redundancy into existing systems. Procurement should be a means whereby we invest for resilience. Some more specific recommendations include:

The first priority is to find out your loved ones are safe

1. **Communications**: Telecommunications procurement must be able to accommodate network outages. A fail-safe communication system is vital for health and communities. Rural primary care must have access to satellite internet, satellite phones and radio transmitters. Wireless Local Area Networks at public facilities must include a open access option that is free at the point of use.

Hubs must tolerate outages

2. **Power and water**: Community hubs, including rural primary care clinics must have provision for decentralised power generation and water supply.

Medicines need regulatory review for emergencies

3. **Medicines**: There must be robust planning for localised emergency supply, storage, and distribution of medication and medical supplies. Dispensing rules also need to be flexible in emergencies.

Transport and distribution plans must be robust

4. **Transport**: When roads failed during and after the weather events, it showed the need for robust transport and distribution

systems. We recommend everyday access to four wheel drive (4WD) vehicles for rural primary care providers.

Invest in the carers

5. **Human Resource**: We must invest in support services for our health and caring personnel. Many health workers, emergency responders and emergency service providers were also severely impacted by the cyclone.

6.4 Future research and audit

Metrics to monitor equity

This project showed how unequally the harms of adverse weather can fall. For example the loss of bridges often meant that formerly close neighbours would be separated by a round trip of several hours. Such things become issues of equity to the extent they could be avoided by advance planning. Likewise, the disaster worsened prior health inequities, as we saw when those already facing barriers did not have ready access to the system in the emergency. Because these things relate to visits that are *not* made, and service that is *not* given, they are inclined to go unseen. This justifies recommendations for metrics to monitor equity, specific to disasters:

Maps can address geographical inequity

1. **Geomapping**: Maps are especially relevant to disasters, that are about the interaction between people and the physical landscape. By making apparent what would otherwise be far away and less noticed, maps can visually reveal geographical inequity. *Cartograms* are a form of map in which the mapped space shows visual indicators of numerical data. So for example in maps developed for this project, we were able to report on the travel time taken for residents to access medical services. Government agencies widely use map information. We see increased relevance for these formats to track progress, as health services move to closer

community integration. We predict they can be usefully used to track progress of measures for Disaster Risk Reduction.

2. It is a limitation of our study that we were not able to further integrate maps into our analysis. One factor was that we received geographical data only for Statistical Area 2 (SA2), a lower level of resolution. We recommend future Investigators be able to access SA1 data, the highest available resolution. Access to SA1 data permits mapping to be used to a fuller potential. We do acknowledge the greater implications for privacy that come with more precise geolocation. We consider that privacy and related ethical considerations can be managed with careful attention to analytic protocols.

3. A further limitation is that we were not able to access map data on disruption to roading systems. Absence of such data meant this study could not demonstrate the potential of maps to show how roading disruption may increase health inequity, likewise how roading repair can mitigate inequity. We recommend Investigators routinely incorporate data about infrastructure into their analyses of health system performance.

GCH18 Rurality Index

4. **Rural health**: in New Zealand the Geographical Classification of Health (GCH) identifies rural, remote and isolated communities and families. We recommend the continued use of the GCH to track both need (e.g., increasing travel times) and system performance for people affected by geographical inequities. Further work can examine how rurality intersects with other priority populations and socio-demographic factors, for example the impact for rural Māori, and the impact for rural areas with high levels of socioeconomic deprivation.

ICD-10 and DRG diagnostic codes can identify need

5. **Dedicated code-sets**: ICD-10 and DRG diagnostic code sets are

routinely recorded as part of hospital admission, primarily for organisational financing. Alongside other hospital business intelligence, clinical codes can reveal patterns of service use according to particular health states. Although Ambulatory Sensitive Hospitalisation has not been specifically developed for the study of hospital performance after a disaster, we found it to be a useful indicator for this purpose. Another example of relevant codesets are those correlating with waterborne illness after flooding events. We recommend the Ministry develop equity metrics using these sources of routinely acquired health system data.

6. **Coding for function**: The ICF International Classification of Function is not part of the routine data take in New Zealand public hospitals. We went some way to developing a set of codes that could correlate with functional status. It is desirable to keep track of service utilisation by people according to functional capacity, alongside their personal identification of disability or otherwise.

The National Collections are a valuable resource for monitoring equity

7. **Statistical reporting tools**: We offer the visualisation and statistical reporting tools developed in this project as the basis for metrics to monitor equity. Using these tools, we were able to gain insights as to the performance of different health services across dimensions of time, space, and demographics. They can readily be developed with reference to New Zealand's National Collections.

8. **Value of National Collections**: We reiterate the major value of the New Zealand national Data Collections, for understanding emergency events and for surveillance in their aftermath and recovery. The Collections offer a comprehensive source of information for understanding equity of access and performance.

7. Arohaehae | Appraisal

Performance against study objectives

Te Weu me Te Wai had five objectives. Three related to reporting (quantitative research, qualitative research, integrative scholarship) and two related to study conduct (building local capacity and decolonising methodology). Here we assess performance against the objectives. We focus on the experience of working in the project.

Experience of the project

Te Weu me Te Wai: a new collaboration

Our objectives for study conduct were to build local research capacity and partnerships, and to create a replicable approach. Te Weu me Te Wai was a new collaboration for its partnering organisations. We hope this report can be of value in shaping future work of its kind.

Stress of research bidding process

Under constraint of time, the Ministry restricted its call for research to universities, who sought collaborative links into affected communities. Feedback from community groups was that this caused stress. In the space of a few weeks, they had to decide between different possible collaborators, in research where there was a strong case for community control. It is hard to see an obvious remedy from the Ministry's perspective. Although there is no *prima facie* reason why a community organisation should be less effective in finding a partner from the Universities as vice-versa, there are a lot more community organisations than Universities. Perhaps the best longer-term remedy is to keep a record of community-academic collaborations where they exist. Then in future cases, the collaboration can be approached.

Suggestions for future calls for research

Experience of Work in the Project

The project partnership was formalised with a Memorandum of Understanding as part of the Study Protocol. Feedback from the local community research teams was that there was ongoing and respectful dialogue with the academic instiution, but it wasn't always easy and everyone had to work at it. It was an ongoing effort from all sides to engage in respectful dialogue, to listen to and respect different forms of

knowledge, and to collaborate. The teams kept coming back to the table. There was work from all directions (university and community research teams) to make the project succeed.

Financial equalisation

Control of a large part of the budget was transferred directly to the community partner. This called for careful attention to budget transparency from both sides. It had a significant role in equalising power relationships. We would advocate such an approach in similar future partnerships.

Remote working and in-person working

While workshops were conducted for those who preferred in-person engagement, virtual sessions via platforms like Zoom and MS-Teams could accommodate those who needed or preferred to work remotely. An open email channel was maintained whereby project team members could share thoughts, suggestions, and advice at their convenience. Dropbox was used for accessible cloud-based sharing of study documentation. We could not overcome University IT security that excluded community access. Such an issue might be avoided if the community partner were the primary research contract holder.

Local knowledge resource

Local knowledge embedded in the community became a valuable resource for the project. This went beyond description of the cyclone, to understanding the web of relationships, cultural nuances, and historical context that shaped community responses.

Project Progress and Achievements

Data collection and analysis

A key achievement was the effective execution of data collection and analysis phases within tight timeframes. The University worked closely with the Tairāwhiti and Hawkes Bay teams to help deploy their methodologies. The data collected was not only extensive but also representative of the diverse dimensions of community experience after the Cyclone.

Synthesis of findings across communities

The two community teams agreed their qualitative methodologies

needed to be specific to their own region. This made for a challenge in generating a synthesis framework for the data. This was resolved in a combined synthesis exercise on 22 February 2024. With combined regional perspectives, we could understand the differences and similarities of experience across the Tairawhiti and Hawkes Bay regions.

Budget re-allocation

Challenges such as resource constraints, communication barriers, and timeline adjustments were mitigated through flexible project management. Regular check-ins and adaptive planning were instrumental in overcoming obstacles. Early in the project, it became evident our first pass on the budget was not enough to meet extensive planned community engagement sessions. The project team reallocated resource away from academics were not actively involved in the project.

Dissemination of results

The project team presented at a research symposium in Gisborne on 15 and 16 February 2024. They shared their research methodologies and high-level outcomes to stakeholders, academia, and the community. The project aimed to maximize its accessibility and usability into domains of community, policy, education, and the digital realm.

Challenges

Balancing resource

There was periodic challenge in balancing the project's financial, human, and technological resources. Regular budget reviews and checks by an experienced University finance specialist gave reassurance that expenditure would not go beyond budget.

Human resource

The short project timeline made it a challenge to recruit and retain University personnel. As much as people were willing to take part, their availability was often restricted by prior commitments. In the later phases, the University experienced a shortfall in staff. By this time however the commmunity had built its own capacity, and was happily able to take on some tasks originally held for the University. It required administrative care to reallocate budget lines into the Community, in keeping with principles of transparent procurement. Our project manager gave

Project Manager reflections

the following reflections on study conduct that could be of value for further such work:

1. Ensure persons recruited for the various parts of the project have the right experience for the role
2. Ensure persons hired for the role remain in the roles they were employed to cover, unless there was an experienced equivalent FTE or part time person who can take over the work
3. Joint leadership of the Project team needs communication and clarity as to roles, to avoid confusion among team members

Pressure of time

Notable sources of timeline pressure included availability of personnel, and timelines for ethical approval. These depended on goodwill of independent ethical review panels, that had knock-on effects into subsequent project milestones. Health New Zealand | Te Whatu Ora Locality approval was a sensitive topic. It often depended on review by clinical staff who had competing work responsibilities, including managing after the cyclone itself. We are grateful to the Ministry of Health for offering extensions from the original 31 January 2024 deadline to 13 May.

Need for good will

Dealing with project challenges required planning, adaptive strategies, and effective communication within the team. More than anything it depended on good will, good humour, and belief in the kaupapa to maintain project morale. It was a learning journey for the Principal Investigator, who takes responsibility for the challenges that happened along the way, and looks forward to the next steps.

8. Pēpeha | Quotes

8.1 Summary of Findings

Quotes Pointing to Recommendations

"You know like I was the wrong person to be doing courses up there. You know I don't speak Te Reo, I just know basic greetings and that's it" (*Female, Community Organisation Hawkes Bay*) "If we had a Pacifica facilitator, or, we could have opened more doors, definitely, yes. And I think if we had a Māori facilitator we would have been able to open more doors at that point." (*Female, Community Organisation Hawkes Bay*)	*Improve Cultural Safety and language support*

Quotes Pointing to Recommendations

"'Cause we knew days in advance that the cyclone was coming so my girls and I would watch the weather, we'd keep an eye on it that way. But no specific local warnings. And then of course over night we had no communication whatsoever so got up that morning and "And Civil Defence was very, very, very slow. Too slow, far too slow." (*Female, Impacted Person, Tairāwhiti*) "Probably evacuated sooner, yeah. I think the key thing is to evacuate sooner rather than later…..The water was on its way, yes, yes. So, yeah, that's what I say like we need to be better with our civil defence emergency management and whoever makes those decisions to notify people that there is an impending risk. And to respond, yeah. I think, you know, I was on the way out with the horse within 10 minutes of receiving that message so I did respond. But if I'd had the message earlier, I probably would've been able to get the cars out and get them up onto higher ground. Not so worried about your trinkets, probably take out more insurance." (*Male, Person Impacted, Hawkes Bay*) "The river measures, the management system, the emails that came out too late. I think it's been a shake up for the whole country that a warning can be so, yeah, that it can now come to this. So I think everyone going forward will be a lot more proactive about, yeah, letting people know what may or may not come. Like I see a lot more weather reports now saying it may not come to this but prepare and things like that, so that's good. Yeah, just being send the bloody message and say hey, it's going to, or beware that you may need to evacuate, yeah." (*Male, Health Provider, Hawkes Bay*)	*Strengthen Early Warning Systems and acute response*

Quotes Pointing to Recommendations

"We've got a mandate, a national mandate with Civil Defence, the government, to say this is what we do. But we were told a week before that is that oh no, that's gonna be happening there. So yeah, it gets a little bit like that. So we took a backseat really and just let it all unfold. But the point is that today we're still managing the stuff. Everyone else has closed up but we're still doing it 'cause that's our role. That's a national mandated role. …we're actually geared up to do this. In every other region I've worked in is that the (church based not-for-profit) we know our role, we move in, we do that. No one has to worry about that, we do what we need to do, that's it." (*Tāne Māori, Church-Based Non-Profit*) "We were pretty isolated because one thing that I felt in the formative weeks is we weren't invited into the council civil defence. They'd have meetings, but we weren't included." (Wahine Māori, Social Service Director) "Would be nice if you were taken seriously, right, as a key agency by those responders, and included in the [meetings and comms] … I suppose the recognition would be the best, biggest thing. What we're about… Because people, as soon as they get somebody who's 65 or older, straight away oh, Age Concern." (*Kuia Māori, Social Service Connector*) "Important to empower the community "That would be quite good to have the whole community, and a community approach to it, rather than an organisation approach. Like with COVID, we had a community approach to that, which is why we probably reached 90 percent." (*Female, Health Provider, Hawkes Bay*)	*Resource and empower the community and remove red tape*

Quotes Pointing to Recommendations

"Yeah definitely have to remove red tape in events like this, as well. I think there's just been so much politics that's been caught up in this, that it's actually put a delay on helping the people in all communities" (*Female, Marae Lead*) "Yes, sure, I guess when I think about it, it was possible to actually, well, I'm only thinking of my own individual needs. What I did identify though was we have that, the [Rural Locality] Memorial Hall, which should've really been our evacuation centre, you might say. So I'd like to see groups, you know, like [...] and [...] and, you know, having stuff in place. I'd like to think that the [...] Memorial Hall had a stack of mattresses and pillows in the back cupboard…..Emergency stuff, yeah, somebody with a key that can access the building and 'cause I'm sitting outside there and waiting for the police to come and pick me up and take me to St Josephs. The police could really well have been doing many other things at that time. I should've been able to, and there were people sort of walking around and about that perhaps if the [...] Hall was available, because it's raised and it's –" (*Male, Impacted Person, Hawkes Bay*)	*Resource and empower the community and remove red tape*

Quotes Pointing to Recommendations

"We'll kind of half-assed fill in the forms, we'd go and get the kai and the food. And we'll come back maybe within an hour, and honestly seeing the faces of our pakeke, seeing and hearing our tamariki, and their whānau. I'm like yeah, no, I'll wear whatever growling you want to give me. But hearing a kid yell out mum, mum, we're gonna have some kai, we've got some hot dinner, you know? I'm like stuff you, yeah that was the bureaucracy. It's like oh no I like to follow rules, but that was one of the times, and I did say to my CEO, heads up… who are we to assess whether a person needs kai? I'm like sorry, we've all just gone through this major catastrophe and you want us to sit there and say 'you've gotta fill out this two page form'? Then someone will sit there and assess and then we'll get back to you. And assess whether you do need this food or not. The person doing the assessment, do they ever meet the people who they were assessing? Na. Na. It's all dependent, it was all dependent on the information they provided in that form. And in order to get kai you had to fill out that form… you're standing there, a hot day, you know this is like maybe the 20th house we've been to. And you're expected to fill out a two-page form and you can see quite clearly this family needs food. There's 18 people, 10 people in a house, two-bedroom house, come off it! (*Wahine Māori, Social Service Leader*)	*Resource and empower the community and remove red tape*

Quotes Pointing to Recommendations

"I do think it would be useful to have more idea about, and I don't know how this could be, like after it happened to have someone or something guide you. You know, I talked about a bit of this at [Friend]'s, to guide you through the process. Or even to inform you of this has happened so this is going to be the process." (*Female, Impacted Person, Hawkes Bay*) "I think, so the things we needed as a community were number one, first and foremost, well ahead of everything else was decisions. So have a framework in place for someone to make a decision and give them the authority to make that decision. Because everyone in these bureaucracies just won't take ownership, won't take responsibility in case it comes back to bite them in the arse. So they have to have people there that have got the commonsense and the authority to just make decisions and get stuff happening. The other things they can do, find, just have resources, or access to resources quickly and get them where they need to be quickly. So fuel, water, generators, they're probably the three most important things, so whether they do that…. Yeah, no there were containers everywhere, no we were watching them floating down the river. But if you've got a secure place to put one, and put generators, and water purifiers, and all that sort of stuff, tools and have those in key places in key communities. So that if they're cut off, as we were, we can access with some immediacy, you know? Get power up so we can then get communications up –" (*Male, Impacted Person, Hawkes Bay*)	*Improve coordination*

Quotes Pointing to Recommendations

"We had a community meeting with the Council, and our Mayor for CHB, and that was brought up, because I think I was high school, so it would have been about 2004/2005, was when the infrastructure around Porangahu was last updated, which was by my father, and he said after the, sorry after the flooding he said that the infrastructure that he put in back then wasn't, would never cope with the volume of water that they had. So, he said, yeah the main one would be to update the infrastructure around Porangahu, so it copes next time around. The stuff around home, yeah there's been something that we could do off our own, out of our own wallet or stuff. It won't be someone that the tax payers could probably get into, or rate payers and what-not, I'm guessing, but yeah, the stuff around Porangahu to help with, well to stop it from flooding next time around, yeah. It's definitely something to look into in the future." (*Male, Impacted Person, Hawkes Bay*) "I think strengthening our communication system would, so that what happened this time couldn't happen again, like with the cell phones towers going down. Like I don't know, put them up higher, or I don't know, just strengthen them in a way that this couldn't happen." (*Female, Impacted Person, Hawkes Bay*) "Well, I have to say the Red Cross. Their walkie-talkies did not work, and then the kids' ones did. So, I mean, that was just, mmm. Matt said, be patient. I said, aaargh. It was really a bit of a training, but you know, good on, if it gave them experience, then good, and it was a complete fail, yeah. It was just, they, mmm. It was interesting to watch them…." (*Female, Impacted Person, Hawkes Bay*)	*Pre-empt infrastructure issues*

Quotes Pointing to Recommendations

"Yeah, pot holes. Pot holes and pot holes. So, they had 56 tractors driving the same road, and so that was our main easy road once they got that bridge open. So, there's 1000 people that way, to use this road, with the 56 tractors, which had to work, but there was, it was, you had to memorise where the pot holes were every day, because you just didn't want to hit them, and it's, yeah I mean, it held up. That road held up really well for what it had on it. So, at the moment, I have to go via, oh no, I don't know the road. The dump road, and that has a drop-out of shingle, and they've only just fixed one bit of the road, and that was about four weeks ago, and that's everyone that's going to Hastings out this way is using that one road, and if they fix it, then it's going to, it will take longer to drive. So, our roading is our weakness. Our bridges are our weakness, I think, and particularly if you ask now, I mean, the farmers would say the fencing, the slips and all of that, but everyone has to travel the roads." (*Female, Impacted Person, Hawkes Bay*) "I guess the big thing was communication. Just having a whole town cut off completely physically by road and by satellite etcetera. I understand that they were quite quick in getting Council communications up and running but as far as providing for the town, that took quite some time for them to organise. I would've loved to have seen the Starlink stuff happen really quickly so that we could at least communicate with people. People outside of Wairoa seemed to know more about what was going on than we did here. Oh yeah, that first night at the hall, we were the only people who had a radio so we were able to tune into National Programme and listen to the news and hear what was going on. So as far as like communicating with us, I wish that they would've come into the hall and communicated more often. Usually it was one designated spokesperson who came and talked to us once a day. And when you're stuck doing not a lot because you can't do anything it's a really long day." (*Female, Impacted Person, Hawkes Bay*)	*Improve Communication*

Quotes Pointing to Recommendations

"Yeah, absolutely. Like, I talked to someone on the MSD line that was in Auckland and they had major flooding there, and she was like, it was just nice, like, 'oh my God, yeah, what can we do'? Yeah, those kind of people need to be frontline. People that actually want to help." (*Female, Impacted Person, Hawkes Bay*) "Yep, yeah. And put people that are empathetic on the lines of work, because that one person is therapeutic on its own. You're like, 'oh my God, this person is amazing'." (*Female, Impacted Person, Hawkes Bay*)	*Show Empathy and Manaakitanga*
"So yeah, and maybe training to teach people how to survive on that. Like, 'hey I've got lentils and I've got pasta and I've got mince, what can I make'? Like, here's a kai cooker, use that. Just education around how to survive really, to be honest. Because I grew up in a background of hunters, cadets and army life so I'm actually fortunate that I actually know how to make shit, but there's a lot of people that didn't. So access to things like that, like, go into the bloody hall over there and hold a big workshop of, like, 'this is what you actually need to grab, like, for survival mode'. First aid survival and that. Like, get the aunty in here. We had the aunty in here and I haven't seen them once. It's like, bugger, I've seen the helicopter a whole lot of times and I haven't seen them once. Yeah, so." (Female, Impacted Person, Hawkes Bay "Absolutely. Yeah, and if there's funding don't make too much hoops because then people are like, 'oh I just can't be bothered now'. Like we need this and we've got people that can do it, yeah, just, they know the area, they're from here, they love the community, teach people how to build a trench, teach people how to make a bloody long drop, teach people how to clear out their waterways." (*Female, Impacted Person, Hawkes Bay*)	*Teach survival skills*

Quotes Pointing to Recommendations

Their area had no help whatsoever and they'd been missed out. And they were absolutely desperate, absolutely desperate. You had very ill elderly. You had young babies. You know, you've got to think about all of dysentery and the bugs and there's no water. (*Pākehā Woman, Not-For-Profit Org Leader*) There were several deficiencies, but if you're looking at the worst ones – communication, the ability to communicate with the outside world was awful…even the hospital, Te Puia Hospital didn't have ... no way of communicating. That, to me, is just ridiculous. (*Pākehā Woman, Nurse, East Coast*) "The concern is about the welfare and the health needs of the people. So we need communication, we need radios, and the radios are capable of being able to communicate with those in the emergency services on the other side. So if we need a helicopter to fly someone out, or fly medicine in, we're able to communicate with the Civil Defence. 'Cause when it is under that Civil Defence emergency, they have access to those tools." (*Kaumātua, East Coast*) "We really need to hear a bit more about Te Puia, and we really need to hear about some of those inland communities. ….there's a kid with them on meds, but I think he's okay. The dad's on meds, on diabetes meds, he's only got three days left, so it would be good to get some up there. So we couldn't get an Army truck for love nor money, or anyone to do anything, it was terrible actually. So we just organised it ourselves, 'cause they were stuck there". (*Wahine Māori, Iwi Health 2*)	*Attend to Rural Health needs*

Quotes Pointing to Recommendations

"I'll start with medicine. Our whānau up the coast needed medicine. Prescriptions. So that eventually got there but getting access from the helicopter to the home was a challenge. So the Police leant in and helped out. We got a side-by-side from Honda (four-wheeler with a roof on it), we shot that up there and that side-by-side got to places where our four-wheel-drives could never go. We used that side-by-side to get to places and spaces to get medicine in. So that was huge. Getting the basic necessities to whānau, for their health and wellbeing was important, so we did a fair bit of that. Obviously from Civil Defence it was raised about 'what are your priorities'? Well, we need to get medication to certain whānau. 'Where are they'? They're up here. 'How are we going to get them there'? We'll use this mechanism. 'How are we going to get them to them'? I don't know. We didn't know that until we got there, so we worked a workaround and they got the medication there." (*Pacific Male, First Responder*) "So we've brought a new ATV, yeah, yeah, yeah. I think we might have had an old quad bike, but we've got actually our own ATV. And we have used it to go pick up people in Waipiro Bay, yeah, yeah, yeah. We have a staff member who drives her own ATV to work…she lives down Waipiro Bay. It's made us look at our whole accommodation…. And actually Starlinks probably, and some alternate power needs within those spaces as well. Grab and go bags in each of those properties as well, yeah. We have a fleet management meeting this afternoon, we will never have Suzuki Swifts in our fleet ever again… …they're just no good for the Coast. They'll just get trashed on the Coast. …they certainly weren't any good post cyclone." (*Wahine Māori, Iwi Health 2*) "So it costs us a huge amount more to have all wheel drives, four wheel drives, SUVs, and stuff. So that's not particularly eco-friendly, but it is what it is if we wanna manage business continuity. We've rewritten all our business continuity plans with some of the learning that we have." (*Wahine Māori, Iwi Health 2*)	*Attend to Rural Health needs*

Quotes Pointing to Recommendations

"The further you move away from a main centre, I think the harder those supports are to get. What I'm finding in my role as a police officer is we're picking up now a lot of extra work from government agencies that don't come up and help. Oranga Tamariki, Kainga Ora, MSD. Who else? They'll come up and then they just don't want to know about it. It's just too hard, it's too far, unless it's really serious. But it's getting worse and worse. And yeah, I know they're stretched, and I know they've got their own problems in town, but people pay rates up here and should be eligible for the same services as they are, but it just doesn't seem to happen… This place is unique and it's got its own problems, and we don't need people coming in assuming what the community needs. People need to listen to what the community want and actually customise what's going on to help them. It's probably different down the road in Toko, and it's probably different out the other side in TK, but I know for Tolaga, yeah, there are support systems in place and, yeah, you can't keep everyone happy, and if you go to the right place you can find that help. But there are a lot of people going through the cracks that are getting left behind." (*Pākehā Male, First Responder, East Coast*)	*Attend to Rural Health needs*

Quotes Pointing to Recommendations

And the best world would be for the Ministry of Health to give every whānau a maara kai (community garden)… And also supporting smaller organisations like ours to teach people how to be more resilient and know how to, not depend on McDonald's, or fast foods, or a packet or whatever… there needs to be more data and research done on the lack of that awareness throughout all of Aotearoa. Yeah and making people way more resilient. (*Pākehā Woman, Social Service Lead*) "I think about our region which has typically been abundant with fresh produce which is no longer there. The stone fruit, the apples, all those things where our supermarkets would've been able to buy seconds or fruit that was still good and nutritious for people to eat. I'm worried about that and the long-term health impacts on children as their nutritional needs aren't as well met as they would've been in the past." (*Wahine Māori, Social Recovery Lead*) Food security "They've employed a guy up our way and he is trying to encourage people to have self sufficient food supplies. I went to a workshop on pruning your fruit trees so people could make their trees more productive…they've done a several workshops on raising hens…Then they've had workshops on milking a cow and whether people could share cows…there's plenty of hunters…and they're looking at getting some system to freeze down venison in a big chiller that would be available to people and stuff…I think teaching people once again how to be self sustaining is really necessary and it's a skill we've lost." (*Pākeha Male, East Coast*)	*Ensure Local Food Security*

8.2 Theme 1: Health systems

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"We've got different iwi liaisons that kicked into gear and steered everyone in the right direction in that regard as to who did what" (*Male, Responder*) "But they had people that were volunteers in the wharekai. They had trestles set up and they had people going through, sorting out from babies to toddlers, right through. Then went over to the marae and they had the same setup at the supermarket. You were given a trolley, literally a trolley, ... And you had that and you started at the beginning. Right, okay, how many children have you got? Two, okay. Does your little one need nappies? Yes. So they put on nappies, they put on pull ups, 'cause our boy, he wets at night. And so they were putting those on there. Wipes, clothes. That would've been pretty much straight away, set up straight away." (*Female, Impacted Person*)	"….whatever presented, we just kicked in and responded. We sort of set up our kind of systems and processes just to kind of make sure things were pretty lean and efficient. We had our own, our kaimahi that were impacted so there was no expectation about them coming to work. And then leaned into whatever needs sort of came through the door or the comms and it was normally like face to face at that stage… We put BAU [business as usual] to the side and so staff knew that, yes, we would respond" (*Wahine Māori, Iwi Health 1*) "I mean, this is our backyard and to not respond would be doing our whānau a big disservice big time. But we're around and we always have to front our whānau. So we weren't gonna let up." (*Wahine Māori, Iwi Health 1*) "We have new diesel storage and, for our generator, we've got a new generator, so yeah we've upgraded heaps of stuff, yeah. So I guess in some ways the cyclone's been generous like that. You know stuff needed upgrading before that and in some ways it just brought that whole thing forward." (*Wahine Māori, Iwi Health 2*)	*Ko Te Toa o Ngāi Māori: Iwi and Marae leadership*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Like even the COVID efforts, I was involved in that and I wish there was a Pasifika hub that was ready there, like a physical building where you have different departments, different services that are based in there. That's accessible for all respective communities... I just wish we had our own physical Pasifika hub where there's no gatekeepers. 'Cause there's been a lot of that, a lot of gatekeeping where, yeah, filtering the resources from the government to help their own people. There was a lot of that, and not just for the floods but it's been happening for a long time. That's where a lot of people, well a lot of our other smaller communities miss out." (*Female, Pacific Community Organisation*) "I think the fact that we had a good support network around us as the Pacific Health Team but also other community providers that could support those who were affected by the cyclone. Oh, and faith groups, so the hub that I was supporting at the time initially, the first one, was a church. So they actually stood up their church hall to accommodate those that were without accommodation" (*Female, Pacific Health Provider*)	I think our village (Pacific non-profit organization) itself was like the marae, it was like the path for our Pacific people. We had the Fijian community, Samoan community, Rarotongan community, Tongan community. They all feed and all gathered at the village, like it was their marae. So that was probably one positive that came out of it, was that they united, the Pacific peoples, which was awesome and I'm glad we had a space for them to come to. (Wahine *Māori, Social Service Leader*)	*Pacific Health: Pacific leadership*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"I've got a couple of friends that work with the DHB and they were assigned in Napier hospital, so they established, I'm not sure where it was, maybe in Wellesley Road one, so they were working out of there as a makeshift. They were obviously limited to what they could do but they had something there to try and keep people going. Yeah, and the same out in those isolated communities. They were sending DHB reps out to them to see what they needed." (*Male Responder*)	"There's just no way that the way that hospital is at the moment, that if there was an emergency where there was a lot of injuries or fatalities, there's no way that they would cope. That's not the fault of the people." (*Woman, Local Government*) "I think that's an integral part of the future. This hospital system has to be fixed up. Yeah, it's a shambles, and it's not the staff" (*Woman, Local Government*)	*System Issues: Hospital response*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"He knew they would because nurses are nurses and they'll turn up wherever they can" (*Female, Nurse*) "..very quickly in the piece I think the communities and the people that were sick and needed those health supplies, it became a priority. And I take my hat off to CDEM and also Te Whara Ora and all of the medical providers because they really stepped up to the plate as far as that was concerned and went probably beyond. You know, we had a personal friend who was on the other side of the Mangoni Stream which was where the Rissington bridge was blown out, and she couldn't come to town. She has cancer. So they managed to get her drugs to her very quickly when they realised what was going on. And I think she needed to come for a test and so somehow they arranged to come and get her. They went beyond, they made it a priority." (*Male, Community Organisation*)	"A couple of [the nurses] said when we found out that we were going into a state of emergency we came to work. We felt that we got the best care that we could of. And, apart from them saying, you know, we're in emergency and they were on generator power so they were just, like, only these power points will work and these lights, and whatever. Yeah. They were, you wouldn't have even really noticed I think. …definitely couldn't fault them. … think it's really cool that they all love their patients and they try to get the best care that they can. And, they all just, yeah, banded together to make it work. Well, one of them said she lived out at Tiniroto and she said, I don't even, I don't know if I can get home. I'm not going to try, I'm just going to stay here." (*Pākehā Woman, City*)	*System Issues: Health professionals went above and beyond*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"I certainly had the impression that other things, you know, distribution of the resources, trying to plan where people would be, the distribution of who's going to see what patient today. The workload, you know, that kind of stuff did feel like there was some significant variability in how the decisions were being made." (*Male, Health Provider*)	"We need support with funding, infrastructure, staff, better lines of communication. Actually knowing what the hell's going on. And we don't want to say, if we were paid what patients are worth, you know, or what GP's and nurses are worth, we could do so much more for the community. And we could be, so they want us to work, you know, not in silo which I think we do do quite a bit in this town unfortunately. And you do it everywhere. Health is a bit like that. You get, 'cause you're head down, bum up." (*Wahine Māori, Medical Practice, City*)	*System Issues: Need to be better resourced and empowered*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"It must've been day three I think. So that was also very difficult because we had, so I mean, we have incredible support networks over all in the community, so we are working with the Life Pharmacy Napier. And they were at our doorstep pretty quickly, yeah, to say, hey, what do you need, you know, and so because we've got obviously a huge amount of people on all sorts of medications and being reliant on that. And so our pharmacists were amazing, I mean, our doctor was out of bounds because they also didn't have power and everything like this. But they established this like an emergency centre in Napier …." (*Female, Disability Provider*)	"You know, the pharmacy people were just amazing – And I was like, I'm so sorry, we were trying to get the comms going from here [Te Karaka] to town. We were using the RT and 'cause like we were like, are you there, are you there? Like, running across the roads, to write the list out and then we'd run across the road to [Tūranga Health] drop it off. And then figure out who's going back out this way [Te Karaka] and do one drop at a time like we were trying to be a little bit efficient around our timing. And I'll tell you what, we just worked together, you know? It was all like trust-based –Dispensing and then coming back to it later. That's pretty much what they did." (*Wahine Māori, Iwi Health 1*)	*System Issues: Prescriptions and medications were a key issue and pharmacists stepped up to provide solutions*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Getting medical appointments, yeah, was difficult. Yeah. Just all those things were affected, so having, yeah, maybe having a, I don't know, a hub with all those things available to be people might've been helpful" (*Female, Community Organisation*)	"So my main role was to ensure safety first of the staff and the team. Who was here? Who wasn't? Who had heard from people? And then of course our community. And I think we were all a bit caught out at the extent of that damage. … But, a lot of our team, you know, some of my nurses, my senior nurses, community nurses, their houses were under water. You know, so they got smashed, so that was pretty hard, but we just kicked into overdrive. So our first thought isn't ourselves, it's our community… establishing a plan number one, for who did we have available to actually service the community? And number two how were we going to do that?" (*Wahine Māori, Medical Practice, City*)	*System Issues: Primary health care and GPs were important*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Nothing like a ute. And so being able to access people who were rural, remote. We had, like I said, a couple of patients that we weren't able to locate for a number of days and that feels a bit uncomfortable." (*Male, Health Provider*) "Not having everything available like on the day of the cyclone, that they would've needed to support them like we were in the school. People needing hoisting to go to the toilet and that sort of thing, so that was quite challenging." (*Female, Nurse*)	"The generators and Starlinks are all down to individuals. I don't think the medical centres even get generators funded. Previously, I've known of some medical centres refusing to spend the money on a generator, because they didn't feel it was their responsibility, and then central won't fund it. But the generators and communication issues are ad hoc and entirely dependent on what business owners are prepared to spend. And I don't really think that's good enough." (*Woman, Pharmacist*)	*System Issues: Lack of specific resources and equipment hampered health response*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Once we got internet we became a magnet to like Wi-Fi tourists as well. So we had 50, 60 people sitting out the front, you know, trying to log into the Wi-Fi. So we ended up having to password protect it because we couldn't get any work done, because just nothing worked." (*Male, Health Provider*) "There's like no power, and I'm like, 'oh no, what am I going to do'? And no communication. That was probably the hardest thing because it was like, how do my staff know what to do? So in the end we couldn't do anything here so we went home." (*Female, Pharmacist*)	"The communication has, and always has been between different parts of health systems. I think that's the health system's biggest problem across the board, is the IT that doesn't talk to each other. And the difficulty it is getting messages from pharmacy, to GPs about things that are going wrong. Whether it be stock issues, or funding issues, or, there is no system that allows for easy communication, you know? … So given those problems, some of those liaison people, they are actually quite critical, particularly in an emergency. The communications infrastructure all falls over [in an event like this]" (*Woman, Pharmacist*)	*System Issues: Infrastructure challenges*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"The combination of Covid and the cyclone It's just snowballed, you know, and like I said, people are getting a bit grumpier and haven't got as much tolerance and they're going, 'I'm sick of waiting for this operation'. And I know there's people waiting for hip surgeries or they've got implanted ports and things that they don't need, and they would've just been whipped out but now they're waiting months and months to get these things done. So it is affecting people" (*Female, Pharmacist*)	"…before the weather events and before Covid, Tairāwhiti had problems… family violence and addictions issues, and that's all exacerbated by this. And so if you're talking about what does social recovery look like, it looks like a community which is not addicted and does not beat up its whānau. So, ultimately dealing with housing in category three is what we need to do this month and for the next six months, but there's a point where we need to deal with the fact that family violence is worse, addictions are worse, and that's the long term answer." (*Pākehā woman, leadership role in social service sector*)	*System Issues: Fragilities exposed in the system*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Well overall my sense of the event was that it was a civil engineering or a civil issue rather than a medical issue. You know, in truth yes we had a few more patients that had some unusual injuries, and yes there were people who couldn't access healthcare in the normal way who maybe were a little bit decompensated compared to what they would normally be. But ultimately I think what the cyclone gave us was actually a good pressure test of our health systems in that sort of an event without actually putting any real burden on it, if that makes sense. So there was the redistribution of resources burden, but what there wasn't was the tidal wave of patients that would come with say an earthquake for example, yeah. So very different and I think a really good opportunity for us to sort of stretch our legs, find out where the kinks were and hopefully, you know, as we move forward." (*Male, Health Provider*)	"Going away, flying out, driving out, cost of living, all of that impacts on an already stretched community… And that's what I don't think people who don't live here weren't experiencing it, they just don't get it. They still don't get it. We're still surviving… We didn't need that cyclone just when we'd started breathing again after COVID. Five weather events in a row that annihilated us!" (*Wahine Māori manager of medical practice*) "I've seen first-hand I've seen the unconscious racism in the health system I've had staff who've had heart conditions and we get the ambulance to take them up to the hospital and they'll go up there and show my presence to get the attention. 'Cause I see how they are! And older Māori don't demand, they are humble. They don't wanna make a fuss, well, some older Pākehā are like that too. But then they don't get the care they deserve" (*Pākehā Male, observations of racism in Health System*)	*System Issues: Fragilities exposed in the system*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Those kinds of prioritisations absolutely had to happen. So that was the immediate need and then you move into your psychosocial needs." (*Male, Health Provider*) "I know some of the medical centres had reduced staff because their own people were affected. So, that meant reduced ability to see patients, yeah. So we had to just, you know, deal with that and prioritise who would" (*Female, Nurse*)	"…we had our dialysis patients, who had them fly out straight away. And they had to stay in hospital for a long stay. It would have been a stress eh, on them. But, they were flown out the next day, two of them. So being a tight community eh, everybody knows who is, dependent on…power" (*Wahine Māori, First Responder, East Coast*)	*Making Do: Triaging and prioritising*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"We established a drug safe [in Napier] so that we could be compliant with all the medicine requirements that were required. And so we were able to maintain the service provision to the people who were on the other side of the big bridges that were washed out." (*Male, Health Provider*) "We were told as a team to organise ourselves to come back in groups of four to help City Medical manage unexpected people that would come throughout the day. So they could manage the medical needs and we would manage the wound needs, which was really our forte really, so that was a good plan." (*Female, Nurse*)	They started having twice daily meetings up at the hospital, … I went up there to the first meeting thinking we were going to get information. We actually didn't, what they were doing was information gathering, I was a bit taken aback by that. 'Cause clearly they still had no idea who was able to access what. I actually think they did quite a good job, it worked quite well. So they had a, kind of an operations room, they had everyone gathered there, representations from everywhere. And we just all spoke telling everyone what was going on. And so there were people in that room that you could access the information, so that worked particularly well with getting stuff up the coast. Because we had some of our Māori health providers, and the community workers up there. And so you could coordinate with them and find out who was doing what, and how to get stuff out. (*Woman, Pharmacist*)	*Making Do: Adapting and improvising*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Our paper based recording keeping [...] didn't really work. So the outage papers are normally used over the short term for urgent care centre presentations and they were fine for that. But when you're looking at larger cases or a longer time looking after someone they were not sufficient by a long way. So we have come up with another document in the meantime which has been adopted by both us and Te Whatu Ora as an outage paper for in the event that we lose computer systems" (*Male, Health Provider*)	I'm old school, it was initially before we had the computers, and everything went, you know, before computers it was pen and paper. So the lab forms were tick, tick, I need this test done and yeah, writing everything down at the end of the shift just for the co-ordinator who came round. It was like any problems you have today, so you could, they could have a list and take it back and, you know do things like that, so yeah, that worked (*Pākehā Woman, Specialist Nurse*)	*Making Do: Handwritten systems*
"The day after the cyclone, the hours were just crazy. It was just, because some people could not come to work because of their own homes being flooded or they couldn't get through to work. The people that were here just worked whatever hours was needed to support everyone." (*Female, Nurse*)	"…the existing staff, they went to 12 hours on, 12 off, instead of general more eight hour shift. And there were no days off, I think, for nearly, it might have been almost up to nine days for a couple of staff, until we could get some reinforcements. And then we had some out of town staff come, I'm gonna say three weeks after the event who, so we were able to stand people down for a full week at a time. We'd tell them go out of town, get out, and go and get a real break away from this, get away from it all together." (*Wahine Māori, Iwi Health 2*)	*Health Staff: Long hours with no breaks*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"We had one staff person whose home was completely annihilated, so up the walls of water. So she's lost absolutely everything … We had a lot of staff that were particular Napier based who really struggled psychosocially and had what you would call an emotional trauma and that was quite challenging." (*Male, Health Provider*)	"Seven days with no comms. And what we did in that previous week 'cause we had to go back and load everything. So the administration after a week of not having that, then going from manual, we have to put it all into the computer. So we stayed, we kept our hours short so the clinicians could catch up. So we still only did eight til four for the Monday, Tuesday, Wednesday after the cyclone went, the worst week. And just communication internally. Meeting every day, huddle every day. So it's back to daily huddles and checking in on everyone. Who needs what? And of course this went on for months because the staff that lost homes, were still displaced" (*Wahine Māori, Medical Practice, City*)	*Health Staff: Health professionals continuing despite their own difficult situations*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Other people were coming in so rude, and you do know that some of it's stress and anxiety and stuff, but you think, well, I'm not the person to take it out on. But no, it was quite difficult sometimes." (*Female, Nurse*) "Managing patients' expectations is a big deal because a lot of people expect more than what they can receive" (*Female, Nurse*)	"Every day my reception girls get hammered and I'd like the community to kind of remember hey, they're human, they went through that and we don't make all the rules, you know?...They're doing what we can and we're doing the best we can and we don't have a magic wand. And the government needs to wake up and smell the coffee really don't they?... There's a lot of yuck out there and it's not nice. And we walk out of here some days going well sometimes why the hell do we bother? You know if they're going to talk to us and treat us like that it gets exhausting. Yeah so we get a bit empathy fatigued too." (*Wahine Māori, Clinical Practice, City*)	*Health Staff: Being treated badly by the public*
"My boss, … kept putting the hours in that I'd worked but they said they didn't have the authority to pay when they hadn't asked me to work all those hours. That I'd stayed on voluntarily or something like that," (*Female, Nurse*)	"So for the hospital, the nurses were given 40 dollars in vouchers for petrol. But at a later date they did have to pay it back in their salary" (*Pākehā Woman, Specialist Nurse*)	*Health Staff: Acknowledgement important and efforts quickly forgotten afterward*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"...one of our good friends that was leading the Te Whatu Ora team, she had to go on three months stress leave." (*Female, Community Organisation*)	"A friend of mine's a nurse at the hospital. She's exhausted. Half the nurses are leaving. And what was the stats recently, we were 28 doctors down, 41 nurses down in one little hospital. They're short again in ED. Mental health is chronic, in absolute crisis. It's appalling here. Absolute crisis in terms of resources" (*Pākeha Woman, Elderly*)	*Health Staff: Burn out and Mental Wellbeing*
"…In the latter part like when our search operations were finishing, some of our members were going out supported by FENZ just doing community work, just doorknocking, people in the rural places asking if there's anything you need. And they did that for about a week under FENZ's guidance. So, yeah, in that rural area. It was quite, I guess it helps people that think no-one cares." (*Male, Responder*)	"Tokomaru was in the worst state. So they'd put a doctor in there and keep them there so that they had a doctor and a nurse, and then flying them out as needed...Then the road between Ruatoria and Te Puia opened, and so there was a bit of flow there, but pretty much they had medical people staying on site up Te Araroa, that department, so that people's service was going there." (*Pākehā Woman, East Coast*)	*Rural Health: Doing whatever it took to find and reach people*

Quotes from 'Health Systems' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"… it wasn't obvious to the work that I was doing. Certainly the feeling was that the more isolated communities were being ignored. Well, I don't know if ignored is the right word but they weren't being as looked after as perhaps they could've been……..Communication and infrastructure were the big things. I mean we got around the infrastructure with the helicopters, you know, those areas that we couldn't access with the trucks we were flown into." (*Male, Responder*)	"They were trying to get communication up the Coast, that was the worst. They can cope with a lot of stuff, so it was, it was getting communications going up there and fielding the information down. What do you need up there? Because some of inlands, it's like they hadn't been visited, they couldn't, people couldn't get in there, along their roads. Because it was either bridges were taken out, or the road was no longer passable. And even our good duty nurse manager, she had to get a canoe, her kayak. Rode down the creek to get on the other side," (*Pākehā Woman, Specialist Nurse*)	*Rural Health: Communication and infrastructure*

8.3 Theme 2: Personal health

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Yeah, we all got gastro two weeks later, so [partner] and I went to, were on a drip for that. The kids weren't as bad but, yeah, we all got gastro after that so that was just mental. We hadn't had that one before." (*Female, Impacted Person*)	"We had this problem of our sanitary system, our toilets were not working well and our water was contaminated as well This we had sickness within the family. Some of us were affected and we were just not prepared" (*(Fijian, city)*)	*Ā-Tinana: Water and Sanitation impacts*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"...there's some respiratory issues out there with the silt dump, that's been like, obviously placed in Moteo... There's a silt dump out there, and the silt dump is literally near when the bank broke, but the residents that actually live next to the silt dump weren't consulted at the time, and so that's, one elderly couple that live straight across the road have been having really severe health issues with it." (*(Female, Impacted Person)*)	"Because of the sewer came up and all that, a lot of the elderly were affected by that sewer, the smell, the fumes coming up under the house. Just gave them breathing problems, kids getting sick because they're running around touching stuff. It's the smell. They'll touch, eh? You couldn't tell them – you had to tell them a hundred times, don't go there, don't touch it, but kids are kids." (Tāne Māori, Volunteer Lead, Western Rural)	*Ā-Tinana: Respiratory*
"People who had leg wounds, or, and someone lost a toe. And then they took a while to heal because of the toxins and everything, and everything with the silt" (*Female Nurse*) "So more complicated, greater acuity, more significant injuries. People who were unwell because they couldn't get their usual healthcare. It's a very, very different way of working." (*Male, Health Provider*)	"We had a young fella, he got flown out, and he had a head injury. They more or less just kicked him out of Gisborne Hospital and he's like well where am I gonna go? You flew me in, I've got no way to get home. The only way home is that eight hour trip around the coast through Opotiki and around the coast…With a head injury. They didn't care, they just kicked him out, discharged him." (*Wahine Māori, First Responder, East Coast*)	*Ā-Tinana: Injuries and slow healing*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Yeah. So my baby and his dad, like my ex-partner, they got school sores and that was from the silt. It hasn't gone, they still get it now. So my son's had ear infections, he's had respiratory problems from it. I've had respiratory problems from it, and I really think it was from inhaling all the silt and the dust…..Yeah, the dust…..Yeah, there was, you know, 'wear a mask if you're going around silt', but it doesn't work. Like, we had gloves, we had everything, all the cleaning and hygiene supplies you could think of, sanitiser was our best friends. I was washing my arms and hands in sanitiser and once it's in you I feel like it's not going anywhere. So I get a lot of chest infections now. Yeah, my daughter gets a lot of chest infections just from the aftermath, but my son is still dealing with skin conditions from it." (*Female, Impacted Person*)	"We ended up with quite a lot of sores and things on our hands, didn't we? And our legs and knees, just from cleaning up. Like blisters and things, or sores from the contaminants in the dirty silt, I suppose." (*Woman Horticulture, Western Rural*)	*Ā-Tinana: Skin conditions*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"….my husband has sleep apnoea, so he has a machine, and he knew the power had gone off at half-past-12, because his machine stopped working…." (*Female, Impacted Person*)	"For me being a cancer patient, everything was available. …because I'm on a hormone treatment, they tell me it's because if I don't take it, the cancer could come back so I've gotta take this fortnightly which then affects my bones. My bones could become brittle and break if I fall so I need to have an infusion… …it helps to strengthen my bones. But when it was due, it was there. They'd ring me up and say it's time for your injection, come on up. …that was at the local hospital at the cancer rooms… Yeah, there was no worries there" (*Kuia Māori, Cancer Patient, City*)	*Ā-Tinana: Concern for those with existing medical conditions*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"I actually had like heart attack symptoms in the motel and they had to take me to the hospital and that. I didn't know if I was having a stroke or a heart attack, and it was a panic attack. And so everything just got to much and the pain was horrific, but you just, yeah. But they've still got me booked in to go to a cardiologist to go and check that my heart is okay. 'Cause they go deeper than just your standard sort of check in scan type thing. So yeah, we came and had a look and I thought oh, look, bother it, we'll come here, I said because it's just getting too much at the motel. And I actually felt like I was heading into a very dark hole." (*Female, Impacted Person*)	"I think for me the stress is [impacting] physically. I think I did not sleep well initially. And I started having numbness. Recently I feel numbness in the right side. One day I went into emergency thinking that I'm having a stroke. So they tested me with some tools and they said you're fine, go home. Even when I'm not associated with Gabrielle, it's little things that happen. The medical system's different here. It is like, it has not affected your brain in the name of stroke, so just talk and you'll be fine. So I think, I personally think when I go back, I'm gonna go and have an MRI scan." (*Indian Woman whose home was destroyed, Gisborne City*)	*Ā-Hinengaro: Physical health and mental health overlaps*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"...once the light came out and then we just saw it... the river was roaring through the marae like nothing. Oh, not through the marae but through the marae carpark... our kohanga's down in the car park and our Nannies, they were right there from the heart of it so they were absolutely wailing, sobbing, crying. And we were trying to tell them go to the garage so you can't see anything, but they were like no, leave me alone. So they got their chairs and they just sat on the veranda and they watched the whole thing. In their blankets, you know, but crying. But us, we were trying to get them to go to the back to alleviate a bit of stress, but I think that might've made it worse for them." (*Hawkes Bay*)	"Once you saw the state of the river, and the other people being impacted by it the way they were. There was a little bit of heaviness that started to, you know touch us, come over us like a dark cloud full of rain to drop again...the stress, and anxiety, and worry that comes with that uncertainty…my ability to get out of a situation was limited." (*Wahine Māori, Chronic Illness, City*) "Yeah, you could hear it. You could hear it. I could hear it from my house along the river. It sounded like a train, like honesty just choo-choo-choo-choo. That's all just the wood rolling on top of each other. Sounded like a train." (*Wahine Māori, East Coast*)	*Ā-Hinengaro: Acute stress/anxiety*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"So yeah, still been difficult. It still is difficult. Well, at the time I was crying every day. Probably yeah, February, March, April, May, probably a bit of June until it sort of pushed itself out to about a week, every week. But even now I can still get teary eyed or something will happen or someone might say something and it just sort of whoosh, catches me. And yeah, and I can get quite teary eyed with it. (*Female, Impacted Person*) "So there's been a lot of anxiety like that for all of us. My two girls that I've still got at home, they're 13 and 15. The 13 year old's been mostly pretty good. The 15 year old hasn't coped so well with the flooding and everything that's happened since then. So we've got her help with CAFS adolescent mental health support. So yeah, that's been quite difficult, how that's impacted her and affected her thinking" (*Female, Impacted Person*)	"People are so flat. People are tired, they've got nothing in the tanks. We're going into that season of cyclones again. So actually, it's, yeah, people are tired, people are so flat and it's just like not again, you know? Not again. Resilience, you know, is an overused word and, yeah, I mean, we've had to develop a hell of a lot of resilience over 40 years in business. But, yeah, we all have our limits!" (*Elderly Māori-Pākehā Woman, Horticulture*) "I was not good, because it was seeing the impact on how it was for your own community whānau. I think it hit me quite a bit later on. I fell into depression. I think there was a lot of things that added in why I was going into depression. I think what I seen, what I experienced, what we experienced, and just life itself, just the whole thing just started getting … I think it was quite overwhelming. It just built up over time. I'm still slightly in that at the moment, in healing therapy and all that sort of stuff, for the last probably six, seven months now, since Gabrielle. I'm just trying to get my wairua and my tīnana and everything back on place so I can start focusing." (*Tāne Māori, Volunteer Lead, Rural*)	*Ā-Hinengaro: Mental health symptoms –- burnout, grief, anxiety, depression*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"I feel really guilty. It's like survivor's guilt, but the water was going around our house. It was quite strange. Once we realised there was a problem, we realised there was water coming in under the fence, and then we went out onto the deck, and realised that the river had changed its course, and it was going through the original pathway below our house, and the paddock below, and we could see that it was going through our neighbour's house." (*Female, Impacted Person*)	"I almost felt guilty that I didn't, nothing happened at my whare here. And I saw some of the other people who I know, whose homes were red stickered because they were so bad." (*Kaumatua, Kaiti*)	*Ā-Hinengaro: Survivor guilt*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"And my four year old now actually suffers from a lot of nightmares. Like the rain, that's really big for him. He's like, to the point where it puts him in flight mode. Like, he hasn't come out of it and relaxed, even though its been a while now. He's gotten a bag ready to go if we need to go in the car now, he's quite a clever little boy, but it's sad for me that he's always stuck in that mode. And, like, every time it rains he has to come and find me. So I tell his dad, 'just let him talk it out because telling him to stop being silly and not do it is bad. So he's got him a bag to go every time, which is quite sad but quite good at the same time" (*Female, Impacted Person*)	"I don't think we're talking enough about the stress and the anxiety that people feel when it rains. I feel it. I watch the weather in a way, I mean I've always taken notice of the weather, but now its become quite ingrained. It's more of a need to know that the coast is clear, you know, that it's not another hit. And I worry about children and I worry about older people… and it doesn't matter whether you're on a hill or on the flats, everybody's affected but affected differently. I think that there's a whole level of stress here that nobody's talking about." (*Wahine Māori, Social Recovery Leader*)	*Ā-Hinengaro: Rain anxiety*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Cause they all, some of them have lived in Hawkes Bay for a very long time, seen the changes and destruction that's out there and it was actually probably quite traumatic. And it's still ongoing, I mean, you still can drive through Pakowhai and places like that and, you know, things aren't back to what they used to be. And, yeah, if you've been in this community for a long time, you know, those changes are huge and they do impact on our people's health and wellbeing. So, yeah. Things are getting better". (*Female, Impacted Person*)	"Our maunga is right by the ocean and, you know that's slowly getting eaten away. My nephew, I gifted him a name and the name of our maunga is in that. You know that's how important our maunga is to us, but she's becoming lost. Every time the ocean gets higher, every time there's big storms in, you know the creek turns, and starts cutting into the maunga instead. And that impact is really huge, but I haven't been able to go home and put my feet on the land" (*Wahine Māori, Kaiti*) "…you've gotta think about all the urupā that were affected too… …for us that emotionally hurts us when we can't go and visit our tīpuna anymore. Or we don't know where they are anymore. So yeah that was probably one of the big grievances, I suppose after the cyclone too, was that knowing that a lot of urupā, or graveyards, had been swallowed up by the cyclone." (*Wahine Māori, Kaiti*)	*Ā-Hinengaro: Ko te Matemate-a-one	Solastalgia*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"It's got worse, yeah, it's definitely got worse. From their like anxiety of not having anywhere to be. Or, I mean they, you know they'll go and sofa surf sometimes and stuff like that. But it's more of a risk for them now to be out there sleeping rough now" (*Female, Mental Health Worker*)	"Yes, more than what I usually am, 'cause I'm diagnosed bipolar type 2. And that's very well controlled with medication but since the cyclone all that added stress has just made things harder to stay level, yeah." (B14 Female, Impacted Person) "Taking time to stop and listen is an important and simple way to reduce stress levels/anxiety…we would have whānau just turn up and all they wanna do is someone to talk so or a cuppa tea. Pretty basic manaaki aye, they want a cuppa tea and someone to talk to. That's huge, and that's mental health. And a lot of people with mental health were also coming in very distressed." (*Tāne Māori, Not-For-Profit Org Leader*)	*Ā-Hinengaro: Challenges for those with existing mental health issues*
"Te Whatu Ora. … And they indicated that they were having a problem that everyone was being referred to the mental health services." (*Female, Health Provider*)	"There's not enough support for mental health generally, so why would there be support for trauma associated with weather related events right? I really don't think there's anything that health can do. Like the community need to find its own way around how to do that. And it might be through, you know these collective conversations that are happening." (*Wahine Māori, Local Government*)	*Ā-Hinengaro: Mental health system overloaded*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"There wasn't really much presenting to us at least kind of acute mental health need in the first two or three days. As you would expect I guess most people at that point are just in coping mode and they're getting on with it. We found that that became more of a feature maybe sort of a couple of weeks down the track." (*Male, Health Provider*)	"My team, I had 12 of my crew there from mixed ages, ages from 18, 19 to 50. Yeah, they were very taken by – there was a lot of awhi in amongst the crew, my crew especially. I think, come the second week, they were starting to feel the crunches of the community, they were feeling the affects from the health, the wellbeing, the mental states. The exhaustion, the smell, everything. I did in my project offer counselling and we had organised counselling through the Mahaki to be able to come onboard if needed. I gave my team a few days off work for them to be able to get themselves together. When we had wānanga, and after all that all happened, and we had our wānangas together and we talked about the devastation and the effects, a lot of them did talk about how it had impacted in their wellbeing, how it impacted them mentally, physically, emotionally, financially" (*Tāne Māori, Volunteer Lead, Western Rural*)	*Ā-Hinengaro: Mental health issues more likely to present later on*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"And there's clients that have never been to a counselling session before, so obviously the anxiety of coming in and actually sitting down and talking to someone that you don't know from a bar of soap about what's happened, this enormous event that's just happened, people might be private and to suddenly need to go and talk to someone is a foreign concept. So just acknowledging the courage and the bravery of some of these people, to actually come in and sit down and talk about what's been going on for them." (*Male, Mental Health Worker*)	"Our people are not good at asking for help. So I don't know how open people were about asking for help." (*Pacific male, first responder*) "Just asking people too, like knowing people. 'Cause there's a lot of people around here that don't ask for themselves. You know, like whaakama, they're shy." (*Wahine Māori, CD Volunteer, East Coast*) "Our people are not good at asking for help. So I don't know how open people were about asking for help." (*Pacific Male, First Responder*)	*Ā-Hinengaro: Challenges with asking for help*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"So some schools are eligible for what they call counselling in schools service, we're one of them. And that work is contracted out to various providers and our contract is held with Dove. So we have counsellors from Dove working in the school. But separate to that, as our Kāhui Ako, our group of local schools that work together. We also had employed in the past a counsellor through money that we all contribute. And, but we haven't been able to get anyone to do that work. So locally we're the only school that get counselled in schools... the high school will have their own counsellors that they employ, and the intermediate employs their own counsellor as well. But certainly [35.32], Puketapu, who else, Taradale Primary, have got anybody, no." (*Female, Community Organisation*)	"The supports are there if you know where to look. But what I've found is the further you get away from Gisborne and I reckon it gets worse as you go up the coast, the less supports there are. They are there if you know and people know which people to approach. But then we've got situations where there's people here that they weren't contacted by the council. They were only followed up eventually through local knowledge otherwise they would have just been left." (*Pākehā Male, First Responder, East Coast*)	*Ā-Hinengaro: Mental health supports offered*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Spirituality is one of our main values or what ties together Pacific communities. And so the church is pretty much the pivotal point that are able to send those messages of comfort. And so we believe that obviously faith is one of the biggest things. Faith and hope is one of the biggest things that has really calmed people, our Pacific community. You know, and have helped them remain their resilience throughout. So compared to someone that doesn't have that hope and doesn't have that aspect in their life. Or faith, hope and hoping in things, that don't have that resilience built up, the Pacific community have done really well compared. That's why the RSEs as well were very resilient. One of them said that, one of the Tongan RSEs said that they were singing songs as they were waiting on top of their cabin, their floating cabin which was sinking. And they said that he was singing hymns, but he was singing the hymns as though he wasn't sure he was going to make it. But yeah, that's something that showed me that, oh, our Pacific people are resilient people." (*Female, Pacific Health Provider*)	"You do what you do, I suppose, and I suppose when you come from great leaders, as in your whakapapa who are great leaders, obviously that's filtered down to you. I always go back to karakia. It's karakia. So important and it helps. It helps us with our days." (*Tāne Māori, Mahi Taiao, Rural*) "Just I knew that's what I needed to do, and there were a few of us that just showed up and cranked out a workout and it was good. I actually coached the ladies for quite a few sessions. Sometimes it was a lot, like, going home, cooking dinner and then going back to the gym, but I loved it. And, it's the, like, doing something, keeping busy but also doing something that makes a difference." (*Pākehā Woman, Manager*) "…when nine days out of 10 a whole pile of us would end up at [neighbour's name] drinking wine every evening, or vodka. And it was like lockdown in a way that you just felt the need to be together." (*Elderly Pākehā Women, Coastal*)	*Ā-Hinengaro: Coping strategies*

Quotes from 'Personal Health' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Definitely the drank more wine. Smoked more cigarettes, drank more wine. All the bad things, yeah. I feel like it's aged me, and I do feel that, just the whole thing. So I do feel a bit tired inside from it. " (*Female, Impacted Person*)	"We karakia. Every morning. We definitely karakia, and it's all about moving forward on the day that we're here for our whānau, our mokopuna. It's all of that and just reaching out, reaching out, reaching out to our whānau. If it's not whānau, it's those that we know that we can have a kōrero with, just someone outside of the whānau." (*Tāne Māori and Wahine, Rural*)	*Ā-Hinengaro: Coping strategies (cont.)*

8.4 Theme 3: People at Risk

Quotes from 'People at Risk' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"And anytime any dementia clients are out of their routine and they, you know, they get very confused" (*Female, Community Organisation*)	"We got to remember, some have got dementia, some have got Alzheimer's, some are bipolar, some drink too much, drugs. There's a lot out there. Not necessarily the elderly, but this is where the nasty side comes into play with our elderly that have dementia and Alzheimer's. They don't know the first thing about phones and especially a computer. They've heard of it, but how to operate it?" (*Kuia Māori, Not-For-Profit Org*)	*Ahungarua, Hauora, Whaikaha: Elderly*

Quotes from 'People at Risk' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Because I'm the only Deaf person being affected, my worry would be if there are other deaf affected, that means there'd be more of those people access to their services and the problem will be communicating. So that means we're gonna make sure that the sign language interpreters are available on the spot or are available for a video call. So, that would be a bit of a headache. ….. It's like when the ..., like people coming in, they don't know who it is. Whether it's old people, minority people. But when it comes to deaf, no verbal, just signing, they're just like they freeze. Like, oh, uh-oh, what do we do? And usually they put it in a too hard basket rather than deal the same how you deal with other people…….my worry would be if there are other deaf affected, that means there'd be more of those people access to their services and the problem will be communicating. So that means we're gonna make sure that the sign language interpreters are available on the spot or are available for a video call. So, that would be a bit of a headache." (*Female with Disability*)	"It's hard when you have mobility issues to think about 'am I gonna be able to get out of my house quickly?' And that's why we've also made the decision to leave before anyone gets evacuated. 'Cause if there's any flooding, or anything that is going to hinder my mobility, I can't get out. Like I physically can't, so I have to be more proactive in that sense, and 'cause I live on my own, so that also changes things" (*Wahine Māori, Chronic Illness, City*) "Those with disabilities should be a list that's regularly updated, called, and then when things do happen, you've got that list. Doctors should have them. We need to have a database because when they have civil defence, they have – they have all the manpower, just need to give them the lists." (*Wahine Māori, Social Recovery Lead*)	*Ahungarua, Hauora, Whaikaha: Disability*

Quotes from 'People at Risk' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"... not just for the adults, but also our kids, as well, and that was one of my main focus points too, was not forgetting that our children have also been affected, whether they were flood-affected, or trauma from the rain." (*Female, Marae Lead*)	"… we had 10 of our families at kura who were totally impacted, so their houses were absolutely washed out. So they lost everything, and then for some of those families, they were displaced. But they were moved three or four times within, so once they were moved on from kura, moved to hotels in town. …some of them were moved three or four times before they were, you know finally got to come back home. Tamariki were not sure about where I was gonna be tomorrow. And their whānau were stressed" (*Wahine Māori, School Leader, Rural*)	*Ngā Tamariki me Ngā Rangatahi*

Quotes from 'People at Risk' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Our Māori population tend to live with different generations in one home, so they were very deprived. When we went there we realised there was very little food and warm things, so that was all part of our network again, to support people to get what they needed." (*Female, Nurse*) "Rural Māori, the elderly, I suppose, and those ones with a disability, 'cause I'm just thinking of the families that I do know" (*Female, Health Provider*)	"…we don't want to move. We don't believe we should move. So we sit amongst where we're all from and we don't want to move. And we're adamant to stay on our farm and work that. The holistic values of why we are Māori and why we are uri ke te whenua. Holding our pao. It feels like we're the last." (*Wahine Māori, East Coast*) "We're treated like second class citizens that don't matter." (Wahine Māori, East Coast) "… we've been forgotten about entirely." (*Elderly Māori-Pākehā Woman*)	*Māori: Values and experiences*

Quotes from 'People at Risk' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"By the time they returned back to their homes, and found out about the funding, a lot of the dates had closed. So, they had missed out on some of the funding, and others have used that to start cleaning up their homes... yeah and this is actually a professional... so they're actually, they're not a low-income earning family, but I think just getting access to financial funding... has been one of their challenges" (*Female, Marae Lead*)	"…I worry that we will become an economic backwater with all of our social problems exacerbated for a much longer term. …all the stuff that we do up here is plasters on bleeding wounds and that the underneath issue is colonisation, capitalism, and economic prosperity, and housing are the two things that are the end point of it. So colonisation and capitalism are the wrong things, which is why I work on devolution to iwi. But, given that that's the system that we're in, the two things that are needed to stop addictions and family violence are better paying jobs and nice houses. … The family violence and addictions that go on are because of shit lives, and shit lives include not just not having work, but the kind of work that's available is not fulfilling work, and is dangerous work, and is precarious work." (*Pākehā Woman, Social Recovery Lead*)	*Māori: Flooding Events increase inequities*

Quotes from 'People at Risk' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"We were able to just introduce them to the Civil Defence preparation course. And that was just borderline understanding, you know, hazards and what to do and how to prepare yourself. So that's one thing that came from there. But we believe that there needs to be more Pacific focused, culturally competent, 'cause it had missing elements in there." (*Female, Pacific Community Organisation*) "It wasn't our programme. We supported Civil Defence in delivering this programme. There was a lot of feedback coming back that it needed to be more Pasifika. Just some Pasifika language included in it." (*Female, Pacific Community Organisation*)	"There was a course for people to do for Civil Defence, for them to be able to deal with people… Can we just get someone professional in now? [We need] funding for specialist roles. You know, I'd like to hear from those people too as advocates. Like what would yous, how would you prefer to work? Do you like working with your own whānau or do you actually like working with others? Yeah, that whānau thing" (*Wahine Māori, East Coast*)	*Māori and Pacific: Need for cultural safety and competency*

Quotes from 'People at Risk' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Oh we're lucky that we speak the language and they were very shaken up. They were quiet. We gave them a deck of cards I have in my car, so we went and got the cards just so, you know, they weren't talking. They were dressed in other, they were dressed in women's clothes, a few of them because they just picked up whatever they could find at the Hastings centre that they were taken to. Real shaken up." (*Hawkes Bay*) "A lot of them went home, eventually went home. Yeah, just the sheer case of almost dying would contribute to the traumatic, you know, mental, well took a toll on them mentally." (*Male, Pacific Community Organisation*)	"…I have children in Kiribati, so when the storm happened, I was worried in case there is anything happened with me. …We all had the same problem at that time, they all needed to contact their family" (*Kiribati RSE Worker*) "…they didn't know when they were gonna get paid. They haven't been paid for the two weeks prior to the cyclone and then, you know, post-cyclone. I mean, let's say six to eight weeks post-cyclone, they were still fighting to get their money." (*Samoan-Māori Woman*) "…it's a whole lot of that visa status stuff and what they thought and they were entitled to and not entitled to. And then the fear of not being able to get anything and then, oh it was pretty gross." (*Samoan-Māori Woman*)	*Pacific: RSE workers*

Quotes from 'People at Risk' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"A lot of it is reliant on the employers 'cause they are the ones that have sponsored them to come over. So it's having that open communication about the best way to support in terms of financially supporting someone who is a non-resident for healthcare." (*Female, Pacific Health Provider*)	"We were not prepared for cyclone… but with our experience from back on the Island, when a cyclone hit Tonga… we always prepare ourself. Because there were three or four cyclone a year, so people are getting used to it. And when they had the radio, the radio announce prepare, that's what we prepare. But when we come to New Zealand, we already prepared for that. And people, if there are people, they have no food, have no shelter, we have to help each other. We ring around and see if there is any family that need help, or need food, or need anything. That's how we do it at the Island, and we'll continue doing it here" (*Tongan Elder*)	*Pacific: Values and experiences*

8.5 Theme 4: Activating Communities

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"When people are emotional they need that person that, they need a good person that they can go to and vent, and, you know they can build a rapport with. Have a bit of a relationship with, when different people are coming in." (*Male, Responder*)	"would have whānau just turn up and all they wanna do is someone to talk so or a cuppa tea. Pretty basic manaaki aye, they want a cuppa tea and someone to talk to. That's huge, and that's mental health. And a lot of people with mental health were also coming in very distressed." (*Tāne Māori, Not-For-Profit Org Leader*) "I didn't realise how traumatised we were aye, until we've had to talk about it. I think it was more anger and frustration about what wasn't going on to help people." (*Wahine Māori, School Leader, City*) "…that was the worst night of my life, he was quite shellshocked. …I had to stop at one of the neighbours, and I had dark glasses on, and he said are you all right? I said no I'm not. … he said do you want a cup of tea? I said no, I just need someone to talk to and a little moment together" (*Wahine Māori, Rural*)	*Wā Kapu Tī: Listening and talking*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"And a couple of young guys put their hands up and said, we'll come, we'll bring some dogs, we'll help with that. So, yeah, that was the value of those connections is there were people that we could ring and say we've got this situation, do you have someone who could help with that?" (*Female, Community Organisation*)"It was cool to have your faith in humanity restored, you know. There's the beautiful people out there that always serve, but it was cool to see new leaders born in such a dire circumstance, so yeah it was cool to see. So I just wanna commend everyone that went out there to clean the debris of those houses. Everyone that came together, it was cool and their stories need to be told more. Especially those RSE workers who formed the human chain carrying our local kaumatua, you know. Lifting them onto the Army trucks, that's a cool story." (*Female, Pacific Community Organisation*)	"I asked one lady, 'how are you', and she stood up and walked out and bawled her eyes out. You know, it just hit her at that time because she'd been hard and strong and doing this in the community and then when someone checked in on her like I did, it just hit. Reweti from Tūranga Health Health sent an ice cream truck out there, so we ended up having an ice cream together me and her." (*Pacific Male, First Responder*)	*Wā Kapu Tī: Manaaki / kindness*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"They need, yeah, someone has to go and visit and not be a one off fly by, shake hands and kiss babies." (*Male, Responder*)	"Some of the communities, Ūawa, you know, they weren't happy with what did or didn't happen for them and some of it is rightly so. You've got helicopters shooting over left, right and centre and no-one calls in, or the Chief Scientist is cruising up and goes into their area and does something but he doesn't call in for a cup of tea. So, there were some things we could've done better." (*Pacific Male, First Responder, City*)	*Wā Kapu Tī: Visitors needed to stop and connect*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"...they're just lovely, lovely people. I call them all sis now. Like you know, sis and aunty and nan. They're all like 'oh Bub'...They're just family now, you know. They were family before but they're family family now. You know, you get invited to go to their kids' birthdays and we celebrate our children's birthdays here with them, you know. It's just awesome." (*Female, Marae Lead*)	"The strength was always there. In the background it was always a strong community, a strong based community. I think this sort of shocked everybody, put everybody on the backstep. There was a lot of confusions, a lot of upsets, a lot of things going on, but once they sort of got over that barrier, I think, as they were gathering around at afternoons at the main school, being able to sit and share food with each other and talk, they were starting to see, and you can hear the kōrero because I used to go there and have meals after I finished in the afternoon and go and sit down and you can hear them talking about, oh, this group over here come in my house and did this and did that, and, oh, someone was over here doing this and that. There was some jokes, there was laughter, there was a whole lot of humour going around, which was cool. That's what you wanted to hear. That's what the community needed to do, was bring the humour out and start having a bit of a laugh about it. But at the same time, still aware in the back of their minds that it just wasn't clear, it wasn't safe at all, things just … it was terrible." (*Tāne Māori, Volunteer Lead, Rural*)	*Wā Kapu Tī: Togetherness and stronger connections*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
Yeah, so there was, you know I evacuated a couple off a roof who couldn't raise anyone locally, but raised their daughter in Invercargill. And asked could you ring, yeah the police and then they thought the police had got hold of me, which was not the case at all. We just happened to be in that area when we could see all the flooding. And plucked them along with 30 people off the houses. (*Male, Responder*)	"We set up a priorities board and we said we'd go to Poho-o-Rāwiri and we set up there. That was one point that the community went to. All our Fijian men, RSC plus the forestry guys, they were just there. So we went there, got a Starlink set up, we ran services out of the wharenui. That took a couple of days'. So we got that set up and then we created a space in the whare kai for our whānau to come in and ask questions. And we listened and one thing we thought was, all this messaging is coming out of Civil Defence, it needed to go out into our community in a number of languages because we had a number of ethnic languages that we couldn't communicate with. We utilised the Fijian/Tongan/Samoan leaders very well, so we would get the state of the play for today and then we'd get that interpreted then we'd shoot over to our man, Bevan, our radio announcer, and try to get that on the air." (*Pacific Male, First Responder, City*)	*First Responders: Communications*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"So, you know if there had been a proper debrief, and it's not a point of finger saying you didn't do your job well. And you didn't do this, how could we improve if this happened again? And it will happen again, whether it's in our lifetime or not, but I suspect it could be with the way the ocean's warming. You know that's what creates cyclones, and I'm, you know my biggest criticism is they didn't reach out to the first responders and saying how did you actually go about doing that? And how did you do that, and what was the problems with comms and, you know?" (*Male, Responder*)	"… everyone was quite chaotic and I was just like, you know [name] from, you know Gisborne Ambo, I was like have you got your sat phone? He was like what do you mean have I got a sat phone? And I was like you have a sat phone in the hallway cupboard of the ambulance station, like why have you not brought that down? And why are we not using that? And he was like oh, oh, you know, and all these people were chaotic. It was crazy, people lost their minds and it's just something that sits with me. Because I'm like we practice these things all the time, yet the people that are supposed to be so helping us, couldn't think. They just could not logically think." (*Woman, Local Government*)	*First Responders: Coordination*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"And he goes can you get those kids off the back there, and I still remember this, and I've told this, not a story, it's an event. Yeah took the tailgate down in the mog and there's two kids and a mum on the back. They'd been on the roof of their house since about two am when the water got too high yelling out across the valley to help.....And Stormy had gone and got them, yeah so yeah, the first thing I remember is I said there's this little young fella, he must have been about seven or eight. And he jumps up off the seat and he just goes look how big my jacket is, it's cool eh? I said man that's an awesome jacket, shall we go and get a hot chocolate or something eh? He goes oh yeah, and his sister goes hot chocolate, that's us, you know kids eh? So resilient and it didn't register that their lives were at stake and poor mum was an absolute mess, yeah, yeah. Yeah." (this was when interviewee was visibly emotional) (*Male, Responder*)	"Yeah. I felt that our public service didn't have a good plan around giving their staff rest and, you know, there's someone sitting in the WINZ office in Queenstown doing their day job, why couldn't they be here? And you could see it in our people and they were tired. Several days on they were very, very tired… Then we make a mistake because we're tired and we blame ourselves and then, oh goodness me." (*Pacific Male, First Responder*) "…when it was happening we were just all over the place. I was tired, drained…we didn't look at those things until you finished …until it was all back to normal." (*Wahine Māori, First Responder, East Coast*)	*First Responders: Distress and fatigue*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"And I want that to be on the record, the Police and the fire department were amazing. They were amazing, they're incredible, those guys, they, yeah, they looked after us really well on the day. They made sure we had everything we needed, except fuel, but that wasn't their fault. ……..I want it to be known that we really appreciated what they were doing on the day. And yeah they were under a lot of stress as well, we know that. ……..yeah, but they held it together and they kept us on task and made sure we were okay doing what we were doing. And everybody was a really good team on the day, it was cool to be part of." (*Male Responder*)	"From a police perspective, five, 10 years ago, you would have just been left to your own devices. You would have been tired and grumpy, and they would have wondered why you were so upset about everything, because you've taken the weight of the world on your shoulders. But in more recent years, we've got some really good leadership in the police, and we've been really looked after. So as soon as they know something's coming, they're putting other extra staff in strategic places, expecting the roads to get cut off. We've been getting really, really well supported through the police, and that never used to be the case with these events, but they've obviously seen the harm that's happening in the community and the stress that it's causing us. Because we've still got our own lives and our own families and stuff going on" (*Pākehā Male, First Responder, East Coast*)	*First Responders: Police and fire response*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Like were pulling all these other families off rooftops and we didn't know whether our families were on rooftops on the other side of the bridge……." (*Male, Responder*)	"My children and their families are all in Hawkes Bay. Obviously, there were concerns around what was going on at that end because you've got to make sure home's alright. How do we get the best out of our people when things at home aren't right?" (*Pacific Male, First Responder, City*)	*First Responders: Concern for their own families and situations*
"But [River] was big. I mean it was over my head in places when we went to get back in there to get people out. We were just waiting down the road because the caravan park by the golf course ……..But I got assigned to the swift water group on about day two, who came in with rafts and things like that, so we had even more specialised gear; dry suits and bits and pieces." (*Male, Responder*)	"Every time we had to evacuate everyone along the river, you know that would cause anxiety…but we've just stood up, brushed ourselves off and carried on with life. Realistically it wasn't until Gabrielle that they started talking about psychosocial services. The need for psychosocial services, I guess, for us [is] after every weather event" (*Wahine Māori, First Responder, East Coast*)	*First Responders: Risky and challenging situations*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"...the unfortunate thing about our marae is that we didn't have a wharekai, so there was nowhere we could feed our people and look after them in terms of the immediate and then the long term effects. So we had the wharenui... we had the marae itself so people could go in there and sleep, but the power was out. So we weren't prepared, that's being honest. Waiohiki wasn't prepared. We didn't have a Plan B. There was no like click into this, we've got a container, we can do this, this and this. We had pretty much nothing. And then in our back garage we had a lot of water and some sort of tinned food". (*Female, Marae Lead*)	"You see a marae is not only a facility, it's got heaps of mattresses, it's got a huge kitchen, tables, cutlery, everything, everything there. But they also have people who know how to host many people. It's a skill and we do it without even thinking, we just, as soon as the need comes, bang we're into it… once again, proved during Gabrielle, how important it was. Sadly however, there are some of our marae that ended up being munted like many of the homeless people. One of Pine's houses out at Te Karaka, for instance, hopefully it will be saved, but it was close to being red stickered." (*Kaumātua, Kaitī*)	*Communities Take the Lead: Marae*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Yeah, we don't have a nursing home, nah, it's gone. They pulled the pin. And Heritage, that's it, Heritage, they pulled the pin [...] Because their place got flooded, like, flooded bad and then their emergency evacuation point was at the presbyterian church across the road, over there, and they had them there. And, like, their care workers just worked amazingly doing them. But they all got flown out to other care facilities and left there. So there's nowhere for them to come back here." (*Male, Community Organisation*)	"You wanna get something done in a community you go to the local marae and ask them first. Then you go to the church groups, right, they're the other ones who, you know you can go and talk to. Then you go to the community spaces, that's how you get into a community, and that's how you get to the community. And I think a lot of our big organisations forget that" (*Wahine Māori, Kaitī*) "The role of the church, bring the people together, for us, and also the church will look at those who are poor, or they need help. Not only helping poor and everything, but they will have to go and visit them, and prayer for them, mmm. And talk to them, so that they can feel they are looked after... I can see the people coming together, working together. Those people from Auckland, they came and brought trucks with the local food. And we share it at our church, not only the Tongan, but all the Pacific Island people. We share, like before the government helped, the SIAOLA group arrived." (*Tongan Methodist Church Elder*)	*Communities Take the Lead: Churches*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Another amazing turn of, so St Josephs was just they put on, we just sat in the gymnasium I think, maybe it's their hall, the school hall, for what seemed like an age. But they had a generator and they were organising food so we were given some food and hot drinks…..Yeah. Probably the last thing you think about at the time and then at this time, people were, lots of people were arriving, like quite a large group of RSE workers arrived. Because they don't speak English, they were really quite noisy and there were some elderly people, there was all sorts of people arriving. And we had food and then there was a bit of a meeting and they organised where they were going to place people around the building…. Sleeping arrangements, yeah. And it was absolutely no panic, no fuss, no stress, it was really straightforward. They said they didn't have much in the way of bedding for a large number of people, but it was a warm day anyway so it wasn't and –The principal I s'pose, presume, yeah….Yes, yeah. Everyone seemed to jump when she spoke." (*Male, Impacted Person*)	"Our school is the Civil Defence headquarters, and so we had 107 people living there. Because they'd been displaced, they couldn't go back to their homes. …the school became the place of refuge and was quite a pertinent space for the recovery, and still is now." (*Wahine Māori, School Leader, Rural*) "…the schools were quite fit for purpose, so our gym became eating and kind of recreation space, coffee, tea, cups of tea just rolling all day in our gym. The Civil Defence headquarters was where the Civil Defence team were, so they were all kind of, there were people kind of constantly in and out there, communicating with the head of the Civil Defence team. And then we [TK School] had two people in charge of incoming donations and then we had two people in charge of donations going up. We had someone in charge of all the health resources that were coming in, nurses, doctors." (*Wahine Māori, School Leader, Rural*)	*Communities Take the Lead: Schools*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
And they had like a supermarket set up at their community hall and that sort of thing. So they look after themselves really well, they almost dragged you along for the ride, you know? You just feel like part of the community, you know and you just wanna come and do stuff for them, so it was good in that respect I must admit, yeah. (*Male, Responder*)	"…manaakitanga, so, you know just absolute, kind of unconditional support awhi, help, sustenance. Just being able to look after people, manaakitanga. Whakaute, respect, so in all of our dealings, all of our communications. You had to maintain a respectful demeanour, in order to keep relationships well. Because people were already feeling at the lowest that they've probably ever felt in their lives." (*Wahine Māori, School Leader, Rural*)	*Communities Take the Lead: Community Hubs – Local Knowledge, Relationships and Manaakitanga*
"well I'll speak on behalf of [13:28] church in Flaxmere. He was just running it off of donations. He wasn't getting paid. He wasn't getting any money, he wasn't getting any help... So he was doing it off of nothing pretty much. Opening up his cupboards, cooking the meals, big pot." (*Female, Pacific Health Organisation*)	"I feel Marae [are] taken advantage of, hey, we'll do it anyway. But given that they are such an important resource, I feel that it should be the responsibility of central government to make sure that those resources are kept up to standard. And are supported, and being able to be provided, you know they're lifesavers in many cases. And, you know we hear lots of, it's not just for, as a sanctuary during a weather thing. A marae is a place where Māori can grieve, where Māori can celebrate, where Māori can learn, and Māori can share." (*Kaumatua, Kaitī*)	*Communities Take the Lead: Resourcing*

Quotes from 'Activating Communities' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Saving grace, my uncle turns up with on his truck. Metal truck with a snorkel on the side. And I said to him Uncle, we need to go and collect, you need to go house to house and collect everybody 'cause everyone's still stuck in their houses. And he's like yeah, not a problem. A cousin had made her way across, she'd walked her way out. She jumps in. Another cousin walked his children over. He jumped in. And they all went house to house, every single house." (*Female, Marae Lead*) "Well yes there was, because people just kept turning up to help. Which I was blown away by the generosity of people. We had absolute strangers just turn up at the door, like parents with a couple of their teenage kids saying we've come to help, what can we do? And people from up the road that I'd never met, relations." (*Female, Impacted Person*)	"From my perspective it's just, all I can do is just help all the aunties. Yeah, that's what I can do 'cause I can just see that they're hurt aye. All the aunties, you can just see them smiling but they're hiding stuff, you know. …I just want more bros like me just to come and help all the families aye. That's why I sorta jumped on this contract with…just to help out the aunties and that with the smashed houses. ….all I just wanna do is just give back to the community 'cause everyone helped me around here. 'Cause I was whangai'd to all the houses, yeah, and now it's just giving back." (*Tāne Māori, Rangatahi, East Coast*) "It was such a beautiful site to see all these people just come, come along and support each other and the community, the wider community. Absolutely! But hopefully it never happens again" (*Tāne Māori, Mahi Taiao, Rural*)	*Communities Take the Lead: Community supporting each other*

8.6 Theme 5: 'Action Stations'

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
It was around communication, I couldn't get in touch with my family, I couldn't get in touch with my children, you know that sort of thing" (*Female, Health Provider*) "There's a phone system called Starlink and a lot of farmers are now buying those or I know a couple of communities are looking at buying a couple of them and having them in strategic places. So the guys with Starlink, they were able to phone out and do whatever they wanted, so it's a marvellous system. It's expensive on a monthly basis… I think the initial cost is about $400 or $500 for the kit. Might even be more than that. Then it's something like $90 or $100 just to have it there, then you've got user costs on top of that. It's more expensive than a cellphone but it works. So if you look at the things that muck people up, it's comms." (*Hawkes Bay*)	"I think with the Civil Defence and all that, I think the messages didn't get out there fast enough, especially when it hit the 8.5 mark. The level of water was way up there. Seven, you'd be knocking on doors and telling everybody to get out. They were doing that around eight, 8.5, so it was like, well, you guys needed to wake up on this one real fast." (*Pākehā Male, Horticulture, Western Rural*) "I found the hardest thing for me living alone was no access to 111. No access to emergency services. So I sort of felt like if anything happened say in the middle of the night or if someone was trying to break in or something like that, you had no access to ready assistance." (*Wahine Māori, Disability, Kaitī*) "So the isolation for telecommunication was probably about a month. Hence that's why we, that's why we required some assistance in looking at the Starlink to try and prepare us for the next event that may occur. So yeah we were severed by communication, there was no, no outside contact with us." (*Pakeke, East Coast*)	*Whakaaweawe Hanganga: Communications*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"But things like availability for money, you know, like EFTPOS went down and no-one had any cash…….But, you know, things like no-one has cash anymore so and, yeah, so that was probably for a lot of our clients and family anyway, was probably impacted, getting petrol, all that sort of stuff." (*Female, Community Organisation*)	"…oh, my God, I wish I had got some cash out… I try and keep cash on me now, just in case." (*Kuia Māori, Social Service*)	*Whakaaweawe Hanganga: Money*
"The second thing was access. We had a number of major bridges in Hawkes Bay that got blown out and we had a number of minor bridges, so rural bridges if you like, on rural roads, which were also destroyed as well as massive slips and washouts. We had a situation where the opportunity to hop in your ute and drive from your farm to go to town to get your groceries was gone." (*Male, Community Organisation*)	… roading is a humanitarian issue, people don't see it like that. They see it as more of a, like a nice to have, it's not like a fundamental lifeline for people to live their lives. It's like you should be grateful you have a road…. (*Wahine Māori , Local Government*) I still haven't been home. When you say "hoki ki o maunga" we can't "hoki ki o maunga" we can't go back to our mountains, we can't go back to our rivers. And if we're going to, if there's a hui on it's like hmm, am I gonna get stuck up there, you know? It's huge, the impact that the weather has on the coast especially, yeah. (*Wahine Māori 1, Gisborne City*)	*Whakaaweawe Hanganga: Roading – isolating, Access, Wellbeing, it's a humanitarian issue, can't go home*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
Those operating logistics, no power, no water supply, particularly wastewater. We didn't have a generator, we don't have Portaloos here, food supplies would've been a challenge, you know, all those sort of things." (*Female, Community Organisation*)	"It was a challenge. And we were constantly thinking about it and constantly trying to do our part too, to make sure we weren't adding pressure to the network. So, you know, not flushing every single time, not washing clothes. You know, capturing water in buckets to pour down the toilet, all of that. Buying water, that was a biggie. Felt like forever 'cause then it came back but it was still filthy. It was like running brown. I couldn't believe that. You know, okay power, yes, internet, yes, that was hard. But water, not having water was a whole other level." (*Wahine Māori, City*)	*Whakaaweawe Hanganga: Water and sewage*
"[Rural settlement] I think was the last place to get power… Twenty-eight days after the cyclone they got power. So there were people living in rural communities on large farms that didn't have power for three weeks, and some of it was by and large generators." (*Male, Community Organisation*)	"So when you wake up the next morning and there's nothing on it's like – No power, phone, nothing. … I'm somebody who holds back tears. But it does make my nose get a little bit kind of twitchy and wanna cry because I think the comms thing was huge." (*Wahine Samoan-Māori, Social Service Leadership, City*)	*Whakaaweawe Hanganga: Electricity and fuel*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Yeah, I can speak on the council because of the frustration of a lot of our community members where they were hoping that council would come through. But they were struggling as well. And we got to see what they were going through with Civil Defence and, yeah, they were overwhelmed maybe, understaffed. And because it happened so quickly they had to just pretty much roll with the punches." (*Female, Pacific Health Organisation*)	"I felt like they were trying to cope as best they could and it was overwhelming because you had crowds of Gisborne people turning up to the Council trying to be heard all at once. And yeah, there was a lot of, I think Council just trying to figure it out as they went, yeah. Trying to get themselves back online too." (*Wahine Māori, Artist, City*)	*Local Councils, Civil Defence: 'They did their best'*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"But civil defence weren't necessarily, like they wanted to, didn't necessarily seem to want to engage that much and with organisations, with agencies like us." (*Female, Community Organisation*) "But, you know, it was just that disconnect between doing the active doing-the-work-people and the support level. And process disconnect it's always the way with the SIMS structure when the Council gets involved" (*Male, Responder*) "That started coming through Civil Defence at that stage. It was very disjointed." (*Male, Responder*)	"… it's compounding, it's continually compounding. So you just come to work and you're like right, like, you know and you're getting the calls from people with the impacts and stuff. So in terms of my work, that's, that is the real impact of continuous ongoing events, is our funding system is absolutely not geared up to support recovery. And they just, they being government and, you know Crown kinda central government agencies. They have no idea, they have no idea what it's actually doing to offices on the ground and people that have to deliver these work programmes." (*Wahine Māori, Management Local Government*) "The permanent Civil Defence, not the local one, needs to come out and visit these hubs. Because it reinforces the support, but it also allows them to see any changes that occurred within the hub, change of faces, change of needs and that." (*Kaumātua, East Coast*)	*Local Councils, Civil Defence: coordination, leadership, and 'out of touch with those on the ground'*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"I think it was lack of help, I guess, from Council. Well, some government firms helped out, I guess, but I think there was the urgency that they lacked. I think we got, we had a visit from the mayor, from our Regional Mayor, I think it was about 10 days after the cyclone, by the time we had actually already cleaned up [Remote Settlement]." (*Male, Impacted Person*) "Civil Defence were, we didn't see them really, I mean other people at [Rural Settlement] might have, but they didn't have a strong presence. Yeah so it took, it took days and days and days before any of that stuff to make an appearance." (*Male, Impacted Person*)	"You know, [Rural Settlement] didn't get the help that it needed. I don't think it was on purpose, but it was real. I think never let a good crisis go to waste and there was an opportunity there to get some radical progress on iwi rights, like their own Civil Defence Act." (*Pākehā Woman, Social Service Connector Lead*) "The only helicopter that flew over was that news one eh, and they thought they were bringing us supplies. Nobody, no, it was so strange this time, with Bola, the old Civil Defence people, they had helicopters out going to people who were stranded. But they didn't this time …" (*Wahine Māori, Clinic Staff, Rural*)	*Local Councils, Civil Defence: Certain areas, especially rural, 'let down'*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"…. I think the councils were probably under resourced to be exposed to such an event. And they rely on volunteers and a lot of those volunteers have actually got no training. And as Jim said, a lot of people look on a map and they see this name, and they've got no idea where it is." (*Male, Responder*) "That was the worst bit, yeah. Yeah some, oh this might sound a bit harsh, but they had the wrong people in that Civil Defence headquarters" (*Male, Responder*)	"…I mean have you got the right people in place in the first place? You can have psychologists, you can have social workers, you can have health rescue and health safety people. You can have a baker and mechanics. It's like taking a baker to a mechanics. Some of them I don't think have the skills to be able to emotionally connect… in saying that I understand because they might not have the skills 'cause they're volunteers too…." (*Wahine Māori, East Coast*) "There was a course for people to do for Civil Defence, for them to be able to deal with people… Can we just get someone professional in now? [We need] funding for specialist roles. You know, I'd like to hear from those people too as advocates. Like what would yous, how would you prefer to work? Do you like working with your own whānau or do you actually like working with others? Yeah, that whānau thing" (*Wahine Māori, East Coast*)	*Local Councils, Civil Defence: Lack of the right time or skills for Civil Defence and Council*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"So, I suppose, I mean, I heard conversations about that, that they were slow to….Yeah. So, and I think it might have been Civil Defence that came in, and of course, they couldn't work all the, they were down there from 7:00-5:00 transporting stuff all the time, and they could only work 9:00-2:00, and it became, I mean, helicopters were working then, so it did, the fuel, but it's just the ease of stuff. So, that's what I heard, but I didn't have anything to do with that stuff." (*Female, Impacted Person*)	"All they talk about now is if this ever happens again, are we ready for it? Is Civil Defence going to be a lot more onto it this time around? Are we going to get help from the council this time around and jump onboard straight away without saying, oh, no, we can't do this because we haven't got the money to come in there. It's like it wasn't about the money, guys, it's about the help. If you can send one truck and help the community, well, that's something, that's showing something. But there was nothing like that. It was very slow coming and then when it did turn up, everybody else already had done the bigger work." (*Tāne Māori, Western Rural*)	*Local Councils, Civil Defence: 'Slow response'*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"there's definitely now risen quite a lot of distrust in the community. And the community now bands together instead of trusting in the organisations... Councils... Any government, any governance that makes those, yeah, they felt like they were let down. They felt like they weren't prepared enough. They felt like, yeah, things weren't carried through the way it should. No equity in it, no transparency. Yeah, definitely. The government have to understand that people look up to them as our leaders and they felt disappointed. So when someone's disappointed in their leader they're gonna voice it." (*Female, Pacific Health Provider*)	"It's gotten to the point where the iwi up the coast are actually taking the bull by the horns themselves and said, we're not having anything to do with the council or Civil Defence. We're going to go out on our own and sort our own stuff out, because they're dissatisfied with the way the council have operated around, and we've seen it for ourselves first hand, and we can see why. Which is quite a significant thing to go out, set up all their own shipping containers and all their own equipment for when there's a natural weather event like this." (*Pākehā Male, First Responder, East Coast*) "I just want to say to government, I want them to stop calling us resilient and I want them to just help. We're allowed to call ourselves resilient, I think it's a cop out when they do it. And I think they need to stop doing that, taking it for granted. Because then the rest of New Zealand turns around and goes oh they're fine, they're so resilient, that's not okay. We're only resilient because we have to be, we have no choice. Well we've had to be for a long time, with or without cyclones. So please stop saying that. Stop saying that and tell us how you're gonna help us. And stop saying that we need to remove people from communities that their whānau have been part of since before they were even in New Zealand. Right, before Pākehā came to New Zealand our people were on that land, so stop saying we need to move out of those communities and put money in to help with the	*Local Councils, Civil Defence: 'Dissatisfied'*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
Yeah, I guess they're tied in the same. We've got too many Councils. Scrap them all and have one. (male, responder) The Napier Council and the Hastings Council need to work better together. Because we were doing meal requests, 'cause we were catering for the first responders. And yeah we were just getting double ups and just simple things that should be quite a good process. But yeah, Napier was kinda doing their own thing and Hastings should have been more of the lead, I suppose, I feel. (*Female, Responder*)	"…it was surreal when you think back to how people responded. … we don't have the benefit of other regions [like the Hawkes Bay] that have five councils." (*Wahine Māori, Local Government*)	*Local Councils, Civil Defence: Councils Structure*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
But in saying that, you know, it's funny though the things that we have learnt though about actually, because, you know, they are recommended items for emergency food supplies. But now we sort of went out saying, actually, we need to create like an emergency menu plan and then really buy exactly the ingredients for those because then we had, because, you know, you then had like whatever, you know, like planned rice, oh yeah, okay, you can survive. ……. So that's a good idea that came out of it to rethink about let's make a menu plan for three days with just non-perishable items to have every single meal, like a proper nice meal. And what we also learnt is that without electricity, we were cooking on barbecues, but barbecues use actually quite a lot of gas" (*Hawkes Bay*)	"…the council was sending out messages about the water supply. ..so the day of, we did have water. We had, what were those, 20 litre buckets, we had about six of those and we filled the bathtub up." (*Wahine Māori, Kaitī*) "People obviously thought, oh we'll be fine and they weren't, and there were a lot of people who didn't take it serious and they didn't have the moorings. The power was down so they didn't have their radios, these days, people don't have transistors, and they were on their own." (*Pākehā Couple, Horticulture*)	*Preparedness, Response and Recovery: Preparedness*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"That water came in really fast and it was coming in strong. And we were trying to get out with both of our vehicles, the little vehicles, and you could feel the pressure of the water pushing up against the vehicle. And my thought was like oh my gosh, okay. Our son was screaming and I said to him wind down the window, 'cause I thought if we can't get out at least we can come out through the window. And I was thinking to myself please give me the strength to grab my son, who's 18, to pull him out of the vehicle and take him with me." (*Female, Impacted Person*) "Yes, I thought we were gonna die." (*Impacted Person Hawkes Bay*)	"The scariest part was when it was still dark and we lost power. We managed to get a little gas light before the power went out, just in case, and had that on bench so for a few hours until it got light, that was the only thing we had. Yeah, it was a bit scary not being able to see. And obviously, we couldn't go out the door because we didn't know what was out there." (*Pākehā Couple, Horticulture*)	*Preparedness, Response and Recovery: Frightening experiences*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"So I rearranged the deck chairs on the Titanic for ages. I was just faffing about, not really knowing what I was doing. But looked for the cat, couldn't find the cat. Found the dog. I remember shifting my car up to the highest point on the property just hoping, oh I hope my car doesn't get any water in it. And I chucked into the car things like photo albums, certificates, stuff like that. And I realised I've either got to try and get out now or I'm completely stuck. And when I shifted the car I just happened to see someone going past on a loader and, yeah, he picked me up, me and the dog, and off we went. So between me realising it was flooding and finding someone to go out with, 15 minutes at most." (*Hawkes Bay*)	"We didn't sleep, we stayed up the whole time. We have dogs, 13 dogs, we had to put them on a trailer, back them into the shed. It wasn't just scary for us, it was scary for the animals. And preparing ourselves and getting all the sheep moved as well as the horses the day before was pretty stressful. So yeah, there's livelihoods, animals to save first before moving gears and things like that." (*Wahine Māori, East Coast*)	*Preparedness, Response and Recovery: Pets and animals impacted decisions*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"I feel like I shouldn't feel abandoned, but I do, yeah. Because I know that there's, like I see it when I drive up and down between here and Wairoa, all the road workers out. People helping people who have been flooded. There's lots and lots of support and I know it's there. But I guess when it comes to who do I think I should get support from and thinking particularly here of Council, I do feel abandoned. And I guess the other night when we had all that rain I just realised that if the exact same thing happened again like what happened in February and we got another flood like that, nothing's actually changed. We're gonna get the same outcome. We're gonna flood again. And I just felt angry because it's been nine months. And I know if the water comes up there's nothing there that's been put in place to stop it from happening again." (*Hawkes Bay*)	"No one ever came to us, no one came, no one come to us over the last five events, that's going back two years, five events we've had. And no one came to us, we're off the radar, we're watching other regions on the television when we had power and access to television. We're watching other regions which are just over the hill being accessed with helicopters and assistance. And for us, we saw it as yeah, a bit of a gripe, 'cause it looked like those that were managing the services, were taking care of their own whānau, which were in those other regions. And those services of assistance didn't have whānau out our way, so we dipped out. That was our take on the way things were going. What did you guys require from the responders? [To ask] How are we? How are we? Do we need anything? Just to see a face, that someone trying to connect. And just to take the questions" (*Kaumatua, East Coast*)	*Preparedness, Response and Recovery: Sense of abandonment*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"People didn't have houses to live in, their livelihoods were compromised and farm infrastructure was destroyed." (*Hawkes Bay*) "….[Rural locality] has about 200 homes, and there were only 20 that were liveable after the event…." (*Hawkes Bay*)	"This is our fourth move. We've had four places since February. Yeah, it's not ideal. The owners live here and we're like here (demonstrate proximity of houses) so we haven't really got our own privacy…. Temporary accommodation through MSD. I just contacted them and said, look, we've got nowhere to stay, and they put our name on the list and nothing was coming up. There's just no accommodation available." (*Pākehā Woman, Horticulture, Western Rural*)	*Preparedness, Response and Recovery: Housing*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"Lost the whole lot. Wiped out. Yeah, all gone. That's how powerful it was. It was just able to, it like twisted corrugated iron. And the water went thrashing through, yeah." (*Female, Impacted Person*)	"Money's getting a bit short and food's getting really expensive and there's these sheep that are running out of grass. And I had this meltdown one evening that there's too many mouths to feed, we need to get rid of some stock, because I'm stressed about feeding you…" (*Pākehā Woman, Local Government*) "These people put their heart and their souls into planting those vineyards, building those farms. It's their life and just to see them in shock… to see them like it was in a car accident, they didn't know what to do. They couldn't really do anything, they were just completely overwhelmed." (*Pākehā Male Horticulture, City*)	*Preparedness, Response and Recovery: Livelihoods*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"A lot of elderly people don't tend to have a large stock of food in the house, usually because it's only one or two of them, and then all of a sudden they can't get to the supermarket, they haven't got much in" (*Hawkes Bay*) "Cause it's amazing how many people, some people had nothing in their fridges, and their cupboards, or anything" (*Hawkes Bay*)	"All supermarkets only had one day supply if it was going to be panic buying. So they needed police marshalling and all of that. They didn't have any cash. They didn't have any way of doing Eftpos. So for those first three or four days the demand on (not-for-profit food bank), because it was being given out, was huge because the supermarkets weren't open. Once they did open it did take quite a bit of pressure off us which was good. But, then the isolated people, that sort of started rearing its head, and the need among isolated people… was huge." (*Pākehā Woman, Social Service Lead*)	*Preparedness, Response and Recovery: Food security*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"….at the petrol stations. They, we needed them open, they were getting threatened, and horrible stuff happening to them…. Some of those got a bit ugly and then they were obviously stealing generators from banks and stuff as well." (*Hawkes Bay*) "Looting big time, to a point where we had to take a photo of a guy with a backpack that had come across the river." (*Hawkes Bay*)	"So a great example and, you know you see the absolute best and the absolute worst of humanity in this. Because the absolute worst is the people that started looting." (S10 Hawkes Bay) "At nighttime, there's people going and looting homes. Or they came in and having showers. I caught up with the police and said to them, look guys, you guys need to start monitoring the roads, especially Lavenham Road and Branson Road, because my mate that lives down Branson Road caught four fellas looting in the homes. They were from town. They just came in and started taking stuff, and he called them out and got them and held them down, and then there was a couple of other locals held them down, rung the cops up and the cops turned up and took them away. Then they put a barrier at the front of Branson Road with a gate and closed it at nighttime. That was cool but Lavenham Road, you couldn't close that up because it was a busy road. And farms too. Meat walking around in the paddock. I don't think these townies were desperate. I think they were just silly and greedy and just didn't have any respect for other people." (*Tāne Māori, Western Rural*)	*Preparedness, Response and Recovery: Safety and law and order*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
"...being in that limbo for the last seven, eight months is horrendous, you know. People are stressing out because they wanna go home but they just physically can't because the insurance companies won't pay out until that stopbank's up." (*Female, Marae Lead*) "But in my career, which is about 12 years now, I've been to three or four once in a 50-year flooding events. So they are happening and they are happening more and more, but there has to be, because they don't happen 'often', there's no appetite to fund or prepare too much for them. Especially with FENZ as an organisation funded through insurance levies and things like that rather than through government, we obviously don't get any money out of anything until it happens. You know, once people pay their insurance, that's where the money comes from. So stockpiling and preparing for huge things like that has to come from somewhere else because your core business is covered, the stuff you do day-to-day, but it's that once every couple of years thing. And you need the resources, but where does it go in the meantime, who looks after it, and who funds it?" (*Hawkes Bay*)	"It's hard too, because we haven't been paid out for this house. We've got some insurance money but in the meantime we've got a loan. We did need somewhere to live. It's not what we really wanted, but it's a house. It has been forced upon us, I guess. Yeah, which doesn't feel crash hot. We'll make it our own place. I guess if you have a farm or a house in a floodable area, then you have to expect these things. But I guess our biggest frustration has probably been the insurance and having to battle with them. It's not so much the time. It's constant communication backwards and forwards." (*Pākehā Male Horticulture, Western Rural*)	*Preparedness, Response and Recovery: Insurance and payouts*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
It also has opened up people's opportunity to maybe learn a bit more about global warming. It's made them want to know more, want to be more prepared. A subject that was never quite a big subject is now becoming a really big subject." (*Hawkes Bay*)	"Climate change is real, and our level of resilience and adaptation needs to escalate. That's where to me, the big thing that we need to focus on, is a voice for the region that is joined up. I think the way in which we come together as a community is the good thing. I think that iwi is the good thing. That it is true that never waste the crisis. This is an opportunity to get some stuff through, and that includes devolution to iwi." (*Pākehā Woman, Social Recovery Lead*) Every day I'd go out and spend a couple of hours cleaning plastics and detritus stuff off the beach that shouldn't be there. You couldn't do anything about the driftwood and the slash. But unfortunately, councils so-called transfer station is located in an old flood path. And this is common of all over New Zealand, so we ended up with a lot of dump on the beach, which we were continually cleaning up, dragging out the way. (*Pākehā Couple, East Coast*)	*Climate Change is Here: Action is needed*

Quotes from 'Action Stations' Theme

Hawkes Bay	*Te Tairāwhiti*	Subtheme
	The world is in deep shit, climate change, we have to start recloaking the whenua. Recloaking Papatūānuku might seem like a, you know, not necessarily a health thing. But actually it is a health thing. It's a huge wellbeing thing. Like, yeah, we've gotta look after the awa, you know? It's like, for them it's live, it's the real earth. We've gotta look after the whenua, we've gotta look after the Awa. (*Elderly Pākehā Male, Horticulture*) Doing this mahi gives us hope. Being able to put some trees in. Today we planted [Coastal locality] urupā. So that was where the chasm was, so being able to do those sorts of things and bring in [rural, remote] School...whānau ki te whenua, we're fostering kaitiakitanga… (*Wahine Māori, East Coast*)	*Climate Change is Here: Health and Hope*

8.7 Points of Difference

Gender Quotes from Te Tairāwhiti
"We had children, we had women with us who had nothing, so when, I say everything, they'd lost, like things like bras and undies were, for us so common. But it was like when you don't have them, and you have your period, you're in dire straits basically." (*Wahine Māori, School Leader, Rural*)

Gender Quotes from Te Tairāwhiti
"My son is a truck driver. Sometimes he goes right up into the middle of nowhere. So whenever we hear the heavy rain it's like 'okay, you're gonna be off the road', which means I don't have to worry about the babies. 'Cause he'll be home for them, so it's like have you got work, have you not got work? And then for the babies, it's making sure that they have the things that they need." (*Wahine Māori, Social Services, Gisborne City*)
"Another thing I was concerned about is the Waipaoa River behind us because that was right up when we came across the bridge. So if the Waipaoa broke and we're standing there and we haven't got mum out and we haven't got back across the bridge to town, my then 16 year old son is home alone and I'm also starting to worry about my daughter, son-in-law and two grandchildren that live at Tolaga Bay." (*Wahine Māori, Gisborne City*)
"If it wasn't [us], and we had two males there, they would never have got the abuse we've had and the treatment that we've had from some of our own, never, ever. I have no doubt in my mind that being woman has also made us an easy target" (*Wahine Māori, Leadership Role, City*)

[1] Russell L, Jeffreys M, Cumming J, et al. Ngā Kawekawe O Mate Korona | Impacts of Covid-19 in Aotearoa 2022.

[2] Harrington Luke J., Dean Sam M., Awatere Shaun, et al. The role of climate change in extreme rainfall associated with Cyclone Gabrielle over Aotearoa New Zealand's East Coast World Weather Attribution Initiative Scientific ReportGrantham Institute 2023.

[3] *Sendai framework for disaster risk reduction 2015–2030* 2015.

[4] Chisholm B.. The World Health Organization. *British medical journal.* 1950;1:1021–1026.

[5] Durie Mason H. A Maori perspective of health *Social science and medicine.* 1985;20:483-486.

[6] Hatala Andrew R.. Towards a Biopsychosocial–Spiritual Approach in Health Psychology: Exploring Theoretical Orientations and Future Directions *Journal of Spirituality in Mental Health.* 2013;15:256-276.

[7] Jaberi Azita, Momennasab Marzieh, Yektatalab Shahrzad, Ebadi Abbas, Cheraghi Mohammad Ali. Spiritual Health: A Concept Analysis *Journal of Religion and Health 2017 58:5.* 2017;58:1537-1560.

[8] Pitama S, Huria T, Correspondence C Lacey Clinical, 2014 . Improving Māori health through clinical assessment: Waikare o te Waka o Meihana *nzmj.org.nzS Pitama, T Huria, C LaceyClinical Correspondence, 2014*nzmj.org.nz.* 2014.

[9] Catlin Bridget Booske, Athens Jessica K, Kindig David A, Remington Patrick L. Different perspectives for assigning weights to determinants of health *files.static-nzz.chB Catlin, J Athens, D Kindig,*

*P RemingtonWisconsin: County Health Rankings Working Paper, 2010*files.static-nzz.ch.* 2010.

[10] Organization World Health, others . Ottawa charter for health promotion, 1986 in *Ottawa Charter for Health Promotion, 1986*World Health Organization 1986.

[11] Lauzon Chantal, Stevenson Anna, Peel Kirsty, Brinsdon Sandy. A" bottom up" health in all policies program: Supporting local government wellbeing approaches *Health Promotion Journal of Australia: Official Journal of Australian Association of Health Promotion Professionals.* 2023;34:660–666.

[12] Pomare Pikihuia, Tassell-Matamua Natasha, Lindsay Nicole, et al. Te Mauri o te Kauri me te Ngahere: Indigenous Knowledge, te Taiao (the Environment) and Wellbeing *Knowledge Cultures.* 2023;11:55–83.

[13] Baciu Alina, Negussie Yamrot, Geller Amy, et al. The root causes of health inequity in *Communities in action: Pathways to health equity*National Academies Press (US) 2017.

[14] Diderichsen Finn, Andersen Ingelise, Manuel Celie, et al. Health Inequality-determinants and policies *Scandinavian journal of public health.* 2012;40:12–105.

[15] Gurney Jason K, Campbell Shelley, Turner Stephanie, Scott Nina. Addressing cancer inequities for indigenous populations: The New Zealand story *Journal of Cancer Policy.* 2020;23:100209.

[16] Huria Tania, Pitama Suzanne G, Beckert Lutz, et al. Reported sources of health inequities in Indigenous Peoples with chronic kidney disease: a systematic review of quantitative studies *BMC Public Health.* 2021;21:1–10.

[17] Reid Papaarangi, Paine Sarah-Jane, Curtis Elana, et al. Achieving health equity in Aotearoa: strengthening responsiveness to Māori in health research *NZMJ.* 2017;130:1465.

[18] Ramsden I. Cultural safety and nursing education in Aotearoa and Te Waipounamu *Unpublished PhD thesis.* 2002. Times cited: 281.

[19] Curtis Elana, Jones Rhys, Tipene-Leach David, et al. Why cultural safety rather than cultural competency is required to achieve health equity: a literature review and recommended definition *International journal for equity in health.* 2019;18:1–17.

[20] Wither David, Orchiston Caroline, Cradock-Henry Nicholas A, Nel Etienne. Advancing practical applications of resilience in Aotearoa-New Zealand. *Ecology & Society.* 2021;26.

[21] Walker Brian, Gunderson Lance, Kinzig Ann, Folke Carl, Carpenter Steve, Schultz Lisen. A handful of heuristics and some propositions for understanding resilience in social-ecological systems *Ecology and society.* 2006;11.

[22] Folke Carl. Resilience (republished) *Ecology and society.* 2016;21.

[23] Brundiers Katja, Eakin Hallie C. Leveraging post-disaster windows of opportunities for change towards sustainability: a framework *Sustainability.* 2018;10:1390.

[24] Holling Crawford S. Resilience and stability of ecological systems *Annual review of ecology and systematics.* 1973;4:1–23.

[25] Hewitt Kenneth. Environmental disasters in social context: toward a preventive and precautionary approach *Natural Hazards.* 2013hewitt2013environmental;66:3–14.

[26] Sword-Daniels Victoria, Eriksen Christine, Hudson-Doyle Emma E, et al. Embodied uncertainty: living with complexity and natural hazards *Journal of Risk Research.* 2018;21:290–307.

[27] Moallemi Enayat A, Elsawah Sondoss, Ryan Michael J. Robust decision making and Epoch–Era analysis: A comparison of two robustness frameworks for decision-making under uncertainty *Technological Forecasting and Social Change.* 2020;151:119797.

[28] Anonymous . *Our atmosphere and climate 2020*. Environmental Reporting SeriesMinistry for the Environment & Stats NZ 2020.

[29] Apārangi Royal Society Te. Human health impacts of climate change for new Zealand 2017.

[30] Kjellstr"om Tord, Corvalán Carlos. Framework for the development of environmental health indicators *World health statistics quarterly.* 1995;48:144-154.

[31] Hambling Tammy, Weinstein Philip, Slaney David. A review of frameworks for developing environmental health indicators for climate change and health *International journal of environmental research and public health.* 2011;8:2854–2875.

[32] Bishen Shyam, Glick Sam. Quantifying the Impact of Climate Change on Human Health tech. rep.World Economic Forum 2024.

[33] Teen Rachel, Roberts Lin, Challies Edward. Disruption as opportunity for transformation? Insights from water supply contamination in Havelock North, New Zealand *Local Environment.* 2020;25:810–827.

[34] UNDRR . Disaster Risk Reduction in New Zealand: Status report 2020 | UNDRR 2020.

[35] Basher Reid E. High stakes: disaster risk in New Zealand *Policy Quarterly.* 2016.

[36] Poterie Arielle Tozier, Baudoin Marie Ange. From Yokohama to Sendai: Approaches to Participation in International Disaster Risk Reduction Frameworks *International Journal of Disaster Risk Science.* 2015;6:128-139.

[37] Kenney Christine, Phibbs Suzanne, Meo-Sewabu Litea, et al. Indigenous Approaches to Disaster Risk Reduction, Community Sustainability, and Climate Change Resilience *Disaster Risk Reduction for Resilience: Climate Change and Disaster Risk Adaptation.* 2023:37-59.

[38] Masters-Awatere Bridgette, Howard Darelle, Young Patricia. Haumanu Hauora: refining public health institution policy to include Māori and climate change *Climatic Change.* 2023;176:1-15.

[39] Beckham Tira L, Cutts Bethany B, Rivers III Louie, Dello Kathie, Bray Laura A, Vilá Olivia. BRIDGE Builders–Leadership and social capital in disaster recovery governance *International Journal of Disaster Risk Reduction.* 2023;96:103942.

[40] Lam Lai Ming, Kuipers Rob. Resilience and disaster governance: Some insights from the 2015 Nepal earthquake *International Journal of Disaster Risk Reduction.* 2019;33:321–331.

[41] Duda Patrizia Isabelle, Kelman Ilan, Glick Navonel. Informal disaster governance *Politics and Governance.* 2020;8:375–385.

[42] Briones Fernando, Vachon Ryan, Glantz Michael. Local responses to disasters: Recent lessons from zero-order responders *Disaster Prevention and Management: An International Journal.* 2019;28:119–125.

[43] Organization World Health, others . *Operational framework for building climate resilient health systems*. World Health Organization 2015.

[44] Andrew Albert. Aotearoa New Zealand general practice workforce crisis: what are our solutions? *Journal of Primary Health Care.* 2024.

[45] Sheridan Nicolette, Love Tom, Kenealy Timothy. Is there equity of patient health outcomes across models of general practice in Aotearoa New Zealand? A national cross-sectional study *International Journal for Equity in Health.* 2023;22:79.

[46] Wakerman John. Innovative rural and remote primary health care models: what do we know and what are the research priorities? *Australian Journal of Rural Health.* 2009;17:21–26.

[47] Blattner Katharina, Clay Lynne, Nixon Garry, et al. The place of rural hospitals in New Zealand's health system: an exploratory qualitative study *Rural and Remote Health.* 2023;23:1–10.

[48] Glavinovic Krystyna, Eggleton Kyle, Davis Rhoena, Gosman Kim, Macmillan Alexandra. Understanding and experience of climate change in rural general practice in Aotearoa—New Zealand *Family Practice.* 2023;40:442-448.

[49] Ibrahim Mustapha D. Efficiency and productivity analysis of innovation, human capital, environmental, and economic sustainability nexus: case of MENA countries *Environmental Science and Pollution Research.* 2023;30:34394–34405.

[50] Chambers Tim, Wilson Nick, Hales Simon, Prickett Marnie, Ellison Edward, Baker Michael G. Beyond muddy waters: Three Waters reforms required to future-proof water service delivery and protect public health in Aotearoa New Zealand *The New Zealand Medical Journal (Online).* 2022;135:87–95.

[51] Damaševičius Robertas, Bacanin Nebojsa, Misra Sanjay. From sensors to safety: Internet of Emergency Services (IoES) for emergency response and disaster management *Journal of Sensor and Actuator Networks.* 2023;12:41.

[52] Routray Sudhir K, Anand Sharath. Narrowband IoT for healthcare in *2017 International Conference on Information Communication and Embedded Systems (ICICES)*:1–4IEEE 2017.

[53] Lokmic-Tomkins Zerina, Bhandari Dinesh, Bain Chris, Borda Ann, Kariotis Timothy Charles, Reser David. Lessons learned from natural disasters around digital health technologies and delivering quality healthcare *International journal of environmental research and public health.* 2023;20:4542.

[54] Belkhir Lotfi, Elmeligi Ahmed. Carbon footprint of the global pharmaceutical industry and relative impact of its major players *Journal of Cleaner Production.* 2019;214:185–194.

[55] Akrofi Thomas, Buor John, Ottou Jemima, Bugri Benjamin Adelwini. An Inter-Related Resilient Strategies for Healthcare Medical Supplies in the Face of Disruptions *ADRRI Journal (Multidisciplinary).* 2023;33:1–33.

[56] Hamdi Abdul Hafeez Ahmad, Hatah Ernieda Md, Bakry Mohd Makmor, Basari A Halim, Hamdi Najwa Ahmad. Operations management of pharmaceutical supply during preparedness and disaster response: A scoping review *International Journal of Disaster Risk Reduction.* 2024:104296.

[57] Hogan William, Harris Matthew, Brock Alexander, Rodwell John. What Is Holding Back The Use of Drones for Medication Delivery in Rural Australia? *Sustainability.* 2022;14:15778.

[58] Heying Charles. Autonomy vs. solidarity: Liberal, totalitarian and communitarian traditions *Administrative Theory & Praxis.* 1999;21:39–50.

[59] Reboita Michelle Simões, Da Rocha Rosmeri Porfírio, Oliveira Débora Martins de. Key features and adverse weather of the named subtropical cyclones over the Southwestern South Atlantic Ocean *Atmosphere.* 2018;10:6.

[60] Stephenson DB, extremes HF Diaz Climate, … , 2008 . Definition, diagnosis, and origin of extreme weather and climate events *Climate extremes and society.* 2008.

[61] Karl Thomas R., Trenberth Kevin E.. Modern Global Climate Change 2003.

[62] Climate Change (IPCC) Intergovernmental Panel. Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change *Climate Change 2022 – Impacts, Adaptation and Vulnerability.* 2023.

[63] Steffen Will, Richardson Katherine, Rockstr"om Johan, et al. Planetary boundaries: Guiding human development on a changing planet *Science.* 2015;347.

[64] Ebi Kristie L., Vanos Jennifer, Baldwin Jane W., et al. Extreme Weather and Climate Change: Population Health and Health System Implications *Annual Review of Public Health.* 2020;42:293-315.

[65] Mercier O Ripeka, Palmer Symon, King-Hunt Alan. Hoha riha: Pest insect control in Maori tradition *TheJournal of the Polynesian Society.* 2022;131:261–287.

[66] Galway Lindsay P, Beery Thomas, Jones-Casey Kelsey, Tasala Kirsti. Mapping the solastalgia literature: A scoping review study *International journal of environmental research and public health.* 2019;16:2662.

[67] Lu Hang. The role of repeated exposure and message fatigue in influencing willingness to help polar bears and support climate change mitigation *Science Communication.* 2022;44:475–493.

[68] Toogood C. Climate medicine: our changing climate and health inequity in New Zealand *New Zealand Medical Student Journal.* 2019.

[69] Butsch Carsten, Beckers Liza-Marie, Nilson Enno, et al. Health impacts of extreme weather events - Cascading risks in a changing climate *Journal of health monitoring.* 2023;8:33-56.

[70] Curtis Sarah, Fair Alistair, Wistow Jonathan, Val Dimitri V., Oven Katie. Impact of extreme weather events and climate change for health and social care systems *Environmental Health: A Global Access Science Source.* 2017;16:23-32.

[71] Jayawardhan S. Vulnerability and climate change induced human displacement *JSTOR.* 2017;17:103-142.

[72] Morganstein Joshua C., Ursano Robert J.. Ecological Disasters and Mental Health: Causes, Consequences, and Interventions *Frontiers in Psychiatry.* 2020;11.

[73] Cianconi Paolo, Betrò Sophia, Janiri Luigi. The Impact of Climate Change on Mental Health: A Systematic Descriptive Review *Frontiers in Psychiatry.* 2020;11.

[74] Bolin B, research LC Kurtz Handbook, 2018 . Race, class, ethnicity, and disaster vulnerability *SpringerB Bolin, LC KurtzHandbook of disaster research, 2018*Springer.* 2018.

[75] Mason K, Lindberg K, Haenfling C, Schori A. Social vulnerability indicators for flooding in Aotearoa New Zealand *mdpi.comK Mason, K Lindberg, C Haenfling, A Schori, H Marsters, D Read, B BormanInternational Journal of Environmental Research and Public Health, 2021*mdpi.com.* 2021.

[76] Verrinder Glenda, Talbot Lyn. Rural communities experiencing climate change: a systems approach to adaptation *Climate Change Adaption for Health and Social Services.* 2015:179–199.

[77] Johnson DE, Fisher K, Sustainability M Parsons, 2022 . Diversifying Indigenous vulnerability and adaptation: An intersectional reading of Māori women's experiences of health, wellbeing, and climate change *mdpi.comDE Johnson, K Fisher, M ParsonsSustainability, 2022*mdpi.com.* 2022.

[78] Fischer Alexandra Paige. Pathways of adaptation to external stressors in coastal natural-resource-dependent communities: Implications for climate change *World Development.* 2018;108:235-248.

[79] Cutter Susan L., Ash Kevin D., Emrich Christopher T.. The geographies of community disaster resilience *Global Environmental Change.* 2014;29:65-77.

[80] Serrao-Neumann Silvia, White Iain, Dean Samuel M, et al. The need to reconfigure consistency and variability to best manage changing flood risks in Aotearoa-New Zealand *Journal of the Royal Society of New Zealand.* 2023.

[81] Keegan LJ, White RSA, Ecology C Macinnis-Ng New Zealand Journal, 2022 . Current knowledge and potential impacts of climate change on New Zealand's biological heritage *JSTORLJ Keegan, RSA White, C Macinnis-NgNew Zealand Journal of Ecology, 2022*JSTOR.* 2022;46:3467.

[82] Smith Willie, Davies-Colley Christian, Mackay Alec, Bankoff Greg. Social impact of the 2004 Manawatu floods and the 'hollowing out' of rural New Zealand *Disasters.* 2011;35:540-553.

[83] Mehring P, Geoghegan H, Cloke HL, Clark JM. The F word: The experiential construction of flooding in England *Emotion, Space and Society.* 2023;48:100966.

[84] Tiatia Jemaima, Langridge Fiona, Newport Christina, Underhill-Sem Yvonne, Woodward Alistair. Climate change, mental health

and wellbeing: privileging Pacific peoples' perspectives–phase one *Climate and Development.* 2023;15:655–666.

[85] Tupou Trish, Tiatia-Siau Jemaima, Newport Christina, Langridge Fiona, Tiatia Suelaki. Is the Concept of Solastalgia Meaningful to Pacific Communities Experiencing Mental Health Distress Due to Climate Change? An Initial Exploration *International Journal of Environmental Research and Public Health.* 2023;20:7041.

[86] Schluter PJ, Hamilton GJ, Deely JM, open MW Ardagh BMJ, 2016 . Impact of integrated health system changes, accelerated due to an earthquake, on emergency department attendances and acute admissions: a Bayesian change *bmjopen.bmj.comPJ Schluter, GJ Hamilton, JM Deely, MW ArdaghBMJ open, 2016*bmjopen.bmj.com.* 2016;6:10709.

[87] Allen Joanne, Brown Lisa M., Alpass Fiona M., Stephens Christine V.. Longitudinal health and disaster impact in older New Zealand adults in the 2010–2011 Canterbury earthquake series *Journal of Gerontological Social Work.* 2018;61:701-718.

[88] Beaglehole B, Mulder RT, Boden JM, Australian CJ Bell, Zealand New, 2019 . A systematic review of the psychological impacts of the Canterbury earthquakes on mental health *Elsevier.* 2019.

[89] Beaglehole Ben, Boden Joseph M., Bell Caroline, Mulder Roger T., Dhakal Bhubaneswor, Horwood L. John. The long-term impacts of the Canterbury earthquakes on the mental health of the Christchurch Health and Development Study cohort *Australian and New Zealand Journal of Psychiatry.* 2023;57:966-974.

[90] Macinnis-Ng Cate, Ziedins Ilze, Ajmal Hamza, et al. Climate change impacts on Aotearoa New Zealand: a horizon scan approach *Journal of the Royal Society of New Zealand.* 2023.

[91] Pourzand Farnaz, Bolton Annette, Salter Claire, Hales Simon, Woodward Alistair. Health and climate change: adaptation policy

in Aotearoa New Zealand *The Lancet Regional Health–Western Pacific.* 2023;40.

[92] Kjellström Tord, Corvalán Carlos. Framework for the development of environmental health indicators *World health statistics quarterly 1995; 48 (2): 144-154.* 1995.

[93] Matthews Veronica, Bailie Ross S, Hu Wenbiao, Salvador-Carulla Luis, Barratt Alexandra L, Chu Cordia. Building resilience to Australian flood disasters in the face of climate change *mja.com.auS Vardoulakis, V Matthews, RS Bailie, W Hu, L Salvador-Carulla, AL Barratt, C ChuThe Medical Journal of Australia, 2022*mja.com.au.* 2022;217.

[94] Yu Pei, Xu Rongbin, Abramson Michael J., Li Shanshan, Guo Yuming. Bushfires in Australia: a serious health emergency under climate change *The Lancet Planetary Health.* 2020;4:e7-e8.

[95] Hall Nina Lansbury, Crosby Lucy. Climate Change Impacts on Health in Remote Indigenous Communities in Australia *International Journal of Environmental Health Research.* 2022;32:487-502.

[96] Wood Nathan, Jones Jeanne M., Yamazaki Yoshiki, et al. Population vulnerability to tsunami hazards informed by previous and projected disasters: a case study of American Samoa *Natural Hazards.* 2019;95:505-528.

[97] Burki Talha Khan. Volcanic eruption in Tonga and effects on respiratory health *The Lancet. Respiratory medicine.* 2022;10:e31-e32.

[98] Hashim Jamal Hisham, Hashim Zailina. Climate Change, Extreme Weather Events, and Human Health Implications in the Asia Pacific Region *Asia Pacific Journal of Public Health.* 2016;28:8S-14S.

[99] McIver Lachlan, Kim Rokho, Woodward Alistair, et al. Health impacts of climate change in pacific island countries: A regional assessment of vulnerabilities and adaptation priorities *Environmental Health Perspectives.* 2016;124:1707-1714.

[100] Tamasese Taimalieutu Kiwi, Parsons Tafaoimalo Loudeen, Waldegrave Charles, Sawrey Richard, Bush Allister. Asiasiga: a Samoan intervention to address the immediate mental health needs of Samoan communities after a tsunami *https://doi.org/10.1177/1039856219866321.* 2019;28:31-33.

[101] Salmond Anne, Brierley Gary, Hikuroa Dan, Lythberg Billie. Tai Timu, Tai Pari, the ebb and flow of the tides: working with the Waimatā from the Mountains to the Sea *New Zealand Journal of Marine and Freshwater Research.* 2022;56:430-446.

[102] Mcallister Janet, Neuwelt-Kearns Caitlin, Bain Leah, Turner Nikki, Wynd Donna. *The first year of Covid-19: Initial outcomes of our collective care for low-income children in Aotearoa New Zealand*. Child Poverty Action Group 2021.

[103] Chappell Petra Rose. *The climate and weather of Hawke's Bay*. NIWA 2013.

[104] McGuinness Institute . Our atmosphere and climate 2023 *mcguinnessinstitute.orgNZER Seriesmcguinnessinstitute.org.* 2023.

[105] Eustace Kerry, MacDonald Carol, Long Nigel. Cyclone bola: A study of the psychological after-effects *Anxiety, Stress and Coping.* 1999;12:285-298.

[106] Smith Linda Tuhiwai. *Decolonizing Methodologies*. Zed Books 2021.

[107] Weilnhammer Veronika, Schmid Jonas, Mittermeier Isabella, et al. Extreme weather events in europe and their health conse-

quences – A systematic review *International Journal of Hygiene and Environmental Health.* 2021;233:113688.

[108] Bennett Hayley, Jones Rhys, Keating Gay, Woodward Alistair, Hales Simon, Metcalfe Scott. Health and equity impacts of climate change in Aotearoa-New Zealand, and health gains from climate action *New Zealand Medical Journal.* 2014;127.

[109] Jones Rhys, Bennett Hayley, Keating Gay, Blaiklock Alison. Climate change and the right to health for Māori in Aotearoa/New Zealand *Health and Human Rights.* 2014;16.

[110] Bennett Hayley, King Paula. Pro-equity climate change and environmental sustainability action by district health boards in Aotearoa/New Zealand *New Zealand Medical Journal.* 2018;131.

[111] Metcalfe Scott, Woodward Alistair, Macmillan Alexandra, et al. Why New Zealand must rapidly halve its greenhouse gas emissions *New Zealand Medical Journal.* 2009;122.

[112] Harrison Sarah, Macmillan Alexandra, Bond Sophie, Stephenson Janet. Participatory modeling for local and regional collaboration on climate change adaptation and health *Journal of Climate Change and Health.* 2023;12.

[113] Beavan S. Ethical Guidelines for Post-Disaster Research. 2023.

[114] Aimers Jenny, Walker Peter. Community development in Aotearoa New Zealand: A historical journey tech. rep.Unitec ePress 2016.

[115] Frey Rosemary, Balmer Deborah. COVID-19 and hospice community palliative care in New Zealand: A qualitative study *Health & Social Care in the Community.* 2022;30:e4165–e4174.

[116] Wilson Geraldine, Windner Zoe, Dowell Anthony, Toop Les, Savage Ruth, Hudson Ben. Navigating the health system during

COVID-19: primary care perspectives on delayed patient care *NZ Med J.* 2021;134:17–27.

[117] Oetzel John, Scott Nina, Hudson Maui, et al. He Pikinga Waiora Implementation Framework: A tool for chronic disease intervention effectiveness in Māori and other indigenous communities *International Journal of Integrated Care.* 2018;18.

[118] Tenbensel Tim, Silwal Pushkar Raj, Walton Lisa, Ayeleke Reuben Olugbenga. New Zealand's integration-based policy for driving local health system improvement–which conditions underpin more successful implementation? *International Journal of Integrated Care.* 2021;21.

[119] Carroll Stephanie Russo, Garba Ibrahim, Figueroa-Rodríguez Oscar L., et al. The CARE principles for indigenous data governance *Data Science Journal.* 2020;19.

[120] Sporle Andrew, Hudson Maui, West Kiri. Indigenous data and policy in Aotearoa New Zealand *Indigenous Data Sovereignty and Policy.* 2020:62-80.

[121] Lorette Pernelle. Opportunities and challenges of positionality in quantitative research: overcoming linguistic and cultural 'knowledge gaps' thanks to 'knowledgeable collaborators' *Journal of Multilingual and Multicultural Development.* 2023.

[122] Jafar Anisa J N. What is positionality and should it be expressed in quantitative studies? *Emergency Medicine Journal.* 2018:emermed-2017-207158.

[123] Jones Camara Phyllis. Toward the science and practice of anti-racism: Launching a national campaign against racism 2018.

[124] Crampton Peter, Parkin Chris. Warrior genes and risk-taking science 2007.

[125] NZ“ ”Stats. Microdata output guide (fifth edition) 2020.

[126] R Core Team . *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical ComputingVienna, Austria 2021.

[127] Zhao Jinfeng, Gibb Sheree, Jackson Rod, Mehta Suneela, Exeter Daniel J. Constructing whole of population cohorts for health and social research using the New Zealand Integrated Data Infrastructure *Australian and New Zealand journal of public health.* 2018;42:382–388.

[128] Exeter Daniel John, Zhao Jinfeng, Crengle Sue, Lee Arier, Browne Michael. The New Zealand Indices of Multiple Deprivation (IMD): A new suite of indicators for social and health research in Aotearoa, New Zealand *PLOS ONE.* 2017;12:e0181260.

[129] Whitehead Jesse, Davie Gabrielle, Graaf Brandon De, et al. Defining rural in Aotearoa New Zealand: a novel geographic classification for health purposes *New Zealand Medical Journal.* 2022;135.

[130] Beere PC. Creating a road network analysis layer with travel time estimates using open-source data *University of Canterbury Research Repository.* 2017.

[131] Higgins Christopher D, Xi Yang Luna, Widener Michael, et al. Calculating place-based transit accessibility *Journal of Transport and Land Use.* 2022;15:95–116.

[132] Duncanson Mavis, Wheeler Benjamin J, Jelleyman Timothy, Dalziel Stuart R, McIntyre Peter. Delayed access to care and late presentations in children during the COVID-19 pandemic New Zealand-wide lockdown: A New Zealand Paediatric Surveillance Unit study *Journal of paediatrics and child health.* 2021;57:1600–1604.

[133] Bates Douglas, M"achler Martin, Bolker Ben, Walker Steve. Fitting Linear Mixed-Effects Models Using lme4 *Journal of Statistical Software.* 2015;67:1–48.

[134] Akaike Hirotugu. Akaike's information criterion *International encyclopedia of statistical science.* 2011:25–25.

[135] Douglas Bates MM, Bolker Ben, Walker Steve. Fitting linear mixed-effects models using lme4 *Journal of Statistical Software.* 2015;67:1–48.

[136] Burnham Kenneth P, Anderson David R. A practical information-theoretic approach *Model selection and multimodel inference.* 2002;2:70–71.

[137] Hayat Matthew J, Higgins Melinda. Understanding poisson regression *Journal of Nursing Education.* 2014;53:207–215.

[138] Cieza Alarcos, Stucki Gerold. The International Classification of Functioning Disability and Health: its development process and content validity. *European journal of physical and rehabilitation medicine.* 2008;44:303–313.

[139] Saunders Benjamin, Sim Julius, Kingstone Tom, et al. Saturation in qualitative research: exploring its conceptualization and operationalization *Quality and Quantity.* 2018;52.

[140] Braun Virginia, Clarke Victoria. To saturate or not to saturate? Questioning data saturation as a useful concept for thematic analysis and sample-size rationales 2021.

[141] Airini Deidre Brown, Curtis Elana, Johnson Odie, et al. Success for all: Improving Māori and Pasifika student success in degree-level studies *Milestone report.* 2010;8.

[142] Reid Mary-Jane, Paine Sarah-Jane, Curtis Elana, et al. Achieving health equity in Aotearoa: strengthening responsiveness to Māori in health research *New Zealand Medical Journal.* 2017.

[143] Cheyne Christine. Empowerment of local government in New Zealand: a new model for contemporary local-central relations? *Commonwealth Journal of Local Governance.* 2008:30–48.

[144] Wilson Nick, Chambers Tim, Prickett Marnie, Broadbent Adele, Kerr John. Water infrastructure failures from Cyclone Gabrielle show low resilience to climate change *Public Health Blog.* 2023.