The Covid-19 Pandemic and the Role of Primary Care in Nelson-Tasman, New Zealand

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A Dissertation submitted to

The Faculty of
The Milken Institute School of Public Health
of The George Washington University
in partial fulfilment of the requirements for the
degree of Doctor of Public Health

May 18, 2025

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Dedication

I would like to dedicate this dissertation to my grandparents and my parents, Michael and Deborah Greig. My grandparents instilled a conviction that education was incredibly important and supported their children, my parents, to make the most of very opportunity and to pursue academic excellence. My parents both worked incredibly hard to attain their education, succeed in their chosen fields and, alongside this, to instill intellectual curiosity in me and provide me with every opportunity. They believed in my ability to achieve and were models of hard work, perseverance and balance – good manners, fun, interesting conversation, travel, cultural pursuits, and sport were all important. My mum has always shown me that a woman and a mother can also be a respected doctor and professional. I am fortunate to follow in their footsteps and blessed to have always had their love, and encouragement in all things.

Latterly, the practical support of my mother, Deborah, in helping with childcare, making cups of coffee and being a sounding board for this dissertation was invaluable – Thank you so much for all that you have done for me and Ivo!

This work is also dedicated to Ivo - you are a spark of joy, a curious little boy with an infectious laugh and, already, a desire to see and understand the world and all god's creatures in it. I love you and am so lucky to be your Mumma.

Acknowledgments

The author wishes to acknowledge and thank the following people who provided invaluable assistance with this dissertation.

Firstly, I want to acknowledge Dr Anne Markus. From the moment I landed at GWU you were a great support and wise counsel. Your openness, availability and guidance have been most appreciated as I navigated how to start (and re-start) the dissertation and my field work. I am very grateful for your patience and support.

I am very grateful to the other members of my committee - Dr Candice Chen and Dr Marsha Regenstein. I have learnt so much from you both during my time at the Milken Institute School of Public Health and from working on research projects alongside you. Your advice and encouragement as I worked on this dissertation was much appreciated.

Dr Ross Lawrenson provided an important perspective and expertise from Aotearoa New Zealand, as Reader for my defense and I thank him for his generosity of making time to support this work.

Dr Janet Heinrich has been a great support in organization, oversight of academic requirements and encouragement to persist with this dissertation - Thank you Jan!

Thanks also to Elif Alyanak who provided support with qualitative analysis.

Finally, I would like to acknowledge and thank all those who participated in the key informant interviews – without whom this work would not have been possible. Thank you for your resilience and hard work across the pandemic and for participating in this research.

Abstract of Dissertation

The Covid-19 Pandemic and the Role of Primary Care in
Nelson-Tasman, New Zealand

The Covid-19 pandemic was unprecedented in its impacts worldwide. In primary care, the first point of contact for health care delivery in New Zealand, it had a profound impact on the model of care and generated a number of new roles and tasks.

The purpose of this study was to describe the experience of the Covid-19 pandemic in primary care and understand the barriers and enablers to the pandemic response in primary care services in the Nelson-Tasman region of New Zealand. To do this a phased scoping review was undertaken. Phase one describes the environment and context of Covid-19 in New Zealand and maps the key policies relating to the delivery of primary care in New Zealand during the pandemic. Phase two reviews the peer-reviewed literature on how primary care services have adapted in response to Covid-19 in Australia and New Zealand, including new roles and responsibilities. In phase three, key informant interviews with primary care practitioners and leaders in the Nelson-Tasman region provided an adjunct to the scoping review and outlined the barriers and enablers that participants perceived in delivering high quality primary care during the Covid-19 pandemic.

Synthesis of the results of the scoping review, and key informant interviews allowed for the articulation of barriers and enablers to optimizing the primary care response, to fulfill the aim of identifying those generalizable to pandemics/epidemics. Key findings comprise

a description of roles and responsibilities undertaken by primary care, including the establishment of testing and vaccination centers, the infection control practices and procedures employed in primary care and articulation of key challenges faced over the response including communication and the implementation of telehealth. Key government policies, for example vaccine mandates for primary care workers is discussed.

Congruent with the aims of a scoping review, research gaps and opportunities are identified. Triangulation of findings across the scoping review identifies potential modifications to the conceptual framework, and the following recommendations are made to address the policy and practice implications of this research:

1. At the practice level:
    a. Institute regular planning – locally, and regionally spanning business continuity and clinical care.
    b. Improve physical infrastructure of practices including building plant, ventilation and technology.
    c. Prepare workforce through regular training and simulation.
2. At the regional and national health systems level:
    a. Grow the primary care and ancillary workforce.
    b. Embed sustainable financing for primary care.
    c. Improve supply chains for medicines and PPE and develop policies and procedures for fair distribution and access.
    d. Plan strategic communication including pathways to update, collate and disseminate.

e. Invest in relationship development especially locally and plan governance and accountability.
f. Consider how commissioning policies, especially around contracts, can facilitate rapid development and initiation of programs and clinical services.

The findings of this research are of use to policymakers and practitioners as they relate to preparedness for future pandemics. In view of the current reforms underway, these research findings may be relevant for the future of primary care services in Aotearoa, New Zealand.

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Glossary of terms

CBAC: Community Based Assessment Center

CCitC: Covid Care in the Community program

Covid-19: common name for disease caused by infection with the Sars-CoV2 virus

DHB: District Health Board

GP: General Practitioner

HNZ: Health New Zealand, also known by its Māori name Te Whatu Ora

MCNZ: The Medical Council of New Zealand (the registration body for doctors in New Zealand)

MIQ: Managed Isolation and Quarantine

PCP: Primary Care Practitioner

RNZCGP: The Royal New Zealand College of General Practitioners

WHO: World Health Organization

Glossary of Māori words used

Hapu: kinship group, or subtribe. It consisted of a number of families or *whānau* sharing descent from a common ancestor. A number of related *hapū* usually shared adjacent territories forming a looser tribal federation (*iwi*).

Hui: to gather, assemble or meet.

Iwi: extended kinship group, tribe or nation. Often refers to large group of people descended form a common ancestor and who lay claim to a distinct territory.

Kaimahi: worker or employee.

Kaupapa Māori: Māori approach, or customary practice, or Māori ideology - a philosophical doctrine, incorporating the knowledge, skills, attitudes and values of Māori society.

Manaaki: to support, take care of or give hospitality to. Show respect, generosity and care to others.

Mahi: occupation, work or employment.

Marae: the area in front of the wharenui or meeting house on Māori tribal lands.

Rangatahi: youth

Whanau: extended family or family group.

"Historically, pandemics have forced humans to break with the past and imagine their world anew. This one is no different. It is a portal, a gateway between one world and the next."

Arundhati Roy in her article "The pandemic is a portal" published in the Financial Times, April 3rd, 2020.

Chapter 1 - Overview of the Study and Background

Statement of the Problem

Covid-19, the common name for Coronavirus disease caused by infection with the SARS-CoV-2 virus, was declared a Public Health Emergency of International Concern by the World Health Organization (WHO) on the 30th of January 2020. From the first notification of a cluster of cases of viral pneumonia in Wuhan, China, reported on the 31st of December 2019, this novel pathogen has spread rapidly worldwide, with cases identified in more than 228 countries and territories. Four years into the epidemic, there are over 774 million confirmed cases of disease and more than 7 million deaths globally, figures that continue to increase. [1]

New Zealand, like the rest of the world, has experienced unprecedented change in societal structures, government and health care functions and individual behaviors, in response to the public health imperative to reduce or eliminate transmission. Early in the pandemic, the country introduced a variety of restrictions on population movement. These occurred, both to prevent international travel across the border by non-citizen/residents and to introduce a mandatory two-week quarantine for those legally allowed to enter the country. Within New Zealand, over the following two years, regional and national "lockdowns" of varying degrees of restrictiveness were used as a response to cases of community transmission of Covid-19 i.e., when a case cannot be identified as having been introduced from overseas.

The promotion of hand and respiratory hygiene, and the wearing of face masks became increasingly common and relatively well accepted in practice. Phrases such as "case isolation", "contact tracing" and "quarantine" entered the common parlance and surveillance of Covid-19 disease trends of intense interest to a lay audience. Dr Ashley Bloomfield, the Director-General of the New Zealand Ministry of Health during the height of the pandemic, became a public figure and local celebrity because of media attention, particularly the daily press conferences he fronted with Prime-Minister Jacinda Ardern during the time the country was in lock-down.

At the beginning of this study (two years into the pandemic), New Zealand had experienced a very low burden of Covid-19 disease. As of December 31st, 2021, just prior to the first wave of Omicron, New Zealand had just 51 deaths due to Covid -19 and 14,206 cases in a population of over 5 million. [2] Many of those cases were identified at the border and did not reflect community transmission. At that time New Zealand was applauded for having the lowest mortality rate for Covid-19 in the OECD and the success of the elimination strategy. [3]

Over the first two years of the pandemic, the impact of Covid-19, in terms of the speed with which change was experienced, was prominent in the health care sector. Health care systems were challenged with the need to rapidly expand capacity for testing for Covid-19 disease and case management in hospital settings. While globally we saw events spaces transformed into hospital wards, in New Zealand case numbers did not reach a point of

overwhelming hospitals. However, the health sector prepared for this eventuality with anesthesia machines repurposed as ventilators and staff being rapidly trained in new care pathways. A lack of sufficient trained intensive care nurses and doctors remains a major concern for the country. [4]

As the country prepared for Covid cases seeking health care, it was recognized that hospitals and other health care facilities, including primary care, were sites of potential disease transmission. Consequently, the services delivered were rationalized and prioritized during lockdowns. This led to the deferral of planned or low priority procedures and routine clinic appointments in secondary and tertiary care, as well as restrictions on visitors and family support for those who required acute care.

Impacts on service delivery were experienced in primary care also. Overall visits in primary care reduced or shifted to telehealth. This was due to the advice from the Royal New Zealand College of General Practitioners (RNZCGP) that practices should provide only essential in-person care and otherwise move to telehealth-based assessment and treatment where possible. [5] Primary care practitioners (PCP) had to rapidly adapt to new protocols for virtual and in-person clinic assessments. At the same time, they were experiencing pressures on funding and financing this new way of delivering care, due to reduced patient volumes and delays in agreeing government funding for new primary care activities, including widespread telehealth consultations and Covid-19 clinical assessments. The pandemic accelerated the speed of adoption of some technologies which

had previously been infrequently used in New Zealand such as videoconferencing for assessment and treatment of patients.

Many general practices did not undertake much direct clinical care of Covid patients in the first wave of Covid-19. However, with the arrival of Delta in August 2021 "Covid-care-in-the-community" hubs (CCitC) were established with primary care involvement to support the clinical management of cases resident in the community. PCP, including practice nurses, in this model were intrinsic to the delivery of clinical assessment and monitoring of potential Covid-19 cases in the community. Practices provided care for their own enrolled patients by calling them daily to monitor any Covid symptomatology and manage any other medical complaints. They liaised with public health services with regards to release from isolation. This work required PCP to assume new clinical roles, sometimes at risk to their own health and wellbeing, and with a reduced workforce.

Covid-19 impacted primary care resourcing and care pathways as the primary care workforce staffed Community Based Assessment Centers (CBAC) where Covid-19 testing (nasal swabbing) was conducted in community, and, in year two of the pandemic, community sites for delivery of the Covid-19 vaccination and booster program. CBAC were newly established testing sites specifically for Covid and required the development of a new workforce. These centers, alongside vaccination centers, and the CCitC model, all placed additional demands on the workforce alongside their traditional scope of practice.

From mid-February 2022 there was a rapid increase in cases driven by the community transmission of Omicron into the New Zealand population. This led to the establishment of Covid-19 in the community and has driven subsequent waves of infection with a fifth wave occurring as recently as January and February 2024. [6] Despite the increase in incidence and prevalence of cases, New Zealand continues to have both a high vaccination rate, with approx. % of the population over 12 years having completed a primary course of vaccination [7] and is amongst the countries with the lowest Covid-19 death rates and lowest excess mortality.[a] [8-12]

As the pandemic has progressed and Covid-19 became widespread, there arose concerns about complacency in the New Zealand population. Public health strategies such as social distancing, limiting gathering sizes, use of QR codes to monitor locations, and mask use, have all fluctuated in uptake over time and their use has generally been curtailed, as people perceived a low risk or tolerance for Covid-19 in the community. Wearing a mask and isolating if infected is now generally at individual discretion as government restrictions have ended. Despite significant efforts and investment in vaccination campaigns, there a persistent gap between vaccination rates for Māori and other New Zealanders. These

[a] It is important to note that the methodology of calculating excess mortality for New Zealand has been a subject of debate with an author asserting that the protective effect of the New Zealand elimination strategy, and specifically the assertion that New Zealand had negative cumulative excess mortality in the first three years of Covid-19, may be inaccurate. This is due, the author asserts, to researchers failing to take account of the change in population growth in New Zealand from before the pandemic and extrapolating this to predict future deaths, failing to take account of the cessation of population growth when borders closed during the pandemic. [269]

factors have all contributed to a perceived “malaise” and unpreparedness for the persistence of Covid-19 in the community, let alone the emergence of new highly pathogenic variants or new pathogens.

The study undertaken for fulfillment of this dissertation aims to understand how the primary care system of New Zealand adapted and changed in relation to the Covid-19 pandemic, using a scoping review methodology. The scoping review focuses on outlining the context and mechanisms by which primary care service delivery acclimated to operating in a pandemic by describing the regulatory environment and New Zealand health sector policies that affected primary care and undertaking a narrative review of the peer reviewed literature. This is supplemented by the in-depth reflections of those involved in primary care delivery in the Nelson and Tasman regions of New Zealand – doctors, nurses, administrators, and managers. The study sought to understand the barriers and enablers to establishing and optimizing the Covid-19 response in primary care, including where, when, and how services were delivered, and what policy and system settings supported or prohibited an effective response to the changing circumstances of the pandemic.

The study focuses on the experiences of primary care in New Zealand in the first three years of the pandemic. The environmental and policy scan outlines the evolution of the pandemic from Covid-19 being identified in January 2020 until the last legal restriction in New Zealand relating to the pandemic was removed in August 2023. The literature review encompasses studies published between 01 January 2020 and 31 December 2023 and interviews with participants were conducted between October 2022 and May 2023.

Background

Covid-19 is by no means the first disease of pandemic potential to challenge governments and societies. Infectious diseases with pandemic potential have regularly occurred across history. Plague, Cholera, Influenza, and variants of Coronaviruses have all crossed borders and affected large and diverse cultures and societies. Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and Middle Eastern Respiratory Syndrome Coronavirus (MERS-CoV) are examples of recent viral diseases of pandemic potential that have occurred within the 21st century. [13]

The term "pandemic" indicates the scale and potential impact of the disease spread. In epidemiology, an outbreak describes an increase in a health condition beyond the rate of occurrence predicted for that community, over a defined period of time. It can be both an increase in an existing disease beyond the "normal" incidence or the introduction of a completely new disease, as with the first cases of Covid-19 identified in Wuhan. An epidemic describes an outbreak of disease that has spread to a larger geographic area (including across international borders), while pandemic describes an outbreak of disease that has spread globally. [14] The potential to spread diseases is influenced both by the characteristics of the infectious agent itself (how easily transmissible it is) and the movement of infected animals or people which can lead to increased contact with a pathogen or host and/or promote dissemination throughout a population. Piret and Boivin in their analyses of the major pandemics across history, consistently show the influence of human travel and trade routes on the spread of pathogens with pandemic potential. [13]

Why then should we continue to prioritize and invest in learning from pandemics and in research that helps us improve planning and preparedness for future pandemics? Beyond the recognized impacts on the health care system, and on continuity of essential services, there is some evidence that the frequency of pandemics may be increasing. Whereas previously they were estimated to occur once a decade, since the beginning of the new millennium the frequency between pandemics seems to be shortening. SARS-CoV occurred in 2003, Influenza A H1N5 (bird flu) in 2007, H1N1 (swine flu) in 2009, MERS-CoV in 2012 and Ebola in 2014. [15] Analyses of a database of emerging infectious disease occurrences between 1940 and 2004 show that disease trends overall are consistent with this, demonstrating a general increase over time with a peak in the 1980's (at the time of the human immune-deficiency virus pandemic). This upwards trend persisted, even when increases in the reporting of emerging infectious disease were controlled for. [16]

The Covid-19 pandemic is both predictable, in the sense that it is part of a sequence of similar global outbreaks of disease that have occurred across history, while at the same time manifesting unpredictability in the novel nature of the infectious agent and significant disruption caused to supply chains, global travel and social goods such as health and education. SARS-CoV-2 has genotypically evolved, revealing phenotypic diversity in transmissibility, severity and immune evasion. [17] The resulting pandemic has been unprecedented in the size and scale, and the world-wide impacts on global and national health policy, health service delivery and individual behaviors. As such it offers an opportunity, to view the health sector, particularly the roles and function of primary care,

which is the fundamental underpinning of the system, through the lens of the pandemic and to attempt to understand what has changed and why, what worked and what didn't, and what can we do better next time.

Analysis, locally, nationally, and internationally of how we responded to the global threat of Covid-19, in primary care, is crucial to our ability to improve the response to pandemics going forward. As well as enhancing preparedness, analysis of the primary care response will also offer insights into the strengths, capabilities, challenges, and weaknesses facing our primary care system more generally. It can be anticipated that focusing on the response of primary care to the pandemic will also allow us to think critically about how tools such as telemedicine for remote consultations and testing and vaccine deployment strategies are developed and implemented more effectively.

Primary care delivery and funding in New Zealand

New Zealand is a country of approximately 5 million people with a diverse ethnic structure: approximately 16% Māori (indigenous peoples of New Zealand), 7% Pacific peoples, 15% Asian, and 62% European or other. [18] As a country it has achieved universal coverage of its population through a centrally directed and regionally administered health system, funded from general revenue (taxation). New Zealand realized universal health coverage in 1938 following the passage of the Social Security Act.

All New Zealand citizens and permanent residents are entitled to publicly funded health care (secondary and tertiary care and mental health services) free at point-of-care in hospitals across New Zealand, as well as medicines on the national formulary and subsidized primary care services delivered in the community. Primary care services typically require an additional co-payment. In practice, due to financial barriers such as co-payments and distribution of health care services, individuals' access to care varies with ethnicity, income, geography, need and type of service required. [19]

An overview of the New Zealand Health Care system is provided in Appendix 1. Extensive reforms to the structure of the New Zealand Health System were enacted in 2022 and have led to the reorganization of secondary and tertiary care and public health services. Primarily this has been a shift from 21 independent sub-regions (District Health Boards or DHBs) to one system "Health New Zealand - Te Whatu Ora" (HNZ) which has four regional subdivisions. As of late 2024 primary health care services were relatively unaffected by this restructuring but with the possibility of reform to come.

Primary care has been defined as "first-contact, continuous, comprehensive, and coordinated care provided to populations undifferentiated by gender, disease, or organ system". [20] Prior to 01 July 2022 DHBs contracted primary care services from Primary Health Organizations (PHO), which are generally not-for-profit trusts. There are approximately 30 PHOs in New Zealand. Following the establishment of HNZ in July 2022 this arrangement has remained similar, however the funding contracts now sit with the sub-regional offices of HNZ which have replaced the individual DHB's. In this context PHOs

have maintained their role as local coordinator of primary care practices and services and the conduit for capitated funding streams.

A PHO is responsible for providing primary care services in the areas in which it is contracted to do so. In general, a PHO works closely with regional secondary/tertiary and public health care services on delivery of health targets and acts to coordinate and support individual primary care practices. Services can be either be provided directly by the PHO or (more usually) through contracted health care providers, independent practices owned and operated by one or more primary care doctors known as General Practitioners (GPs) or in some cases by corporate or non-profit entities. The government subsidizes care for all those seen in a practice that is part of a PHO, and it is completely free for children 13 years old and under. However, as many practices are private businesses, they may set co-payments in addition to the government subsidy for those over 14 years of age. [19]

PHOs are funded via a capitated payment. PHOs also receive additional payments for specific health targets; subsidies for high-needs non-enrolled patients; as well as for provision of specific activities such as mental health, and chronic care management; and for injury-related services. The PHO passes on these capitated payments to individual practices based on their enrolled population, including age, sex, ethnicity, and socioeconomic status of their enrolled population, and those in specific social programs

indicating high needs – the "Community Services Card" or a "High Use Health Card". [b][21] The PHO may be funded and provide additional services in support of their specific community and affiliated practices such as Green Prescription (a healthy lifestyles program).

GPs in New Zealand are (with limited exceptions) fellows of the Royal New Zealand College of General Practitioners (RNZCGP), a medical training and certification body. These doctors, after completing a minimum of two years' experience in hospitals, complete 3-4 years of specialized post-graduate training in General Practice before being admitted to fellowship. After this they can practice as independent primary care physicians in New Zealand. GPs are doctors similar in scope of practice to a Family Practice Physician in the United States and provide care to adults and children. An average of 3.5 GP's work in a typical practice supported by practice nurses who undertake preventative and other care. Primary care nurses are salaried and paid by the general practice. [19]

What is the anticipated role for primary care role in a pandemic?

The interrelationship between a strong health system, founded on primary health care principles and the ability to have an effective health emergency management approach has

[b] Individuals who meet certain criteria regarding income are eligible for the Community Services Card and as such it is used as a proxy for socio-economic deprivation. The High Use Health Card is not means -tested and is allocated to individuals who have had 12 or more visits to primary care for one or more chronic conditions in a year and as such is a proxy for high medical need.

been recognized in the literature and a central role for primary care in preparedness, response and recovery has been identified. This recognition is consistent across the spectrum of low-income to high income countries and health care settings. [22] While much of this literature focuses on disasters, it is relevant to emergency responses more generally and can be seen to be even more important in a pandemic, where the emergency is a disease. In the context of a pandemic there are multiple challenges that impact how primary care is delivered and new roles that primary care teams may undertake. As a first point of entry to the health system, during a pandemic, primary care (alongside urgent care and the emergency department) should assume a key role in the assessment and diagnosis of people presenting with symptoms of the disease of concern. However, prior to a pandemic, it is often unclear exactly what those roles will be, and the demands on the primary care workforce may differ to what is anticipated in pandemic planning.

For example, modelling based on a predicted influenza pandemic, suggested that large numbers of excess consultations would be required to manage pandemic influenza in countries with similar primary care systems to New Zealand. Estimates (prior to the current Covid pandemic) suggested 1570 to 3135 additional visits to primary care practices per 100,000 population in the United Kingdom and an excess of up to 7.5 million primary care consultations in Australia at the height of a pandemic. [23,24]

However, during Covid-19, when the period April to August 2020 was compared with the same period in 2019, it has been reported that the total number of general practice appointments in England fell by 20.8%, from 120.66 million to 95.52 million. [25] We know

that Covid-19 was active throughout the United Kingdom at that time, so this suggests that the pandemic either inhibited patients from seeking care, leaving PCPs underutilized and/or required health care professionals in primary care to assume other roles or other methods of delivering patient care that were not captured by metrics as simple as the number of visits per capita. This could indicate that there is also a burden of "deferred care" due to delays in seeking treatment that will require people either presenting late for routine and preventative care and/or presenting with more advanced disease. [26]

From the literature, it is anticipated that new roles and ways of delivering care in a pandemic require primary care practices and health care professionals to rapidly update their knowledge and skills. This could include technical skills such as use of telehealth platforms, infection control and wearing of personal protective equipment (PPE), as well the clinical skills and knowledge required to manage Covid-19 affected individuals (including identification, monitoring for deterioration and recovery, knowledge of public health management and referral to tertiary services as needed). Other roles for primary care in a pandemic include gathering health intelligence for public health surveillance, education, and communication directly with patients, in addressing social and mental health needs for low-socio economic status and ethnic minority communities who may be disproportionately impacted by the disease and eventually, infrastructure for vaccine delivery. [23,27]

During the pandemic, the PHO in Nelson-Tasman region assumed responsibility, with DHB support, for running CBACs and pop-up testing sites as needed and staffing multiple

vaccination centers. GPs have continued to deliver general patient care across the duration of the pandemic through telemedicine and, when appropriate, in-person appointments. They also undertook clinical assessment of those seeking health care, who were ill with Covid-like symptoms, and initiated public health management, by notifying those who are "high-index of suspicion" for Covid, to public health units. Later in the pandemic (from mid-2021) they were actively engaged in CCitC models that provide clinical oversight and monitoring of individuals isolating in the community.

This research study

New Zealand navigated the first wave of Covid-19, with community and border controls that achieved initial success with elimination of SARS-CoV-2. Subsequently New Zealand achieved the control of several community outbreaks of disease and navigated the eventual shift from elimination to suppression as new variants, Delta and Omicron, emerged. A vaccination program began on the 19th of February 2021 and has achieved relatively high vaccination coverage for the population aged 12 years and over, though there is concern this is diminishing over time. [7,28]

New Zealand, alongside the rest of the world, at the outset of this study, was two years into the global pandemic, with Covid-19 continuing to dominate the political agenda and the ways in which ordinary New Zealanders lived and worked. The motivation for this study, considering the duration of this pandemic, and the potential for future pandemics, was to reflect on our experience, and explore what went well, and what we could improve next

time, to truly understand the strengths and weaknesses of our response and to better inform our recovery and future preparedness.

New Zealand's initial success in eliminating Covid-19, and the ongoing attempt to control and ameliorate the disease, relies on the interaction of many aspects of the health system. Primary care has played a crucial part as a front line "delivery arm" of testing and vaccination early in the pandemic and case management latterly. Focusing on primary care also allows us to understand the effects of Covid-19 both directly, in terms of assessment and testing of cases, but also indirectly, in terms of its effects on the ways that GPs treat and manage other conditions, allowing us to understand the impacts on the populations health and system as a whole.

High quality primary care, that spans the life-course and that includes preventative and acute care, is also fundamental to the New Zealand health system and its function and performance in the pandemic is important to understand. Systems that emphasize primary care, based on care provided in communities rather than in hospital settings, can be expected to lower costs of care, improve access to appropriate care and reduce inequities in health outcomes. [29] This study seeks to understand the perspective of primary care practitioners in recognition that their work is the core foundation of a successful health system.

The study comprises a scoping review that draws upon both government policy and the literature to articulate the context and evolution of the primary care services response to

the pandemic in New Zealand. Triangulating this with the views of stakeholders working in primary care, and the primary-secondary care interface in the Nelson-Tasman region allows exploration of how primary care interacts with HNZ, who are responsible for funding primary care, and how policy decisions were operationalized on the ground. This is relevant for considering any future reform to the existing primary care entities in this time of dynamic change for the New Zealand health system.

Study purpose

The purpose of this study was to describe the experience of the Covid-19 pandemic in primary care and understand the barriers and enablers to establishing and optimizing the pandemic response in primary care services in the Nelson-Tasman region of New Zealand. This includes describing the impact of the pandemic on the when, where and how services were delivered, describing the new roles that were undertaken by primary care in the pandemic, outlining any challenges that emerged for services as the pandemic response evolved, and what policy and system settings supported or prohibited an effective and equitable response to the changing circumstances of the pandemic.

To do this a phased scoping review was undertaken. Phase one describes the environment and context of Covid-19 in New Zealand and maps the key policies that were developed relating to the delivery of primary care and frontline health services in New Zealand during the pandemic. Phase two identifies the evidence from the peer-reviewed literature on how primary care services have worked and potentially adapted and evolved in response to

Covid-19 in New Zealand and Australia, including roles and responsibilities. In phase three key informant interviews with identified stakeholders describe the barriers and enablers they perceived in delivering high quality primary care in response the Covid-19 pandemic in the Nelson-Tasman region.

Synthesis of the results of the scoping review, and key informant interviews allows for the articulation of barriers and enablers to optimizing the primary care response, with an aim of identifying those generalizable to pandemics/epidemics and other emergent situations. This is anticipated to be of use to policymakers and practitioners alike as they focus on preparedness for future pandemics. In view of the major changes to the New Zealand health system that are proposed, there may be relevance of the research findings for the future of primary care.

Study population and justification

The study focused on the New Zealand experience with phase three of the study analyzing the experiences of primary care practices in the Nelson-Tasman region of New Zealand. New Zealand was selected as it is a high-income country that was initially successful in eliminating Covid-19 and that has subsequently experienced several outbreaks and then widespread Covid-19 disease which has necessitated a change in the strategic approach to management of the pandemic.

With the restructuring of the former DHBs to become Health NZ; a district office and hospitals continue to serve patients across the geographical region of Te Tau Ihu o Te Waka-a-Māui[c] extending from Seddon to Collingwood, at the top of the South Island of New Zealand. The geographical boundaries overlay three local territorial authorities, the Nelson City Council and the Tasman and Marlborough District Councils (see figure 1). Hospital and urban primary care services are provided in the larger centers of Blenheim and Nelson with Māori and rural primary care services distributed across the region. [30] This study is geographically constrained to the Nelson and Tasman regions which make up approximately 3.9% of the total land area of New Zealand with approximately 115,000 estimated regional population. [31]

The study focuses on primary care as a key component of the health system and the response of primary care practice to the exigencies of the pandemic. The key entities included in the study are those involved in delivery of primary care services – i.e., the PHO and individual general (primary care) practices and those leaders involved at the primary care and wider health system interface. Activity in primary care is undertaken in response to demand for services from the community, the setting of policy directions by the Ministry of Health and professional bodies such as the RNZCGP. Health NZ contracts services and may engage with primary care and PHOs on quality and service delivery improvement initiatives.

[c] The Māori name for the top of the South Island, referencing "the prow of the waka (canoe) of Maui".

Consequently, a variety of roles are included in the study: PHO leadership and coordination, practice staff including GPs, practice nurses, practice managers and administration and support staff, to obtain a holistic view of the service. It also includes the key personnel involved in commissioning primary care services in community. These staff oversee purchasing, monitoring and delivery of primary care and community services. These personnel are uniquely placed to provide insights into the challenges of the Covid-19 response in New Zealand, those factors that enhanced efficiency and equity, and those that did not, and any barriers or facilitators to care delivery.

Most primary care services in the Nelson-Tasman region are delivered through practices affiliated to the one local PHO with adjunct services such as behavioral health, screening and immunization also delivered through a regional Kaupapa Māori (Māori culturally appropriate and led) health service. There are additional smaller providers, some with a focus on Māori communities, that offer other primary care services.

The Nelson-Tasman region was selected because as a single district, it offers a unique opportunity in New Zealand to understand the impacts on urban, rural and Māori health services, in an accessible geographic area[d], it is possible to explore the pandemics impacts on a wide range of primary care services. In terms of generalizability, the Nelson region operates in ways that are like the other 20 DHBs in New Zealand, with similar funding

[d] It is approximately two hours and forty minutes to drive from the Bryant range (the north-eastern boundary to Collingwood (the most westerly settlement) and approximately 2 hours and 50 minutes from the Bryant range to the most southerly point.

mechanisms, organizational arrangements and a responsibility to implement policy as directed by the Ministry of Health. While there are unique contextual features, including differing Iwi Māori leadership in the region and different demographic characteristics, there is nonetheless an ability to generalize findings to other regions and DHBs in New Zealand where there are similar demographics and primary care sectors. Understanding the strengths and weaknesses of the existing services may be useful as they are aligned and brought into a new national structure.

The selection of this region for the study also allowed the study to benefit from the unique position of being led by an "embedded researcher". Dr Alexandra Greig is an employee and Public Health Medicine Specialist in the Nelson-Marlborough Public Health Service. This service is part of the DHB and involves a close working relationship with the PHO of the region including being co-located in local offices. The term "embedded researcher" has been defined as persons who work inside host organizations as members of staff, while also maintaining an affiliation with an academic institution. [32]

This positioning of the researcher as both a co-producer and user of the knowledge generated, facilitates the research on several different levels. It enables the development of trusting relationships between the researcher and participants, that build upon other dimensions of their collective work. It allows for a depth of understanding of organizational characteristics, both of the wider New Zealand health system, and of the PHO, that will add a richness of analysis and that will inform the translation of research to improvements in policy and practice in a way that accords with local custom and practice. [33]

*Figure 1 Geographical boundaries of the New Zealand regional council areas**

*Reproduced from Te Ara Encyclopedia of New Zealand.[34]

Research aims

Five specific aims for this study were developed:

1) To contextualize the policy features of the New Zealand response to the COVID-19 pandemic and the implications of these for the equitable delivery of primary care services in New Zealand following declaration of a global pandemic.
2) To review the literature on how primary care services have evolved in response to Covid-19, in New Zealand and in comparable health systems, and the response activities undertaken.
3) To characterize primary care responses to the pandemic through key informant interviews within the Nelson-Tasman region of New Zealand, highlighting the experiences of urban, rural and Māori-led services.
4) To synthesize the shared and unique experiences across the primary care sector in Nelson and triangulate with the literature and policy to identify barriers and facilitators to successful control of the pandemic in primary care.
5) To develop recommendations for policymakers on "lessons learned" from the response of the primary care sector to the pandemic, gaps in research and identify how opportunities to improve preparedness for future pandemics.

Research Approach

The guiding proposition for this work is that, despite there being a recognized role for primary care in pandemics, including to provide access to key medical services and to undertake new tasks, as part of the pandemic response, planning for how these activities would be operationalized was preliminary and incomplete. The unique features of the Covid-19 pandemic required rapid evolution of policy, and quick scale up of service delivery. The key features ["variables"] that promote/facilitate, or inhibit the rapid adaptation of clinical pathways, models of care and service delivery in primary care were yet to be identified and resolved. This study seeks to elucidate those variables.

This study is a staged qualitative approach consistent with the methodology for scoping reviews, as outlined by Arksey and O'Malley and refined by Andersen et al. [35,36] A scoping review utilizes a broad and comprehensive review of the literature and can include policy mapping and a process of knowledge testing and exchange with stakeholders to assess the evidence base, identify existing initiatives and assess future directions for policy, research, and practice. This is supplemented with key informant interviews with stakeholders involved in the delivery of primary care in the region during the Covid-19 pandemic.

Phase 1 of this research described the policy and regulatory environment of the primary care sector in New Zealand during the Covid-19 pandemic. This process has two components. Component A identifies (non-systematically) the main policy documents and statements from government agencies, including the Ministry of Health and professional

bodies, that describe the regulatory and policy environment, including funding, adaptations to primary care practice or required service delivery and the constraints and opportunities for primary care are explored. Component B systematically identifies and, using qualitative description and content analysis, maps the legislation that had a bearing on the nature and practice of primary care services in New Zealand during the Covid-19 pandemic. [36] This phase seeks to characterize the political, social and health context within which decisions on primary care activities were being taken, the changes and adaptations to primary care delivery that were made and the specific response activities that the primary care sector engaged in. Together these components are woven into a narrative description of the policy and regulatory environment as a whole.

Phase 2 of the study undertook a literature review to understand the evidence on how primary care services have evolved in response to Covid-19 regionally, and the response activities undertaken. This is primarily qualitative in nature as it sought to engage with, chart and provide a narrative account of the literature. [37] This review includes peer-reviewed literature from New Zealand, and Australia as a comparable health system. The review focuses on identifying potential barriers/challenges and facilitators/enablers.

Phase 3 – the key informant interviews - comprises an additional qualitative method and adjunct to the scoping review. An interview guide, based on the conceptual framework and literature review, was developed to gain the insights and reflections of stakeholders on the barriers and facilitators they perceived in delivering high quality primary care in response to the Covid-19 pandemic in the Nelson region.

A concrete outcome of Phase 1,2 and 3 was modifying the conceptual framework used in the study to inform future planning. Details of the conceptual framework are outlined in Chapter 3. [38] The specific study constituents are outlined in Appendix 2.

Former Research Efforts

Prior to the outset of the study in early 2022, no qualitative or quantitative study, with a described and replicable methodology, that examines the impact(s) of Covid-19 on the delivery of primary care services in New Zealand was identified in the literature. There was limited anecdotal and "expert opinion" which mainly focuses on descriptions of the ways in which primary care operated during the pandemic. Al-Busaidi and Martin described the experience of providing primary care to individuals in a government -run managed isolation facility in Christchurch, New Zealand. This brief report identified specific challenges experienced in this unique setting but was not broadly relevant to primary care in New Zealand as a whole. [39] Huston et al. provided a descriptive overview of the role that primary care played in the first months of the pandemic (prior to June 2020) in Canada, Australia, New Zealand, the United Kingdom, the United States and the Netherlands. This report relies on professional communications and anecdotal evidence to explore the ways in which primary care undertook key tasks such as Covid-19 patient assessment and testing. Challenges identified include the lack of long-term planning for the role of primary care in a sustained emergency response, differences in support for primary care from central agencies/government with regards to policy, PPE and

remuneration, as well as indirect effects such as deferred care or non-presentation of patients for necessary non-Covid-19 primary care. [40]

With regards to telehealth, Al-Busaidi and Martin also described the implementation of virtual visits in one medical practice and identify some preliminary challenges that the practice faced in doing so including the availability of technology (both information technology and home medical monitoring devices for patients with chronic disease), reduced revenue and the acceptability of this form of visit to patients. [41] Imlach et al. undertook a mixed-methods study which analyzed survey and interview data relating to consumers experiences with use of telehealth for virtual visits during New Zealand's lockdown. This study however did not include provider or practice experiences of barriers and enablers to implementation of telehealth. [42]

Implications for Research, Policy and Practice

Pandemics have occurred frequently over human history. Each new pandemic and the implicated pathogen present different challenges and requires adaptation of existing plans and procedures. The New Zealand response to Covid-19 has been commended for clear communication, strong leadership, and a rapid scale up of the response. However, opportunities for improvement have also been identified, including criticism of being slow to implement some measures such as border restrictions and facemask use, the ability to scale up contact tracing and issues with the management of isolation and quarantine for returning travelers (MIQ). [43,44] Reflecting on the first three years of the pandemic allows

us to consider our ongoing response to Covid-19 in the community and other pandemics we may face in the future.

This study seeks to capture information, around 3 years after the arrival of Covid-19 into New Zealand, when the experiences are still fresh in people minds and as they are looking ahead to the prospect of Covid-19 as an established disease in the community. This is an interesting and important time to critically review the New Zealand Covid-19 response as in parallel, we are also engaging in a national large scale health system redesign. This study will offer insights into the experience of primary care, that can inform these efforts.

At the outset of this study, except for in telehealth, there was no published work examining the general experiences of primary care in New Zealand with the Covid-19 pandemic, nor any studies that identify barriers and facilitators to the delivery of high-quality care in a pandemic, or that recommend ways that future preparedness can be improved. It is anticipated that this study will fulfill a gap in this literature. This study uses a well-described and replicable methodology to comprehensively identify why and how service delivery changed over the course of the pandemic.

This study generates new knowledge of what the barriers and enablers to high quality care in the pandemic were, and from this, result in recommendations for future preparedness. This scoping review will characterize the existing evidence, as well as identifying future directions by triangulating knowledge gained across the scoping review components - policy mapping, literature review, and key informant interviews. This will strengthen

findings from this study and support the development of recommendations that inform pandemic preparedness and that are robust and generalizable to differing regional contexts and cognizant of national priorities.

These research findings can be disseminated, through peer networks of the primary investigator, who is part of the Nelson regional community and to researchers and public health practitioners in New Zealand. This work will support the identification of research and policy gaps and future directions in practice. This is timely given the previously discussed extensive health reforms being undertaken from June 2022 and beyond. In addition, learnings on barriers and facilitators may be usefully translated to policy briefs and other reports that can be informative to those working in primary care, at the interface of policymaking and service commissioning and in central government.

Chapter 2 - Review of related Literature

The role of primary care and analysis of existing literature on the experiences of primary care practices and staff with preceding pandemics

The historical roots of primary care within the health system

Primary care has been defined as "first-contact, continuous, comprehensive, and coordinated care provided to populations undifferentiated by gender, disease, or organ system". [20] The term "primary care" is used to define the entry point to personal health care services. It is thought to stem from the report of Sir Bertrand Dawson, who was asked to advise on the "systematized provision of… medical and allied health services as required" in then Great Britain, current-day United Kingdom. This report was published in 1920 and formed the basis of the modern-day health system - the National Health Service (NHS) - and informed the development of other health systems, including the former British colonies of Australia and New Zealand. Lord Dawson, in this report, found the difficulties the common person had in accessing the advances of modern medicine were attributable to "insufficiency or organization" and proposed a new model for the distribution and interrelationship of health services. [45]

Distinguishing institutional and domiciliary (home-based) services, Dawson proposed that health care should be provided within health centers, that would offer a variety of necessary

medical and allied services spanning both the “preventative and curative” with an aim of coordinating service delivery. He further characterized these health centers as “primary” denoting “more simple”, or “secondary” denoting “more specialized” services. Primary health centers would be staffed by General Practitioners (GP’s) alongside nurses and visiting specialists. These centers could include both outpatient and inpatient services, and were supplemented by doctors undertaking home visits, which were the usual practice of the day. Several primary health care centers would align with one secondary health center in a hub and spoke model. In turn secondary health centers would be aligned with existing hospitals who would then be affiliated with a larger teaching hospital and medical school. This arrangement was designed to allow improved access to advanced medical knowledge and specialty care, which we might refer to as “tertiary care” in the present day.

Dawson’s model includes some elements, including home visits and inpatient primary care services, that are less common today. However, even at this early point in the evolution of primary care, we can identify key themes that continue to frame our understanding of primary care services 100 years later. Dawson identified the essential relationship between a health service and the defined community they serve and explicitly states that these services must be available and accessible “to all classes” of person, adaptable to local conditions and comprise all those services necessary to meet the health needs of that population. The report recognizes the importance of the social determinants of health and health services. He makes note of the “close relationship… between medical services and the problems connected with poor law and local government” and makes a case for health services to operate in the context of their local environment. The report states that

"preventative and curative medicine cannot be separated" and that both must "be brought within the sphere of the general practitioner" who can follow a patient across the life-course.

The tiered nature of health system delivery, with referrals from primary to secondary and then tertiary care, and the planned "discharge" of the patient back to primary care, is maintained to the current day.

Following on from the Dawson report, paths diverged in terms of the embedding of primary care services in different countries. New Zealand, Australia and the United Kingdom followed a trajectory of developing national health services characterized by general practice and primary care as a cornerstone of care delivery. In the United Kingdom, insurance for low-income workers was made compulsory by the National Insurance Act in 1911. These workers were allocated to a panel or "list" of a local General Practitioner who were paid an annual capitation fee by the insurer. With the introduction of the NHS in 1948, all the population were eligible for free primary care and GPs were funded for the care of their panel through national agreements. In response to concerns about the quality and standard of General Practice, the College of General Practice was established in 1952.[46] Australia, too, had developed a well-established role for General practice by the early 20th century. Initially funding was from mutual benefit societies and direct patient fees until the establishment of Australia's National Health Insurance scheme in 1970, though controversially this was initiated with GP's receiving lower fee reimbursements than specialists. The Royal Australian College of General Practice was established in 1958 and

developed roles in policy and advocacy, post-graduate medical education and in standard setting and accreditation. [47]

New Zealand, a colony of Great Britain, instituted a citizen entitlement to free, taxpayer funded health care with the Social Security Act of 1938. Originally this was intended to incorporate the breadth of primary, secondary, and tertiary care and was intended to fully fund both GP services in primary care and any hospital level care. However, intense lobbying by GP's themselves, who wanted to retain independence to determine their own reimbursement, led to an agreement that the government would subsidize care on a fee for service basis, and that GP's would retain an ability to set their own fees alongside this subsidy.

Subsequent health reforms have attempted to resolve the two-tiered health system that resulted, whereby secondary and tertiary care is free at the point of care, but primary care is at a variable cost. Despite moves to different payment models, including capitated payment in the latter part of the 20th century, New Zealand has retained some ability for GPs to set their own fees. As a result, cost is a frequently cited barrier to accessing primary care. [48]

Similarly, to Australia and the United Kingdom, The Royal New Zealand College of General Practitioners (RNZCGP) was established in 1972 as a professional body for GPs with a role in practice accreditation, policy and advocacy and as a provider of post-graduate

medical education in General Practice. General Practitioners became vocationally registered as a medical specialty by the Medical Council of New Zealand in 1996. [49]

Primary care in the 20th Century

In the latter half of the 20th century industrialized nations were developing their own policy response to the growth of medical knowledge and novel technologies including advances in surgery, pharmaceuticals, and other therapeutics. However, there was a growing concern internationally about the efficacy of primary health services, especially in low- and middle-income countries that were less able to adopt new technologies. Reflecting on this period, Cueto points to the critique of traditional "vertical" health programs and the growing influence of models such as Indian rural medicine and the Chinese "barefoot doctors" as successful approaches to the expansion of primary care to deprived, rural and marginalized populations. This paralleled growing political interest in a "new economic order" that promoted long-term socio-economic development as opposed to technical interventions. In 1975 a joint WHO-UNICEF report titled "*Alternative Approaches to Meeting Basic Health Needs in Developing Countries"* was published. This report emphasized the lack of success of both the vertical programs and western models of health imposed upon developing countries and the relative success of varying models of primary care in countries such as Bangladesh and Nigeria. In 1976 the goal of Health for All by the Year 2000" was proposed at the World Health Assembly. Member countries rallied around the concept and in 1978 the landmark conference for Primary Health Care was held in Alma Ata in Kazakhstan. [50]

The Alma-Ata conference can be seen as one of the defining moments in the evolution of primary care. It was attended by 3000 delegates from 134 governments and 67 international organizations. The conference culminated in the Declaration of Alma-Ata, a "universal and bold statement" that had been carefully crafted by the World Health Organization and which had already been made known to many participants as part of the framework for progressing "Health for All". [50] The declaration reaffirms that health, in its broadest sense, is a fundamental human right and points to the inequalities in health, both between and within countries, as "unacceptable". It identifies economic and social development, supported by the international community, and the role of government in delivering adequate social and health measures as fundamental to reversing these inequalities.

The declaration explicitly links the attainment of "Health for All by the year 2000", with primary health care. It goes on further to define primary health care as comprising "practical, scientifically sound and socially acceptable methods and technology:", that is "universally accessible" and at a cost that the individual, community, and country can maintain over time. Primary health care should be "the central function and main focus" of the countries health system and provide the "first level of contact" and first element of the continuum of care. [51] Cueto, in his analysis of this point in history, identifies that this paradigm was offered in direct contrast to models that promoted urban hospitals and expensive disease focused technologies. [50] Perhaps, in recognition of the challenges developing countries were facing, primary care in this declaration encompasses sanitation, prevention and control of endemic disease and other elements that encompass population level health approaches and extend beyond personal health care to involve all sectors of

"national and community development". In its concluding statements the declaration calls upon all governments to develop "policies, strategies and plans of action to launch and sustain primary health care as part of a comprehensive national health system" and on the wider health and international community to endorse and support this aim.

In the period following the declaration of Alma-Ata there evolved a growing focus on primary care, despite contrasting approaches to how such services should be implemented. Responding to the concern that the Alma-Ata declaration was too broad and too far-reaching, proponents of "selective primary care" proposed focusing on more narrow and measurable components of primary care as an entry point to strengthening primary care approaches in developing countries. [52] An example of such an approach is the focus by UNICEF on provision of "GOBI" – growth monitoring, oral rehydration therapy, breast-feeding and immunization for improving child health. [50]

Comprehensive primary care, in contrast, sought to transform the social and economic systems underpinning health and re-orient health care services to deliver better and more affordable care. For many this was true to the ethos of Alma Ata and that to do less was to nullify the global accord achieved by the declaration. This ambitious agenda, of social change and change in health care delivery systems, was challenged by entrenched views of physicians, and political will, but nonetheless had managed to gain increasing traction as the 20th century ended, both in developed and developing countries. [50]

Defining modern primary care and its relevance in developed countries

Numerous different definitions of primary care have been offered. As referenced earlier, Barbara Starfield, drawing on the Alma Ata declaration of 1978, offers a widely accepted definition of primary care as "first-contact, continuous, comprehensive, and coordinated care provided to populations undifferentiated by gender, disease, or organ system". [20] The Institute of Medicine in 1994 stated "Primary care is the provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community". [53] In 2008, the World Health Report, affirmed that "people-centered primary care" was characterized by a focus on health needs, an enduring personal relationship over time, comprehensive, continuous person-centered care and recognized a wider responsibility, beyond the medical consultation, to look at the health of the community over the life-course and tackle determinants of health in partnership with the community. [54]

Common to all these definitions, is the theme of primary care as the "first contact" point of care, with primacy in determining and managing most ongoing health needs, including referral to other providers. This theme emphasizes the importance of a relationship between a provider and patient over time; the necessity of providing care that is integrated, comprehensive and person-centered; and the relevance of the wider community context.

Early evidence for the success of a primary care approach was provided by authors such as Barbara Starfield. Starfield, looking at the period from the mId-1980's, demonstrated that

there was a general tendency for countries with stronger primary care systems, as demonstrated by indicators relating to how the system was designed to support primary care and the characteristics of primary care delivery, to also be correlated with greater consumer satisfaction and better health across a range of indicators including neonatal and infant mortality, life expectancy of different cohorts and the percent of infants with low birth weight. An interesting anomaly in Starfield's study was the United Kingdom, which despite having a robust primary care system, failed to perform in terms of health indicators or consumer satisfaction. Starfield postulated that the fiscal policy of the time, which had constrained both health spending but even more so social security, housing, and education spending, contributed to this discrepant outcome. [55]

By 2005, accumulating evidence demonstrated a robust association between primary care provision and better health. Starfield et al. in summarizing this evidence showed that:

- Areas in the United States which report higher numbers of primary care physicians, report better health outcomes on both objective measures such as life expectancy, all-cause and disease specific mortality and birth weight, and on subjective measures such as self-reported health status, even when social and demographic features are controlled for [29] This relationship has also been demonstrated in the United Kingdom [56];
- Those persons who receive care from a primary care physician are generally healthier across a variety of health indicators than those who do not. This relationship holds true across a variety of different countries where people see a primary care physician as their regular source of care, [29];

- The relationship between primary care and objective and subjective measures of health holds true not only when identified by the type of physician providing it (i.e. a generalist or family physician/GP) but also when the characteristics of primary care, (identified as first-contact access for each need; long-term person- (not disease) focused care; comprehensive care for most health needs; and coordinated care when it must be sought elsewhere) are studied. [29]
- Repetition of Starfield's earlier study looked at the association between primary care and health across 13 countries. It found that, when smoking rates and income inequality were controlled for, there was a consistent relationship between the strength of a country's primary care system and health indicators, most significantly for maternal and child health as indicated by reduced rates of low birth weight and post-neonatal mortality. [57] A comparison of 18 member-countries of the Organization for Economic Cooperation and Development showed that stronger primary care systems were significantly associated with lower all-cause and cause specific mortality even when system-wide (e.g., GDP per capita) and individual-level (e.g., tobacco and alcohol consumption) factors were controlled for. [58]

Building on this evidence, Starfield et al postulate six mechanisms by which primary care may exert a positive effect on health outcomes. These are:

1. Greater access to needed services,
2. Better quality of care,
3. A greater focus on prevention,
4. Early management of health problems,

5. The cumulative effect of the main primary care delivery characteristics, and
6. The role of primary care in reducing unnecessary and potentially harmful specialist care.

Primary care in the 21st Century

Primary care has continued to evolve in the 21st century. In recognition of the aging population, the growing burden of chronic conditions, and the need to balance cost and quality of health care, new models of care have been sought. Key themes of focus in primary care innovation, have been the growing emphasis on team-based care, patient-centered care as a core requirement, the use of health care technology and telehealth and the focus on care coordination. These features can be seen in the growth of the patient-centered medical home model or PCMH. PCMH were proposed as a way of transforming primary care to deliver both traditional primary care services alongside more preventative care, with a focus on improving both patient and PCP experiences, health outcomes, safety, and efficiency. Core features of this model include team-based care, using a range of different health care practitioners to deliver care; patient-centered care with a focus on the whole person; improving the coordination of care across the practice, system and community, using alternate forms of communication to improve timeliness and transparency of health information between the patient and PCP, and using data to improve quality of care. [59]

In systematic review, studies of PCMH have demonstrated a small positive effect on the patient experience and a small to moderate effect on improving the delivery of preventative care services. There was a small improvement in the staff experience. While cost-savings and reductions in hospitalizations overall were not able to be consistently demonstrated, there was a small reduction (RR 0.81) for emergency department visits in older adults. A limitation of this work was the lack of standardization of the model and inconsistencies in its implementation. [60] Many policymakers however recognize the promise of this model, and it has been adopted in a number of countries, who are adapting it to fit their culture and health system.

The evolution of primary care in New Zealand from the 1990's to today

In New Zealand, in the latter part of the 20th century, primary care services operated as independent small businesses owned and run by one or more GP's who provided services to those who chose to attend their practice. Over the subsequent 25 years there have been major changes which have changed the organization and delivery of primary care with the aim of reducing costs (to government and to the patient) and improving care. In the 1990's GPs in New Zealand began to voluntarily join together to form Primary Care Organizations (PCO's) as a response to government looking to institute regional purchasing arrangements for certain services. These were primarily Independent Practitioner Associations (IPA's) who acted together to contract with regional health authorities for funding and to become budget holders for certain investigative and referred services (e.g., laboratory tests) and acted as a support organization to the independent member practices. In parallel, a number

of community-based PCO's were established in priority communities in order to meet the needs of a specific, often socio-economically deprived or minority ethnic, population. These networks of GP's also began to impact quality of care, as for the first time, GP's had data showing how their prescribing or laboratory testing patterns differed from colleagues and collaborated in developing local programs that supported primary care, for example diabetes and palliative care services. [62,63]

These diverse models of primary care were formalized in the 2001 New Zealand Primary Health Care Strategy which sought to improve access, reduce inequalities in health, increase community participation in governance and develop a multi- disciplinary, team-based approach to primary care delivery. This strategy established PHO's, which continue to the present day, as the contract holders with DHB's for primary care funding. This led to two very significant changes for primary care delivery. Firstly, individuals had to register with their general practice, which in turn was affiliated to a single PHO. This gave GP's a clear line of sight to the patient population that they were responsible for. Secondly, government funding changed from being a fee-for-service, to a capitated payment tied to the number of patients registered. Capitation payments are based on the number of patients enrolled with a practice, rather than the health care utilized and is adjusted based on demographics, for example the number of elderly or children in the practice population. The nature of this payment allows the practice to use it flexibly, e.g., to pay for nurse visits for preventative health care needs. This in turn contributed to some improvement in access, through a reduction in patient co-payments for GP visits. [62,63]

Over time the number of PHOs have rationalized, from originally close to 80, to currently approximately 30. In 2013 all PHOs and DHBs were mandated to form local health "alliances" to advance the integration of local service delivery. These alliances, initiated under the government's policy direction of "Better, Sooner, More Convenient" aimed to bring the DHB's and PHO's closer together by aligning their efforts at delivering care in the community, improving clinical governance, extending hours and locations to improve access and improving care coordination. Over time this has evolved into the national "System Level Measures" framework (SLM), which aims to monitor the performance of the whole system by making DHBs and PHOs accountable for a set of measures that span primary through to secondary/tertiary level care with contributions to these measures being identified at each level. [63] These historical developments in primary care are summarized in Table 1 below.

*Table 1 Summary of key developments in primary health care in New Zealand (1990-present) **

Time Period	Milestone
1990 -1999	• GP-owned general practices joined together as "Independent Practitioner Associations" (IPAs) to collectively negotiate contracts for primary care services on behalf of individual practices. • Funding for primary and secondary care is integrated in regional purchaser budgets. • Some GP budget management agreements are negotiated between regional purchasers and general practice organizations to include pharmaceuticals and laboratory testing. • Māori and community-orientated services become more established.
2000-2008	• 21 (later reduced to 20) District Health Boards (DHBs) are established as integrated entities to provide secondary health services and purchase primary care services. • In 2001 the Primary Health Care Strategy establishes not-for-profit intermediary organizations – Primary Health Organizations (PHOs) – to commission and manage primary care services. • Primary care funding changes from fee-for-service for GP services to weighted capitation to PHOs who then pass on funding to general practices. All patients are required to enroll with a PHO through their general practice; general practices choose which PHO to join.
2008 - 2016	• "Better, Sooner, More Convenient" policy direction is launched which aims to improve integration, increase the use of primary and community care and provide services closer to home. • Growth in primary health care funding begins to level off. • PHOs begin to be consolidated (falling from around 80 in 2007 to 30 by 2020). • In 2011, early models of health care homes are introduced in New Zealand. • In 2013, DHBs and PHOs are required to enter into "alliances", which involve joint planning of district services by DHBs and PHOs with joint accountability • The 2016 NZ Health Strategy envisages a health system that is people-powered, provides services closer to home, is designed to deliver value and high performance, and that operates as one team in a smart system. The System Level Measures Framework was introduced and used by alliances to focus local initiatives.
2017 till the present day	• In 2017 a new left-of-center government comes into power and commits to review and reform of the health system.

	• In 2018 Health and Disability System Review announced and in 2020 the Final Report of the Health and Disability System Review is released. • In 2021 the response from government to the report is a White Paper committing to sweeping reform. A new agency called Health NZ is to replace 20 DHBS and coordinate national contracting and service delivery including purchasing primary care services. • 1 July 2022 Health New Zealand is established when the new Pae-Ora – Healthy Futures act receives royal assent. • As of 2025 PHOs remain in place but the future of primary care reform is uncertain.

*Adapted from Cumming et al. in the Journal of Integrated Care. [61]

As a benchmark, to be eligible for government funding as a general practice in New Zealand, practices must meet the RNZCGPs "Foundation Standard". This requires a three yearly self-assessment of quality, which tracks performance against 15 quality assurance standards. (65) This incorporates elements of equity, cultural safety alongside clinical governance, compliance with legal requirements and, policies and procedures and infrastructure, and aligns to New Zealand health strategy. Attainment of this quality standard is verified by an independent college assessor who undertakes a site visit. The RNCGP has developed additional "cornerstone modules" to indicate advanced practice in continuous quality improvement and equity. Practices can enroll in these at a cost to the practice. [64]

In response to trends identified overseas, including the growth of team-based care, recognition of the importance of patient-centered care and the importance of data-driven improvement in care quality, New Zealand primary care practitioners, in collaboration with PHOs, developed the "Health Care Home" model. Influenced by the Group Health

Cooperative Medical Home model conceived in Seattle, in the United States; Collaborative Aotearoa, a primary care led initiative, adapted and developed a New Zealand version of this model of care. The aim of this model is to support high-performing primary care and consequently it has modified the "10 building blocks of high performing primary care" identified by Bodenheimer et al, to be fit for purpose in the New Zealand context.[e] [65]The model has grown in acceptance and uptake and is now implemented across 387 practices in New Zealand though inconsistent access to funding across regions has limited uptake.[f] [66]

Thus far there is limited evidence on the success of the model in New Zealand. An evidence review in 2022 summarized the findings from 21 evaluations of the Health Care Home model in practices. Positive findings included the impact of expanded care teams on improved teamwork and continuity of care, the application of LEAN processes improving efficiency and that the model may have positive impacts on secondary care use. However, there was variability noted in practices and patient populations requiring flexibility in implementation and a recommendation that the model was reviewed and updated considering new evidence. [67] In response to this Collaborative Aotearoa has instituted a process to review and reconfigure the Health Care Home model. [68]

[e] Modified from Bodenheimer et al., these are engaged leadership; data-driven improvement, patient/whanau centered, team-based care, patient-team partnership, population management, continuity of care, appropriate access to care, comprehensiveness and care coordination, alternatives to in-person care. [65]

[f] It is estimated there are approximately 1000 general practices in total in New Zealand.[270]

As of April 2020, 96% of the population was enrolled with a PHO emphasizing the centrality of primary care to the health system. Key challenges include a shortage of GPs in New Zealand and the way the current model of care is delivered and funded. The number of full-time equivalent GPs per 100,000 of population is decreasing and 49% of GPs have signaled their intent to retire within the next ten years. Recent surveys of the GP workforce by the RNZCGP indicate that burnout is a significant and increasing concern and may be contributing to GPs leaving the workforce or changing the way they practice, reducing their hours of work. While funded GP training places have also increased, it is unclear to what degree, and how quickly this will impact these workforce shortages. [69] The Nurse Practitioner role is growing in New Zealand, especially in general practice and aged care, however there are still small numbers of these practitioners as an overall workforce. [70]

There is recognition that the model of care needs to change. The current model of fifteen-minute face-to-face appointment is no longer fit for purpose when patient's needs are more complex (including mental health), and with the growing use of telemedicine and videoconferencing technologies. There is concern amongst GPs that the capitation model is "one size fits all" and that the sector needs increased reimbursement for high needs patients, that supports them to care for more complex needs and to provide care in different ways. [5]

Primary care, global health threats and equity

Thirty years on from Alma-Ata, the 2008 World Health Report, titled "Now, more than ever" reaffirmed the WHO's commitment to primary health care. This report recognized

the gains made internationally but noted that these were unevenly distributed. It emphasized the growing evidence of health inequalities globally. The report blamed a disproportionate focus on specialized curative care, a focus on priority diseases/programs and short-term results leading to the fragmentation of health services, and a laissez-faire response to increasing commercialization, for failing to bring about the full potential of Alma Ata. The report went on to re-commit to primary health care as the solution to these problems and to reducing disparities in health, within and between countries. [54]

The report articulates the complex role of primary care within the health system. On one hand there is a critique of a perceived narrow focus on Maternal and Child Health and communicable diseases, and on the other, these are identified as "unfinished business" that must be addressed. The report makes clear that the increased burden of non-communicable diseases will concurrently provide a major challenge for health systems and primary care. It distinguishes the four "pillars" necessary to support primary health care, in its broadest sense. These comprise service delivery reforms, universal coverage reforms, leadership reforms and public policy reforms. The public policy reforms are explicitly identified as "supporting the integration of public health actions with primary care". This work identifies specifically that public policies, and the public health system, must provide guidance for primary-care teams in how to approach priority health problems, and that those countries should identify the rapid-response capacity to deal with acute threats to the public's health, including epidemics and pandemics and natural disasters and describes primary care as a key actor to protect individual and community health in these scenarios. [54]

Why is primary care important in preventing and/or managing a pandemic? One dimension that has been explored in the literature is the reciprocal relationship between individual and collective "security" against global health threats. Heymann et al. identify, in their analysis of lessons learned from the Ebola epidemic in West Africa, that threats to individual health, for example from lack of access to medical services or lack of access to vaccines, may manifest as collective threats to health security, where entire towns, cities or countries become at risk of disease. This reinforces the fact that primary care, with its focus on addressing the health needs of individuals and communities, operates in concert with the wider health system, and provides collective security against any disease threats. In turn this collective security, to the extent it prevents ingress of novel diseases or pathogens into a community, provides an enhanced level of individual protection.

Primary care can be seen to operate at different levels to promote global health security and reduce the impacts of disease threats. The establishment of universal health coverage programs and through these, expanded access to health services, medications, and laboratory testing, is fundamental to social solidarity and the freedom from fear and want that enables collective human security, of which collective health security is one part. Ebola exemplified how a fragile health system, with inadequate public financing and poor access to primary medical care and diagnostics, was unable to contain and manage a severe disease threat. In counter to this, a robust, horizontally integrated, and effective primary care system, able to respond to a variety of health care needs across the life course, is perceived as building community trust in government when faced with critical disease threats. A robust primary care system both facilitates care for the disease of concern and minimizes

the domestic and international movement of cases of disease that results from people seeking more effective health care.

The experiences of the primary care sector in a pandemic – roles and responsibilities

A focused literature review was conducted concentrating on the roles, and any barriers and enablers, identified for primary care in an infectious disease pandemic. This was focused on the period prior to the emergence of Covid-19, and in countries with similar health systems to New Zealand. The purpose of this literature review was to inform the development of this research project, by determining the status of the evidence base with regards to:

- Descriptions of the role(s) and responsibilities undertaken by primary care practices in a pandemic (what role, how this was undertaken, using what tools/resources, and for what populations, any barriers or enablers identified); and
- Descriptions of the role(s) and responsibilities undertaken by primary care practitioners (doctors, nurses, and other staff) in a pandemic (what role, how this was undertaken, using what tools/resources, and for what populations, any barriers or enablers identified).

In developing the scope and terms for the review, inclusion and exclusion criteria were developed. These are described in Table 2. In general, these aimed to include a diversity of study and article types that examined the experiences of responding to a pandemic, in a primary care setting that was comparable to New Zealand. The search was conducted

across five databases: Google scholar, Scopus (including Embase and Medline), PubMed, Medline and CINAHL. These databases were selected as CINAHL is inclusive of qualitative and social science studies (unlike Medline) and Scopus includes conference papers and books. Medline, Scopus and PubMed were searched independently due to reported variation between results achieved when Medline is searched alone or as a part of other databases. [71]

Table 2 Inclusion and Exclusion criteria

Criteria:	**Explanation:**
Article **published prior to 01 January 2020**	To capture experiences prior to the Covid-19 pandemic
No **publication type limits** were set	To capture a diverse range of published evidence including expert opinion
No limitation set based on the **level of evidence**	Due to the diversity of study types identified in preliminary analyses
Article text in the **English language**	Unable to access reviewers with skills in other languages.
Inclusion criteria:	
Describes experiences with a **disease pandemic**	
Discusses the **experience, perspectives, barriers** or **enablers** within a **primary care setting** or for **primary care practitioners**	
Exclusion criteria:	
Duplicates of studies	
Papers describing **patient outcomes** or **treatment guidelines**	
Studies using **hypothetical** pandemic scenarios	
Studies undertaken in **ambulance services, secondary** or **tertiary care**	Not in a primary care setting
Describes a **non-communicable disease** 'pandemic'	Other diseases, for example Opioid use or Obesity may be termed a 'pandemic'

Study not undertaken in **a comparable health system** as defined by the Medical Council of New Zealand[g] [72]	Less generalizable to the New Zealand setting

The search terms used are described in Table 3. These were developed to specifically target the experiences of primary care and general practice. Articles were limited to prior to January 1st, 2020, in order to capture what was known prior to the Covid pandemic. A further literature review, as part of the scoping review, will focus on the period post January 1, 2020, to the present.

Table 3 Search terms

("primary care" OR "primary health care" OR "primary healthcare" OR "general practice" OR "general practitioner" OR "general practitioners" OR "primary care practitioners" OR "primary care physicians" OR "family practice" OR "family physician" OR "family physicians")
AND (pandemic)
AND (infectious disease OR communicable disease)

From this search an initial 203 articles were identified in traditional bibliographic databases. Review of Google Scholar references was confined to the first 200 references as sorted in the relevance ranking of Google Scholar. This was required because Google scholar does not operate as a typical bibliographic database and does not support traditional search structures. When abstracts were screened 43 articles were identified for full text review. Through application of the inclusion and exclusion criteria a total of 38 articles

[g] Comparable health systems are defined by MCNZ based on public health indicators e.g. life expectancy and mortality, and system indicators including the similarity of the registration environment, the percentage of registered doctors per head of population and total health expenditure per capita.

were identified that were included in the literature review. [23,24,38,73-107] One article was a systematic review of 10 studies that was also included in this literature review. [82]

This literature review incorporated descriptions of both practice level, and individual practitioner level experiences of a pandemic response. These were often addressed concurrently in the literature with participants commenting on both their experiences as individual practitioners and the ways their practices had been impacted or adapted as the result of a pandemic. Within the 38 articles reviewed there was a variety of different study types, including evaluations (n=2), literature reviews (n=1), systematic review (n=1), surveys (n=9), qualitative studies (n=9) and mixed methods (n=2) and other articles (n=14). The category "Other articles" comprised commentaries or expert opinion (n=9) or brief reports on phenomena (n=4), and a registry study(n=1). These articles have been treated in this review as another piece of qualitative data i.e., offering an insight to an issue that may be supported or refuted by other data points across the review as a whole. [23,24,38,73-107]

The literature examined the experience of pandemic influenza predominantly, with most studies referring specifically to the influenza H1N1 pandemic in 2009 (n=17) to influenza more generally (n= 10) or avian influenza (n=2). Other articles included information on experiences of SARS (n=5) and perspectives or comparisons of more than one pandemic disease (n=4). The literature described the experiences of practitioners in 8 countries. The most prevalent of these was Australia (n=12), followed by Singapore (n=6), the United States (n=4) and the United Kingdom (n=4). Other countries represented in the literature included Canada (n=3), The Netherlands (n=2), New Zealand and Norway with some

articles discussing more than one country, or comparing two countries, for example the experience of SARS in Canada and Hong Kong.

Themes can be identified from the literature which are of relevance to preparedness, response and future planning, within the primary care sector, for pandemic disease. Several studies included participants perspectives on what the role of primary care practices and primary care practitioners was in a pandemic. One specific role identified for primary care in a pandemic was the surveillance of communicable disease. [24,76,81,84,105] When a novel influenza virus, or other pathogen, spreads in the community, primary care is likely to be the site at which the clinical syndrome is first identified or a laboratory specimen collected. This is because primary care is generally more accessible in a variety of geographic locations and communities, and because of its role as first contact for people seeking health care. In some jurisdictions primary care practitioners act as "gatekeeper" to patients being able to access secondary and tertiary care (other than emergency care for the very unwell).

As part of this surveillance role, general practitioners and primary care physicians may have requirements to formally notify cases of disease to public health officials, as part of routine surveillance of communicable diseases. Doctors and laboratory service providers will have an obligation to notify cases of disease both "on suspicion" and when there is laboratory confirmation. [76] Many jurisdictions also operate sentinel surveillance systems, which are designed to aid the early identification of novel disease, facilitate the rapid development and dissemination of a syndromic case definition, and support the acquisition of representative community level clinical presentation data. These are predominantly

electronic systems, whereby practitioners submit clinical and laboratory information on some or all of cases presenting to their practice with influenza-like illnesses.[74,80,102,105]. To be successful, sentinel surveillance systems must be in place prior to a novel disease emerging and have effective mechanisms for reciprocal communication of case characteristics back to primary care, to support case finding. [74] General practice-based sentinel surveillance in New Zealand was identified as providing the most reliable information about the progression of pandemic H1N1 influenza in the country. In part, this was due to a policy decision, which discouraged routine laboratory testing of all patients meeting clinical case definitions, to preserve laboratory capacity and reduce expenditure. This resulted in sentinel surveillance, based on clinical diagnosis, being the most widely used surveillance tool. [105]

One study in Canada identified a high level of concern amongst primary care practitioners about their role in surveillance. These concerns related to the potential impact on the physician-patient relationship, if trust was eroded through disclosure of test results; loss of confidentiality, both for patients and for the practitioners themselves; a concern that data could be used for other purposes, including in pay-for-performance, and lack of clarity that there were any benefits to patients from disclosure of their private information. [76]

GP's and PCPs also have an identified role as providers of clinical care, both for the disease causing the pandemic, and to maintain usual care of acute and chronic conditions. There was a recognition that practices would need to be able to respond to a surge in demand for

their services, as part of their first contact role in health systems, and that in parallel there would be a need for essential, non-pandemic health care to continue. [24,83,88,103-106]

The provision of care during a pandemic was also recognized as causing potential and actual conflicts for GPs/PCPs between their role as a personal health provider and their obligations within the larger public health response. For example, the need for public health approval for laboratory investigations for influenza and provision of antiviral medications for treatment, and the rationing of these, conflicted with GP's duty to provide optimal clinical care for each patient that presented to them. This was both due to the opportunity costs of the time spent in administration of these requirements, and by constraining their ability to provide what they perceived as the best available care on an individual basis, when this was rationed by public health officials. [75,104]

Various practice operating models were proposed for managing both the surge in patients presenting with pandemic disease and maintaining continuity of care for patients. These could include maintaining the status quo, where practices provided the usual mix of clinical services, developing separate streams where some practices provide influenza/pandemic disease care and others non-influenza/non-pandemic disease care, or developing formal processes by which patients could be triaged remotely and sent to specialized fever/influenza clinics, or to practices that were delivering usual care. [38,73,83,87,92,97,104,106] One study of primary care practitioners identified that there was a concern that urgent, non-pandemic disease may be missed, due to people electing not to come to a practice or by

being misclassified e.g., fever from a severe kidney infection being triaged as possible influenza. [104]

Specialized fever or influenza clinics were recognized to confer benefits, particularly in terms of infection control, by separating out those with a communicable disease from general patients. Dedicated fever and influenza clinics offered efficiencies, in that staff could become very competent and familiar with clinical pathways for the disease of concern. However, they also needed careful management to insure they did not inadvertently cause spread of disease by staff moving between dedicated fever or influenza clinics and usual care clinics. It was identified that early engagement of primary care in planning for such services was necessary to address staffing and ensure they could be quickly operationalized in a pandemic. [24,81] Practical issues included their location and the timeliness with which they were established. [104,106]

Kunin, in analyzing the response to H1N1 in three countries (Australia, the UK and Israel), found that flu clinics were inconsistently used over the course of the pandemic. These clinics were used when case numbers were increasing, serving as emergency department diversion in Australia, and primary care diversion in the United Kingdom and Israel, and were used outside of hours. Clinics were initiated within three weeks in the United Kingdom but took much longer to become operational in Israel and Australia and were operational only for short periods of time. These delays, alongside the fact that in Israel and Australia primary care was still responsible for routine assessment of all flu cases, limited these clinics utility in providing workload relief for PCP/GPs. [83]

Dedicated fever /flu clinics were rapidly operationalized and embedded early on as a core feature of the national 2009 pandemic influenza response in the United Kingdom. However, in one study, 50% of primary care clinicians surveyed were concerned that these dedicated fever/flu clinics could not safely see and assess patients. Concerns focused on clinical management of patients presenting to these clinics, using the novel clinical algorithm that was used to assess and assign treatment to patients. There was concern that this was not fit for purpose in terms of its diagnostic ability and prescribing safety. [73] Beyond this clinical safety concern, general barriers to their effective operationalization of fever/flu clinics were perceived to include the need for re-organization of the workforce, including finding adequate staffing, and ensuring these clinics were acceptable to the primary care workforce as a model of care. [87,97,106]

A further identified role for primary care was in the delivery of vaccination. Primary care is commonly a first-line provider of vaccinations and, in a pandemic, may be involved in staffing and supporting community mass vaccination. Jurisdictions differed with regards to the models of vaccination delivery that are proposed and implemented, and it was unclear what strategy was more successful and in what conditions. [83,85] From both an ethical and infection control perspective it is important that those involved in vaccination first receive the vaccine themselves. Some providers felt that the need for the protection conferred by vaccination, extended to their families as well, who they saw at high risk of contracting the disease from them. [81,84,85] These concerns, which focus on obtaining access to vaccination, contrast with surveys which report a high proportion of GP's have not

elected to receive the seasonal influenza vaccine. One survey of a United Kingdom GP after hours service (with 20 respondents) reported that prior to the pandemic, 70% had opted never to receive the seasonal influenza vaccine, with reasons ranging from 'not wanting the vaccine' to 'natural resistance is adequate' and 'fear of vaccine related influenza and other side effects' and only 45% reported an intention to take up a vaccine against the pandemic influenza strain. [101] A survey of Australian GP's (n=184) found that only 55 per cent of respondents had had an annual influenza vaccination. [79] This suggests that attitudes and beliefs surrounding vaccination, and related behaviors in choosing to be vaccinated, may differ in the context of a pandemic.

In a pandemic there is a necessity to quickly disseminate any vaccine when it becomes available and to obtain high immunization rates as soon as possible. However, this is balanced against other objectives such as prioritizing high-risk groups. Decision-making around the prioritization of different population groups for the vaccine, was seen as a challenge in primary care, especially when opposed to a doctor's duty to their individual patient to provide care, and clinicians relative distance, and lack of insight into the overall processes of distribution and implementation of the vaccine policy. [83,85,86] In H1N1 influenza epidemics there was concern about the ability of the vaccine to impact the overall trajectory of the outbreak, as it became widely available when case numbers had already significantly reduced. [77,85,86]

The need for effective guidelines, plans and protocols, was identified in planning for a response. [24,78,79] Plans were seen to be very important for the management of pandemic

diseases and the public health and primary care response. Several studies comment on the existence of well-developed plans at regional and national levels. [38,81,92,108] Post-hoc analyses identified a range of issues with the implementation of plans, protocols and guidelines in primary care. These included:

- Primary care physicians feeling inadequately involved in planning or a need for more effective engagement of primary care in developing pandemic response plans. [23,73,84,85]
- The challenge of engaging with a range of different primary care practitioners and entities as opposed to a single organization. [85,103]
- Plans being unclear, duplicative, or changing frequently. [73,83,85,103]
- Inadequate resourcing of primary care to participate in planning. [103]

A "practice champion", or GP with special interest and training in the management of pandemic disease, who had familiarity with national and regional plans, and who could lead the practice response, was seen as a useful way of implementing good procedures within an individual practice. [24,103,104]

Communications, between public health and primary care, and to the community at large, was a common theme across a variety of studies and in expert commentary. [23,73,75,79,82-85,89,90,92,96,97,101,104] Issues identified in the literature included the large volume of complex clinical and public health guidance being communicated, from multiple sources, and the difficulty of maintaining currency with this guidance, or it not being synchronized or sufficiently timely in relation to the rapidly evolving pandemics. Communications were

critiqued for being unclear, duplicative, non-specific, and impractical in terms of application in a primary care setting. [85,91,96,104] A desire for clear, two-way communication, from a single authoritative source, was expressed. [24,104] This was partly due to difficulties experienced in seeking timely responses to requests, e.g., for antivirals (for influenza) or personal protective equipment (PPE) provision. One study found a clear preference amongst primary care staff for faxed clinical information. While this technology may no longer be current, it does suggest a desire for targeted and direct communication, and communication delivered in such a way that a clinician did not have to independently search for the relevant information. [79]

Some jurisdictions noted more positive experiences of communications in general, though what strategies contributed to the perceived clarity and informativeness of communications are not clearly elucidated. [90,92] One proposed strategy is to have smaller and more cohesive groups to guide on message development and dissemination. [92,97] Mass media communications also caused consternation for primary care in a pandemic. There were concerns that publication in the media of practices where SARS cases had been treated could lead to patient avoidance of these practices and financial and other repercussions for practitioners. Publication in the media of the deaths of other health care practitioners who had become infected with SARS and died, added to the burden of fear and anxiety carried by practitioners. [89]

Personal protective equipment (PPE) availability and/or use was a frequently identified concern for primary care. Inadequate supply to practices, low availability within practices,

and/or difficulty accessing PPE, were frequently cited as barriers to primary care practitioners being able to provide both usual clinical care and respond to cases of novel disease. Participants and studies describe shortages of PPE in clinics, delays and difficulties in obtaining PPE, and a financial burden from purchasing PPE at high cost and sometimes leading to recycling of PPE. [73,75,79,81,89-91,101,104] Even when PPE was available, there were concerns with compliance with its use and confidence in using it correctly. [89,90,93] Further support in infection control training and education was desired. [95] In the H1N1 pandemic influenza response, jurisdictions differed in whether they offered PPE freely to primary care (Israel and the United Kingdom) or if practices were expected to self-supply this (Australia in the first part of the pandemic). [83] Practitioner participants identify that they expect the government to supply PPE to practices during a pandemic response to a novel disease. [84,89,100,104] From an ethical perspective, the supply of adequate PPE to allow practitioners to undertake their clinical work safely has been identified as essential. In acknowledgment of the "duty of care" that GP's/PCP's must provide care in pandemics or epidemics, there is recognition that there is a reciprocal duty on the community, and government, to provide adequate protection, including PPE and access to vaccination or anti-viral medication and other treatments. [98-100]

Education on infectious disease control was seen as lacking in studies of the SARS pandemic. [89,96] In one survey of 188 practitioners affiliated with the University of Toronto and of Chinese University of Hong Kong (both epicenters during the SARS pandemic) found that 80% (n=41) of Canadian and 85% (n=116) of Hong Kong based PCP identified they lacked any training, and this correlated with their perceptions of how confident they

felt in dealing with SARS, with 74% (n=36) and 68% (n=92) respectively in Canada and Hong Kong, saying they lacked confidence. [96] General education on the pandemic disease, clinical management, and infection control, was identified as being necessary for all staff in a primary care setting, as they would each have different responsibilities in triage, quarantining of ill patients presenting to the practice and clinical care. [24,87] It was suggested that any future education be practical, scenario based, delivered face to face, and tailored to local and regional context. [79,87]

The mental and emotional effects on GPs/PCPs, of working during a pandemic, were also noted in the literature. These clinicians were concerned about the risk to their personal health but generally were willing to work despite this. [87,94,95,101] There may however be significant impacts on practitioners following a response. A study of 188 Canadian and Hong Kong physicians following SARS, found that approximately 50% met criteria as "highly anxious" after their work in the pandemic response. [96] A larger study of 721 health care workers in Singapore found 14.1% had significant levels of psychological distress and the likelihood of this correlated with those who had treated a clinical case(s) of SARS. [91] Fear, uncertainty and stigma were also identified in surveys, where practitioners identified that they believed that they and their families would be avoided socially due to their role in caring for SARS patients. [94,95]

Other barriers and enablers cited in the literature included:

- Increased overhead costs overall relating to staffing, PPE and other costs relating to the pandemic, and the availability of adequate financing. [24,79,90,96,106]

- The physical layout of primary care practices and the way these limited practices from implementing optimal infection control procedures. [79,104]
- The provision of adequate professional medical indemnity cover for those responding to a novel disease in a pandemic, especially for those working outside their usual scope of practice or returning from retirement to support the response. [24,87,98]
- Technology capacity and adaptations to support streamlined clinical care, remote outreach to patients, and communication between public health authorities and primary care. In many cases the technology described was limited by what was available and in use at the time of the report, for example fax or telephone, and electronic booking systems. There was no discussion of video consultations which may reflect their more recent adoption into clinical practice. [24,79,104,106]

In conclusion, a comprehensive and systematic search of the published literature was conducted; however, this search was designed to be deliberatively inclusive of a variety of literature, such that it includes both peer-reviewed empirical studies, and expert opinion. Despite this broad inclusion criteria, it is possible that some articles were missed due to limitations of the search strategy and the review being limited to English language publications. Forty-three publications, one of which was a systematic review were identified, with the search confined to the period prior to the emergence if Covid-19. Of note, was the repetition of themes across multiple pandemics at different points in time. This suggests that we require additional research to fully understand the impacts of a pandemic on primary care, and the degree to which these issues were

resolved in the Covid-19 pandemic response. This also may indicate, a potential for improved dissemination and implementation of research findings. The barriers and enablers identified within this review may serve as a starting point for evaluating the response of primary care to Covid-19, those areas that have worked well and where improvements can be identified and provide insight into those issues that have proved less tractable in the current response.

GPs and PCPs from a variety of different countries and across multiple different pandemics, identified common challenges, barriers, and enablers in their response. This suggests that there are many transferable learnings which could have been integrated into pandemic planning to strengthen the response. As a core component of the health system response in New Zealand, the investigation and analysis of the challenges and successes in the current response is essential to enhance preparedness and response for the future pandemics that we will undoubtedly experience.

Chapter 3 - Study Design and Methodology

Research Approach – A Scoping Study

Scoping studies as an overarching approach are generally described as ways to "map" or "rapidly map" a body of evidence on a subject. They are increasingly being used as a research approach and in parallel the literature has been growing describing modifications to terminology and research methodology described. A proposed definition states that "scoping studies aim to map the literature on a particular topic or research area and provide an opportunity to identify key concepts; gaps in the research; and types and sources of evidence to inform practice, policymaking, and research'". [109] Pham et al. in a review of scoping studies found that the main purpose of over 90% of published scoping reviews was to identify, characterize, and summarize research evidence on a topic, including identification of research gaps. [110] The first description of a scoping review, outlined by Arksey and O'Malley comprised six steps, described in detail in Table 4, below.

Scoping reviews aim to inform policymakers and practitioners working in the area, on what the status of the evidence is, how this can inform best practice, and to guide researchers to formulate more specific and focused research questions for future investigation. [35,36,109,111,112] The term scoping review is sometimes, erroneously, used to describe broad and non-systematic evidence reviews. However, in their originally described form, scoping reviews contain multiple elements of evidence gathering and can incorporate a step of

developing evidence syntheses and testing these against stakeholder knowledge and understanding. This iterative process of "sense-making" of the evidence itself can generate new ideas and concepts for future exploration. [35,36]

Scoping studies are often used in areas where there is emerging or rapidly changing evidence on a subject, to inform policy and practice, and guide further research efforts. They are particularly useful in mapping the evidence in broad topic areas. Andersen et al., reflecting on a variety of scoping reviews commissioned in health services research offer the following definition: "Scoping studies are concerned with contextualizing knowledge in terms of identifying the current state of understanding; identifying the sorts of things we know and do not know; and then setting this within policy and practice contexts". They identify four main potential components: a literature map, a conceptual map, a policy map and a consultation with stakeholders. They identify that, most-commonly, scoping reviews comprise, at minimum, a review of the literature with the other elements forming important adjuncts to this. Scoping reviews, in their analysis of 24 commissioned works, can be seen to be a flexible and responsive research approach. While not all components have to be included in every scoping review, using elements such as policy mapping and stakeholder consultation can strengthen findings through the ability to triangulate across different data sources. [36]

*Table 4 Overview of the Arksey and O'Malley methodological framework for conducting a scoping study**

Arksey and O'Malley Framework Stage	**Description**
1. Identifying the research question	Identifying the research question is the starting point to guide search strategies. Consider which aspect or 'facet' of the question(s) are most important. Terms used in research questions must be defined and the parameters of the definitions informs the breadth of material the study might include.
2. Identifying relevant studies	This stage involves identifying all relevant studies that can provide an answer to the research question with an aim of being as comprehensive as possible. Decisions are required as to timespan, language and other parameters, recognizing that this can lead to relevant articles being missed. The search strategy should be broad and inclusive of a variety of methods including electronic databases, searching bibliographies and hand searching relevant journals etc. Breadth must be balanced against practical considerations of time, budget and personnel to conduct the scoping study.
3. Study selection	Study selection involves the development of post hoc inclusion and exclusion criteria which are then systematically applied to the studies. Criteria are specified by both the research question and based on increasing familiarity with the literature.
4. Charting the data	A data-charting form is developed and used to extract data from each study. A 'narrative review' and/or 'descriptive-analytical' of the study allows for contextual or process-based information to be recorded and includes collecting standard information on each study and applying a common analytical framework to outcomes.
5. Collating, summarizing, and reporting results	The scoping study seeks to present an overview of all material reviewed. This may include numerical counts of the extent, nature and distribution of studies and a narrative account of the existing literature using an analytical framework or thematic construction. The process of collation and reporting does not seek to differentiate the "quality" of evidence. Clarity and consistency of reporting are important.
6. Consultation (optional)	This process while optional is recommended to improve the relevance of results obtained in the scoping study. It involves consumer and stakeholders being identified and actively engaged in the study e.g. to provide additional references, and to provide clarifications and insights about issues or themes identified in the scoping study.

*Summarized from Arksey and O'Malley in the International Journal of Social Research Methodology [36]

Central to the scoping review is the concept of breadth vs. depth in coverage of the available literature, and other data sources (policy documents and stakeholder consultations). It is important to broadly cover the relevant research, to identify gaps and to ensure we can adequately describe its strengths and limitations. The depth to which this literature is explored is more flexible and depends on the nature of the scoping review subject matter and anticipated outcomes of the review. A process of sense-making, that brings together evidence and context across this wide range of sources is an important part of this process. [35,36] Andersen et al. articulate that, beyond being a non-systematic review of the literature, part of a scoping review is to "map" the origins of the literature. For example, by considering the geographic origins, temporal relationships, and disciplinary origins of research, we also learn something important about the field and its evolution. This is particularly important when considering the response to Covid-19, which has varied significantly globally and where learnings can be anticipated to differ based on the context (political, health and social system) and the distinctive approach that each country has taken. This should occur alongside understanding the content of the literature and its limitations, especially, what it does not address.

Policy mapping, in the context of a scoping review, is described as the process of tracing the relevant policy documents that are applicable to the study question. Anderson et al. identify that typically these include both government agencies and professional bodies. Policies must have a "bearing on the nature of practice in that area" i.e., they must shape how primary care practitioners and PHOs were asked to deliver services in response to Covid-19 including newly developed services and changes in existing service delivery. [36]

This can be anticipated to include policy that directly applies to primary care, and broader policy that impacts primary care as part of a wider group, for example a government policy that affects all health care workers. These policy documents are anticipated to be sourced from several different institutions, who, in this case, have roles in setting policy parameters for the Covid-19 response in New Zealand.

Stakeholder consultation is a component of a scoping review originally described by Arksey and O'Malley and further elucidated by Anderson et al. Arksey and O'Malley describe this "consultation exercise" as having a twofold role for stakeholders. Firstly, as commissioners of research themselves, they describe the importance of the consultative process in setting the parameters and objectives of the review itself. They describe this as an exchange between the commissioner of the review and the researcher(s) undertaking the work. Anderson et al. and Arksey and O'Malley, secondly, both identify an important role for stakeholders as "subjects" within a scoping review, particularly in evaluating and providing feedback on the outcomes of a scoping review. Arksey and O'Malley also suggest a role for stakeholder consultation in developing the review, for example suggesting materials to include in analysis, as well as providing insights on how the summarized and synthesized results should be interpreted. Both authors highlight the "added value" of an external perspective in refining the results and our understanding of them [35,36]

In reflecting on their experience with scoping reviews, Anderson et al. identify that stakeholders have an important role in drawing links between, the review and the broad

context of the health care system and socio-political environment. Without this step, the identified outcomes, including identified research priorities and gaps, may lack relevance to the current activities and concerns of the health sector. [36]

More recently the guidance for scoping reviews has been formalized by the Joanna Briggs Institute (JBI) who published methodological guidance for scoping reviews. This was updated in 2017 and does not include the originally proposed stakeholder consultation process developed by Arksey and O'Malley and recommended by Levac et al. [35,113] In 2018, as an extension of the existing PRISMA reporting standards for systematic reviews, a technical advisory group comprising technical experts from the JBI and others, developed a checklist entitled the "Preferred Reporting Items for Systematic Reviews extension for Scoping Reviews (PRISMA-ScR). The aim of this was to be consistent with the JBI's scoping review methodology and to enhance the quality and consistency or reporting of scoping reviews. In this study the PRISMA-ScR criteria were used to guide reporting. [114]

Research Approach – Novel extensions of the Arksey and O'Malley framework

The approach described in this proposal is true to the desire to "map the relevant literature, summarize and disseminate research findings and identify research gaps" as described by Arksey and O'Malley but also extends the approach in novel ways. Firstly, as a novel way of synthesizing research findings, and as a contribution to the development of the field, an output of Phase 1, 2 and 3 of the research, is the refinement of a conceptual framework which has been proposed to develop and analyze the primary care sector's role in pandemic

influenza, to assess its utility for pandemics of other infectious diseases. This conceptual framework is further described in the next section.

Secondly, because of limited data available describing the experience of responding to the Covid-19 pandemic in Primary Care in New Zealand, this study integrates new qualitative data collection. The study adjuncts traditional elements of a scoping review with the primary collection of qualitative evidence gained from key informant interviews in the Nelson-Tasman region of New Zealand. This will include asking key informants for their reflections on the experiences of delivering primary care services in the pandemic, their insights as to how services changed and adapted and the barriers and facilitators that they perceived in delivering high quality primary care in response to the Covid-19 pandemic in the region. The intent of this qualitative data collection is to "inform and validate findings from the main scoping review" as per Arksey and O'Malley. [35]

Theoretical Framework

The challenges of planning for and undertaking a response to diseases with pandemic potential was recognized by Patel et al. when reviewing pandemic influenza in Australia, the United States, Canada, New Zealand, and the United Kingdom. In recognition of the lack of any existing framework to guide planning and response, and to appraise plans and outcomes, these authors undertook a multi-method process to develop a conceptual framework of the general practice (primary care) response to pandemic influenza. [38] The

proposed conceptual framework of the general practice response to pandemic influenza is shown in Figure 2 below.

The development of this framework builds upon the Haddon Matrix – a tool developed by William Haddon Jr. to apply the principles of public health to injury prevention. Initially this was used to devise strategies to reduce road traffic accidents, though it has subsequently been used for other issues. The Haddon Matrix uses the concepts of host, agent, and environment (physical and social) to consider the factors responsible for injury/harm across the different phases of primary or "pre-event", secondary or "event" and tertiary or "post-event" prevention. Analyses of specific threats using this matrix allow for the identification of root causes and opportunities for public health action. [115] The Haddon matrix is flexible in that it can consider these issues at the level of an individual or a household, community, or the population. The notion of a pandemic as "injury" on a mass scale, and the utility of the Haddon matrix in public health emergency preparedness for other threats, guided the authors to its potential use as a framework for pandemic influenza planning. [38]

*Figure 2 Conceptual framework: the general practice response to pandemic influenza**

Domain of practice	Challenges anticipated during a pandemic	Responses to be addressed in the general practice pandemic plan
Clinical services	Surge in demand for primary care services for influenza	Ways to enhance surge capacity for responding to influenza
	Sustaining other urgent or essential primary care services	Maintaining other urgent and essential clinical services
Public health responsibilities	Effective surveillance of acute respiratory infections	Contributing data and specimens for clinical and laboratory-based surveillance
	Implementing influenza control measures	Assisting public health units with contact tracing and monitoring people in isolation or quarantine, dispensing antiviral medications and the pandemic influenza vaccine
Internal environment of the general practice unit	The physical environment:	
	Minimizing the risk of spread of influenza in the practice setting	Structuring clinical facilities and stockpiling personal protective equipment to enable effective infection control
	Organizational environment:	
	Reliable delivery of medications and essential equipment to the practice	Ensuring emergency access to essential drugs, vaccines and equipment
	Ongoing communications with patients and the health system	Strengthening capacity of communication systems
	Organizational arrangements to sustain efficient and effective services	Customizing business continuity plans to the local context
		Training in use of clinical decision-making tools and conducting simulation exercises
Macro-environment of general practice (the health system context)	Overall organization of the health system that will facilitate or impede effective functioning of general practice	Integrated planning across the health system, e.g. with other general practices and ambulatory care services, public health units and hospitals
		Appropriate legislation, e.g. to address professional accreditation, indemnity and ethical concerns
		Financing mechanisms for general practice

*Adapted from Patel et al. in Plos One [38]

Patel et al. describe undertaking a review of the WHO guidelines, grey and peer-reviewed literature, to adapt the Haddon matrix structure and populate its fields. They state this was informed by organizational theories and theories about measuring and improving the quality of public health emergency preparedness. The exact processes by which they constructed the matrix are however not specified. They state that the framework was tested by a purposive sample of clinicians from general practice who were engaged in pandemic planning, policy leaders, focus groups and workshops with general practice staff and desktop exercises to test pandemic planning scenarios. Again, the modifications and changes resulting from this testing are not specified in detail. [38,106]

Components of the conceptual framework and limitations

The high-level framework, developed by Patel et al., identifies four domains of practice: clinical services, public health responsibilities of general practice, internal (physical and organizational) environment of the general practice unit, and the macro-environment of general practice which constitute the rows of the matrix. The corresponding columns are the key challenges to be anticipated by general practice during an influenza pandemic, and the type of responses that need to be addressed in the general practice pandemic plan. By considering in turn each cell of the matrix, it is possible to anticipate key challenges that will occur during a pandemic in each functional domain, and to identify those issues that can be addressed in planning for a pandemic.

It is important to recognize, in the first instance, that a Haddon matrix comprises both consideration of host, agent and environment, and the time scale of the event, to deduce issues that can be strategically addressed by general practice. It is apparent that, as opposed to a traditional Haddon matrix the column and rows have been juxtaposed in this conceptual framework. Whereas the time scale of the event, typically before, during and after, normally appear as the rows, in this framework they form the columns. [115] Contemporary research on disasters and emergency management has commonly followed the all-hazards model and divided a disaster or emergency into four phases: mitigation, preparedness, response, and recovery. The proposed conceptual framework developed by Patel et al. does not clearly identify these four phases. This is a key limitation of the proposed framework. [116] The column "challenges to be anticipated during a pandemic" most closely corresponds to the response or event while the column "responses to be addressed in the general practice pandemic plan" most closely corresponds to "preparedness" as it describes planning for an event. The "mitigation" phase, which also occurs pre-event and the "recovery" or post-event phase are not specifically included in the matrix.

Inclusion of a time scale in the matrix is made more complex, because in the emergency response cycle, planning occurs both before the event and prior to any subsequent event. In pandemics such as Covid-19, different waves of infections are experienced. Preparedness and mitigation are the key outcomes of a Haddon matrix, i.e., it is constructed specifically to identify the strategies that could be implemented to reduce risk of injury or harm before, during and after an event. Consequently, the inclusion of "responses to be

addressed in the general practice pandemic plan" as a column within the matrix appears to be a logical fallacy.

Broadly the four functional domains of practice identified are analogous to host, agent, and environment from a sector perspective. Clinical care relates to host in that it looks at the needs for primary care for the affected population, while public health responsibilities relate to the agent as it outlines the effects of the agent, in this case pandemic influenza, on the population as a whole. Clinical care can be seen to include both the needs of patients in relation to pandemic influenza – for example assessment and treatment of flu-like illness, as well as the need to maintain other primary medical care throughout a pandemic. This can also be seen to change with the phase of the pandemic – for example care for chronic diseases may need to be maintained throughout the response phase, alongside treatment of influenza, whereas in the recovery phase there may be more demand for mental health support. Public health responsibilities can include surveillance and support/management for obtaining clinical samples and managing those with symptomatic influenza. Again, this varies with the phase of the response and activities such as mass vaccination may be seen as both a response and a mitigation activity.

Environment has been disaggregated into the specific environment of general practice/primary care and the wider "macro" environment. The internal environment focuses on the physical environment of a general practice/primary care site and the practice-level organizational structures and processes. This could constitute changes to the physical environment, or new activities driven by infection control and prevention

priorities, and by the need to maintain business continuity. The macro-environment includes the policies and structures of the wider health system that shape, enable, and constrain the response within general practice and primary care. In the model presented by Patel et al, this extends beyond those factors of the macro-environment that can be influenced or shaped by primary care into legislation and policy setting that are enacted at a government level.

By focusing on these four domains of primary care function in a pandemic and reflecting on the Covid-19 pandemic as an event, it is anticipated that the conceptual framework can be adapted and modified for more general use outside influenza. An outcome of this study is a modified framework that specifies strategies across the timescale of the pandemic. This synthesizes research findings from the study in a way that can be used to inform policy and practice.

The conceptual framework identifies the importance of context and environment, and this is a key element that this study will examine. By describing the key elements of the social and political context, and the internal environment of primary care, it is possible to identify barriers and facilitators to the successful control of the pandemic in primary care and generate potential strategies and solutions that are relevant to New Zealand, and possibly to other jurisdictions.

Phase 1 – Pandemic context and policy mapping

This phase of the study undertook a descriptive analysis of the experience of primary care, in New Zealand, between 2020 and 2023 when the New Zealand government and professional bodies had in place legislation and policy relating to Covid-19. This phase of the research focused on outlining the course of the pandemic and the changing policy and regulatory environment for the sector.

Legislation and public policy have important effects on public health goals, both intended and unintended. Gostin has described law, as it relates to public health as comprising the "study of the legal powers and duties of the state to ensure the conditions for people to be healthy (e.g., to identify, prevent, and ameliorate risks to health and safety in the population), and the limitations on the power of the state to constrain the autonomy, privacy, liberty, proprietary, or other legally protected interests of individuals for protection or promotion of community health". [117] The spectrum of public policy, from powers and duties to restraints, can be seen in the lawmaking that was undertaken across the Covid-19 pandemic response in New Zealand. This spanned the border and immigration, requirements for isolation and testing of cases and contacts and how the government restricted public movement, through to requirements for health care and other workforces such as vaccine mandates. Many of these public policies have had important effects on equity as they privilege certain groups or behaviors and restrict others.

Burris et al identify that the effect of laws, and legal practices on population health is mediated by the changes in behaviors or environments that result. Consequently, analyses must look to outline the law, the pathways by which it mediates effect and any intended or unintended consequences, including on health care behaviors, outcomes and equity for different priority populations and groups. [118]

The research aim relevant to this component of the study was to contextualize the policy features of the New Zealand response to the Covid-19 pandemic as they are applied to primary care services in New Zealand. This aim informs understanding of the political context of the response, New Zealand's elimination strategy, and the specific guidance, promotion or constraints relating to delivery of primary care services that policies provide. The context description and policy mapping informed the:

- Development of the conceptual framework
- Development of questions for semi-structured interviews

Study question

The specific research question that was addressed in this phase of the study is:

- What was the context within which primary care was delivered during the pandemic?
- What were key policies that influenced this context and the delivery of primary health care services during the Covid-19 pandemic in NZ?

Phase 1 research approach and search strategy

Burris et al. in their description of Public Health Law Research, the empirical study of the relation of law and legal practice to population health, point out that the law is not confined to government legislation. Regulations, the roles of regulatory bodies, the ways that individuals and institutes negotiate their roles under the auspices of legal authority and legal language and practices, all expands law beyond statute. As they describe it, the law is "embedded in institutions and implemented by agents". As such, bodies including the Medical Council of New Zealand (which is responsible under legislation for both registration and disciplinary action relating to the medical profession) and medical colleges (which undertake specialist post-graduate training, oversee continuing medical education and act to maintain and enhance the profession) are also vehicles through which legislation and government policy is enacted. [118]

Key policy influencing primary care are codified in legislation such as the Covid-19 Public Health Response Act (and subsequent amendments and orders), and in guidelines, directives and orders from government agencies, such as the New Zealand Ministry of Health. Other policy making agencies included entities with statutory authority including registration and licensure bodies and health care quality and safety agencies, and professional bodies such as the RNZCGP. Some of these policies were directed towards primary care specifically, such as requirements for the care of Covid-19 infected patients in the community, and others were more generally applicable to the health system, or to physicians at all levels of practice.

The primary method used, as per the scoping review methodology, was data charting. A relevant law or policy for inclusion was defined as having been developed or proposed to address an aspect of the Covid-19 pandemic response and that was applicable to primary care services. For example, a Covid-19 policy that required the isolation of ships at the maritime border to prevent transmission of Covid-19 to the community, would be out of scope as it relates to Covid-19 but is not applied by or in primary care. Whereas a policy that outlined requirements for vaccination of health care workers, would be in scope as it relates to Covid 19 and is applicable to primary care staff.

The search strategy used electronic searches of the New Zealand Legislation website (www.legislation.govt.nz) and the following entities web portals:

- The New Zealand Ministry of Health
- The Department of Prime Minister and Cabinet
- The Royal New Zealand College of General Practitioners
- The New Zealand Medical Council
- New Zealand Doctor Magazine web portal

The Royal New Zealand College of General Practice is the standard setting body for accreditation of primary care practices. Consequently, their polices were applicable both in terms of guiding the practice of general practitioners and in guiding the management of the general practice site and wider general practice staff. New Zealand Doctor magazine is a trade magazine for primary care in New Zealand and includes topics applicable to other

PCPs. It is recognized that there are entities of relevance to primary care that were not included (to contain scope) but that may also have published influential guidance. For example, peak pharmacy and nursing bodies.

Table 5 Search terms Phase 1

(“primary care” OR “primary health care” OR "primary healthcare" OR "general practice” OR “general practitioner” OR “general practitioners” OR “primary care practitioners” OR “primary care physicians” OR “family practice” OR “family physician” OR “family physicians”)
AND (“Covid-19” OR “COVID-19” OR “SARS-CoV-2” OR “coronavirus”)

The New Zealand legislation website publishes all amendments to law online so that it is possible to see the original version and how the law changes over time. Due to the nature of other web portals a systematic search strategy is not always able to be applied. Because the search was retrospective it was not possible to confirm that all relevant policy documents over time were identified, as websites have updated or replaced guidance as it was superseded by new policy.

This phase had two components. The first component systematically identified and, using data charting and analysis, mapped the legislation that had a bearing on the nature and practice of primary care services in New Zealand during the Covid-19 pandemic. [36] The second component identified (non-systematically) the main policy documents and statements from government agencies, including the Ministry of Health and professional bodies, that described the regulatory and policy environment, including funding, adaptations to primary care practice or required service delivery and the constraints and

opportunities for primary care. Inclusion and exclusion criteria for laws and policies were developed and are described in Appendix 3.

Analytic approach

Data charting for a scoping review uses a process of extracting the data relevant to the study questions, recording in excel and using basic qualitative content analysis. A pre-defined data extraction template was used to capture key information about each law or policy document.

Legislation was systematically identified using searches on the New Zealand Legislative website[h] and charted in excel using the following criteria:

- Name of the act
- Date of assent
- Date revoked
- Government department administering the act
- Triggering environment
- Purpose of the legislation
- Main provisions of the legislation that relate to primary care
- Population impacted
- Enforcement provisions

[h] Available at: https://www.legislation.govt.nz/browse.aspx

- Resources attached to the policy and form (e.g., financial, or non-financial); and
- Key amendments to the law over time.

Policy documents identified through the search strategy above were also charted in excel. Policies or key policy communications that were identified were charted based on the date at which they are developed or issued, the source of the policy, the institution or body who developed it, the content of the policy, the document title, type of document, and the main provisions of the policy or document as they relate to primary care.

A narrative synthesis (see chapter 4) was produced which combines legislation, key policy documents alongside media reports and other sources to document the course of the pandemic in New Zealand, key events and the policy environment, providing a context for the pandemic response in New Zealand and key decisions that influenced primary care.

Phase 2 – Literature Review

The research aim relevant to this component of the study was to review the evidence on how primary care services have evolved in response to Covid-19, in New Zealand and Australia, including:

a. Examples of primary care roles and responsibilities during the pandemic.
b. Examples of how service delivery changed and adapted in response to the pandemic; and
c. Any barriers and enablers identified in the literature.

Study questions

Specific research questions were developed for phase 2 of the study where the peer-reviewed literature is evaluated. The literature search strategy sought to answer the following question, aligned with the aims described above:

- What roles and responsibilities were adopted by primary care practitioners and practices (PCP) in New Zealand and Australia during the Covid-19 pandemic?

Questions ask what new demands were made on primary care practices because of the pandemic and what roles GPs and other health care practitioners undertook in tackling Covid-19, topics that were further explored in the key informant interviews. New roles were identified and alterations in how, where, when and why services were delivered, and by whom. These topics were further explored in the key informant interviews.

Relevant sub-questions include:

- How has primary care service delivery been modified or adapted in response to Covid-19?
- What were the barriers or disabling factors that made it more difficult to implement the required changes or adaptations or that worsened the efficacy, quality, or experience of care?

- What were the facilitators or enabling factors that that made it easier to implement the required changes or adaptations or that improved the efficacy, quality, or experience of care?
- What were the implications for the primary-care workforce from Covid-19 (including training, availability and retention of PCPs?

Phase 2 research approach and search strategy

This literature review is described as a qualitative non-systematic review in keeping with the scoping review methodologies described in the literature. [35,36,109] It is non-systematic in that it employed a search strategy, of the peer reviewed literature, that focuses on breadth and inclusivity of different kinds of studies and as such may not be able to ascertain whether ***all*** the relevant literature is included in the review. However, in describing this approach, the researcher would endorse the comments of Greenhalgh et al. who note that any review that is "explicit, rigorous and transparent" with regards to its methodology can be considered to be systematic. [119] It is qualitative, because the diversity of study types and methods identified in preliminary analysis suggests that this was the most meaningful way to synthesize findings across the body of work. [37]

The guiding proposition for this work was that, despite there being a recognized role for primary care in pandemics, including to provide access to key medical services and to undertake new tasks as part of the pandemic response, planning for how these activities

would be operationalized was preliminary and the unique features of the Covid-19 pandemic required rapid evolution of policy and scale up of service delivery. Consequently, the key features ["variables"] that promote/facilitate or inhibit the rapid adaptation of clinical pathways, models of care and service delivery in primary care were yet to be identified and resolved. This phase seeks to elucidate what those variables were.

In developing the scope and terms for the literature review, inclusion and exclusion criteria were developed. These are described in Appendix 4. As per the description of Arksey and O'Malley the reviewer familiarized themself with the literature prior to developing and applying inclusion and exclusion criteria post-hoc. "Quality" of study was not an inclusion criterion as per the scoping review methodology. [35]

The literature reviewed is confined to those studies describing the experience of primary care (practitioners, practices and the primary care sector as an entity) in New Zealand, and Australia as a comparable health system. Australia was selected as a close geographic neighbor of New Zealand and a country with a similar historical and political context as a previous British colony who developed a national health system based on the United Kingdom "National Health Service" model. [120] Australia is also a comparable health system based on criteria set by the Medical Council of New Zealand which includes both indicators of population health such as life expectancy and mortality, per capita spend on health care and the similarity of the registration and practice environment. [72]

In general, inclusion criteria aimed to include a diversity of study types that:

- Have generated new data through quantitative or qualitative study methods.
- Described the contextual features of the response to Covid-19 in primary care/general practice.
- Described roles and responsibilities PCP and primary care entities adopted in response to Covid-19.
- Described experiences and real-world examples of responding to Covid-19 in primary care.

The search strategy was implemented across four databases: Scopus, PubMed, Cochrane Library and CINAHL Compete (including Medline, Medline Complete and Health Policy Reference Center). These databases were selected as CINAHL Complete is inclusive of qualitative studies (unlike searching Medline alone) and the Health Policy Reference Center is inclusive of some grey literature [121]. The search terms used are described in Appendix 5 and were developed to broadly include studies of relevance. A flow-chart describing the study selection process following application of the inclusion and exclusion criteria is included in Chapter 4. An overview of the articles included in the scoping review is provided in Appendix 6.

Analytic approach

For each study identified in the literature review, a process of data extraction and charting to an excel spread sheet was undertaken. Data charting utilized appropriate sub-categories from the column titled "challenges to be anticipated during a pandemic" in the conceptual

framework. Additional columns to record information were identified when there were themes in the literature identified that did not correspond to the existing conceptual framework. Specific categories of data to be extracted and "mapped" included:

- Study citation
- Study countries
- Study time period
- Study aim
- Study type
- Study size
- Primary care practice type
- Study population
- Primary care role or responsibility
- Internal environment of the General Practice Unit - organizational environment
    - Education
    - Protocols and Guidelines
    - Leadership
    - Technology and Telehealth
    - Screening or Triage processes
- Internal environment of the General Practice Unit - physical environment
    - Infection control
    - Physical workplace adaptations or modifications

- Macro-environment of general practice – the health system context
    - Communication
    - Financing
    - Human resources
    - Regulatory issues
- Experience/reflections/outcomes of initiatives
    - Barriers experienced in implementation.
    - Enablers of implementation; and
    - Burnout and Emotional wellbeing
    - Other issues

Phase 3 - Key Informant Interviews

The research aim relevant to this phase of the study was to understand the perspectives of key stakeholders in primary care in the Nelson-Tasman region of New Zealand with a key focus on:

- Characterizing primary care responses to the pandemic.
- Identifying barriers and facilitators to successful control of the pandemic in primary care.
- Identifying opportunities to improve preparedness for future pandemics.

The key informant interviews built on the themes and concerns identified in the literature review and integrated new primary data, which is important given the small amount of New Zealand specific research found in the literature. These interviews further explored the impact of Covid-19 in primary care in New Zealand and how the sector adapted and responded.

Study questions

Several specific research questions were developed for phase 3 of the study:

- How did the Covid-19 pandemic change the roles and responsibilities of primary care?
    - What new activities were undertaken in primary care?
    - What activities were modified or stopped?
- What barriers were experienced in the response to the pandemic in primary care?
- What facilitated or enabled the response to the pandemic in primary care?

Phase 3 research approach

A purposive sample of key informants across the Nelson-Tasman region was sought. Strategies included advertising via primary care networks, purposively emailing of known potential participants and a snowball approach to recruitment with key early interview participants identifying other experts in the field. The purposive sample included:

- Key staff in what was the District Health Board Planning and Funding unit who worked with primary care.
- Public Health staff who have worked closely with primary care in the pandemic response.
- PHO leaders and key practice liaison staff.
- Māori Covid-19 response partners.
- General practitioners, practice nurses and practice leaders.

Fifteen individuals in the region were included in the interviews. Recruitment of participants was via email contact with the study information sheet and consent form supplied. No incentive for participation was offered. As no similar study was identified in the literature the determination of sample size was made based on an assessment of the range of types of entities who have a role in primary care in the region and what was a credible sample that encompasses this diversity, alongside resource and time constraints. The interview schedule in its final form was informed by the conceptual framework, literature review and policy mapping. The Participant Information and Consent form is available in Appendix 7 and the Interview Guide with questions for the semi-structured interviews are included in Appendix 8.

Interviews with key informants were selected as the most appropriate method of data collection for this study component. Participants were geographically widespread across the region, and had limited availability, consequently in-depth interviews are the most practical method for data collection. One interview, with participant consent, include two

individuals from the same organization. One researcher (AG) conducted all interviews. Interviews were conducted using teleconferencing software (Zoom). With participant consent all interviews were digitally recorded. These recordings were professionally transcribed and then checked by the interviewer against the recordings. Participants did not review final transcripts unless requested.

Analytic approach

A thematic analysis was conducted to identify the:

- The roles and responsibilities identified by primary care practitioners relating to the pandemic response.
- Any deleted, new and modified activities undertaken in primary care as response to the pandemic.
- Participant identified barriers and enablers to the Covid-19 pandemic response.
- Lessons learned in terms of preparedness for a future pandemic.

Initially, following each interview informal “diary” memos were created to capture first insights. Subsequently all interviews were reviewed by listening alongside reading and correcting transcribed versions. The transcripts were uploaded to NVivo 14 (QSR International) software for analysis. Informed by the techniques outlined by Bradley, Curry and Devers, the researcher used both inductive and deductive coding to allow for themes drawn from the research questions and conceptual framework to be captured and to enable

previously un-identified themes to emerge. A codebook was created that includes both a priori codes based on the research questions and conceptual framework, and emerging codes identified in review of the data. Themes are identified based on single interviews (where a concept was discussed at great length or referred to repeatedly in the interview), due to its prevalence across interviews (in two or more interviews) or due to the intensity with which participants discussed this theme. [122] Themes are compared across sources using NVivo 14 and by running word queries looking at associations between themes including attributions, looking at hierarchical visual displays of codes to identify any patterns or links between codes, and looking at coding matrices for co-coding.

One researcher (AG) manually coded all transcripts. A selection of transcripts, comprising one third of transcribed interviews, were coded independently by a secondary coder for comparison purposes to ensure concordance in the concepts and themes identified. Overall, there was good concordance between the primary coder and secondary coder. The consolidated criteria for reporting qualitative studies (COREQ) checklist was used to guide reporting of key informant interview findings. [123]

Study rigor

This study required empiric data collection, analysis, and synthesis. Firstly, this comprised the policy mapping described in phase 1 which was an independent researcher activity and limited to publicly available documents (from legislative records, and government and professional body websites). Phase 2 of the scoping review was also an independent

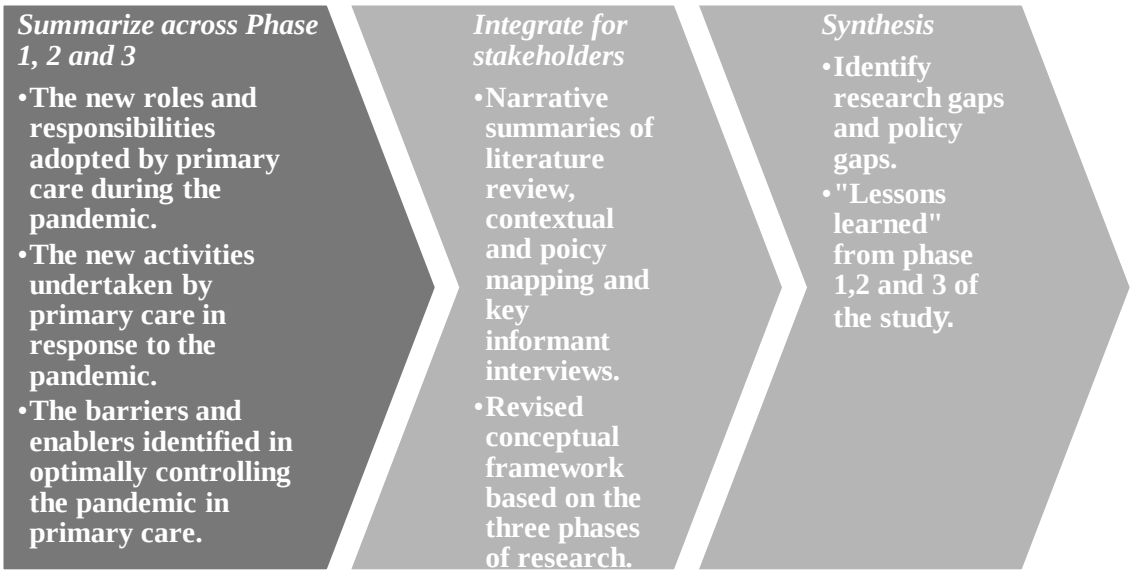
researcher activity and was limited to review of peer-reviewed literature. As per the scoping review methodology, specific critical appraisal of the level or grade of evidence of each paper in the literature review, and/or risk of bias assessment is generally not recommended. This is because, as a methodology, the aim is to map the available evidence to inform understanding of the body of evidence as a whole and potential gaps rather than provide an assessment to inform a determination of the weight of evidence for a certain approach. Consequently, the literature review contains a broad array of study types, study sizes and quality. [35] Qualitative data from key informant interviews was newly collected and used interviews conducted over videoconferencing software.

Triangulation of these data sources is a key facet of what Lincoln and Guba describe as the "trustworthiness" of qualitative enquiry and defines whether a study is of sufficient quality to guide further work in the area. [124] In outlining their response to the traditional criteria of "study rigor" they identify a parallel paradigm for qualitative research in which credibility is seen as an analog to internal validity, transferability is an analog to external validity, dependability is an analog to reliability, and confirmability is an analog to objectivity. Credibility is seen to be demonstrated by several features of this study, including prolonged engagement with the data during fieldwork, over 12 months, and the in-depth immersion and observation allowed by the authors position as an embedded researcher. Reflexive practices were used including journalling and having a second researcher co-coding a subset of the interviews. Dependability can be inferred through the consistency of findings across different research phases outcomes when these were compared, and data was triangulated. Triangulation across these data sources also contributes to the "thick

description" which Lincoln and Guba identify as facilitating transferability of the study finding. This thick description results from developing a narrative about the context (as described in phase one) and providing detailed descriptions of qualitative findings (phase 3) so that others can note the similarities and difference to their own context. [124]

Figure 3 below, shows how the differing strands of data collection and analysis will build upon each other to construct a holistic overview of the important issues identified and contributing to recommendations to improve the preparedness of primary care for future pandemics.

Figure 3 Outputs of research and potential research syntheses



Protection of Human Subjects

This research comprised low risk of harm for individuals participating. Prior to undertaking any study activities ethics review from the George Washington University Institutional

Review Board was undertaken. This study was assessed as exempt on the basis that data collection is limited to the participants subject matter expertise rather than being about the participants themselves.

Participants in this study were asked to contribute new data through participation in key informant interviews. For this form of data collection, as there is no subterfuge and no intervention being undertaken by researchers, the possible identified harms were, firstly the risk of a loss of confidentiality, and secondly, potential mental or emotional discomfort. Mental or emotional discomfort may have arisen if participants were asked to reflect on adverse experiences during the pandemic, for example sickness, loss of life of staff, family, friends, or patients or if they were asked to describe unsuccessful initiatives or adaptations where they may feel that an outcome reflected poorly on them or raised questions about their personal work role.

Subjects in key informant interviews were selected for their expertise as practitioners and leaders involved in primary care in the Nelson-Tasman region of New Zealand. They were asked to share their subject-matter expertise on the roles and responsibilities adopted by primary care in the pandemic, the activities undertaken, and the features of the political, policy, social and health system landscape that facilitated optimal control of the pandemic or that caused barriers to optimal control. One complexity of this study was the role of the "embedded researcher". This arose as the study author is a resident and health care worker within this region. The study author consequently was interviewing peers and colleagues working in the wider health community and colleagues and managers whom she works

with and for in the DHB. In all cases it was made clear to the participants that this research is separate to the researcher's ordinary work, that it is being undertaken in personal time, for the purpose of attainment of an advanced degree in Public Health, the voluntary nature of their participation and that this will not have any repercussions on other work relationships (see Appendix 7). Regardless it is important to recognize that this may pose a risk of bias in the way information is shared and presented. This is described further in the section entitled study limitations.

Regarding a possible risk of loss of confidentiality – all possible efforts were made by the researcher to nullify this risk. This included selecting private locations for conducting the interview where participants will not be overheard, securely storing in a separate electronic file the record matching interviewee names to unique interview identifiers, using alpha-numeric identifiers only for recordings and transcripts, ensuring the safe and secure electronic storage of deidentified transcripts within NVIVO 14 and aggregating and de-identifying transcribed information during data analysis to preserve confidentiality and minimize risk of attribution of any reported data or quotes to a particular participant. Where direct quotes are used, these do not contain any identifying information in the quoted text.

Regarding the possibility of emotional or mental distress arising from the interview, this risk was tempered by the interview schedule itself which focused on broad and general questions describing the roles and responsibilities of primary care, the activities undertaken in response to the pandemic and the barriers and facilitators identified. This risk was mitigated further by providing participants with the opportunity for a one-on-one individual

interview and by giving permission for them to omit questions if they felt uncomfortable without needing to provide explanation (participants were informed of this during the informed consent process). Additional mitigating features of this study included the assurance to participants of confidentiality, and the aggregation of data in any reporting so that it reflects a common experience.

All participants in key informant interviews were supplied a written study information sheet and written consent form prior to the interview (see Appendix 7). These were returned to the researcher prior to the interview taking place. Additional oral consent was affirmed at the beginning of the interview. It was made clear to participants both through the process of oral consent, and the written consent form that they were entitled to withdraw at any time or decline to answer specific questions.

An important component of this study is the notion of reciprocity – acknowledging the benefits we gain as researchers from the knowledge and participation of subjects in the study. As part of this all efforts were made to minimize the burden on participants by being respectful of their time and flexible in scheduling. In addition, it was made clear to the participants that they were contributing to future planning and preparedness and that whilst they may not directly gain themselves, they are building knowledge for the greater good. The intent is to share the study findings with them when published.

Chapter 4 – Results

Results are presented for the three phases of the study.

Phase 1 – Environmental and Policy scan

These results comprise a narrative synthesis of the chronology, key events, legislative and policy environment to describe the context for primary care service delivery during the pandemic. An overview of key events in the Covid 19 pandemic and their relationship to important legislation and policy for primary care is presented in Table 6 below[i].

Table 6 Key legislation and policy decisions relating to Covid-19 in New Zealand

Date enacted	Type of legislation or policy	Responsible body	Key provisions relevant to primary care
30 January 2020	Infectious and Notifiable Disease order under the Health Act 1956	The Government of New Zealand	Novel coronavirus capable of causing severe respiratory illness is added to Schedule 1 Part 1 Section B of the Health Act - the list of infectious diseases that must be notified by primary care to a Medical Officer of Health (a statutory position responsible for population health in a region).
New Zealand's first confirmed case reported to the Ministry of Health on the 28th of February 2020.			
21 March 2020	Urgent clinical guidance	The Royal New Zealand College of General Practitioners	The guidance requested all GP practices in the country immediately adopt virtual triage for all patient contacts and aim to provide 70% of

[i] In **red** are key events that are not directly applicable to primary care, but of significant import to the context and course of the Covid-19 pandemic in New Zealand and that are occurring in the broader national context.

			consultations by virtual means, commencing Monday 23 March 2020.
The WHO declares that the outbreak of Covid-19 disease constitutes a global pandemic on the 11th of March 2020.			
New Zealand's alert level system is announced on the 21st of March 2024 and New Zealand is at level 2. Due to escalating case numbers the government moves rapidly announcing progression to alert level 3 on the 23rd of March and alert level 4 "lock down" on 25th March.			
25 March 2020	Epidemic Preparedness notice under the Epidemic Preparedness Act 2006	The Government of New Zealand	The Prime Minister gave notice the effects of Covid-19 outbreak are likely to significantly disrupt or continue to disrupt essential governmental and business activity in New Zealand.
25 March 2020	Section 70 (1) (m) order under the Health Act 1956	The Director-General of Health	The lockdown order which required all premises to be closed until further notice other than essential businesses and forbids people to congregate in outdoor places. Applies to all of New Zealand. As "essential businesses" primary care services were allowed to remain open.
31 March 2020	Waiver under Regulation 43 Medicines Regulations 1984	The Director-General of Health	The waiver allowed doctors to provide a prescription (excluding certain controlled medications) without a physical signature and send it using electronic means such as email or the New Zealand e-prescribing service.
08 April 2020	Policy	The Ministry of Health	Establishes CBACs as preferred sites of community testing for Covid-19 alongside some designated urgent care and general practice sites.
On April 9th the Director General issues an order under the Health Act Managed Isolation and Quarantine program starts for incoming passengers into New Zealand to prevent Covid-19 transmission from the border.			
The lockdown at alert levels 4 and 3 (stay at home order) is lifted on the 14th of May 2020 indicating the waning of the first epidemic wave.			
13 May 2020	COVID-19 Public Health Response Act 2020	The Government of New Zealand	The act provided a legal framework for responding to Covid-19 and allows the responsible minster to make orders under the act to give effect to the public health response.
28 April 2021	Policy	The Medical Council of New Zealand in conjunction with	Clarified an expectation that all medical and dental practitioners will take up the opportunity to be vaccinated (unless medically

		the Dental Council of New Zealand	contraindicated) as an ethical and professional obligation and requires practitioners to provide evidence-based advice around vaccination and management of Covid-19. This was echoed by the Pharmacy council in May 2021 and the Midwifery council in August 2021.
22 June 2021	Policy	The Nursing Council of New Zealand	Strongly recommends nurses take up the opportunity to be vaccinated unless medically contraindicated and requires practitioners to provide evidence-based advice around vaccination and management of Covid-19.
On the 28th of July 2021 the general vaccination program for the community begins with age-based rollout, initially over 60 years of age invited for vaccination. Priority groups including border and health care workers had already been vaccinated.			
On the 17th of August 2021 a case of community transmission of the Delta variant is confirmed in Auckland. This detection of the new variant is the beginning of a large community wide outbreak **and** a long period of lockdown with no general ability to move in or out of Auckland, New Zealand's largest city.			
25 October 2021	The COVID-19 Public Health Response (Vaccinations) Order 2021	The Government of New Zealand	The order, colloquially known as the "vaccine mandate" requires workers in the health and disability sector to be fully vaccinated by 1 December 2021, and to receive their first dose by 30 October.
October and November 2021	Covid-Care in the Community framework (and revisions)	The Ministry of Health	Establishes local care communication hubs to ensure patients with Covid-19 have access to primary care services.
On the 2nd of December 2021 the Covid-19 Alert Level system was replaced by the Covid-19 Protection framework which provides for varying guidance and restrictions based on case presentations and vaccination levels in communities. Indicative of a transition to a suppression strategy border restrictions for Auckland continued until December 15th, 202**1,** then are lifted for those who are double vaccinated or who test negative for Covid.			
On Sunday 23rd of January 2022E all of New Zealand enters the "red" traffic-light setting following the detection of community transmission of Omicron in the Nelson-Tasman region. This signals the beginning of a widespread Omicron outbreak that will eventually become the dominant variant nationwide. In response New Zealand will transition from an elimination strategy to one of suppression.			
18 February 2022	COVID-19 Public Health Response (Requirements for Close Contacts) Order 2022	The Government of New Zealand	Due to concerns about the impacts on essential workplaces e.g. primary care and hospitals, of essential workers being required to isolate as close contacts of omicron cases (which is spreading rapidly in the community) the close contact

			exemption scheme is announced. This allows “critical worker" close contacts who can't work from home to keep going to work under the "close contact exemption scheme" if they are asymptomatic, vaccinated and return a daily negative rapid antigen test.
01 March 2022	Policy - Testing Operational Guidance for General Practice	The Ministry of Health	Outlines testing principles - to guide public health management and patient management and that rapid antigen tests (RAT) becomes the primary testing diagnostic tool for most of the population and special scenarios where PCRs can be used. GPs funded for clinical assessment and testing by RAT or PCR. Supervised RAT made available at primary care sites, including General Practice and community pharmacy. Initially in Auckland and subsequently elsewhere.
Between March and May 2022**,** the Border progressively reopened, initially to fully vaccinated New Zealand citizens and then to fully vaccinated citizens of other countries who were able to enter without a requirement for isolation. The border fully reopened to all on the 31st of July 2022.			
14 July 2022	Policy	The Ministry of Health	Covid-19 antivirals were reclassified from prescription-only medicine to pharmacist-only (restricted) medicine. This change aimed to increase timely access by allowing pharmacists to provide these medicines without a prescription to people with COVID-19 and who meet the eligibility criteria.
12 September 2022	COVID-19 Public Health Response (Masks) Order 2022 and COVID-19 Public Health Response (Self-isolation Requirements) Amendment Order 2022	The Government of New Zealand	Revokes the Covid-19 Public Health Framework Order and institutes new order promulgating mask use and self-isolation of cases. All other Covid-19 related restrictions were removed. Persons must wear a mask at premises of a health care facility but are at the discretion of employers in respect of staff and patients/residents at health care and aged care facilities. Only COVID-19 positive individuals are required to isolate for seven days, and household contacts no longer need to.

			Government vaccination mandates will end on 26 September.
26 November 2022	The COVID-19 Public Health Response (Extension of Act and Reduction of Powers) Amendment Act 2022	The Government of New Zealand	This act modifies the Covid-19 Public Health Response act and extends the expiry date to 26 November 2024. More stringent measures are removed recognizing that New Zealand is transitioning out of the acute phase of its response. The Act retains the ability to implement some limited public health measures to manage COVID-19 including through isolation of cases, mask use and management of travelers to New Zealand.
08 December 2022	Royal Commission of Inquiry (COVID-19 Lessons) Order 2022	The Government of New Zealand	The Government announced the appointment of a Royal Commission to inquire into COVID-19 and report on what lessons can be learned to prepare New Zealand for future pandemics.
5 May 2023	Policy	The World Health Organization	WHO declares COVID-19 is no longer a global health emergency. It is now an established and ongoing health issue which no longer constitutes a public health emergency of international concern.

The New Zealand experience with COVID-19 – the first wave

As an emerging infectious disease, SARS-CoV-2 had no effective pharmaceutical controls or vaccination available when the pandemic was first identified in January 2020. Previous planning for an epidemic had focused on the introduction of pandemic influenza. [125] It rapidly became apparent this plan was not fit for purpose. New Zealand elected to pursue an elimination strategy for the containment of Covid-19 early in the pandemic. [126]

The “Keep it out, stamp it out” strategy of the previous Influenza pandemic plan was modified for what was known of the novel coronaviruses’ incubation period and routes of transmission. The focus was on keeping out Covid-19 at the border and stamping out any chains of disease transmission within the community. The aim was to eliminate disease as opposed to merely slowing its spread. The end goal was no, or very low and contained, incidence of Covid-19 in the community. [127] Elimination was to be achieved primarily by policy directives and legislation from government, actioned through the Ministry of Health, and operationalized through the healthcare system as a whole. Policy directives codified traditional public health tools: isolation of cases, contact tracing and quarantine, and infection prevention and control; and propagated their use widely across community and primary care, secondary and tertiary care and even into people’s homes.

Initially, in January 2020 an Infectious and Notifiable Disease order under the Health Act 1956, was made to make the novel coronavirus [128] and subsequently Covid-19 [129] notifiable and quarantinable diseases. This meant that all cases had to be notified on suspicion, by GPs or laboratories, to a Medical Officer of Health for surveillance purposes and to activate a public health response.

New Zealand’s first confirmed case of Covid-19 was identified on February 28th, 2020. Just prior to this, on February 2nd New Zealand had imposed travel restrictions banning arrivals from mainland China. [130] This restriction was gradually extended to countries with emerging outbreaks including Iran on February 28th and northern Italy and South Korea on March 2nd, 2020. [131] The WHO declared a pandemic on the 11th of March 2020. Being an

island nation, with most international arrivals into the country channeled through several international airports, this was the key early source of control, with orders imposing 14 days self-isolation for all returnees instated on March 16th and the border being subsequently closed to all except returning citizens and residents on March 20th. On the 9th of April 2020 the Director-General of Health issued an order that required all people entering New Zealand by air to enter managed isolation and quarantine (MIQ) – specific hotels, managed by local DHBs with New Zealand Defence Force support, where new arrivals are quarantined at the border. [18]

After limiting the entry of Covid-19 at the border, limiting contact between citizens was a key strategy in eliminating chains of transmission. On March 16th, 2020, a direction banning gatherings of more than 500 people was made and shortly after for gatherings of more than 100 people indoors. [132] Following this on March 21st, 2020, to formalize public health guidance for New Zealanders, Prime Minister Jacinda Ardern announced the Covid-19 Alert Level system. [133] This system was designed as a scalable approach that was able to clarify for citizens what the level of concern about disease spread was i.e., the alert level and inform them as to what public health measures were applicable based on that level. A description of the alert levels as they applied in the first wave of the outbreak is available in Table 7 below. New Zealand moved rapidly up the alert levels and entered level 2 when the alert levels were announced on March 21, 2020.

The legislative framework for managing Covid-19 initially was the Health Act 1956. [134] Special powers, including Section 70 powers to isolate, quarantine and close premises,

under the act are triggered by the declaration of a State of Emergency under the Civil Defence Emergency Management Act 2002 [135] or the issuing of an Epidemic Notice by the Prime Minister under the Epidemic Preparedness Act 2006 or by authorization of the responsible Minister. [136] An Epidemic Notice signals to the country that there is anticipated to be significant disruption to ordinary life, business and facilitates the use of special powers by the government to address the outbreak.

An epidemic notice was issued for Covid-19 on 25 March 2020.[137] Rapidly following this, a State of National Emergency was declared on 25 March 2020 and New Zealand entered Level 4 that same day. Using Section 70 powers, the Director-General of Health announced a national stay at home order or "lockdown" which went into effect on the 26th of March 2020. During the lockdown all businesses except essential services were closed and people could only leave their homes to access or provide essential services or for exercise when undertaken in isolation from other households. This was strictly interpreted and enforced. All schools were closed to in-person teaching.

During the period of lockdown, the public health and primary care sector implemented a number of strategies, led by the Ministry of Health, to support the elimination strategy. All cases were notified to public health who undertook intensive efforts to ensure all cases were isolated and that all contacts were traced and isolated. This public health activity was in parallel with a government led communications campaign mandating social distancing, respiratory and hand hygiene, and restrictions on population movement. New Zealanders were advised to "stay home, save lives" and to only interact with their bubble – those in

their household or, on occasion, where two single households had formed a shared bubble. Public billboards and posters, and social media advertising was supplemented by the masterful and near daily communications from the Prime Minister, leading bureaucrats and science and public health experts. The country was reminded they were part of a "team of five million" and for the most part they were very compliant and indeed supportive of government decision making. [138]

*Table 7 Description of non-pharmaceutical, public health and other interventions introduced in the New Zealand Covid-19 "Alert Levels" system**

Alert level	Impacts
1	• Travel restrictions commence. • National case and contact management guidelines are implemented. • National communication campaign launches (e.g. promotion of hand and respiratory hygiene, isolation and testing if symptomatic). • Government Covid-19 financial stimulus package established.
2	• Physical distancing is enforced. • Additional precautions are encouraged for high-risk groups (e.g. >70-year-olds). • Gatherings (e.g. weddings, funerals) are permitted if no more than 100 people.
3	• Population is advised to restrict contact to their "bubble" - comprising household close contacts and carers. • Population encouraged to work from home. • Businesses must not physically interact with public. • Public venues are closed. • No gatherings of more than ten people are allowed. • Telehealth services are encouraged. • Only essential inter-regional travel is permitted.
4	• Population required to stay at home except for essential reasons or limited exercise. • Businesses are closed unless offering essential services (e.g. Grocery stores). • Educational facilities and public venues are closed. • Health-care services are reprioritized. • Alert level specific communication campaign launched.

*Adapted from Jefferies et al. in The Lancet.[18]

Strategies in Primary care during the first wave

Ministry of Health guidance to primary care included a case definition and advice on how to manage the case initially including the need for isolation, avoiding exposure-prone procedures such as nebulizers or aerosol generating procedures and notification to public health. Advice in the Community Response Framework outlined how triage, PPE use and virtual care amongst other strategies, could be implemented at different levels of the response. [139-141] In turn primary care services adopted new strategies to manage risk to their practices and patients. On 21 March 2020 the RNZCGP advised that its 5,500 members should move to provide remote consultations within the next two days with a target that 70% of all primary care consultations should be undertaken using telehealth modalities i.e., phone or video. This was a significant change in the model of care but was generally supported by authorities and embraced by patients. [142,143] Other strategies employed by the Ministry of Health included moving testing for Covid-19 outside of most general practices. Recommendations were that testing in general practices should only be undertaken in situations where it was impracticable for the patient to attend a CBAC, Urgent Care or Designated Practice that had protocols and facilities in place for testing. [139]

The RNZCGP took a significant role in providing support for its members on the practical management of primary care settings and developed a "Rapid Response Team" to field queries from membership with an undertaking they would reply within 24 hours. They issued advice on managing infection control risks within practices for the patients that still needed to be seen face-to-face, including instituting triage for telehealth and face to face

consultations, the development of “green” streams for people who were low risk (without respiratory symptoms and no identified epidemiological risk factors), and “red stream” (for those with respiratory symptoms and/or epidemiological risk i.e., close contact or travel history). This streaming directed their flow through the practice and the PPE required. [144] As a result of these activities there was a very low rate of Covid-19 infections in New Zealand primary care staff during the first wave. Only one primary care doctor and one administration worker acquired Covid-19 from their workplaces. [145]

A key concern in the early stages of response was whether the appropriate PPE was getting to those who needed to use it and confusion about who had access and in what circumstances. After concerns were raised from providers, the Office of the Auditor General agreed with the Ministry of Health that they would review the systems and processes for procurement and management of PPE. Key findings of this review included that the Ministry did not have systems to know what PPE was held in reserve supplies or to forecast demand. Primarily the procurement and stock management processes were undertaken at a DHB level, and this was not an effective strategy in a situation where global demand exceeded supply. This negative finding required the ministry to act rapidly to centralize procurement. For providers there was a lack of clarity as guidelines about PPE use changed and communications about these changes caused confusion. There were consistent concerns from community-based health and disability care providers that guidelines did not provide the level of PPE they felt they needed to be safe. Several strategies were recommended to improve the management of procurement as the pandemic evolved [146]

In addition to infection control, the RNZCGP also supported their membership with advice on the clinical risks from Covid-19 and implications for different patient groups. This was at a time when there was little available information. The college was responding to a large volume (over 1500) of queries received from members, seeking advice about which clinical conditions in patients and in members of staff placed them at particular risk of complications from COVID-19 and requesting guidance on how to manage exposure in the workplace or community for essential workers. This resulted in the development of the Covid-19 Risk Matrix. This characterized risk for individuals based on their health status and work roles and potential exposures. [147,148]

A further key role for the RNZCGP was that they undertook frequent targeted communications to membership to update them on changes in clinical guidance and policy from the Ministry of Health and in doing so acted to collate, distill and disseminate key messages. [147]

Across the lockdown, pharmacy remained open as an essential service. Pharmacists experienced increased demand for medicines provision and provision of health advice and care including influenza vaccination. Practices instituted infection control procedures as fitted their context including perspex screens, cones and yellow lines to direct flow and maintain social distancing, splitting teams into separate shifts and beginning home deliveries. [149] In order to minimize patient contact with pharmacy, and to reduce paper prescriptions as a possible vector, strategies were put in place to support electronic

prescribing. This was either through the New Zealand e-prescribing service (NZePS), which grew in uptake from 30 to 80 percent of General Practices, or by the introduction of a waiver to allow the secure electronic transmission of signature exempt prescriptions for those not on the NZePS. [150,151] During the lockdown dispensing was restricted to a 1 month of medicines only (usually 3 months for non-restricted government-funded medicines). This was done on order to reduce impacts on the supply of medicine and to manage patients "stockpiling" medications. [150]

The RNZCGP, alongside others such as professional bodies like General Practice New Zealand, Pharmaceutical Society of New Zealand, the Pharmacy Guild, and GenPRO (General Practice Owners Organization of New Zealand); and independent bodies such as the Health and Disability Commission engaged in advocacy on behalf of GPs and their patients regarding funding, sustaining the Covid-19 response and perceived impacts on patient care. A variety of issues were identified. There was a sudden precipitous decline in the number of patients presenting to General Practice, some of which was ameliorated by telehealth but there were concerns on how this impacted practice revenues (due to loss of the additional out of packet payments from patients such visits incurred and the loss of some routine tasks such as screening) and the risk of deferred or delayed care. Advocacy took place on issues such as social marketing to inform the community that GP practices were still open and seeing patients if necessary for face-to-face consultations [147,152] advocacy regarding funding for general practice [153] and the risks of deferred or delayed care, particularly the variation across DHBS in their response to referrals from primary care.[154]

Outcomes of the first wave

These actions across the health system and wider community were effective in controlling the epidemic between February and May 2020. Across the first wave of Covid-19, a total of 1512 cases of Covid-19 were detected in New Zealand, presenting between February 12th and May 10th, 2020. 77% of these were laboratory confirmed cases. The main source of infection was overseas transmission, and epidemiological studies show this declining steadily after institution of the border restrictions and lockdown. In parallel, the case infection rate reduced from a peak of 8.5 cases per million of population prior to lockdown, to 3.2 cases per million of population after lockdown, and progressively declining thereafter. In total, across the first wave, 95 cases (6.3% of total cases) were hospitalized, with 10 cases admitted to an intensive care unit and 22 deaths. This low proportion of hospitalized cases and deaths can partially be attributed to the demographics of the population predominantly infected in the first wave. These cases were primarily of European or other ethnicity, younger and of higher socio-economic status. They were consequently less likely to have co-morbid disease or experience adverse social and environmental conditions predisposing them to poor health outcomes. [18]

New Zealand's elimination strategy was celebrated as a success with one of the lowest cumulative case counts, incidence, and mortality amongst high-income countries. [18] The reduction in cases allowed lockdown restrictions to be eased and the reopening of economic activity towards the end of April and early May 2020. For example, businesses could

reopen if following physical distancing and other guidelines, and domestic travel resumed. Declarations of successful elimination of Covid-19 rapidly followed. [108]

A challenge by constitutional legal experts to the legality of the lockdown order issued by Dr Bloomfield on 24 March 2020 was reviewed by the high court of New Zealand in July 2020. The court found that "while there is no question that the requirement (for a lockdown) was a necessary, reasonable and proportionate response to the COVID-19 crisis at that time, the requirement was not prescribed by law" as an appropriate order had not been made under the Health Act until several days later. [155] From a legal perspective a fit for purpose law that would offer a bespoke legal framework based on the drivers and response needs of the Covid-19 pandemic was required. This was remedied by passage of the Covid-19 Public Health Response Act 2020 on 13 May 2020. [156]

New Zealand continued to experience subsequent smaller community outbreaks and clusters of SARS-CoV-2, including in August 2020 with 179 cases, and February 2021 with 15 cases. There were also episodes of community transmission from border workers and from returned travelers in MIQ. Each time the health sector was successful in achieving elimination.[157] Public health interventions instituted early in the pandemic and promoted across this period included respiratory and hand hygiene education, testing recommendations for any persons presenting with illnesses meeting the case definition and maintaining social distancing. The wide use of face masks or coverings was introduced in August 2020, when the country was successful in eliminating a second outbreak of disease. [44]

Overall, and compared to other developed nations, New Zealand spent a comparatively short amount of time during the first wave in the most restrictive alert levels – level 3 and 4 – where social interaction, work outside the home and travel was very limited, in the first year of the pandemic. Between March 2020 and May 2020 New Zealand spent 7 weeks in Alert level 3 and 4 lockdowns. For Auckland, New Zealand's largest city, several brief periods ranging from 3 days to 2 and a half weeks were spent at alert level 3 "lockdown" in the period May 2020 to August 2021. It is apparent that New Zealand, unlike some other countries, spent most of this period, prior to the arrival of the Delta variant, at alert level 1 and 2 where there are minimal restrictions and impacts on the ordinary activities of society. [157]

Equity issues, the Covid-19 vaccination rollout and the emergence of Delta

At the beginning of the Covid-19 pandemic there was significant concern about the impact of the spread of Covid-19 on priority population groups, especially Māori and Pacific peoples. Modelling for the first wave of the pandemic of SARS-CoV-2, commissioned by the Ministry of Health, predicted that the worst impacts of the pandemic would be on the most vulnerable groups, with 89% of deaths occurring in those over 60 years and predominantly in those of Māori and Pacific peoples ethnicities and from socially deprived communities. [158] Early in the pandemic, Māori researchers and academics in Aotearoa New Zealand expressed their concerns that the perceived "one-size fits all" approach that

characterized New Zealand's pandemic planning and early response would place Māori whānau, hapu and iwi at higher risk of adverse health and social outcomes. [159]

Epidemiology of the first wave of Covid-19 in New Zealand revealed that imported infections were predominant and had occurred in a younger, less deprived and healthier population. [18] However, subsequent community outbreaks in New Zealand had different epidemiological profiles, with outbreaks in August 2020, February 2021 and August 2021, being identified in lower income and more racially diverse communities, predominantly in New Zealand's largest city, Auckland.

Ethnic disparities were confirmed on subsequent analysis of more than 1800 cases in New Zealand between March and September 2020. This study showed that after controlling for age and pre-existing conditions, Māori had 2.50 times greater odds of hospitalization (95% CI 1.39–4.51) than non-Māori/non-Pacific peoples. Pacific peoples had three times greater odds of hospitalization (95% CI 1.75–5.33). [160] New Zealand's success in terminating community transmission relatively early in the outbreak was recognized to have ameliorated what could otherwise have been significant morbidity and mortality stratified by deprivation and ethnicity. If the pandemic had gone unchecked, the consequences for priority populations, Māori and Pacific peoples, are predicted to have been much different. [18,161]

Māori health researchers have pointed to the fact that these historic and predicted inequities in Covid-19 outcomes are attributable in part to differences between indigenous and non-

indigenous populations in access to primary care, social deprivation, housing quality, and overcrowding amongst other factors. This is compounded by the increased risk for Māori of severe sequelae due to the inequitable burden of co-morbid disease including respiratory, endocrine, cardiovascular, and renal diseases and cancer. [162] Many of these health disparities are also experienced by Pacific peoples in New Zealand.

These equity concerns were particularly relevant to the roll-out of the Covid-19 vaccine in New Zealand. The Ministry of Health had developed, and Cabinet had approved, a sequencing framework that prioritized initially those at most risk from an occupational exposure (border and MIQ workers, followed by the health and aged care workforce, including primary care). These groups were to be followed by a rollout to the wider community from late July 2021 stratified by age e.g., over 60-year-olds first, to be followed by over 50-year-olds etc. The Waitangi tribunal in its retrospective report on the vaccination rollout states that there was advice from the Ministry of Health to cabinet that there should be an adjustment to the age cohort eligibility for Māori to account, in part, for the fact they have a younger population and have earlier mortality than the general population. Despite this advice the decision was made by Cabinet to prioritize by age cohort alone. [163]

The first Covid-19 vaccines in New Zealand were administered on the 19th of February 2021. The vaccination program was designed by the Ministry of Health and delivered by DHBs who contracted with local providers. The demand for vaccinators was supported by the government who offered a pathway of training for people to become provisionally

authorized vaccinators for select vaccines including Covid-19, with a pathway to achieving full authorization later. Initial stages of the program (February through June 2021) focused on vaccinating the vaccinators, and those at high risk due to potential contact with cases of Covid-19 at the border. The program was delivered by DHB contracted providers, and this excluded individual primary care providers and general practices from delivering vaccination. [164] While they were advised they were an "important part of the rollout", the decision was made that due to the need for ultra-low temperature freezers, seven-day access and the lack of supply of the vaccine they were not to be part of the DHB led local contracting for vaccination provision. [164]

This however changed as the year progressed. In May 2021, Medsafe, the medicines regulator, approved a longer duration of storage for the Pfizer vaccine (the main vaccine in the New Zealand program) in regular cold chain (as opposed to ultra-low temperature freezers). This expanded the number of vaccination sites that were able to store and administer vaccine. When supply of vaccine increased in July 2021, in preparedness for the roll-out of the vaccine program to the general population, it was possible to bring on board primary care as vaccine providers. Both pharmacies and general practices became important community sites of vaccine delivery. [164] General practices were already established vaccinators as part of the National Immunization Schedule, as had been some pharmacies for limited adult vaccines such as Influenza. Readiness to undertake Covid-19 vaccination was facilitated for general practice by the work of the RNZCGP demonstrating that their Foundation Standard, required for certification of practices in New Zealand, aligned with most of the vaccination program delivery requirements in the service scope.

This allowed practices to more easily demonstrate compliance and become approved to begin vaccinating.[165]

New Zealand experienced its first outbreak with the more infectious Delta variant of SARS-CoV-2 on 17 August 2021. This outbreak was genomically linked to an ongoing outbreak of the disease in New South Wales, Australia. However, it is unclear how the virus entered and became established in the community. [166] As a result of this outbreak, the Auckland region spent an initial 5 weeks in the most stringent alert level 4 restrictions - the longest period thus far at this level. In recognition of the growing evidence behind mask use, the wearing of a mask on public transport in any essential service was made mandatory as part of the Level 4 restrictions. The government also introduced a requirement that businesses keep a register of people entering for contact tracing purposes. These requirements were applicable within primary care services. [167] In a continuation of the elimination approach cases and contacts were strictly managed with cases usually not being permitted to remain at home but being moved to community isolation facilities. [168] As case numbers reduced and were predominantly resulting from household transmission, Auckland moved down to level 3 restrictions on September 21, 2021. [169]

Alert level 3 allowed some businesses to resume trade if this could be undertaken in contactless ways, though otherwise retail and hospitality was curtailed. Ongoing restrictions included a police-controlled border, separating Auckland from the rest of New Zealand, and continued restrictions on in-person attendance at work and school. Primary care services were open throughout this outbreak but with increased use of PPE, including

expanded access to and use of N95 masks, use of telehealth where appropriate and limitations of capacity and distancing in waiting rooms, similar to what they had initiated during the first wave. [144] Despite these precautions, a number of health facilities (general practices, pharmacies and secondary and tertiary care) were implicated as "locations of interest" where a case had been present. This had a range of implications including cleaning and the potential standdown of staff as close contacts. [170]

Over the course of the delta outbreak there was a growing emphasis on vaccination uptake, with eligibility rapidly expanded to all New Zealand citizens, residents and any other persons in the country aged 12 and over. Led by the Ministry of Health, health providers and central government undertook a variety of communications and mass vaccination events to encourage uptake, particularly for the Auckland region and priority populations. General practices and pharmacies became involved in mass vaccination events such as "Super Saturday". The government signaled that achieving a vaccination coverage of 90% of the eligible population would allow greater freedoms, as a motivation to encourage uptake. [171]

Due to diminishing social license in the face of ongoing restrictions, the New Zealand government announced a "roadmap" out of lockdown on the 4th of October 2021. This phased roadmap was reliant on a large push from the government to increase levels of vaccination, particularly in Auckland. As the proportion of the general population vaccinated rose, restrictions were eased with the government initially allowing outdoor gatherings of up to ten people to occur and early childhood centers to reopen. Continued

implementation of the roadmap out of lockdown relaxed restrictions on outdoor gatherings and allowed school attendance to resume as of 26th of October. Retail in a limited form re-opened in Auckland on the 9th of November. [171]

It became apparent that, based increasing uptake of vaccination, and due to the virulence and difficulty in containing the Delta outbreak, New Zealand was shifting away from the Covid-19 elimination strategy. Instead, the government was pursuing a suppression strategy, aimed at protecting the health care system from being overwhelmed and learning to live with some level of Covid-19 circulating in the community. [172] There was a mixed response to this. Strong voices in criticism of this change in approach came from Māori and Pacific health researchers and academics who saw this strategy as high risk for these populations, who experience existing inequalities in access to care, particularly primary care, quality of care and health outcomes. [173-175]

Existing health and social disparities were compounded by a low relative rate of Covid-19 vaccination for Māori populations and a high proportion of cases identifying of Māori ethnicity in the Delta outbreak in late 2021. Prior to Delta's emergence, Māori only made up 13% of all cases of Covid-19 in New Zealand. In contrast, following the move to alert level 3, Māori made up 40% of all cases in Delta outbreak (persons of Māori ethnicity comprise 16.5% of the population). [176,177] This was predominantly due to the shift of the Delta variant into more vulnerable populations including those in social and transitional housing. [172,178]

A contributing factor to the lower vaccination rates for Māori was the population demographics with a younger age profile overall. Because of this more of the population were eligible relatively later in the program's rollout that other ethnicities, due to the age-based prioritization. As a result of this increased recognition of low vaccination levels, significant investments were made to improve these rates through funding Māori community providers to undertake community outreach to their populations though vaccination rates still lagged significantly behind after restrictions began to ease in Auckland. [173,175,178] By November 2021, first dose vaccination rates, amongst the population aged 12 or over, for Māori were 77% and Pacific peoples 88% compared to 90% for the general population. [164]

To add to the complexity of this time period, the government also announced on 11 October that workers in the health sector (including primary care and community services), alongside other professional groups such as teaching, fire and emergency and police, would be required to be fully vaccinated against COVID-19 before 11.59pm 1 January 2022 and must have received their first vaccination before 11.59am on 15 November 2021. The mandatory vaccine requirement was formally implemented by way of an amendment to the COVID-19 Public Health Response (Vaccinations) Order 2021 which came into effect on 25 October 2021. [179] Exemptions were strictly managed and were on medical grounds only. The scope of this order included health care workers but also those who work within two meters of health care workers or members of the public in a health care setting, for example cleaners, administrative staff and care and support workers. Anyone who did not do so

would not legally be allowed to work after these dates and could be subject to termination of their employment. [179]

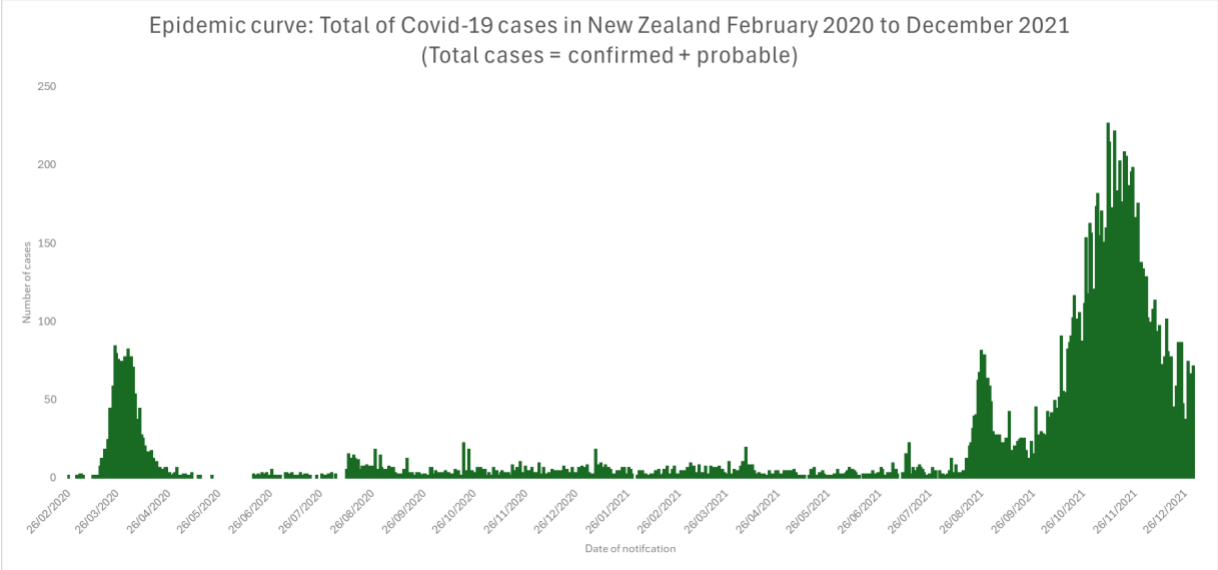
This was a controversial policy that caused significant stress and distress for workers who did not want to be vaccinated and who faced the choice of having the vaccine under threat of their employment being terminated or their employment indeed being terminated. It was unclear to what degree it was necessary given health care workers were already "expected "to be vaccinated by regulators including the medical, dental, pharmacy and midwifery councils, and "strongly encouraged" to do so by the nursing council and overall, there was a high degree of uptake by the professions. A view had been taken by professional registration bodies and regulators that any health professionals that espoused anti-vaccination views or provided non-evidence-based care or advice relating to Covid-19 were in breach of the New Zealand Code of Health and Disability Services Consumers Rights which states patients are entitled to information that a reasonable consumer, in that consumers circumstances, would expect to receive" (Right 6). and penalties could include removing practicing certificates of practitioners found in breach of this guidance. [180,181]

As noted, health care workers as a group already had a high uptake of vaccinations – estimated to be 89.2% overall who had already been vaccinated prior to the mandate. This study estimated a further 5.5% only were vaccinated in between the mandate announcement and deadline for first dose to be given and hence potentially influenced by the mandate. 5.3% remained unvaccinated post the enforcement date for the mandate and it is unknown how many of these were exempt (presumably few). In one study, using a

difference in differences model, vaccination levels did not appear to increase discontinuously following the mandate. A loss of unvaccinated HCW to employment, as was expected based on the policy, was also demonstrated. Given the scarcity of workers in all fields of health care in New Zealand this was anticipated to have a potential adverse effect in terms of access to and quality of care. [182]

As restrictions eased over October 2021, case numbers began to increase. Based on the epidemic curve in Figure 5, the trajectory of the delta outbreak, shows that it declined in late September and October before rapidly increasing with a peak in mid-November at around 220 cases notified per day. This outbreak strain was brought under control subsequently with cases reducing over December and early-January. [2]

*Figure 4 Daily total cases of Covid-19 between 26 February 2020 and 31 December 2021**



*Reproduced from Ministry of Health data available at github.com [2]

At the beginning of the Delta outbreak, the RNZCGP and General Practice New Zealand, representing the PHOs, had written to the Minister of Health highlighting the need to develop clinical pathways to manage cases of Covid-19 in the community. [183] However formalized pathways and resources were slow to develop and were not in place when the outbreaks numbers began to climb. This necessitated work at pace to develop the "Covid Care in the Community" or CCitC model. [184]

This was a new model of care established during the pandemic to facilitate primary care in maintaining their clinical role in providing personal health care to their enrolled population. The CCitC model included a coordination hub where new cases (following identification and interview with public health) could then be passed through to the PHO where they would be allocated to their practice for clinical follow up. The PHO then had a role in providing clinical support to practices, addressing any medical supplies needed by people isolating and providing afterhours care. Through the CCitC hub, social supports could also be coordinated. Funding had been identified for assessment and ongoing management of these patients from July 2021; however, it became apparent that the volume of cases, the expectation for accessible and after-hours care and the complexity of delivering home based care requiring coordination with other providers, required significant resourcing. [185]

The CCitC strategy became established in late 2021 and a framework to guide the response of providers caring for Covid-19 cases in the community was published. Local care coordination hubs were established to join community providers. Supported with IT infrastructure these hubs were able to identify patients, allocate them to an appropriate

clinical service for follow-up (either with their own provider or another if they were not enrolled with a primary care service) and provide out of hours support. In turn patients were triaged with the type and acuity of follow up escalating based on clinical risk, as assessed by the provider, and/or based on clinical concerns identified at the time of assessment. These eservices could also coordinate with social supports to assist with isolation from the Ministry of Social Development.[186]

In the last months of 2021 Covid-19 delta outbreaks and sporadic cases occurred in multiple regions across New Zealand. These included outbreaks of varying size in the Waikato and Northland districts and the city of Wellington, and sporadic cases in the Taranaki, Lakes District and Wairarapa regions and in the cities of Nelson, Blenheim and Christchurch. Most of these were linked to travel from Auckland that occurred under the extremely limited criteria which included Covid-testing prior to departure.

A new system to manage work, education and social settings in the pandemic, was announced on the 29th of November 2021. This was called the Covid-19 Protection Framework. This framework, based on levels of vaccination, alongside community burden of Covid-19, outlined what people were allowed to do at each level, and which businesses are allowed to operate – see Figure 6 below. The aim of the framework was to recognize that Covid-19 was present in the community and that the goal was to control it to a manageable level where the health care system could be protected. It followed the traffic light system with green being the most permissive, where vaccination is high and

community cases low and red the most restrictive, where cases are high, vaccination rates are low or new variants emerge.

Figure 5 Covid-19 Protection Framework Summary*

Colour setting	Control measures
Green	• Mandatory record-keeping (for contact tracing) • Face coverings mandatory on flights • **With evidence of vaccination:** no gathering limits or mask mandates (except on flights) • **Without evidence of vaccination:** gathering limits of 100, mandatory face coverings and physical distancing in close contact settings
Orange	• Mandatory record-keeping (for contact tracing) • Face coverings mandatory on flights, public transport/taxis, retail, public venues • Physical distancing in public facilities and retail settings • **With evidence of vaccination:** no gathering limits • **Without evidence of vaccination:** gathering limits of 50 at private gatherings; not able to participate in close contact businesses, events or gyms
Red	• Mandatory record-keeping (for contact tracing) • Face coverings mandatory on flights, public transport/taxis, retail, public venues • Physical distancing in public facilities and retail settings • Gathering limit of 100 in public facilities • **With evidence of vaccination:** gathering limits of 100 and physical distancing in most settings outside the home (physical distancing but no specific capacity limit in tertiary education) • **Without evidence of vaccination:** gathering limits of 25 at private gatherings; not able to participate in close contact businesses, events or gyms (online participation only in tertiary education)

*Reproduced from New Zealand Royal Commission Covid-19 Lessons Learned[188]

The framework differentiated between what vaccinated people and those who were unvaccinated are allowed to do, based on their ability to obtain and demonstrate proof of vaccination with a covid vaccination certificate colloquially known as a “My Vaccine

Pass." Businesses could choose to operate with Covid-19 vaccination certificates (CVC), where operating with CVC allows entry by larger groups of people but they must all provide evidence of vaccination. For example, a gathering of 100 people was permissible with vaccination certificates or passes, but only of 10 people permitted if these were not used. Some designated premises that provide an essential service were not allowed to operate using CVC as they had to be open to everyone. Restrictions under the framework were placed on both individuals and businesses and government agencies e.g. the Ministry of Education, to comply. Offences are specified under the act relating to failure to comply with guidance and these can incur fines. In addition, local enforcement from police could be used. [187]

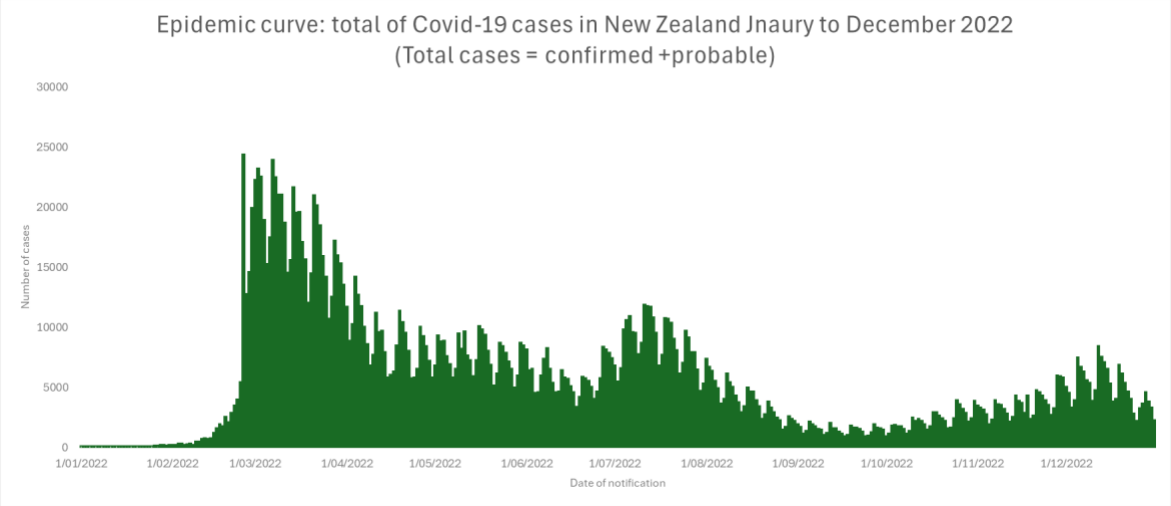
On the 15th of December, the border restricting anyone from leaving Auckland was finally lifted and New Zealanders, with vaccine passes (or documentation of negative tests) in hand were free to move around the country for the traditional summer break. [189]

Omicron enters New Zealand

As the Delta outbreak was diminishing in New Zealand, the Omicron variant was emerging in other countries around the world. This variant was particularly concerning, due to the high infectivity, especially in neighboring Australia, which experienced a rapid increase in cases leading to shortages of PCR and rapid-antigen tests, strain on health-care facilities, and supply chain disruption. New Zealand, due to the use of MIQ, was able to delay the emergence of Omicron into the community until late January 2022.

On Sunday 23 January 2022 it was announced that the Omicron variant had been detected in community cases, with no connection to the border or overseas travel. New Zealand moved to the "red" traffic-light setting on the same day. Cases steadily rose to a level never yet seen in New Zealand, in the hundreds then thousands per day peaking in March 2022 (see Figure 7). The dialogue with the New Zealand population shifted from an expectation we would aim to suppress transmission with extensive case management and contact tracing, to politicians preparing the community for a widespread outbreak. [190].

*Figure 6 Daily confirmed cases of Covid-19 between 01 January 2022 and 31 December 2022**



*Reproduced from Ministry of Health data available at github. [2]

In hopes of improving population outcomes and reducing the burden on health care services, the booster vaccination program for New Zealand adults was accelerated and a pediatric vaccination program initiated. All children aged 5 and over and all adults who are

more than three months from their primary course of the vaccine, became eligible for vaccination. [189] It was hoped that these measures would "flatten the curve" of new infections and ameliorate the impacts from omicron on the health system and essential workplaces.

An equity impact assessment (EIA) was undertaken early in the response to Omicron. Stakeholders identified several concerns relating to priority populations, especially Māori and Pacific communities experiencing the intersectional impact of health inequities, and other issues such as inadequate housing mental health or addiction and the degree of funding and support available for those community providers serving these populations to meet these needs. Many of the concerns raised were based on the experience of these stakeholders in working with communities throughout the first wave and delta outbreaks. Concerns included the ability for populations to access primary care and social services and supports. In response to these concerns the ministry adopted new strategies as part of its Omicron response including

1. The provision of welfare support to those in need for the duration of their isolation period – "manaaki first".
2. Prioritizing case investigation for those identifying as coming from a priority population.
3. Free testing and enhanced support to access testing.
4. A focus on working with Māori and Pacific providers to fund outreach services and a focus on delivering PPE to these community providers.

5. Expanding the non-regulated workforces to support the regulated workforce and to support the “manaaki first” approach.
6. Developing tailored and accessible communications.
7. Improving access to data on specific communities including vaccination uptake. [191]

Demand for testing, which was at this stage still a nasal swab for polymerase chain reaction testing, was very high as the epidemic peaked. There was significant concern from primary care providers as to what their role was in managing cases. Doctors were in the unusual position of receiving large volumes of laboratory test results positive for Covid, but which they had not requested. These could arrive electronically at all hours and as they had been ordered by community testing centers it was unclear who and how the patient would be followed up. This led to significant concern about medico-legal risk for PCPs. [192]

As the numbers of Covid-19 tests increased rapidly to extraordinarily high levels, New Zealand had to move quickly to introduce self-testing in the community to preserve laboratory capacity. As part of the introduction of rapid antigen tests or RATs, community testing centers and primary care undertook a new role of offering supervised RATs for those who had difficulty doing them at home or where it was indicated for clinical assessment. The overwhelming of PCR test capacity and lack of readiness for the introduction of RATs caused complexity and delay, for example in implementing government decisions about widening access to RATS through community testing centers and to rural and remote communities.[193]

This rapid acceleration of cases in the community, and the introduction of RATs placed significant strain on the primary care system. Because of impacts on staffing of health care facilities an exemption scheme was developed allowing asymptomatic close contacts to test and remain at work. [194] This strain was particularly experienced in Primary Care by late February 2022. Peak professional bodies including the New Zealand Medical Association and GenPro, expressed their concern at the demands being placed on the primary care sector. [195,196]

As omicron was spreading, policy makers, public health and the wider community were also challenged by the increased social media and community presence of a small but prominent group who were predominantly expressing anti-vaccine and anti-mask mandate and anti-lockdown beliefs. A loose coalition of anti-establishment groups gained momentum in early 2022 expressing anti-government and anti-establishment views. This culminated in a protest and occupation of the grounds of parliament in central Wellington from 09 February 2022. The occupation lasted 23 days and was characterized by increasingly frequent confrontations with police leading to the forcible removal of protestors on the 2nd of March. [197]

Across New Zealand there was an exponential growth in case numbers after the introduction of Omicron, and by mid-March cases of Covid-19 had reached a rolling seven-day average of over 20,000 cases per day. In parallel, community delivered boosters, and third doses of the Covid-19 vaccine peaked in recognition of the growing community

transmission of disease and rapid-antigen tests were increasingly made available for community testing of cases. [189]

As the outbreak progressed, it seemed that, due to the impact of the lessening social license and the fact that the prevalence of Covid-19 within New Zealand made a number of border and other restrictions irrelevant, there was a move from government to loosen restrictions. Covid-19 rules were progressively relaxed with the requirement for MIQ isolation at the border removed for fully vaccinated New Zealanders on the 28th of February and for unvaccinated New Zealanders on the 18th of March. On the 23rd of March the government had announced further changes including no limitations on outdoor gatherings, increasing limits on indoor gatherings and by the beginning of April vaccine passes were no longer required unless a business chose to use them.

By the end of April cases and hospitalizations had both steeply declined and it appeared that New Zealand was through the worst of the omicron wave. It was recognized that, like the rest of the world New Zealand would continue to live with the presence of Covid and indeed subsequent epidemic peaks occurred in August and December (see Figure 7). Within primary care a "new normal" was recognized but practices and providers were encouraged to retain the lessons of the last few years and maintain those effective infection control practices that had worked well: triaging patients where possible, streaming those with respiratory symptoms and segregating them from other patients, using PPE where it was indicated and thinking about ventilation and cleaning.[144] As of March 19th 2023 over

the first 3 years of the pandemic 2654 deaths have been recorded attributable to Covid-19. [198]

Despite the fact an EIA was commissioned early in the Omicron response there was criticism of the Ministry for not disseminating and integrating its findings as it developed its Omicron strategy at pace. An equity review conducted with whanau and community groups in July 2022 identified that across the three waves of Covid 19 experienced thus far, culminating in Omicron, participants felt that bureaucracy led to unnecessary delays and that resources were often slow to arrive. It was felt that more could have been done to plan and prioritize Māori, Pacific peoples and people with disabilities given recognition of the existing health inequities for these populations. Concerns included that stakeholders felt that vaccine mandates disproportionately affected Māori and disabled whanau and carers and a general perception that elements of the Covid-19 response and the interactions of case and contact investigators demonstrated a lack of cultural safety and responsiveness to Māori communities. Participants also identified that, despite a "manaaki first" approach there was overall an insufficient response in terms of meeting the social needs of whanau in need and that the burden of providing culturally responsive care fell disproportionately on Māori and Pacific providers. This was exacerbated by a sense that they were not at the decision-making table to present the views of whanau and communities they worked and lived within. [199]

The end of Covid restrictions

Even though Covid 19 infections and epidemic waves continue till today, there is a sense both socially and politically that the "pandemic" is now in the past. On the 12th of September 2022 the "traffic light" Covid-19 protection framework was retired resulting in the removal of all Covid-19 restrictions including the vaccine mandates. Masks were no longer required other than in health and aged care settings. On the 5th of May 2023 the WHO declared that Covid-19 was no longer a Public Health Emergency of International Concern but rather an established and ongoing health issue. (2) The last remaining Covid-19 restriction in New Zealand, an order requiring cases to self-isolate was revoked on the 15th of August 2023. [200]

On the 5th of December 2022, the Covid19 Royal Commission of Inquiry – a statutory body focused on investigating the "lessons learned" was announced. Due to concerns that the original inquiry had too limited a scope, new commissioners with an expanded remit were announced by the new government in early 2024. Following on from the report of the initial commission, expected in late 2024, this subsequent commission will examine issues outside the brief of the original inquiry including vaccine mandates and the safety and efficacy of vaccines. [201]

In the primary care sector, the experiences of Covid-19 have magnified core issues that remain unaddressed. These relate to workforce and funding. The RNZCGP conducted its workforce survey in 2022 during the pandemic. It raised concerns about the sustainability

of the general practice workforce finding that 64% of GPs (n=1693) are intending to retire by 2032 (excluding General Practice registrars in training). They noted there is a larger cohort of GPS who are older and relatively fewer aged 24-49. Current entrants to the training program are insufficient to replace these GPs. To meet the current forecasted needs (accounting for modest population growth), New Zealand would need to train 300 GP registrars per annum. Currently the RNZCGP is training 200 registrars per annum. Alongside other issues such as, administrative burden, burnout, renumeration and changing models of care, there is concern that there will be insufficient general practitioners to meet the growing health care needs of New Zealanders in the coming decade. [202]

A contributing factor to retirement intention for GPs was emotional distress with a high degree of burnout indicated by 48% of those surveyed. The survey also identified worrying trends including more practices "closing their books" i.e., declining to enroll new patients because of workforce or other reasons. Of particular concern is access for rural populations which experience worse workforce shortages than urban practices, and Māori and Pacific communities due to the shortage of Māori and Pacific GPs. [202] Many of these findings suggesting overall dissatisfaction with general practice work conditions are replicated in the Commonwealth Fund International Health Policy Survey which found only 31% of New Zealand primary care physicians were satisfied with their income and only 9% were satisfied with their daily workload. More than 9 in 10 primary care physicians felt they spent too much time on administration. [203]

Similarly, nurses working in primary care face issues of remuneration, administrative burden and stress/burnout which are impacting career choice and/or decisions to leave the profession. Primary care nurses in New Zealand currently have a historic gender pay equity claim (relating to the undervaluing of nursing work based on gender) and experience lower renumeration for nurses working in primary compared to colleagues in secondary care. This has led to reported nursing workforce shortages and impacts on job satisfaction for nurses.[204,205] General practices have been told that they will be given a 4% uplift in current core funding for primary care contracts for the 2024-2025 financial year which they identify is inadequate. [206] This is in the context of existing underfunding of Primary Care estimated at between 10 and 20% and a need to address identified concerns about renumeration for the primary care workforce. [207]

Specifically, there are concerns about maintaining access to primary care for the management of Covid-19. Throughout the pandemic Covid-19 related consultations in primary care had been free (with no copayment), as had RATs, and vaccination. Recently the government has announced that, as part of the normalization of Covid, funding for Covid-19 consultations, which made them free at the point of care, has come to an end. This means that they will be treated as any other health problem and incur a cost for those aged 14 and over. RAT tests will no longer be funded after September 2024. This means all Covid-19 related care is subject to usual general practice fees and co-payments, but vaccinations remain free. [208] As Covid-19 persists in the community, the management and support for those with Covid-19 is now the same as influenza or any other winter illness.

Phase 2 - Literature Review focused on the experiences of the primary care sector during the Covid-19 pandemic

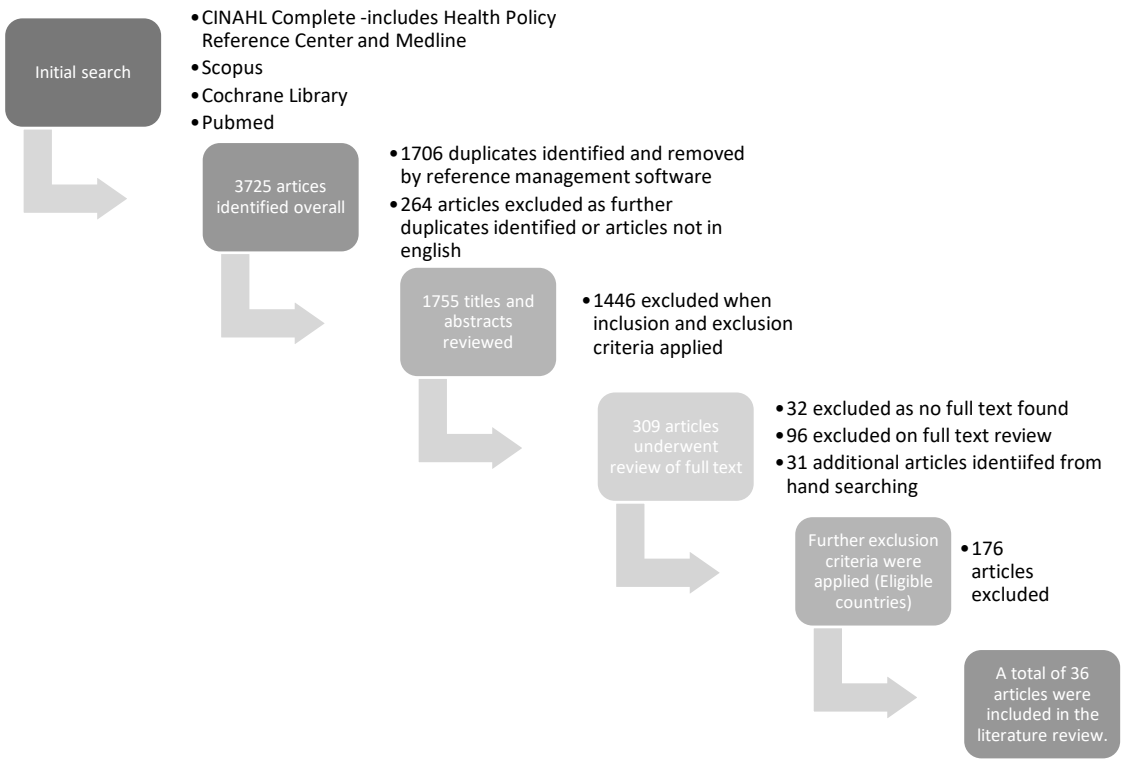
A focused literature review was conducted using the conceptual framework as a guide for analysis. This literature comprised studies undertaken in primary care during the Covid-19 pandemic response between its emergence[j] (with the surrogate of 01 January 2020 as the initial timepoint) and 31 December 2023. Initially this was conceptualized as a broader literature review encompassing all countries with a similar health system to New Zealand as defined by the Medical Council of New Zealand. [72] As per the scoping review methodology, after familiarization with the literature, post-hoc limitations were identified on the scope of literature to be included in the study. [35] The search was constrained to peer reviewed papers, with some form of primary data collection, that described the experiences of primary care professionals in New Zealand, and/or Australia. Australia was selected as it is a neighboring country with a closely related and comparable health system.

An initial search across the four previously described databases identified 2019 articles (when duplicates were removed). Following initial exclusion on review of titles and abstracts, 181 articles underwent full text review alongside an additional 31 articles that had been identified through handsearching of bibliographies. A further exclusion

[j] Covid-19 first emerged in November 2019. As cases grew in number and spread geographically it became of increasing concern and was declared a Public Health Emergency of International Concern by the World Health Organization on the 30th of January 2020. The date of 01 January 2020 was selected as a proxy reflecting the fact that, as this review is focused on original research, there is a time lag between the emergence of Covid-19 and publication.

criterion was applied, and the articles were limited to research set in New Zealand or Australia. Following this, 36 articles met the criteria for inclusion in this literature review. A visual description of the search strategy is included in Figure 8 below.

Figure 7 Flow chart of study selection process



Research incorporates descriptions of both practice level, and individual practitioner level experiences of a pandemic response in primary care setting. A variety of different study types were identified. An overview of the numbers of studies included in the review, by country of origin and study type, is outlined in Table 8 below. An overview of the articles included in the scoping review with key findings is available in Appendix 6.

Table 8 Description of study types

		Number	**Percentage**
Country of Origin	New Zealand	11	31%
	Australia	25	69%
Study type	Qualitative	22	61%
	Quantitative	5	14%
	Mixed methods	9	25%
Study sub-type	Qualitative - key informant interviews	11	31%
	Qualitative – surveys with free text	4	11%
	Qualitative – case study	3	8%
	Qualitative – other	4	11%
	Mixed methods – surveys with quantitative and qualitative components	8	22%
	Mixed methods – quantitative analysis of survey and key informant interviews	1	3%
	Quantitative survey	3	8%
	Quantitative – descriptive analysis of datasets	2	6%
Total	**36**	**100%**	

Of the 36 articles included in the analysis, a number are noted to have shared origins in that one initial research study or sample has generated several different articles. For example, semi-structured interviews with 25 primary care nurses generated four articles looking at aspects of psychological wellbeing, perceptions of risk, the impact of Covid-19 on the delivery of care and general experiences of this sample working in primary care across the time period of data collection.[209-212] These articles have all been treated separately for the purposes of analysis as they address (in the most part) different data

points or different nuances of a subject area, but also (in the lesser degree) have some overlap.[11] This issue is anticipated to have a minor effect on the robustness of the literature review in that some themes may be perceived as having more weight where they are repeated in more than one article but represent the same sample.

There is variation in the sample size, both between study types and within study types. These variations in the size and type of study mean that often studies are not directly comparable but often characteristics of the pandemic's response, emergence of new roles and themes of enablers or barriers were identified that are common across a variety of disparate study types and could be incorporated in a narrative synthesis. A further important feature in interpreting these findings is the wide time period over which different studies collected their data. Some report on data collected as early as April 2020 and others as late as February 2022. A common experience of the pandemic in Australia and New Zealand was that case numbers waxed and waned and that those in primary care were vulnerable to the experience local events and local policy decisions that could impact their experience, and these may occur at different time points both within (from jurisdiction to jurisdiction) and between countries.

[11] A similar concern exists with the work of Mashal and Morrish who have two articles included in the analysis. Based on their review of 16 case studies, they report on digital strategies and on the overall planning and management within primary care practices [229,230] and Halcomb et al who use a survey conducted early in the pandemic to discuss the support needs of primary care nurses and their broader experiences of working in primary care. [223,224] Five articles from New Zealand are based on two different studies however each article presents distinct data on specific aspects of primary care response.[219,220,241-243]

The majority of studies looked broadly at the role and experiences of primary care (n=15, with six set in New Zealand and nine set in Australia. Other studies took a more specific focus, for example on burnout or emotional wellbeing of staff (n=3, with all 3 set in Australia), testing for Covid-19 (n=1, with the one study set in Australia), the experience of primary care pharmacy (n=3, with two studies set in New Zealand and one set in Australia), telehealth (n=10, with three studies set in New Zealand and seven in Australia), and vaccination (n=4, with all four set in Australia). In reporting results themes have been analyzed and reported across all studies.

A data summary form generated from the content analysis is presented in Table 9 below. The scoping review broadly follows the order of concerns in the conceptual framework: clinical services, public health responsibilities, the internal environment of general practice (physical and organizational) and the macro-environment.

Table 9 Data summary scoping review articles

Author	Country	Clinical services - telehealth	Clinical services - e-prescribing	Public health responsibilities - testing	Public health responsibilities – vaccination	Internal environment of the general practice unit - physical environment	Internal environment of the general practice unit - organization environment	Macro-environment of general practice - other	Macro-environment of general practice – emotional and social impacts
Abdi, I, et al. [213]	Australia				x				
Ashley, C, et al. #1 [209]	Australia							x	x
Ashley, C, et al. #2 [214]	Australia	x							
Ashley, C, et al. #3 [210]	Australia	x				x		x	
Ashley, C, et al. #4 [212]	Australia					x		x	x
Atmore, C, et al. [143]	New Zealand	x							
Campbell, C, et al. [215]	New Zealand		x						
Chiu, K, et al.[216]	Australia		x		x				
Copp, T, et al. [217]	Australia	x			x				x
Davis, J, et al. [218]	New Zealand			x			x		x

Eggleton, K, et al. #1 [219]	New Zealand	x	x			x		x	
Eggleton, K, et al. #2 [220]	New Zealand	x							
Giles, M, et al. [221]	Australia				x				
Halcomb, E, et al. #1 [222]	Australia	x							
Halcomb, E, et al. #2 [223]	Australia	x				x		x	x
Halcomb, E, et al. #3 [224]	Australia	x				x	x	x	
Haque, M, et al. [225]	Australia			x					
Hardie, R, et al. [226]	Australia	x							
Hor, S, et al. [227]	Australia	x				x	x	x	
James, S, et al. [211]	Australia	x							
Kippen, R, et al. [228]	Australia	x				x		x	
Mashal, N, et al. #1 [229]	New Zealand	x	x	x		x	x		
Mashal, N, et al. #2 [230]	New Zealand	x							
Morgan, T, et al. [231]	Australia				x				
Mullan, J, et al. [232]	Australia	x							
Nepal, S, et al. [233]	Australia								x

Ng, I, et al. [234]	**Australia**							**x**	**x**
O'Brien, K, et al. [235]	**Australia**				**x**		**x**		**x**
Russell, G, et al. [236]	**Australia**	**x**				**x**	**x**	**x**	**x**
Smyth, L, et al.[237]	**Australia**	**x**							
Snoswell, C, et al. [238]	**Australia**	**x**							
Sotomayor-Castillo, C, et al. [239]	**Australia**					**x**		**x**	**x**
Wikaire, E, et al. [240]	**New Zealand**	**x**							
Wilson, G, et al. #1[241]	**New Zealand**		**x**						
Wilson, G, et al. #2[242]	**New Zealand**	**x**							
Wilson, G, et al. #3[243]	**New Zealand**	**x**					**x**		
		22	**5**	**3**	**6**	**10**	**7**	**11**	**10**

Clinical services

Maintaining clinical care through telehealth and technology

Research examining the introduction and expansion of telehealth and technology was the specific topic of ten studies and was broadly discussed in research examining the overall response of primary care to the pandemic. One Australian study examined the rapid early growth in use of telehealth by looking at Australian Medical Benefits Schedule data on the number of times a telehealth consultation "item" had been claimed. This showed that from February 2020 to May 2020 in person consultations reduced from 10.8 to 8.2 million consultations. Covid-19 related telephone items expanded from 0 to 4.2 million consultations. Interestingly there was much less growth in videoconferencing items which grew from 0 to 0.1 million consultations. [238] In New Zealand a similar phenomenon was observed. A review of consultation types at an urban general practice compared the two weeks following New Zealand going into lockdown with the same period one year prior. They found overall there were similar visit volumes with approximately 20% of the practice enrolled population having contact with practices. However, in 2019 71% of these contacts were face to face while in 2020 only 21% were face to face. [143]

Research across the pandemic sought provider perspectives on the implementation of telehealth. Telehealth was noted to be an important adjunct to the delivery of care as the pandemic emerged and people realized its potential to reduce transmission through face-to-face contact. [210,219,230,236,242] Some providers identified the pre-pandemic use of telehealth as "clunky" and difficult to schedule and use technology. [226] Others noted

that their prior use had at least prepared them well with the appropriate hardware and software and some experience of how to conduct a telehealth consultation and consequently they found it much easier to pivot when it was required during the pandemic. Preparedness was enhanced by the availability of software with latent capabilities including video consultation and ability for electronic referrals to other providers and pathology and electronic prescribing. [210,219,230,236]

A common barrier to the use of telehealth was the availability of appropriate technology – both software and hardware solutions and their integration into existing patient management software. There were mixed views from providers about the impact of connectivity and dropped video calls on the utility of telehealth. Providers identified privacy concerns when they were using personal devices because appropriate work hardware was not available. The use of phone consultations (rather than video consultations) for telehealth dominated. This was due to both lack of access to the right hardware for videoconferencing, lack of provider familiarity with video consultation and perceived patient preferences. [214,219,222,226,227,230,236,242]

Providers identified that appropriate guidelines and training on the technology and delivery of telehealth consultations were required to help overcome these barriers. [214,222,229,230] Funding for telehealth services was acknowledged as an enabler and use of telehealth increased when government funding became available. However, the criteria for funding also impacted patterns of use as it prescribed the provider type and the purpose of the telehealth visit. For example, delays in initiating funding for telehealth visits for nursing tasks, and the amount in dollar terms funded per item,

impacted the finances of practices and the job security of nurses working within them. [211,214,217,223,224,226-230,236]

It was identified that telehealth was not suitable in all instances and important considerations included patient attributes, including their health and technological literacy. [211,219,226,230,236,237,240,243] Face to face was preferred in certain clinical contexts e.g., when a physical examination was necessary and telehealth preferred in others, for example where a patient was immunocompromised. [211,220,222,237] In terms of characteristics of population groups, providers perceived that telehealth was both suitable and beneficial for patients living rurally. [211,214,219,226,237,242]

Key benefits providers perceived of telehealth included reduced time to travel to and wait at a clinic and the consequent reduction in time off work which could improve access for some populations. It was seen as a safe, private and flexible option. [211,219,226,237,240,242] There was not a clear direction overall from this review as to whether telehealth improved or worsened access for priority populations. In two studies, practitioners suggested that Māori, the elderly, disabled persons and low-income populations were perceived to have improved access to care with telehealth, i.e. that it may overcome some barriers such as transport or scheduling. [222,242] Generally however, in a number of other studies, there were concerns about equity of access to telehealth, recognizing that difficulties using technology or lack of access to technology due to social circumstances may exacerbate inequities, as use became more widespread, particularly for culturally and linguistically diverse populations and others such as low-income persons (including low-income Māori whanau), disabled people and elderly. [211,219,222,226,240,242]

Quality of care was perceived to be impacted by the use of telehealth. In one survey of primary care health professionals 39% felt the quality of care in telehealth consultations was about the same as face to face but 30% felt it was somewhat or much worse. [222] Some participants (PCPs) perceived that their patients felt that telehealth consultation provided an experience lesser than the usual standard of care. This in turn could contribute to a reluctance to pay for these visits. [211,219,242] Providers were concerned about missing something through not being able to perceive non-verbal cues. [219,222,237,240,242] There were concerns that in telehealth something could be misinterpreted or inaccurate in the provider-patient dialogue leading to a negative outcome. For example, PCPs reported some patients had difficulty interpreting a doctor's request to "take their temperature" or to interpret and communicate symptoms or signs of ill health. [222,226,240]

One study outlined how technology had been used to support primary care providers specifically through the development of a "Virtual Community of Practice". While not delivering patient care, this was viewed as a beneficial use of the technology available - video conferencing - and the growing technological literacy of providers to support them with information on clinical care and provide a platform for communications and advocacy. [232]

Across several studies a future was envisioned where telehealth would be integrated into hybrid models of care where the use of telehealth was funded, and the choice of a telehealth visit or face to face visit was available for providers and patients to use at their discretion. [211,214,219,222,242].

Maintaining clinical care – the role of e-prescribing

Three studies described the experience of the Covid-19 pandemic in pharmacy primary care, examining the experiences of pharmacists, prescribers and the policy space of pharmacy services. In both Australia and New Zealand, early in the pandemic there was a recognition of the need for prescriptions to be able to be received digitally by pharmacies to avoid unnecessary visits to primary care. To facilitate this, both legislative changes (to permit prescriptions to be received without a physical signature) and technological supports (to support transmission from doctor to pharmacist) were required. In both countries this eventually led to the institution of a formal electronic prescribing service. [215,216,219,229,241]

In New Zealand uptake of electronic prescribing increased from 30% of practices to over 80%. [215] For prescribers the use of electronic prescribing allowed increased flexibility as GPs could transmit a prescription from outside the practice. [215] This facilitated other telehealth provision, reduced the number of patients attending the practice and reduced the risk of exposure to Covid-19 from and between patients. [241] GPs generally identified the provision of a script as primarily an administrative task and did not perceive the switch to electronic prescribing as detrimental to the patient-provider relationship. Some pharmacists felt similarly while other saw this as a missed opportunity to build rapport with patient and engage in education. [215] Technological solutions included modifications to the patient management software to log electronic prescriptions and dedicated electronic prescribing programs that enabled electronic transmission of prescriptions; however, it was perceived that there was a missed

opportunity to build in better, two-way communication between prescriber and pharmacist. While a limited message and reply could be sent this did not facilitate any ongoing dialogue about an issue with a prescription or other medication concern. [215]

Some quality and safety concerns were identified. A common issue was a patient coming to collect a prescription when none had been received – it was unclear where the problem lay, had it been sent to the wrong pharmacy, was it in progress but in an electronic "queue" or had it not been sent at all? GPs and Pharmacists noted that the lack of a physical paper prescription removed some of the system prompt to double check the prescription and medication history and were concerned about the volume of repeat prescriptions being generated without patient reviews, though this improved as lockdowns ceased. [215,241] The electronic transmission of a prescription gave the pharmacy the opportunity to get ahead with dispensing rather than awaiting the patient's arrival, hence reducing delays. However, when a script went uncollected, this had financial implications and raised concerns about patients missing out on prescribed and presumably necessary medications. Other issues included patients stockpiling or rationing medications due to supply concerns or fear of attending the pharmacy to collect prescriptions. [216,241]

Public health responsibilities

Role of primary care practices in COVID-19 testing

Testing was important both for the management of individuals and to direct the public health response. Two studies in New Zealand referenced the role of primary care practices in establishing and running CBACs (Community Based Assessment Clinics)

where Covid-19 testing was undertaken. Their purpose was to increase capacity while streaming symptomatic people away from other primary care sites. In the New Zealand context these were crucial in outreach to priority populations including Māori and Pacific peoples. [218,229] To a certain extent, revenue from operating as a CBAC, was able to ameliorate income lost from reduced patient visits. [229]

One study specifically investigated the experiences of Australian GPs in offering onsite testing for Covid-19 in their practices during the first wave of the pandemic. None of the practices at which key informants worked were undertaking testing and several barriers were identified, many of which are similar to those cited in other studies looking more generally at the role and responsibilities of primary care practitioners. Barriers to testing cited focused on the staff perception of their and the practices ability to test safely, with concerns being raised about personal risk to staff (general fear of Covid and more specific concerns about age or staff who were immunocompromised) a lack of formal training, a lack of clear and discoverable guidelines, and the complexity of identifying appropriate guidance due to the volume of information available, and a lack of space to physically separate patients for testing from the general population that made it hard to safely offer testing. Participants were concerned that they did not have adequate or sufficient PPE to be able to safely undertake testing. Other concerns included the financial cost of testing to the practice including loss of other patients due to a perception the practice was high risk for Covid transmission if offering testing, insufficient reimbursement and a concern about lost work time if staff contracted covid while testing others. [225]

Role of primary care in vaccination

Vaccination is an important role for primary care and was impacted both in terms of the effect on routine immunization program delivery, and the rollout of the Covid-19 vaccine. Four studies examined providers view on these issues, all of which discussed the experiences of practitioners in Australia.

Across all vaccination antigens, Giles et al found that 58% of providers delivered an increased number of vaccinations than usual during the first wave of the Covid-19 pandemic[12] (which was attributed to increased demand), and 40% had delivered less vaccines (predominantly due to lower demand) with only 2% ceasing all together. Increased demand was particularly noted in community pharmacy. Nearly all providers had instituted changes to the way they delivered vaccination to reduce the transmission of Covid-19 including infection control procedures, using telehealth to triage immunization appointments prior to arrival and scheduling vaccination appointments.[221]

The rollout of the Covid-19 vaccination program was a cause of strain for Australian providers in their practice with one third of providers reporting issues of administrative burden, increased patient queries and difficulty with logistics of the vaccination program. This was perceived as an additional source of stress in the context of burnout relating to the pandemic and the long duration of the response. [235].

[12] Data collection for this study took place prior to the development of the Covid-19 vaccine and consequently was looking at routine vaccinations and for respiratory pathogens such as pneumococcal and influenza vaccines.

The time required for counselling patients about Covid-19 vaccination was burdensome and constituted an additional piece of work for providers.[213,231,235] In one survey 49% of respondents reported that discussion took place in at least half of all consultations with an average of 6 minutes being spent on the discussion (this reflects additional time added on where consultations are usually 15 minutes in length). The additional time for vaccination counselling caused longer consultations and decreased renumeration. [235] In some cases the reimbursement for vaccination was perceived as insufficient for the work involved. [213,231]

In these studies, patients wanted to discuss the importance of vaccination, safety of vaccination and access to specific vaccines. It was perceived that the Australian government communication regarding the vaccination program, and safety signals leading to modification of the program, had been poorly executed leaving primary care to deal with the concerns at an individual level. Other barriers included the challenge of keeping up to date with the frequently changing information on the vaccines and anger that providers were not informed about changes to the program before public announcements were made – undermining trust in providers. [213,231,235] There was dissatisfaction with the government communication response to vaccine safety signals and concern that messaging was inconsistent and unclear. [217]

Some providers expressed that dealing with vaccine hesitant patients, disinformation and misinformation was difficult. Further training to support this was recommended. [213] It was recognized also that priority populations, including culturally and linguistically diverse communities, and indigenous persons, may need different support

to access vaccination including translation services, and the use of targeted programs. [213]

As the pandemic evolved, pharmacists took on new roles, particularly in the provision of vaccinations within the pharmacy setting. It was noted that, in the Australian context pharmacy peak bodies had an eye to the future and identified this as an opportunity to raise the profile of community pharmacy and gain recognition for an expanded scope of practice. [216]

Internal environment of the general practice unit – physical environment

Key enablers included the adaptability of primary care and its ability to flex and respond in different ways. [236] Having an infected case in the practice without appropriate management was perceived as not only a risk to providers and patients but could risk business continuity as public health may advise practices to close for deep cleaning and/or for staff to stand down. [227] Practices instituted a number of different strategies to reduce the risk of transmission including splitting teams such that one team was able to step in if another became close contacts or cases. [236]

A major area of change for practices, and for providers was in the institution of novel infection control practices. A practice level strategy was "closing the doors" to manage risk. For some practitioners and practices, for example with elderly or immunocompromised staff, this was a long-term decision with practitioners stopping work or working from home. [210,227,236] For others this was a strategy to allow for triage to occur, either via phone or through a staff member screening at the door for respiratory

symptoms and/or other high-risk history such as travel. Phone triage allowed for a scheduled appointment to be booked either using telehealth or with appropriate protections in place if face to face. Triage then allowed the practice to create risk-based streams which segregated these patient groups to reduce transmission risk and directed their flow through the practice. [212,219,227-229,236]

The efficacy of screening was dependent on patient compliance and open and honest communication about symptoms. [212,227] Often this was combined with other strategies such as having patients wait in their cars, taking a history or swabbing them in their car and/or the use of outdoor temporary facilities such as tents or more permanent facilities such as small portable cabins separate from the main practice. [212,219,227] Other modifications included the use of perspex screens to provide a barrier between reception staff and patients inside the practice.[227,236]

PPE was frequently observed to be an important protective strategy but also a source of concern for providers. Shortages of PPE and the concern that they may have inadequate, low quality or incorrect PPE was a frequently identified source of frustration for providers. [212,224,227,228,236,239] Masks were valued and used with one study observing that N95 masks were perceived as "better" but were found to be more difficult to wear for extended periods of time. [227] Some community providers were concerned that they were being treated differently and offered a lesser grade of PPE and masks because of the perception the community was "low risk", whereas they felt they were at the front door of Covid-19 positive patients' entry into the health system. [212,223] Other providers felt safe with the PPE they had available. [212,227] Many providers felt that protocols and training in the use of PPE was lacking or inadequate. [224,227,239]

A number of other infection control practices were described including enhanced cleaning [228,229,236] wearing scrubs rather than ordinary clothing to work and reducing staff contact within the practice by using electronic communication and limiting social interaction. [227,236]

Providers observed that advice was constantly changing, and it was difficult to keep up to date with shifting advice, for example outbreak management, treatment and infection control. [227,236,239] Providers identified that it was important to frame messages and get communication right, [218] and have consistent and clear messages in one location. [224]

Internal environment of the general practice unit – organizational environment

Communication

Providers discussed the role of communication in the pandemic response. Some noted the impact of shifting guidance which was hard to keep up with and necessitated frequents changes to ways of working. Providers outlined strategies used to circumvent this for example daily meetings to update staff on key changes. [227,229,235,236] There were concerns also about communications from government to patients. This particularly related to fears that messaging may have made patients overly cautious to the point they were not seeking health care for new symptoms and a clear message that primary care was available for routine and urgent care was required. [224,243] In one study, nurse leaders described spending a lot of time debunking erroneous messages patients had

taken on board from other channels/media and were very wary of message fatigue and the need to be judicious with messaging to encourage an appropriate response and manage patients anxiety. [218] PCPs described feeling frustrated that they often learnt of key decisions or policies from the media at the same time as the general population. Providers were concerned they had insufficient voice and lacked channels of communication from the front line of primary care back to government to share these concerns.[235,243]

Macro-environment of general practice

Research examined the broad experiences of primary care providers during the Covid-19 pandemic. One issue that was identified was the long duration of the pandemic response and the fact that, because of this, the response waxed and waned in intensity, the response activities changed frequently and often in ways that had a major impact on primary care. [210,227,236] Practices noted an increase in workload and in non-billable time being spent at work. [209,228,234] Financial pressures were experienced due to reduced practice income and a reduction in household income. [228,234,236] These factors caused practices to feel strain and individuals to feel stress as the pandemic response evolved. [219,239]

Several studies looked at the experience of nurses working in primary care. Nurses in many instances felt that they were uninvolved in decision-making at a practice level despite having key roles in infection control and supporting the practice level response to the pandemic. [224,236] Some nurses experienced an employment impact with a reduction in hours, threatened or actual loss of employment. These factors contributed to feelings of being excluded, undervalued and/or stressed. [209,212,223,224,236] Some had

considered resignation due to concerns about their safety, the safety of their family or due to loss of hours and job security.[223]

The macro-environment of primary care - emotional and social impacts of the pandemic

Providers described a common theme across a number of studies which was fear of becoming infected with Covid-19 and particularly of transmitting this to family. [209,212,217,223,233,234,236,239] Some had experiences of intimidation and abuse based on their work role. [209,218,235] This fear, and anxiety was also reflected in the patient population in some cases requiring additional support from practices and particularly practice nurses. [209,210,217,233]

Three studies looked specifically at the social and emotional wellbeing of firstly GPs (with comparison to hospital-based staff), secondly primary care nurses, and thirdly workers in indigenous led primary health services, during the pandemic. A number of psycho-social stressors ensuing from the pandemic were identified as affecting these workers, including fear for themselves and families, and financial and other stress (as described previously). All three studies describe a range of psychological sequelae experienced by staff. Amongst GPs 75% reported moderate to high burnout (subscale emotional exhaustion) and 19% moderate to severe anxiety on validated scales. Compared to doctors in hospital practice, significantly more GPs had psychological symptoms and significantly less felt well supported by their workplace. [234] Nurses described in interviews experiences of significant stress and anxiety to the point of requiring mental health and other supports. [209] Amongst indigenous health staff, 54%

had moderate or high levels of work-related emotional exhaustion and 30% high or very high levels of psychological distress on validated scales. [233]

Outcomes of the pandemic experienced in primary care

In a number of studies providers expressed concerns about deferred or delayed care. There was a perception that patients had taken on board messaging about the need to limit in person contact, to the extent that they were now avoiding seeking care. Some providers also thought patient finances and the impact on the wider community of covid job losses could lead them to avoid seeking care. Providers noted the impact of health sector decisions to defer low priority activities such as routine screening or chronic disease management, missed opportunistic care and the cancellation of elective secondary care. [210,212,217,219,236,243] There was a fear that major diagnoses may have been missed or care delayed and a perception that the wider public needed reassurance and targeted communication that health care is open. [224,243]

Phase 3 – Key Informant Interviews

Phase 3 results describe the insights gleaned from key informant interviews undertaken with participants across primary care in the Nelson and Tasman regions.

Fifteen interviews were conducted with 16 key informants[13]. The interviews were conducted between October 2022 and May 2023. Interview length ranged between 46 minutes and 73 minutes with a mean length of 63 minutes. Across the 16 participants interviewed, a wide range of roles in primary health care and management of primary health care were identified. Roles included leaders in the management and coordination of the primary health care response in the region (n=6) while other interviewees worked in operational roles (n=10). Specific leadership roles will not be described for reasons of confidentiality (potentially identifiable) however participants ranged in seniority, with some being in operational roles and some in executive leadership and they worked across the PHO and DHB. While some leaders had more narrow areas of responsibility, other senior leaders had general responsibility for multiple areas of primary care. All 16 participants were geographically based in the Nelson and Tasman districts of the upper South Island of New Zealand. Fifteen out of sixteen participants described the length of time they had been working in their current role. This ranged from 1.5 to 14 years with a mean of 6.2 years. Most participants had worked for much longer within the primary care sector. These characteristics are summarized in table 10 below.

[13] When describing themes across the interviews providing counts has been avoided, as often themes are nuanced, and it is difficult to narrowly define these themes. There are limited exceptions to this. In general, when describing an overarching theme, an indication of its weighting across participant interviews has been given as follows. Most = 12 or more interviews; many - 7 or more interviews, several – 3-6 interviews; a few - 3 or fewer interviews. A couple and one have their common meanings.

Table 10 Characteristics of interview participants (n=16)

	Number	***Percentage***
Sex		
Male	3	19%
Female	13	81%
Role		
Primary care leader	6	38%
Community pharmacist	2	13%
Practice Nurse	3	19%
General Practitioner	3	19%
Covid-29 response worker in Māori led organizations	2	13%
Number of years worked in current role[14]		
2 years or less	3	20%
Between 2.1 and 4.9 years	3	20%
Between 5 and 9.9 years	6	40%
10 years or more	3	20%

Interview findings

Interview findings are described below. A table with exemplary quotes for the themes or concerns identified is available in Appendix 9.

1. The current status of the pandemic

Participants described the status of the pandemic, at the time of the interview. For most participants the intensity of the pandemic had lessened. Several participants were of the view that their work had returned to "business as usual". While testing, case management and immunization were still active, participants found that processes had become embedded in day-to-day work and that there was reduced Covid-19 related demand for care. For some this meant an ability to take time to recover and/or to return to what they saw as their core role. (Appendix 9, Box 1A) There was a recognition that

[14] Only 15 of 16 participants responded to this question

despite this sense of "business as usual", Covid-19 was still present in the community and posing a challenge, particularly for priority populations, including disabled persons, Māori and Pacific peoples and the elderly, to manage. Participants acknowledged that primary care still needed to be prepared and that the processes they had had in place throughout the pandemic, regarding infection control were still important. (Appendix 9, Box 1B)

2. Public health responsibilities - new tasks picked up because of Covid-19

Participants described the impact the pandemic had on their roles and responsibilities in primary care, both new tasks that were adopted because of the pandemic, and the impact that it had on their existing roles and responsibilities. A variety of new tasks were assumed by primary care as part of the pandemic response.

Participants described an important role for the PHO in connecting and supporting primary care services particularly in implementing the large-scale public health tasks of testing at CBACs with extended hours for testing, vaccination centers and, later in the pandemic, the development of the "hub" at the PHO which provided seven day per week access in coordinating clinical care.

Participants described how new clinical sites were developed for CBACs. This occurred rapidly at the beginning of the pandemic and required a significant investment of resource. Participants both within and outside the PHO reflected on the successful development of the CBAC model and reflected that the establishment of the CBACs

was rapid and well executed. CBACs were established and run by the PHO with general practice support. (Appendix 9, Box 2A)

Participants described how, at the beginning of the outbreak, testing was reliant on primary care staff from local practices, as GPs were required to staff CBACs and to perform the PCR test. However, as the outbreak evolved, nurses became the primary testers, most of whom worked for the PHO and consequently participants described the CBACs as having minimal effects on the ability to staff local general practices. One participant did perceive a potential financial impact from funding for Covid-19 testing being channeled through the CBAC rather than general practice, noting that the peaks of demand for swabbing occurred during periods of lockdown when practices were experiencing a reduction in patient volumes. The participant identified that participating in swabbing could have ameliorated some of that income loss. At an individual level, participants noted that GPs and nurses could volunteer to do shifts for the CBACs, in addition to their practice work, and were well renumerated. (Appendix 9, Box 2B)

Urban participants working in primary care noted that, with regards to surveillance for Covid-19, while some testing was undertaken in practices, the majority was done in CBACs. Some participants described their practice offering testing in a limited form, for example for their more vulnerable patients, as part of consultations for respiratory illness or to travelers requiring testing. (Appendix 9, Box 2C)

In rural and more isolated areas, participants identified that practices did need to take on more of the day-to-day Covid-19 testing, and (as the outbreak progressed)

opportunistic vaccination, however they did describe a support role for the PHO in community outreach to isolated areas. A significant component of the success of testing and vaccination was its wide outreach to the community. This included mobile testing and vaccination services, and home delivery of health supplies or medication. Participants described a willingness amongst providers to travel anywhere there was a need. (Appendix 9, Box 2D and 2E)

Participants explained how vaccination centers were established by the PHO which handled a large volume of vaccinations across the Nelson and Tasman communities. Leaders communicated that these required a large cadre of workers including clinical leadership, vaccinators and administrative support and the additional complexity of establishing these in parallel with maintain other services like the CBACs. Participants described the vaccination centers as efficient and well received services for the community. When general practices became eligible to provide Covid-19 vaccinations in the community, some general practice participants noted that their practice had elected not to participate in this renumerated activity due to the additional resourcing required and the costs of this. (Appendix 9, Box 2F and 2G)

Participants working in the pharmacy sector noted that in pharmacy the provision of Covid-19 vaccinations was a service that they wanted to provide for their communities, knew they could deliver at scale and was a well renumerated activity. In pharmacy the wider uptake and availability of vaccination changed the makeup of the pharmacy team. Whereas a traditional pharmacy would often previously have only a pharmacist and pharmacy technician, a few participants described how the team had altered with new roles such as nurse vaccinators. (Appendix 9, Box 2H)

Pharmacy participants described experiencing additional pressure as they were asked to perform new clinical and administrative tasks related to the pandemic, particularly vaccination and the introduction of Covid anti-viral medicines, primarily Paxlovid and Molnupiravir. Participants described how initially anti-viral medications were prescription only, but to expand access, they were changed to a pharmacist-only (restricted) medicine whereby pharmacists using the agreed criteria could assess eligibility and dispense the medication as indicated. Some participants perceived that the relative accessibility of pharmacy sites to the general community made them well-suited to this role and enhanced access and that they perceived this as rewarding work. Some of the new tasks required of pharmacies were necessary but time-consuming administrative or operational tasks, that were outside the scope of a pharmacist's role, but that "someone had to do". Participants identified that because pharmacists had access to the appropriate software systems, for example the Covid Immunization Register, they were asked to take these tasks on under Ministry of Health policies. Tasks included printing Mask Exemption Certificates, printing Vaccination Certificates, and (alongside PHO sites) dispensing free masks and free RATs. (Appendix 9, Box 2H)

3. Clinical services

Perspectives on the shift to Telehealth

Participants described how maintaining access to primary care was impacted by the pandemic response required in general practice and how this manifested in various ways. The first and most significant impact was the adoption of telehealth which both

facilitated and limited access. Many participants described how telehealth consultations expanded rapidly in a very short period of time.

While there was recognition that telehealth was a useful adjunct to face-to-face consultations, participants who utilized telehealth in their practices described a range of potential limitations. One participant identified a concern that something might be missed due to the lack of a physical examination and routine observations like blood pressure or a temperature check. Other participants had experienced that the videoconference technology *"didn't really work very well"*. (Appendix 9, Box 3A)

There were mixed views from providers as to the impact on continuity of care. One provider noted that, because practices were employing strategies to reduce contact, including having perhaps a single clinician providing a respiratory clinic or seeing face to face consults, and another PCP working via telehealth, it was not possible to maintain continuity. In contrast another provider was of the view that telehealth provision was enhanced and made possible by the fact that the provider on the phone or video call knew the patient, suggesting care continuity was maintained. (Appendix 9, Box 3A)

Despite video-based telehealth platforms being available some participants expressed that phone calls were preferable and easier for them and for the patient to connect. Some participants shared that patient perceived telehealth as a lower value activity and were less willing to pay for the service. Overall, it was perceived that there was a preference for face-to-face consultations, when these could be offered, even where patients had to travel. (Appendix 9, Box 3A)

Several participants observed the phenomenon of general practices "closing their doors" – primarily as an infection control strategy and because a large proportion of the workload was moving to virtual care and telehealth. The observation from pharmacy was that this barrier to accessing general practice, meant their role as a free and accessible health care provider with relatively "open" doors was amplified. Sometimes this led to patients accessing pharmacy in ways that pharmacists perceived as stretching their resources and placing them at additional risk, for example coming in when potentially infectious. (Appendix 9, Box 3A)

Maintaining essential services

Some participants described a need for cadres of workers to rapidly upskill as a response to the pandemic. This involved becoming technically proficient in areas such as infection control, testing and vaccination, and management of Covid-19. Upskilling also extended to managing other conditions, where access to secondary care was limited, and in developing the processes to support care delivery. (Appendix 9, Box 3B)

Participants described the initiation and impact of the CCitC coordination and identified some concerns with the early iteration of CCitC model. This required new clinical staffing within the PHO "hub" to support after-hours care and care coordination. Additionally, participants described that, at the practice level, both primary care nursing team members and GPs were involved in the management of these patients. They were required to rapidly upskill in the software and how the model of care worked. Some participants found the supporting software systems not fit for purpose, being both

difficult to access and containing questions and prompts that were not well aligned with primary care needs. Several participants noted their practices allocated significant nurse time daily to phone assessment and management of patients with Covid-19. Nurse participants described their role as both clinical assessment and coordination. (Appendix 9, Box 3C and 3D)

One participant noted the initial rollout of CCitC suffered from a lack of national direction on the model, which they perceived as being due to the rapidity with which it was operationalized. One participant was also concerned that pharmacy, particularly medicines advice and delivery of medicines, was not well integrated. Participants noted coordination processes improved as the hub model evolved.

Several participants described the intersection between public health, primary care and social support in the hub. As case numbers grew, more and more people needed support either because they didn't have a safe place to isolate and required temporary housing or because they lacked the necessities to isolate including food, basic hygiene items or medication. The provision of social supports, through cultural providers or from the Ministry of Social Development (MSD), became essential to allow cases and contacts to fulfil legal requirements around isolation. These services were integrated into the CCitC model. As the pandemic evolved and case numbers went up and down, the hub also morphed into supporting primary care with other tasks. This allowed them to maintain this model of care in a state of readiness. (Appendix 9, Box 3E)

Participants described how e-prescribing was introduced early in the pandemic as a response to the emergence of telehealth and concerns about reducing exposure to

infection from persons attending a clinic or pharmacy, or indeed from the prescription itself. Identified benefits from this included integration with practice management software which streamlined, for example which scripts did need to be signed (controlled drugs) or automated electronic delivery of those which could go directly to a pharmacy. Participants noted benefits including being able to see if a prescription had been dispensed to a patient and efficiency in being able to more easily prescribe in a variety of settings, including aged care. (Appendix 9, Box 3F)

Participants in pharmacy settings noted some challenges with the e-prescribing system. The perception was that the GP had performed a consult and sent off the prescription with relative ease, but that the pharmacy then faced the administrative burden of printing a script, liaising with the prescriber and often storing medication awaiting collection. This was noted to have completely changed the flow of work in pharmacy, with prescriptions often coming in a large volume all at once. When a prescription failed to transmit pharmacists also had to inform the patient and which could cause additional tension where they were disgruntled or upset. (Appendix 9, Box 3G)

4. The internal environment of the general practice unit

Physical environment

A wide range of controls were described to manage the physical environment of general practice to reduce transmission of Covid-19. Many participants described that closing their workplace to general entry by members of the public was the first step.

Participants described using signage, tables, road cones and other barriers to prevent and redirect entry. (Appendix 9, Box 4A)

Beyond this, participants described various frequently used strategies to reduce transmission of Covid-19. The use of PPE was the most often described infection control strategy across participant interviews (n=11). Other common strategies included: using phone or in-person triage throughout the outbreak to identify any patients with Covid-19 symptoms, and to direct these patients to the most appropriate care alternative, either telehealth or a face-to-face consultation (n=7); using dedicated clinic rooms that were in some way separate from the main practice areas, and/or a room that had a separate entrance or portable cabins entirely separate from the main building (n=8); perspex barriers to screen off patient facing reception areas (n=5); enhanced cleaning (n=5) and where suitable seeing patients outside or in their cars for vaccinations or testing (n= 6). (Appendix 9, Box 4B-D)

Other internal modifications included, removing chairs from waiting rooms to allow for greater distance between patients, and removing toys and magazines. Staff strategies included wearing scrubs rather than personal clothing, working from home and minimizing social contact between staff. As the outbreak evolved there was an increasing focus on ventilation either using fresh air and for some practices installing HEPA filter units.

Patients who needed to be seen face to face were described as being allocated to either "red" or "green" stream. "Red" meant they had respiratory symptoms and were necessarily segregated from other patients in the "green stream". Tools used in the red

stream included patients waiting outside in their cars, use of a separate entry where possible, the use of a dedicated clinic space as far away from other clinical areas as was possible and augmented cleaning protocols. PCPs working in the red stream wore enhanced PPE including mask, gloves, eye protection and gown. (Appendix 9, Box 4D) Many participants discussed the concept of splitting teams into different shifts or days so that if there was a positive case, only one cohort would be taken out of work at any time. This worked for some practices, but others found that the layout within general practice sites, number of staff in the practice, or the way they structured work responsibilities or shifts did not allow for this to occur.

Organizational environment - Guidance and training

Several participants discussed how guidelines were disseminated and used. These were often generic, either from central agencies or sometimes from overseas, and needed to be tailored to the environment. When guidelines were available, participants perceived that these were often applicable only to one practice and identified that there would have been benefit in rationalizing these to reduce reinvention and duplication of processes across organizations. The kinds of training provided for practice staff did not appear to be standardized across participants with a variety of different trainings being described. These covered topics such as how to don and doff PPE, how to take Covid-19 PCR nasal and throat swab, contact tracing and vaccinator training. One participant described some of the training offered as short with the implication it was relatively superficial, whereas another described training that used “train the trainer model that “worked beautifully” and that was very successful in upskilling clinical staff. (Appendix 9, Box 4E)

Organizational environment - Perspectives on the model of care, workforce and workload

The pandemic highlighted for some participants that the traditional model of general practice in terms of time and cost needed to change. The pandemic had offered opportunities for more flexibility in terms of hours, ways of connecting with primary care virtually or in person and proactive management of at-risk populations and some participants were concerned as to how these positive impacts could continue. (Appendix 9, Box 4F)

Organizational structures had to flex in other new ways to support the pandemic. Many participants discussed the impact of the pandemic on workforce and workload. There was a significant increase in workload noted by many at various times in the pandemic, such as lockdowns, as well as the cumulative burden of increased work responding to the pandemic over a long duration. This caused stress for some participants. (Appendix 9, Box 4G)

Participants described the impacts of staff shortages in primary care. Some participants described this as being exacerbated by Covid-19, for example people who left the workforce because of the pandemic, and staff illness; but more participants described this as being related to general staff shortages in regulated workforces (Medicine, Nursing and Pharmacy) that were magnified by the increased demands of the pandemic. (Appendix 9, Box 4H)

In response to this organizations plugged gaps with ancillary staff. These included workers outside healthcare who stepped into new roles and health care workers who worked outside their scope of practice when needed. Numerous examples of this in primary care were described: A workplace of community travel agents, who had lost their usual work during the pandemic, were recruited to establish a call center, to handle booking and queries for initially CBACs and later Covid-19 vaccination centers. Participants described an occupational therapist who worked as health care assistant, a physiotherapist who delivered meals on wheels, a nurse described picking up reception duties and a pharmacist delivering groceries. Local practices described staff, including doctors and nurses, doing occasional shifts at CBACs and vaccination centers alongside their routine work. In addition, a limited cadre of workers from other areas were recruited from businesses that had no or little work e.g., nurses underemployed in areas like travel health became vaccinators. (Appendix 9, Box 4H)

5. Collaboration and teamwork

A strong theme that emerged as participants discussed their experience of providing primary care during the pandemic was the importance of collaboration and team work to make complex tasks happen in challenging situations. Participants described how coordinated leadership emerged between organizations, within practices and other primary care entities and from local Māori Iwi and pacific health providers. Many participants described leadership from those who were in managerial and clinical leadership roles already and then found their role evolving to include or entirely focus on Covid-19 and the response. Overall, there was a sense from a few participants that

the “right people” were engaged in the work and producing the desired outcomes. (Appendix 9, Box 5A)

Some key facilitators drove this coordinated leadership. Most participants discussed the importance of relationships, often pre-dating the pandemic, that allowed participants to seamlessly come together around key objectives. These relationships were held at multiple levels. Several PCPs working in primary care practice described how having a functional and adaptable team eased their workload in the pandemic and that teamwork was crucial to the successful execution of the myriads of tasks required across the pandemic response. Other participants noted the development of relationships and collaborative work between organizations leading the response. For patient facing clinicians one of the key relationships was with the community. GPs, nurses and pharmacists acknowledged they were in a privileged position of trust with their patients and local community, and this facilitated their work. A few participants described the success of these layers of relationships in achieving an integrated operational system across primary care. (Appendix 9, Box 5B-D)

Trust was the underpinning of these relationships. This manifested in many ways. Participants described a high degree of trust and autonomy that if people were asked to perform and action or task that they would make good decisions and that the task would be executed well. This could be for clinical or operational decisions and at individual or group levels. Examples given were trust in pharmacists to autonomously prescribe in certain settings, or trust in organizations to achieve an objective such as establishing a clinic. Another element of this trust was financial. Governance models facilitated rapid disbursement of resources and trust-based models for contract delivery. In some

situations, participants described that there was an imperative to act quickly, before contracts and financing could be agreed with faith that the financial support would follow. (Appendix 9, Box 5E)

Participants described assorted ways they communicated to connect as teams. This included having dedicated emails and phone lines that would always be responded to and frequent meetings, often over zoom. This communication was very important to the success of their collaboration. (Appendix 9, Box 5F)

This high degree of trust and the relationship allowed participants to effectively share resources to manage the pandemic. Participants described sharing physical resources, such as furniture for establishing clinics or a power generator. It also included financial resources and communications materials. In some cases, this was used strategically, for example one organization described being better able to mobilize human resources to set up vaccination clinics, due to the nature of their entity as a private business. As such they were able to have these in place much sooner than if they had relied on their partner who had much slower government hiring processes. (Appendix 9, Box 5G)

Another resource that was effectively shared to support the response was data. Many participants described that experienced ease of access to data to inform their work in ways that, outside the pandemic, would normally be limited. Participants identified that data was shared more freely and more rapidly but still in ways that maintained privacy and security. This particularly aided the vaccination response for priority populations, as it was possible to identify data at a census area level that allowed outreach to specific communities to occur. The supporting information technology systems that allowed this

level of data sharing were much more rapidly able to be deployed. (Appendix 9, Box 5G)

Many participants described that the mindset of those working on the response and the enabling attitudes and behaviors exhibited were key to the response. Participants variously described primary care and those working within it as “agile”, “nimble”, “flexible” and “adaptable”. Participants described how people and organizations were actively working to remove barriers, and to innovate or problem-solve. A few participants noted the resiliency of the sector and those within it in riding out the range of issues encountered across the pandemic. Several participants described a strong sense of purpose to serve the community in this difficult time. (Appendix 9, Box 5H)

6. Communication

Communication, in its multitude of forms, was a dominant theme across participant interviews. Effective communication was essential and had to operate at different levels to achieve different aims. One of the main roles that PCPs described was in brokering information and communicating to patients to enhance their understanding of what they could do to protect their health. This was both for individuals and for community or professional groups. Communication occurred between providers for operational or clinical reasons, and between providers and the “center” relating to policy decisions. They described different strategies including zoom or in-person meetings (depending on the environment) and email. (Appendix 9, Box 6A) A well-regarded source of information for providers was Health Pathways. This is a GP led source of up-to-date

clinical information on a wide variety of topics including Covid-19. Practitioners viewed this as a "trusted source". Advice from experts, particularly in the form of webinars/online Q&A, or other written communications, was also valued and perceived as high-quality, locally tailored and trustworthy.

Many providers complained of challenges relating to communication about clinical and operational decisions. The chief of these was the experience of many participants of the large volume of information and the speed at which it changed. Participants used descriptors such as "information overload", "chaotic and information flying in all kinds of directions" and "continual change" in policies or procedures. Many participants described the importance of having high quality information provided to the right people. Some participants had worked out strategies (e.g. which websites they checked) and networks of reliable informants to ensure they had the best information possible to work off. (Appendix 9, Box 6B)

Some participants described the merits of a function, usually a person in a key leadership role, to filter and disseminate the information that was coming from multiple sources. Often this took the form of email "digests" summarizing and clarifying information. Locally both the PHO and primary care sector leads in the DHB would share communication summaries. As well as this, PCPs in the sector also received communications from specialty societies such as the Pharmacy Guild and RNZCGP and organizations such as the Immunization Advisory Center. These bodies were referenced by participants as undertaking the role of conduit between providers and the center, with mailing lists to distribute out to providers on the ground. A further

challenge however that providers were often subscribed to multiple sources and there was significant overlap in the information provided. (Appendix 9, Box 6B)

A few participants pointed to strategies that were effective in streamlining information. These included having a function that would directly answer a query if you couldn't find the information you needed – either a phone number to ring or an email that would be responded to; processes that updated guidance with key changes (e.g. Health Pathways) or documents that highlighted the key differences in information i.e. what has changed since the last version; and making sure information was "timely and accurate and consistent" across all channels.

A major communication problem identified by many participants was the way in which policy decisions were communicated to the public. Participants referenced different significant occurrences where a new policy, that involved them, was announced via news media or press conferences to the public, where the provider had a key role, and yet they had not been made aware of this in advance or consulted on how it would be implemented. Some pharmacy providers described feeling left in the dark, and that it adversely impacted their reputation and professional credibility with the public as they were either unaware of the announcement or scrambling to rapidly implement. (Appendix 9, Box 6B)

Other communication challenges for providers, noted by a few participants, occurred at the local level between public health and primary care and primary care providers. Largely these related to discrete episodes of poor communication as systems and processes were developed and embedded, particularly round referrals for services and

how and when information was shared. Participants reported the ability to resolve these issues rapidly because of local relationships and dialogue.

Participants also discussed how communication regarding government policies or initiatives, directed to patients, took place. In general, this was mass media communication from the center to advise of policy decisions around the pandemic. A few participants described some targeted communication to individual patients or groups via direct methods – text messaging and emails primarily. There were similarities between communication targeted at providers, and patients, in that both were described as at times being unclear and confusing due to frequent changes in key messages. A few participants noted that direct communication between PCPs and patients in the clinic was impeded by PPE, for example due to mask use.

Several participants highlighted the impact of misinformation and disinformation on the community. Often this related to vaccination. Participants found in some cases there was an opportunity to demystify and deescalate concerns. But in other cases, there were entrenched views that were very difficult to shift. On occasion this was quite traumatizing, for example PCPs being handed flyers by protestors in which they were likened to war criminals from the Nuremberg trials for supporting vaccination.

7. The macro-environment of primary care

Emotional and Social impacts of the pandemic

Many participants described a sense of fear of Covid-19. This was particularly strong early in the pandemic and lessened as the pandemic progressed. As news reports were received of doctors and nurses dying overseas, participants described being “scared”, and “frightened”. Participants said that, by choice or a sense of duty that they continued to go to work despite this fear. A few participants described trying to reassure others. (Appendix 9, Box 7A)

Several participants described a range of impacts on home life from the pandemic. Participants described being at work during lockdowns when others were off work and school and having to juggle domestic roles, and the pressure of long hours. Others described fear, in themselves or colleagues, of taking illness home to vulnerable family members, and how they tried to minimize this risk by showering before entering the house and stripping off work clothes and scrubs, or counter to this, the relief and ease if they didn’t have people at home who would be at risk.

As the pandemic progressed participants experienced a range of different emotional impacts. Many described it as being fun or a positive experience. Conversely, many participants also described it as causing stress, anxiety or burnout. These experiences were not mutually exclusive. Participants described positive experiences being a sense of comradery and teamwork, a sense of pride and achievement in working together to deliver an outcome and the fact this was something new and different. Others shared that they experienced fatigue, stress and what was described in a few interviews as burnout. This seemed to vary over the course of the pandemic with the intensity of the cases and related workload. Related to this, a few participants noted that there was a need for leave for recreation for the stretched workforce as the pandemic was becoming

more like business-as-usual, but that there was no one available to cover leave. (Appendix 9, Box 7A)

Government policy and impact on health care delivery

Government decision making and public policy had a significant impact on the health care delivery system as a whole and primary care services specifically. Many participants discussed planning as it related to Covid-19. In emergency management the emphasis is on pre-planning for an event, to make sure people and institutions are prepared, however, a few participants described that, with Covid-19 there was no ability to be prepared, as it was a novel pathogen, and tangential plans, such as those for Influenza, were unsuitable or out of date. Participants described that planning was undertaken "on the fly" and as initial response activities began. (Appendix 9, Box 7B)

There were a variety of different experiences of local governance and oversight of the pandemic response. Participants consistently described the governance level at the DHB and PHO level as providing a structure that integrated different voices, including priority populations and allowed for effective planning. However, for some participants sitting outside this, there was much less coordination and consultation, and planning relied on the efforts of individual practitioners or practices. This differed for a practitioner in a very rural area who was necessarily engaged in local planning and preparedness activities because they were one of the main emergency response organizations. (Appendix 9, Box 7B)

A sense of lack of consultation early in the response was highlighted as government policy decisions relating to the pandemic evolved and were shared with the public. Many participants shared numerous examples of policy decisions that were made where the operationalization was left to primary care with a sense there was not the planning or resources to undertake this or where there were unintended consequences. Examples of unintended consequences, that those participants described included:

- A decision that RATs tests must be accessible to people living rurally. While the policy was well intentioned, participants described that it outpaced both the supply to rural communities and the development of plans for distribution.
- Rules around payment for services such as providing vaccination certificates that excluded non-New Zealand citizens despite these individuals requiring these to move around New Zealand under different alert levels causing a lack of clarity around who and how these certificates could be provided.
- Clinical decisions such as the initial decision that Covid-19 and Influenza vaccines could not be given on the same day despite there being no clinical contraindication. This decision had been made for recording purposes to ensure that any adverse events were correctly attributed to the right vaccine but impacted access for hard-to-reach communities.
- A community provider, who stored alcohol hand sanitizer for distribution to priority populations, was advised by WorkSafe (the workplace health and safety regulator) that they were storing too much alcohol-based hand sanitizer on site, and it was considered a dangerous good in need of disposal. (Appendix 9, Box 7B)

The supply chain for government supplied PPE and medications, as well as other imported consumables, was a problem for many participants. At a practice level a few participants noted that the changed needs for technology with telehealth led to increased demand for cameras, headsets and batteries and these were at times in short supply. Participants also described short supply of certain medications on prescription and consumables such as gown, gloves and masks or issues with the quality of those that were supplied. While participants never described lacking the required PPE to undertake their work, there was a sense that supply was precarious at different stages and a hodgepodge of different brands and types. One leader attributed this particularly to local efforts to organize and distribute supplies and later to national systems for ordering and distribution. One participant noted there was lack of clarity at times as to how much guidelines and policy decisions on PPE were based on evidence or influenced by supply issues. (Appendix 9, Box 7C)

One significant issue relating to Ministry of Health policy on PPE supplies, raised by several participants was the perception that there were different standards for different providers. Participants gave examples of PPE distribution, where pharmacists were advised they did not require PPE and would not be distributed it early in the pandemic despite having numerous unwell persons entering pharmacies seeking health care. Pharmacists felt they were placed at risk, and that they were potentially placing their patients at risk, when the rationale was not justifiable. This resolved as the pandemic progressed (and as supply chains opened). (Appendix 9, Box 7C)

Mask and Vaccine mandates were a significant government policy decision that impacted primary care. Many participants discussed the impacts of these mandates to

their work. Participants articulated that there was already a high degree of uptake of the vaccine amongst clinical staff, before the mandates were imposed. The main impacts described for staff was the difficulty and emotional impact of dealing with distressed or angry members of the public who felt they were being obliged, against their will either to wear a mask or to be vaccinated or being prevented from accessing services based on their beliefs. Participants described the significant effort they and other health professionals extended to provide health information and support to those who did not wish to be vaccinated. There were also a number of clinical and patient -facing staff across primary care who elected not to be vaccinated and lost their employment. While seemingly a small number overall, there was an acknowledgement that they were in important roles and a loss of resource to the sector. (Appendix 9, Box 7D)

Financial impacts for primary care

The Covid-19 pandemic had complicated effects on financing in the primary care sector. At the outset of the pandemic particularly, many participants described a real concern about loss of revenue to practices. Due to the lock down and the advice to stay home unless necessary participants described a drop in demand for primary care services. This was exacerbated by a reduction in opportunistic care and in treating accidental injury – again due to people staying at home and not engaging in activity. Accidents anecdotally made up a large amount of revenue for practices through reimbursement from the Accident Compensation Corporation (ACC). This was combined with, as several participants commented, significant additional expense in order to finance physical infrastructure, such as portable cabins or ventilation and air

filtration devices, technology software and hardware and additional staffing. (Appendix 9, Box 7E)

Participants commented that, in some cases, loss of revenue was ameliorated by payments made to primary care by government via the PHO and/or the overall uplift in funding as the pandemic progressed, in the form of claimable items for services such as testing, vaccination and Covid-19 assessment and care. Overall, it was unclear if primary care services were better off, worse off or neutral in terms of their financial status and was probably dependent on the practice. Pharmacist and GP participants especially were very concerned about the future of their practice due to rising costs beyond government reimbursement. Pharmacy owner-operators described putting in a large number of unpaid hours and filling gaps to keep their pharmacy services going and business afloat. (Appendix 9, Box 7E)

Government contracts extended beyond the delivery of testing, vaccination and Covid-related clinical care. For the first time there was funding available to support the social costs of isolating and meet the welfare needs of cases of Covid-19 and their contacts. As the pandemic reduced in intensity there was concern, both in primary care practices and the social care sector that funding availability and government contracts were being concluded or withdrawn. This included a shift in the government's policy on reimbursing Covid-related care. As this changed from being free at the point of care to being a regular primary care service that required a co-payment there was concern from several participants about patient willingness and ability to pay. In terms of government contracting, there was recognition that the funding provided overall for the Covid-19 response at a central level was unprecedented. The hope overall, as the funding reduced,

and the response tailed off, as described aby some participants was that this funding may have facilitated some investments in infrastructure and resourcing that would have longer lasting benefits. (Appendix 9, Box 7E)

Priority populations

Most participants discussed the impact of the pandemic on priority populations, to some degree and described these as including Māori, but also youth, Pacific and rural communities. Participants articulated a focus on these populations that extended from leadership who supported the sharing of data, developed population level strategies to connect with priority populations, and provided financial support, through to providers on the ground, who undertook outreach to individuals, families and local communities. Māori and Pacific providers were described as a prominent part of the response and developed capacity both in supporting clinical services and providing social supports necessary for communities isolating or experiencing the financial and social impacts of Covid-19. In doing so they relied on an infrastructure of key individuals who had strong links to community and understood how the health and social sector worked and understood the needs of the priority populations they were serving. As described previously data sharing was also an important enabler in identifying priority populations and facilitating tailored approaches and outreach. (Appendix 9, Box 7F)

A few participants commented on the need to tailor media and communications messaging to be relevant and effective for Māori communities. Particularly to amend and ameliorate communications from other agencies that were not appropriate. To do this, they sought specialist support from a Māori communications expert to target

messaging to specific groups and to facilitate the use of different communications tools including social media. This was supported by marae-based clinics or outreach by Māori providers. One approach was to align vaccination with a broader community day and bring whanau together for other health checks or food and entertainment (depending on the alert level restrictions). Other approaches included using social media and prizes to reach rangatahi, supporting access to pharmacies where there was quick and easy access, or taking services directly to communities in a mobile van. (Appendix 9, Box 7F)

Many participants discussed outreach to hard-to-reach communities to enable Covid-19 testing and vaccination. This was led by the PHO, who partnered with DHB staff, local practices and other primary care partners. This response extended access across the top of the South Island into isolated and rural regions but also into urban communities that had lower uptake and certain high risk professional groups such as port workers, and Pacific peoples. (Appendix 9, Box 7F)

8. Outcomes of the pandemic experienced in primary care

Participants described a number of outcomes from the pandemic in clinical care and in their professional roles. Most participants described some degree of impact in terms of services that couldn't be offered or deferred or delayed care. Sometimes this was routine primary care services that were ceased for periods of time - examples of which include spirometry, cardiovascular screening - and sometimes services where there was variation, based on clinical indicators, in who should come in - for example some immunizations and cervical smears. In addition, providers noted the impact of patients

delaying care either because they had safety concerns or did not want to burden what they perceived as a system under strain. (Appendix 9, Box 8A) It was not possible to quantify the magnitude of this impact or whether there was any correlation with outcomes for local communities.

A few participants expressed pride in Covid-19 outcomes locally including a perceived reduction in mortality compared to other centers. In contrast many participants expressed a concern about patient outcomes. These included the risk of long-Covid, adverse sequelae from vaccination such as Myocarditis/Pericarditis and the impact of clinical deterioration and how this was managed in community settings. (Appendix 9, Box 8B)

Many participants described recognition for primary care as a whole or for roles, such as community pharmacy, as an important outcome of the pandemic. For some participants this was a positive outcome from the pandemic response, with their being a sense that finally they were being recognized for their contribution. For others, there was a perception that there was insufficient recognition considering the crucial role they, and others in the sector had played in the pandemic response and in maintain primary cares usual role as first point of care. This also tied into a sense of frustration for some participants about pay and working conditions for primary care roles that they perceived as being inadequately addressed in general by governments over time, and which they found particularly frustrating given the commitment they and their colleagues had demonstrated over the Covid-19 response.

Many participants discussed lessons learned for the future. Several highlighted how these lessons had already been integrated into local emergency responses. Lessons learned were wide-ranging. For several participants it was important that strategies for managing respiratory illness including PPE use, triage and streaming of patients, and community wide use of masks be preserved and used for winter illnesses and for future outbreaks. Several participants noted that trust and relationship building, and information technology developments that had occurred during Covid-19 were crucial components for the future system to be effective.

Chapter 5 – Discussion

Principal Findings

This scoping review was undertaken with the aim of describing the Covid-19 pandemic in New Zealand, focusing on the role of primary care, their experience in the pandemic outlining any challenges that emerged for primary care services as the pandemic response evolved, and what contextual features of the policy and health system environment supported or prohibited an effective and equitable response to the changing circumstances of the pandemic.

To do this a scoping review methodology was used with the objective of "rapidly mapping" the body of literature and policy, as it applied to the New Zealand context. The aim was, as per Arksey and O'Malley to summarize and disseminate research findings and identify research gaps. [35] The scoping review components included a description of the policy environment and context of Covid-19 relating to the delivery of primary care in New Zealand during the pandemic and evidence from the peer-reviewed literature on how primary care services have adapted and evolved in response to Covid-19 in New Zealand and Australia, including roles and responsibilities. As an adjunct and extension of Arksey and O'Malley's "consultation exercise", a series of key informant interviews were undertaken with participants in the Nelson and Tasman regions of New Zealand to identify the barriers and enablers, they perceived in delivering high quality primary care in response the Covid-19 pandemic and triangulate these across the three components of this study.

Triangulation across the scoping review identifies some commonalities in the experience of primary care leaders and practitioners. It is apparent that the emergence of the pandemic led to some swift shocks for primary care and the rapid reorganization of services. Fear of Covid-19 and the stories of primary care practitioners overseas becoming infected led many to feel very concerned for their own and family's safety. This sense of unease was exacerbated by precipitous changes in how practices operated with lockdown, a rapid move to telehealth and the need to swiftly embed processes to identify those with respiratory disease, stream them away from other patients and provide care for them in safer ways using PPE. Workload fluctuated with some areas experiencing increased demand and others feeling this had reduced overall. Many practices were fearful of patients staying away and loss of income at a level that would challenge their financial viability. These findings are consistent with the experiences reported of other jurisdictions beyond those included in this scoping review. [244-246]

Across the description of the pandemic context and policy mapping, literature, and the key informant interviews, a myriad of new roles and task for primary care were described in New Zealand. Two major areas of pandemic associated care were the establishment of CBACs for Covid-19 testing and vaccination centers. Facilitated by the DHB and led by the PHO, these centers moved much of the pandemic related primary care out of general practice and into specialized centers. There were pros and cons to this. From an infection control and workload management it was probably beneficial to have established standalone clinics that could flex to meet the variable demand for testing and keep patients who were unwell with respiratory symptoms away from primary care. However, there were concerns expressed by some PCPs that this was removing core activities that were part of the primary care scope of practice and

part of patient investigation and management, and potentially that this was diverting a source of income in a time where general practice was experiencing a broad loss of income.

Primary care did undertake some testing and as the pandemic progressed could elect to provide vaccinations if they wished. Beyond this they were the core provider of Covid Care in the Community – the framework that provided care to covid cases and ensured their appropriate management and escalation if deterioration was detected and access to antivirals. Primary care practitioners were pivotal in providing education to the community, both on public health measures and disease management and provided practical assistance including mask and rapid antigen test provision.

Practices implemented measures to protect their patients and for staff to feel safe in providing care. These involved "closing the doors" of primary care for the first time and using triage to direct patients to telehealth. Face to face care was available with modifications which included changes to the physical layout of practices, improved ventilation and primarily the use of PPE. These responses to the pandemic were consistent across the scoping review, and when compared to other countries. [245,247] However, the government policy response and the operational response from the Ministry of Health were sometimes a source of frustration for providers. A particular example of this was in PPE. Evidence has shown that providers need adequate PPE to both feel and be safe in providing care but problems with adequacy of supply, quality of supply and perceptions that primary and community providers were not a priority for receiving PPE contributed to dissatisfaction and a perception that certain primary care

providers were not as valued or respected. This finding has been echoed in other jurisdictions. [248]

The flow of information and communication was a major issue for those working in primary care. There were frequent updates and changes to information, and it was being transmitted from a multitude of sources making it difficult for providers to keep up to date. Providers looked for trusted sources and for professional bodies to sort, collate, titrate and disseminate information. There was a dichotomy in how communications were perceived. More localized communications, between providers and patients and between local providers and local leaders seemed to work well with professional bodies taking on roles to collate and disseminate information. Local guidance through the program *Health Pathways* was effective in keeping PCPs up to date with clinical management of cases. However, it is apparent, across the literature, the chronology of Covid-19 policies and the experience of key informants that the wider environment was characterized by frequently changing and potentially inconsistent communication of, particularly government and Ministry of Health policy and advice. In many situations providers identified there had been little pre-warning or consultation prior to policy changes that affected primary care being announced. Stakeholders perceived little ability to input or shape policy, which was determined nationally, and this which led to frustration if the policy did not achieve its intended outcomes or integrate into existing models of care.

Across the scoping review the establishment of significant new hardware and software supports and infrastructure to facilitate primary care practice was described. Of note were the initiation of electronic prescriptions, widespread adoption of telehealth and

the increasing ease of access to data and analytics on populations with regards to testing and vaccination for Covid-19. The need for quality data to monitor the pandemic at all levels facilitated investment in supporting infrastructure while the evolving trusted relationships and governance frameworks supported the freer sharing of this data. Telehealth and electronic prescribing were tools that had been developed but that had never seen wide adoption. The pandemic provided the stimulus for many practices to integrate these tools, and they were identified by some as a central part of future models of care. As the pandemic evolved, and case levels fluctuated, it became less clear to what degree these tools are integrated and how "permanent" they are. For example, many prescribers were operating under an exemption allowing prescriptions to be emailed rather than fully integrating the e-prescribing module into their patient management systems. Both the literature and key informant interviews suggested that phone consultations predominated rather than telehealth consultations using video-conferencing and other software. Consequently, it is unclear if providers were integrating telehealth modalities to their fullest extent or in line with guidelines.

At a community level, mandates requiring mask use and vaccination for certain groups of workers adversely impacted primary care. PCPs identified that where patient attitudes and beliefs conflicted with these mandates it could deteriorate into stressful and demoralizing encounters. PCPs found it hard to engage these groups in education and to correct misinformation and disinformation. In some cases, vaccine mandates for health care workers led to loss of staff from practices which caused distress for all parties and could lead to worsening of workloads. This was particularly important at a time when staff shortages and high workloads were of increasing concern to primary care practitioners.

Research gaps

This scoping review has identified areas for future potential research to strengthen our understanding of those aspects of the response in primary care that enabled practices to work flexibly, efficiently and provide good care. Some of these are research areas where data was identified in the scoping review, but where further research is required. Others are areas where there appears to be no current research agenda.

It is clear from this scoping review that telehealth has been an important tool for primary care practices throughout the Covid-19 pandemic. Across the three phases the notion that adoption of telehealth would open future possibilities and new models of care was expressed. This was premised by the near universal adoption of telehealth in some form in general practice. However, it is unclear if and how this will endure post-pandemic. Practices appeared to predominantly use telephone calls as their main methodology for virtual care and expressed concerns about the availability and competence in using telehealth. There was concern that telehealth visits were perceived by patients as lower value and whether patients would find this modality acceptable outside of pandemic conditions. Others believed that the convenience and ease of access would make this a preferred option. Over the scoping review it was rare that telehealth that integrated video and/or remote monitoring devices such as home blood pressure or blood sugar monitors was described. Consequently, an important research question to examine is *What does telehealth look like for primary care in the inter-pandemic period?*

Deferred or delayed care was referred to frequently in the literature, and in key informant interviews in the Nelson-Tasman region. There were different aspects to why

care may be deferred or delayed described in the literature or by participants. Firstly, the impact of lockdowns was recognized, with patients choosing not to attend primary care, either because they thought their health issue was not serious enough to warrant attention or because they were fearful of attending health care settings due to risk of Covid-19. Secondly the widespread adoption of telehealth has been described as elevating risk, as it lacks key sources of clinical information that would otherwise be able to be obtained in a face-to-face visit. The lack of physical examination and observations such as temperature or blood pressure, and the additional complexity of arranging diagnostic investigations such as laboratory investigations added to the risk that a health care issue may not be identified and acted upon in a timely way. Thirdly, was the impact of delaying or deferring routine primary care including chronic disease management, and screening and opportunistic care due to recued availability over periods such as lockdowns. Fourthly, PCPs identified the difficulty accessing secondary and tertiary care services, especially during lockdown periods.

Across the scoping review the concern that serious health problems might be missed that would otherwise be picked up during in-person care, was expressed. While this concern was shared frequently it was not quantifiable. Consequently, an important research question in the primary care context of New Zealand is *to what extent did delayed or deferred care occur? What are the associated the health impacts and how serious are these?*

This is a significant concern for future pandemics. A related research question is to understand *what is the role of proactive population care in a pandemic?* Across the scoping review attempts to identify priority groups and reach out to them proactively

were described. It is important to understand what tools were used to achieve this and how successful it was in averting adverse outcomes. There may be an opportunity to harness the data held within patient management systems to understand this.

The pandemic had significant social and emotional impacts for the population as a whole and specifically for primary care. Across the scoping review issues were identified including fear of covid and the impact on PCPs and their families, the impact of workload and financing as stressors for PCPs and the impact on them of wider social issues including the implementation of mask and vaccine mandates and the growth of misinformation and disinformation were all raised. Some of these have ethical dimensions to them as well, for example the ethical implications of allowing workers to work while unvaccinated, potentially putting patients at risk, vs. the ethical impact of reducing access to healthcare when job losses result from mandates. Some articles in the peer reviewed literature were identified in phase one of the scoping review and attempted to quantify the psychological sequelae of these stressors, however these were all set in Australia. These issues were raised in the Nelson-Tasman key informant interviews, but the researcher perceived that saturation was not achieved in this theme. Consequently, there is an opportunity for further research to examine the question: *what were the social and ethical impacts of the Covid-19 pandemic in primary care and what can be done to mitigate these for future pandemics?*

It is recognized that indigenous rights and the Treaty of Waitangi is embedded in the administrative culture of policymaking in New Zealand. [120] There was concern, identified in the policy mapping and to a degree in the key informant interviews, that the legacy of colonization including disparate access to care and health outcomes

increased the risk to Māori from pandemic disease, and there was a recognition and expressed commitment that policy decisions in the pandemic should not perpetuate these inequities. There were few articles identified that addressed this in relation to the phase two research questions. Important elements at a local level in key informant interviews included authentic leadership from Māori and Pacific led organizations, outreach to priority populations and the provision of social supports for those isolating, and data sharing to identify those at high risk. Barriers identified included communication strategies that were not effective in reaching priority populations, and delays to vaccine uptake nationally. However, there was variation and inconsistency in consultation and implementation of acceptable approaches between the policy mapping component of the scoping review and the key informant interviews, and little discussion in the literature. It appeared from the policy mapping that while equity was prioritized in policy documents, that national approaches that prioritized equity and protected priority populations were not implemented and gaps often only recognized in retrospective reviews. In the key informant interviews several successful local Māori and Pacific led approaches were described. More research could elucidate: *what enablers and barriers specifically facilitated successful management of the pandemics for priority populations (for example Māori and Pacific peoples) in New Zealand?*

A number of key factors were identified that were integral to the success of multiple initiatives locally in the Nelson-Tasman region to support the Covid-19 response. Some related to supporting infrastructure such as technology and the ability to share data. Many more related to relationships between key actors, trust, and enabling attitudes such as adaptability, collaboration, resourcefulness, integrity and sense of shared purpose These factors were described across the scoping review but particularly in the

Nelson-Tasman key informant interviews. These enablers were particularly important in facilitating rapid action to achieve shared goals and facilitating trust-based contracting. Several participants described the importance of having the right people in place to achieve outcomes and shared goals for the community. It is clear these enabling features were in place before the pandemic and that work across the pandemic fostered and consolidated these dynamics. Anecdotally, it was not the experience across some other regions. This is an area that needs further exploration and research. A research question might be: *what are the underlying enabling structures, activities or organizational arrangements are that promoted trust and collaboration in the Covid-19 response?*

Long covid was not included in this scoping review. It was noted briefly by some interview participants as the "next issue" to arise from the pandemic. It is a phenomenon that is not yet fully understood clinically and where long-term outcomes for patients are not clear. Covid-19 is somewhat unique amongst other diseases of pandemic potential that such a significant proportion of cases (estimated at 1 in 10 patients) may survive but experience long-term disability because of their infection.[249]Similarly, in the New Zealand context, the identification and management of myocarditis as an adverse outcome of Covid-19 vaccination was a concern for PCPs and the wider population. While these issues were identified as issues of concern across the scoping review, further research is needed to quantify the magnitude of these, identify at-risk groups and understand how surveillance for these could be better integrated into the pandemic response. The impact of these ongoing pandemic associated diseases, on primary care resourcing and management, is yet unknown. While the management of these diseases is not directly related to pandemic planning

there are important questions for the sector about *how should surveillance be conducted, not only for the primary disease of pandemic potential but for associated conditions and how should the primary care sector be resourced to identify and manage these in the community*?

Revised conceptual framework.

The conceptual framework developed by Patel et al. looked at the impact of pandemic influenza in primary care and proposed a framework to guide planning.[38] This study aimed to revise and augment that conceptual framework with new learning from the experience of Covid-19 in New Zealand and specifically the Nelson-Tasman region. The adaptation of an existing conceptual framework will increase its utility for planning and appraisal of pandemic-related activity in primary care.

This framework was useful in guiding this study. A central focus was preparedness for future pandemics, specifically in what lessons we can learn from the experience of primary care in the Covid-19 pandemic. As such this framework provided a great deal of utility in guiding how studies in the literature review could be analyzed and in guiding the interview guide for the key informant interviews. In general, the domains of practice described were found to be a good fit for the responsibilities of primary care services in New Zealand which generally mapped to one of the four domains and challenges anticipated broadly aligned with what was elucidated from the scoping review and key informant interviews.

One important overarching modification to the framework would be to recognize that the risk of pandemic disease extends beyond influenza. The global experience of coronaviruses (MERS, SARS and more recently Covid-19) and the recognition of other outbreaks such as Ebola and MPox, indicate that preparedness requires a holistic approach that is malleable to different diseases. A finding across this scoping review was that planning which was confined to pandemic influenza caused delays in the initiation of pandemic response activities. It is important for the future that we plan for a variety of pathogens and as such the language in the revised conceptual framework has been changed to refer to "pandemic disease".

Another important consideration in modifying the framework was how it related to the chronology of Covid-19 and of pandemics in general. As evidenced by this scoping review, and particularly the description of pandemic context and policy mapping, the experience of Covid-19 has been of successive pandemic waves and outbreaks in different regions, which continue to today. It is essential that pandemic waves are identified quickly so that the actions require to modify models of care in response to the pandemic can be rapidly initiated. Krist et al point to the fact that the "re-design" of primary care in a pandemic must recognize and respond to the epidemic curve of the disease. Building on the work of the Centers for Disease Control framework to address pandemic influenza, they identify specific primary care readiness activities aligned with six phases – investigation of early disease, recognition of a pandemic, initiation, acceleration and deceleration of pandemic disease, and preparation for future waves. [246] It was important this was integrated into the revised conceptual framework to signify that planning is not static but must be reactive and that opportunities, constraints and choices will adjust with pandemic waves. This is signified by the addition of an arrow

indicating the successive pandemic waves at the bottom of the model shown in Figure 9.

A further feature for consideration was how the framework aligned with the four phases of the emergency response cycle. Certainly, in the New Zealand context, pandemics are managed using the same structures of emergency management as we would a flood or another natural disaster – mitigation, preparedness, response and recovery.[250] Key differences however include the prolonged length of time that may be spent in "response" and the need to sustain activity across multiple pandemic waves. In order to integrate this into the model an additional column comprising considerations for recovery and mitigation was included. These two phases of emergency management were combined as recovery activities to incorporate mitigation or elimination of previously unforeseen or unrecognized risks. A bi-directional arrow at the top of the revised conceptual framework indicates that practices and PCPs will need to move from preparedness to response to recovery/mitigation and back again depending on the recognition of the onset of a pandemic wave.

This scoping review indicated that the communication and policy context was largely outside the control of primary care practitioners. Certain practitioners and leaders had influence through professional bodies where they had leadership roles or as senior regional managers who were included in national planning, but for most in the primary care sector the decisions of the Ministry of Health, and the way these were communicated to PCPs and the wider public, were outside their sphere of influence. Similarly, the response in primary care was constrained by what was perceived by practitioners as underinvestment in government financing of the sector and an aging

workforce and lack of PCPs across general practice. Again, while components of this lie within general practice, including investing in workforce and physical infrastructure at a practice level and advocacy, there are also external forces that must be recognized.

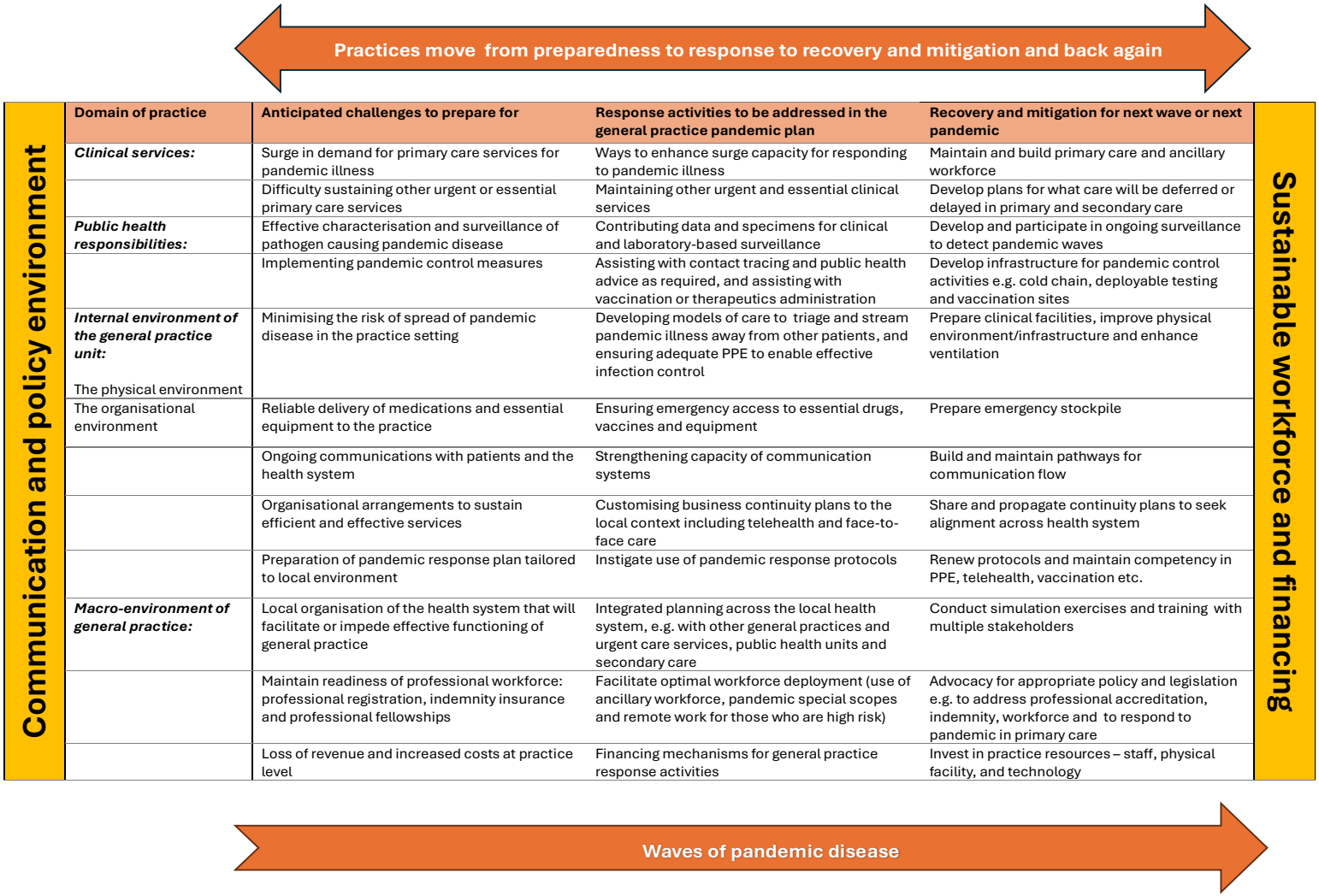
For this reason, in the revised conceptual framework shown in Figure 9 the macro environment has been disaggregated into what those areas of communication and planning, that can be influenced and shaped by practices and the broader policy and communication environment that they cannot (shown as a bold stripe to the left of the domains of practice). Also sitting outside the macro-level domains of practice, is sustainable workforce and financing, as the status of this leading into a pandemic, and coming out of the pandemic, is shaped both from within the general practice environment and without (shown as a bold stripe to the right of the conceptual framework). This also serves as a prompt, in the recovery and mitigation phase, for practices to consider how through advocacy they can seek to effect change in plans, policies, procedures and/or legislation that influences their roles and responsibilities during the pandemic.

Based on the finding of this scoping review and the triangulation across the three components, the contents of the rows and columns of the conceptual framework have been modified with language adjusted to be clearer on domain components. A key new addition is the row under organizational environment referring to local response plans. While this may seem redundant, when the purpose of the conceptual framework is to guide planning, it is apparent from the scoping review that plans were inappropriate (e.g. targeting pandemic influenza), not available or practitioners were not engaged in the response planning. It is recommended that response plans are documented and

tailored to local and practice context. When used these can then move through a cycle where they are modified, exercised and revised in readiness for future waves or other pandemics. This needs to be done in parallel to planning that ensures business continuity across the spectrum of primary, secondary and tertiary care and allied health.

Potential modifications to the conceptual framework are displayed in Figure 9.

Figure 8 The modified conceptual framework



Domain of practice	Anticipated challenges to prepare for	Response activities to be addressed in the general practice pandemic plan	Recovery and mitigation for next wave or next pandemic
Clinical services:	Surge in demand for primary care services for pandemic illness	Ways to enhance surge capacity for responding to pandemic illness	Maintain and build primary care and ancillary workforce
	Difficulty sustaining other urgent or essential primary care services	Maintaining other urgent and essential clinical services	Develop plans for what care will be deferred or delayed in primary and secondary care
Public health responsibilities:	Effective characterisation and surveillance of pathogen causing pandemic disease	Contributing data and specimens for clinical and laboratory-based surveillance	Develop and participate in ongoing surveillance to detect pandemic waves
	Implementing pandemic control measures	Assisting with contact tracing and public health advice as required, and assisting with vaccination or therapeutics administration	Develop infrastructure for pandemic control activities e.g. cold chain, deployable testing and vaccination sites
Internal environment of the general practice unit: The physical environment	Minimising the risk of spread of pandemic disease in the practice setting	Developing models of care to triage and stream pandemic illness away from other patients, and ensuring adequate PPE to enable effective infection control	Prepare clinical facilities, improve physical environment/infrastructure and enhance ventilation
The organisational environment	Reliable delivery of medications and essential equipment to the practice	Ensuring emergency access to essential drugs, vaccines and equipment	Prepare emergency stockpile
	Ongoing communications with patients and the health system	Strengthening capacity of communication systems	Build and maintain pathways for communication flow
	Organisational arrangements to sustain efficient and effective services	Customising business continuity plans to the local context including telehealth and face-to-face care	Share and propagate continuity plans to seek alignment across health system
	Preparation of pandemic response plan tailored to local environment	Instigate use of pandemic response protocols	Renew protocols and maintain competency in PPE, telehealth, vaccination etc.
Macro-environment of general practice:	Local organisation of the health system that will facilitate or impede effective functioning of general practice	Integrated planning across the local health system, e.g. with other general practices and urgent care services, public health units and secondary care	Conduct simulation exercises and training with multiple stakeholders
	Maintain readiness of professional workforce: professional registration, indemnity insurance and professional fellowships	Facilitate optimal workforce deployment (use of ancillary workforce, pandemic special scopes and remote work for those who are high risk)	Advocacy for appropriate policy and legislation e.g. to address professional accreditation, indemnity, workforce and to respond to pandemic in primary care
	Loss of revenue and increased costs at practice level	Financing mechanisms for general practice response activities	Invest in practice resources – staff, physical facility, and technology

Policy and Practice Implications

A significant component of the success of the primary care response in Nelson-Tasman, as described in the key informant interviews, was strong relationships in the region. This led to trust and reciprocity being exercised in the sharing of resources, flexibility in contracting and an attitude of collaboration and adaptability. The health of the population was front of mind and the key objective was achieving good outcomes whether it be in maximizing testing capacity, improving vaccination rates or enhancing care of those sick with Covid-19. The strength of these relationships was seen in pandemic response governance structures and local communication pathways.

It is unclear how the large-scale reorganization of the New Zealand health system will impact local features that strengthen the connectivity between primary and secondary care. These changes have eliminated local DHBs and, to centralize services, have removed some of the autonomy in local service commissioning and delivery of primary and community care that was previously the remit of DHBs. Strengthened regional bonds, for example across the entirety of the South Island for secondary and tertiary care services are a desired outcome of the reforms, but there is fear this may come at the expense of local relationships that span Māori-led, primary care and secondary care services. Concerns remain about inadequate funding for primary care as a sector, inadequate workforce, as more practitioners intend to retire than are trained to replace them and the implications for patients as practices close their books and/or the out-of-pocket cost of services in primary care rises. Any reforms to primary care are still not announced so there may be further

impacts for this sector. It is important that reforms do not create silos where there previously was collaborative working and coordinated leadership regionally across primary and secondary care.

Consequently, it is important to consider what learnings there are from this scoping review that would strengthen the development and implementation of primary health care policy. Indicative findings from this scoping review include:

1. The sector can rapidly pivot and reconfigure when given the resources to do so as was evidenced by the rapid transformation to telehealth as Covid-19 emerged.
2. Regional co-ordination that spans public health, primary care, secondary care and providers form priority populations, especially Māori, is essential for effective and coordinated leadership.
3. Siting key pandemic response activities outside of primary care may be beneficial for both access and infection control but practices and patents want options and moving activity out of primary care carries resource and financing implications.
4. Primary care services, including pharmacies and general practices vary in their physical premises, staffing, size, ownership and models of patient care. This diversity influences their ability to prepare for pandemics and to instigate recommended response and recovery/mitigation activities. It is important to recognize that "one size doesn't fit all".
5. Maintaining supply chains, especially for PPE and medicines, is essential to primary care and wider health care system functioning. It is also important that

processes for monitoring and distributing stocks and accepting orders are clearly developed and that principles guiding use and fair access are articulated.

6. Unfettering appropriate resourcing that sets outcome goals and trusts providers to identify the ways and means to achieve these outcomes is both feasible and prudent in the context of good governance and effective communication.
7. Technology is an important enabler both for facilitating and expediting models of patient care and for leveraging data to ensure priority populations are reached.
8. Relationships, trust, collaboration and coordinated leadership are important enablers, but the mechanisms by which these can develop and become established between partners are unclear.
9. Pandemics are a time of frequent change and disruption. Communication is vital to maintain connections and facilitate consultation and implementation of pandemic responses. To facilitate this, it is essential that agencies and institutions think how communication can be targeted, non-duplicative, highlight key messages and what channels can best reach the intended audience.
10. Primary care participants are keenly aware of their role and responsibilities in the wider system and decisions about resourcing, payment, access to PPE and the support they are given are extremely influential in how they perceive they are valued and acknowledged for their work. These decisions were especially impactful in an environment where participants identified fear of covid, fear for their and their family's safety, and levels of stress and burnout as pronounced. The sector relies on the work and in some case goodwill of primary care practitioners to reduce impacts on secondary care and maintain care in the community. Policy decisions

that privilege parts of the health sector over primary care can have damaging effects on morale.

The following recommendations are made to address the policy and practice implications of this research:

3. At the practice level:
    a. Develop pandemic plan and test regularly – locally, and regionally. Ensure this spans both business continuity and clinical care.
    b. Continue to improve physical infrastructure of practices including building plant, ventilation and technology.
    c. Prepare the workforce through regular training and simulation.
4. At the level of the regional and national health systems:
    a. Use system level levers to grow the primary care and ancillary workforce.
    b. Embed sustainable financing for primary care.
    c. Identify sustainable supply chains for medicines and PPE and develop policies and procedures for fair distribution and access.
    d. Plan for strategic communication including pathways to update, collate and disseminate.
    e. Invest in relationship development especially local relationships and plan for program governance and accountability.
    f. Consider how commissioning policies, especially around contracts, can facilitate rapid development and initiation of programs and clinical services.

Study Limitations

There are some challenges and limitations identified in this study. First and foremost is the fact that, as a dissertation, this is a study led by a single "embedded researcher". While this researcher has expertise in qualitative methods and approaches, scoping reviews are noted to benefit from the engagement of a team in the research. This assists with both the volume of material that must be covered and in having the ability to share ideas and debate and refine study conclusions across researchers with, ideally different disciplinary backgrounds and different areas of subject matter expertise, and who thus encounter the raw data in different ways. [36]

Several actions described in the study methods sought to counter this limitation. Firstly, through the expertise of the dissertation committee the researcher has been challenged to further refine this study aims and methods. Similarly, the experience of interviewing key informants, who had a variety of views and beliefs and who prioritized different experiences, required the researcher to engage comprehensively with all facets of the pandemic response in primary care. Secondly in the data analysis phase, the use of a secondary coder, to code a proportion of the key informant interviews, strengthened the analytic output by seeking consensus on the codebook developed and consistency in its applications to the raw text of coded interviews to enhance reliability. Thirdly, because of the nature of this study as a scoping review, with an aim being to identify areas where further research is needed, the balance of breadth over depth was an accepted limitation of the study methodology.

The volume of data was a significant issue to manage, and this impacted all phases of data collection, Issues included frequently changing public and institutional policy, and the long timeline of the pandemic causing significant changes on the context of the pandemic and the experience for primary care as a sector and an immense production and publication of new literature related to the Covid-19 pandemic of varying quality. To manage this volume, it was important to undertake the scoping review process of engaging and familiarizing with the literature as a whole before applying post-hoc inclusion and exclusion criteria. In the key informant interviews this extensive scope of the literature manifested as a broad interview guide which surfaced a variety of key themes related to the scoping review, but limited the in-depth interrogation of complex topics and meant in some topic areas "saturation" was not achieved.

A further limitation to the study is generalizability. This has been limited in two facets. Firstly, the geographic range of participants in the key informant interviews was limited, both due to interview capacity being reached and due to the locations of participants identified through snowballing and other sampling techniques. As a result, the sample was limited to those within the Nelson-Tasman region. This limits the generalizability of the sample. Secondly no patient/client perspectives were sought, due to capacity in including studies in phase two (the literature review) and capacity in phase three, key informant interview numbers. This limits the generalizability of the study to provider perspectives only. Outside of these factors the purposeful sample was a diverse mix of primary care leaders and practitioners. Generalizability across the study was enhanced by triangulation across the rich account of the contextual and policy environment of primary care as

described in phase one, with the peer-reviewed literature (inclusive of Australia and New Zealand), and the key informant interviews.

An identified limitation of scoping studies is also present in "the potential bias in the perception and interpretation of a subject due to a researcher's prevailing academic discipline and research interests". [36] As a Public Health Physician, researcher and doctoral student in health policy and health systems, and as someone who worked in the Covid-19 response in New Zealand in a public health unit and who is now employed by National Public Health Service in Nelson-Marlborough, the researcher is uniquely placed between insider and outsider status. The researchers work, and previous roles in public and community health facilitated access to individuals who participated in key informant interviews. This also enhanced the researchers' credibility in conducting this research. The researcher has a unique viewpoint having experienced the Covid-19 pandemic response, albeit working alongside primary care in another medical specialty (Public Health Medicine). A potential limitation of this may have been (in some interviews) a need to "save face" or conceal negative outcomes. It was not apparent to the researcher that this occurred. The researcher's perception was most participants felt able to speak frankly as the rare events with a poor outcome or areas of conflict were already known of by both parties, though it is not possible to confirm this. It is still possible, as in any qualitative process, that bias may be present, either for or against certain initiatives or ideas that surface in the study. To minimize the impact of this the researcher engaged in regular journaling and close analysis of data and its interpretation to ensure that credibility and reflexivity are preserved.

Next steps: Implications for Dissemination

This work allowed scopes and summarizes the status of the literature, provides a chronology of the pandemics policy and contextual environment, and outlines the experiences of key

informants, regarding the role of primary care in a pandemic. The study is strengthened by the ability to triangulate and synthesize across different qualitative data sources. Research and policy gaps from this scoping review have been articulated. The revised conceptual framework is anticipated to support general practice in planning for future pandemics and strengthen the capacity and capability of primary care to effectively function in a pandemic response.

A concrete outcome of this work is intended to be a written summary of the scoping review outcomes. This will be useful for policy makers and practitioners in the field, particularly as health reform progresses. This will focus on scoping review phase one, two and three findings, outlining research and policy gaps and "lessons learned" including how to prepare the primary care sector for a pandemic, and how to enhance the role and performance of primary care in the Covid-19 pandemic in New Zealand and future pandemics.

Opportunities for dissemination of key research findings could include publication in local journals including the New Zealand Medical Journal, conference presentations and one on one meetings with policymakers locally and in the New Zealand Ministry of Health. There

is also an intent to share research findings in local fora including with the primary care sector and HNZ regional teams.

Conclusion

This study addresses an important area of health care, the response to global pandemics of disease, and highlights the experiences of primary care, a key component of our health care system. The scoping review synthesizes across an existing body of evidence in peer-reviewed literature, highlights the chronology of the pandemic response in primary care and the impact of policies and decisions on this, and incorporates interviews with relevant stakeholders, to extrapolate both the context of the pandemic response, and barriers and facilitators to success in controlling the pandemic in NZ. This study offers an innovative approach to combing qualitative methods to triangulate findings across multiple sources and facilitates the development of recommendations to strengthen the response to future pandemics, and to identify gaps in our existing knowledge that could be addressed in future research.

Appendices

Appendix 1: The New Zealand health system

Origins, a pandemic and major system reform

The aim of the New Zealand health system (as per the New Zealand Health Strategy) is twofold – to achieve health equity for the diverse communities that make up New Zealand, especially Māori, Pacific peoples and disabled persons who currently have poorer health outcomes, and secondly to improve health outcomes for all New Zealanders. [251]

The government has identified six priority areas for action which are:

1. Voice at the heart of the system - Giving people, whānau and communities greater control and influence over decisions about their health and the design of their health services and embedding their voices in system planning, delivery and reporting on health care.
2. Flexible, appropriate care: Developing services that adapt to people's health needs and expectations, are focused on preventing ill health, are delivered closer to our homes and communities and support access for all.
3. Valuing our workforce: Recognizing our health workforce as our most valuable asset and supporting the development of sustainable, diverse, skilled and confident workers for the future.
4. A learning culture: Creating a culture of continuous learning and quality improvement, supported by research, evaluation and innovation.

5. A resilient and sustainable system: Ensuring our health system is prepared for future shocks and we make the best use of resources to manage demand and affordability over the long term.
6. Partnerships for health and wellbeing: Building cross-sector and cross-government relationships to drive collaborative actions on health and wellbeing and the factors that determine health outcomes. [251]

The context pre-01 July 2022

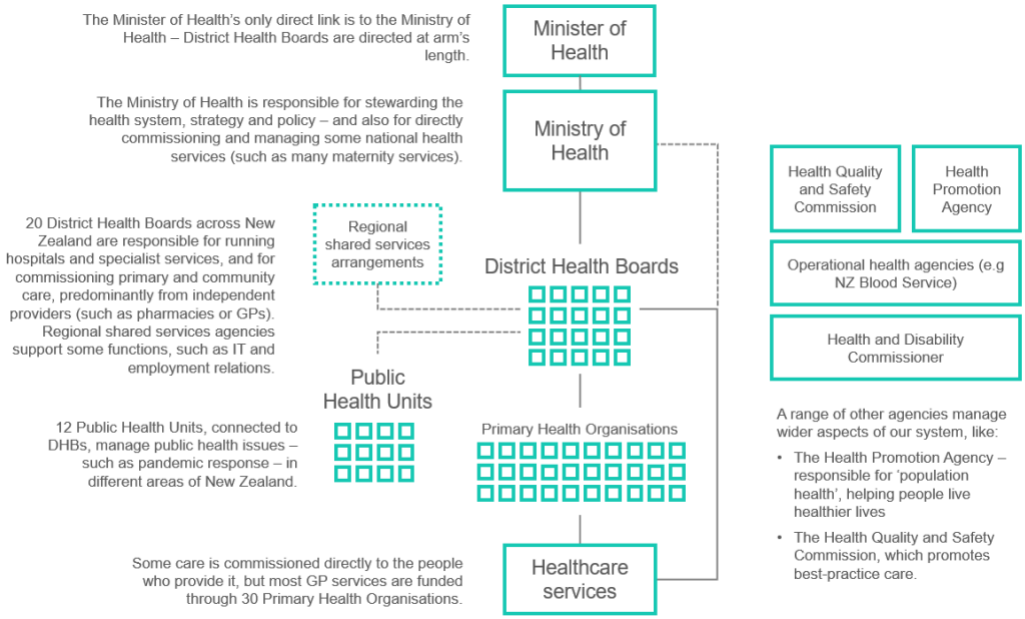
Prior to 01 July 2022, the development of health policy, health planning and the operation of the health care delivery system were all overseen by the New Zealand Ministry of Health. The ministry, led by the Director-General of Health, was the key agency for developing health policy in New Zealand. They were responsible to the Minister of Health, and associate ministers, who sit in the Prime Minister's Cabinet and who set the policy based on ministerial advice and their campaign priorities. Under this system, health care budgets were set annually in the government's budget and allocated alongside a government-directed set of priorities to each of 20 District Health Boards (DHBs). DHBs were responsible for applying policy and locally planning for their region and then contracting or delivering health services for a geographic region.

DHBs oversaw the spectrum of health care delivery for their region, from primary care (which is contracted from external providers) to the delivery of secondary and tertiary services for which they directly employed staff and managed facilities. They provided

most of the secondary and tertiary care in government owned hospitals and health care facilities. They also directly provided, sometimes through regional agreements, public health services. Access to secondary assessment and services were rationed and prioritized by the DHB and hospital-based specialists after receipt of referrals from primary care. This was based upon available funding, available staff and clinic or bed capacity and acuity of the individual's condition, however criteria are often criticized as being opaque and varying from DHB to DHB. The New Zealand Health system prior to 01 July 2022 is described diagrammatically below in Figure 10.

DHB's, in this system, also constituted the funding and contracting agents for primary care and community-based services. DHB's maintain contracts with a variety of private and non-governmental providers for the delivery of primary and community services, including pharmacies, disability support and primary care. Community-based dental care, optometry and physiotherapy services are not generally publicly funded in New Zealand (with some exceptions for accidental injury and children's dental care).

*Figure 4 Diagram of the New Zealand health system structure prior to 01 July 2022**



*Reproduced from the Government White Paper "Our health and disability system" June 2021. [252]

The New Zealand health system context – the case for reform

The arrival of Covid in New Zealand coincided with a period of significant change for the New Zealand Health system. After forming a minority coalition government in 2017, the Labour led government, announced in early 2018 that a wide-ranging review of the New Zealand Health and Disability system would be undertaken. The purpose of which would be to "identify opportunities to improve the performance, structure, and sustainability of the system with a goal of achieving equity of outcomes, and contributing to wellness for all, particularly Māori and Pacific peoples". The drivers for this review were twofold- firstly the manifold pressures on the system with an aging population, rising incidence of

chronic disease and new technologies, and the recognition that there were persistent disparities in access and health outcomes for Māori and Pacific New Zealanders. The panel was instructed to meet by August 2018 with its final report to be delivered by 31 March 2020 – just as Covid was knocking on the doors of New Zealand. [253]

The review published their interim report in August 2019. This process, and its findings, was critiqued for a failure to consult adequately by representatives of the disabled community in New Zealand. [254] While recognizing that in terms of total health expenditure and overall health outcomes, the health system generally performed well and similarly to OECD peer nations, this phase of the review focused on identifying the core challenges facing the health and disability system in New Zealand.

Key findings from the report coalesced around several core themes. The system overall was perceived as complicated and fragmented, contributing to unclear decision-making processes and accountability from leadership, and a lack of public trust. There was concern that the ways people worked within the system was impairing productivity with a professions and organizations not optimally collaborating or cooperating.

There was a widespread concern about inequity of outcomes for different populations experiencing the health and disability system. Populations including Māori and Pacific peoples, those living rurally and people living with a disability experienced inconsistencies and variability in care, difficulty accessing services and were worse off in terms of the wider social determinants of health such as housing and employment. Consumers reported

barriers that included financial costs, alongside time, transport and difficulty accessing culturally appropriate services. [255]

In June 2020 the Final Report of the Health and Disability System Review or "The Simpson Report" was published. This review, in its preface, aimed to provide an evaluation of the overall function of the health and disability system and whether the system is balanced towards wellness (as opposed to treatment of illness), promoting equity, and ensuring that system-levels reforms are sustainable. [256]

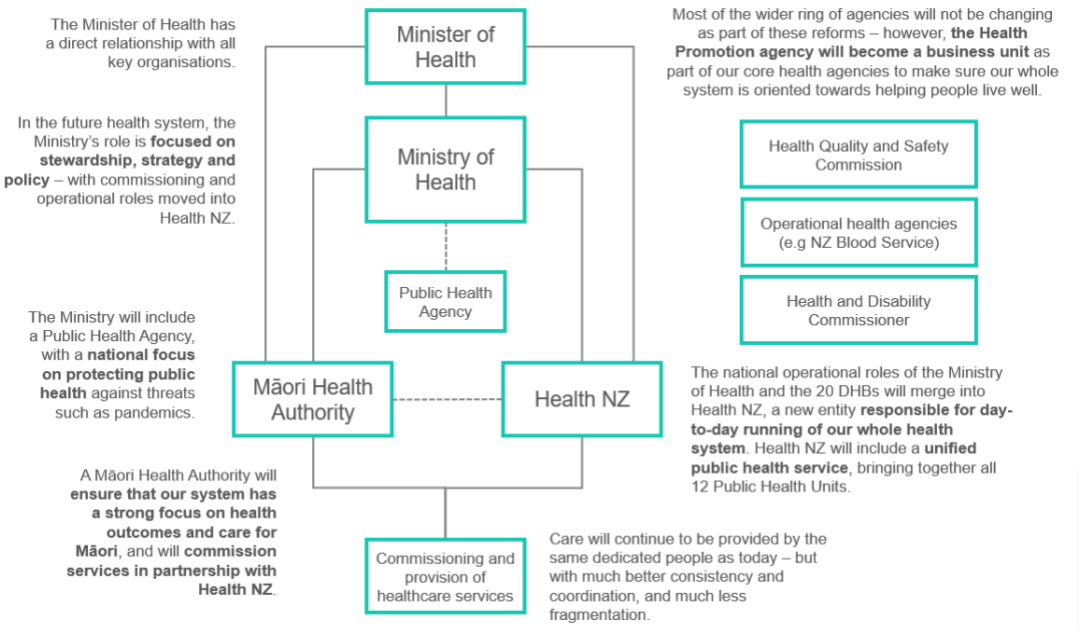
The review made many recommendations that affected all levels of the health system including having population health as the driver of the system, reconfiguring crown agencies that coordinate and deliver health system operations and establishing an independent Māori health agency, possibly with its own role as a commissioner of services and increased centralization of services through a reduction in the number of DHBs. [256]

The now Labour majority government responded to this advice with an extensive reform that went much further than the proposed changes in the final report. The government white paper presaged change by identifying four key issues in the existing health system that they sought to address which included:

- inequitable outcomes for Māori, Pacific communities, disabled people and others.
- limited national planning.
- insufficient focus on and investment in primary and community care; and
- a 'postcode lottery' which means the care you receive depends on where you live. [252]

The "new" New Zealand Health system is described diagrammatically below in Figure 11.

*Figure 5 Diagram of the New Zealand health system structure after 01 July 2022**



*Reproduced from the Government White Paper "Our health and disability system" Updated June 3, 2021. [252]

The context post-01 July 2022

The passing of the Pae Ora (Healthy Futures) Act in June 2022, among other changes, established Health New Zealand: Te Whatu Ora. 01 July 2022 marked the beginning of a new era in New Zealand health sector reform with the first day of operation of this entity. Instead of the previous decentralized system of health care delivery, all DHBs transitioned to a single new crown entity. Under this structure the Ministry of Health retains its role in

policy and planning, and Health NZ is responsible for the delivery of secondary and tertiary care and the contracting of primary care services New Zealand wide. The previous 20 DHBs have become district offices of Health NZ and have amalgamated into four regions: the lower, middle, and upper North Island of New Zealand and the South Island.

Health NZ plans and manages all health services, including hospital and specialist services, national contracts, and primary and community care. Primary health, wellbeing and community-based services are planned and then purchased through the four regional divisions. The emphasis has been on centralization of service delivery as a means of improving efficiency and reducing duplication, ensuring coordination and comprehensiveness of services, and eliminating regional and local disparities in access to care and outcomes of care.

In parallel, the Labour government established Whaikaha or the Ministry for Disabled People which is responsible for the commissioning and delivery of disability support services, and Te Aka Whai Ora, a Māori Health Authority established to work in partnership with Health NZ to commission services and to support the Ministry of Health to ensure the health system performs for Māori. Te Aka Whai Ora was rapidly disestablished by the new National party-led government in February 2024.

Public Health functions were also split into policy and planning and delivery arms. The Public Health Agency was established within the Ministry of Health to provide national leadership on public health policy, strategy, and intelligence, while existing Public Health

Units were brought together into regional offices within a National Public Health Service as part of Health NZ. [252]

The New Zealand health system - performance

Overall, the New Zealand health system performs relatively well compared to peers, though improvements can be made. In its 2021 analysis of 11 high-income countries, the Commonwealth Fund ranked New Zealand 6 of 11 overall, similar in performance to the United Kingdom and Germany. New Zealand ranked highly for care process (1st) and administrative efficiency (3rd). However, it was ranked lower for access to care (5th), health care outcomes (8th) and equity (9th). [257] This pattern of performance is relatively consistent with what was observed in the same report in 2017. [258]

The rankings are based on international surveys of consumers, and clinicians, conducted by the Commonwealth Fund. Issues identified in the survey that contributed to lower rankings included:

1. Barriers to affordability - skipping dental care because of cost, and cost-related barriers to accessing medical care.
2. Impaired timeliness of care – inability to receive a response from a usual primary care doctor to a query within a day, to see a doctor or nurse when needed on the same or next day, difficulty accessing after-hours care and a low percentage of respondents reporting receiving counseling or treatment for mental health in the last 12 months.

3. Equity (focused on income-related disparity) - a larger inequity between people with below-average income and those with above-average income for affordability of care, access to after-hours care, their regular doctor spending enough time with the patient, a clinician explaining things in language they can understand and a clinician having knowledge of their medical history (i.e., care from a "usual" doctor.
4. Health outcomes – second highest rate of infant mortality at 4.7 deaths per 1000 live births, and second highest 30 day in-hospital mortality rate following ischemic stroke. [257]

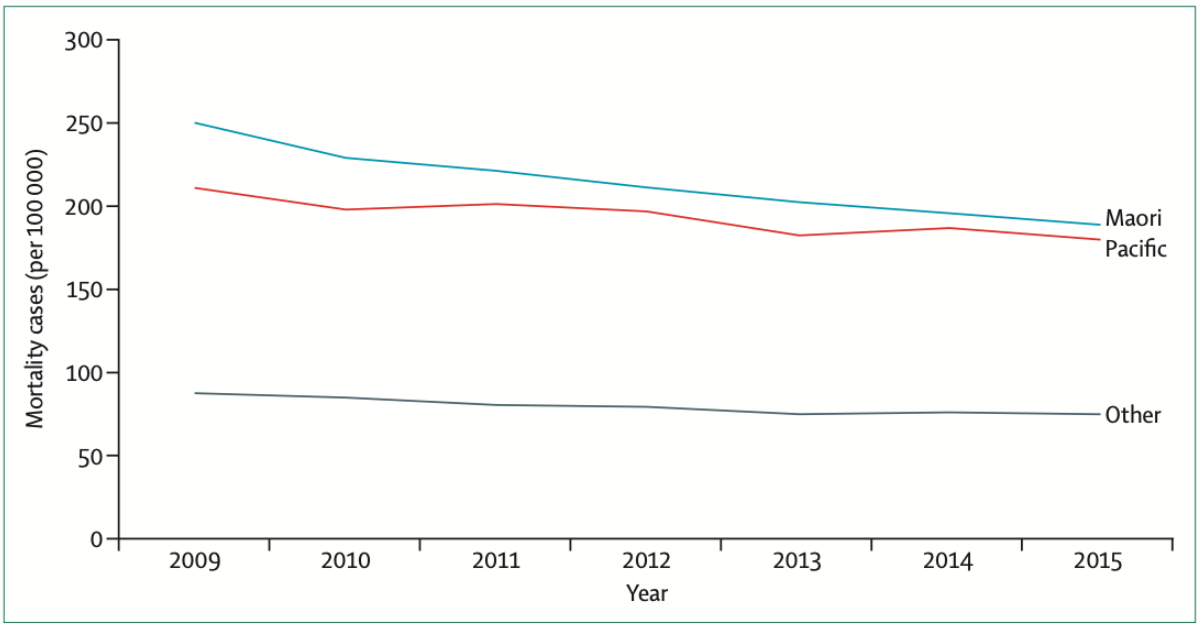
These issues are consistent with some of the key concerns and issues New Zealand health and policy researchers identify with regards to the New Zealand health system as whole. In practice, health service coverage and access for New Zealanders varies by individual income, need, rural or urban residence, and the type of health service required. Out-of-pocket payments (including co-payments and other health expenditure) are estimated to comprise 12.6% of total health expenditure in 2015.[259] One of the main forms of out-of-pocket payments are co-payments for primary care for children over 14 and adults. While these have been limited to NZD $17.50 in low-income areas (estimated to reach approx. 1/3 of the population) these can be much higher in other areas, up to NZD $50 or more. [259] This is an important component of primary health care funding. As primary care is the gatekeeper to accessing most other health services, finance al barriers to access here also constitute barriers to access for the health system in general.

The New Zealand health system – equity and access

New Zealand has a relatively small and very geographically dispersed population. This combined with long travel distances in remote areas means an estimated 16% of the population or 700,000 New Zealanders are living in locations where they do not have timely emergency medical service access to advanced hospital level care by road or air. Māori and older adults are over-represented in these communities. [260] As such, after-hours and emergency care in rural locations is usually provided by the local GP(s) who are on-call. GPs are scarcer in rural locations. Only an estimated 21% of GPs work in rural locations despite 25.9% of the population residing rurally. Smaller settlements may have one or no local general practice meaning limited choice of providers. [261] Indicators of GP workforce shortages include the higher number of foreign-trained medical graduates working in rural general practice (a response to immigration incentives for doctors intending on entering rural practice) and the higher percentage of rural general practitioners working full-time rather than part time. [69]

There are persistent inequities in health outcomes between Māori, Pacific peoples and other New Zealanders as demonstrated in Figure 12 below. [21] Disparities exist in underlying social determinants of health including housing and household wealth, and with over-representation of Māori amongst current smokers. These broader determinants manifest as lower life expectancy, persistent gaps in life expectancy between Māori and non-Māori, and higher infant and maternal mortality. [262-264]

*Figure 6 Mortality from conditions amenable to health care in New Zealand**



*Reproduced from F. Goodyear-Smith and T. Ashton in The Lancet 2019. [21]

A further dimension, which can be predicted to exacerbate the adverse consequences of the Covid-19 pandemic on the Māori and Pacific communities is the inequities they experience in access to health care. Barriers to access include:

- The cultural competency of services, and the experiences of Māori patients who identify cultural alienation and racism in their experiences of health care.
- Out-of-pocket costs, particularly the co-payment for those aged over 14 in primary care, which is more commonly cited by Māori than non-Māori as a barrier to seeing a general practitioner; and
- Disparities in access to secondary care services, including specialist assessments in the public health system and equipment for Māori people living with disabilities. [265]

When Māori do access services, evidence suggests that the quality of care is diminished both in terms of provision of optimal clinical care and in professional dimensions such as communication. [265] An overarching issue that underlies this issue is systemic and structural racism. The experience of racism is prevalent in New Zealand, as it is internationally, and in systematic review, is consistently associated both with poor access to health services and poor health outcomes. [265-267]

It is important, in the New Zealand context, to recognize that health inequities for Māori are increasingly interpreted as a breach of the obligations of the crown under the Treaty of Waitangi/Te Tiriti o Waitangi. The Waitangi Tribunal was established in 1975 to investigate alleged breaches of this historic agreement between European settlers and Māori chiefs in New Zealand. In 2019 the tribunal released the report Wai2575 which investigated health policy, health service delivery in primary care and health outcomes in the context of Te Tiriti. This report identified that the crown had a responsibility to ensure equitable health outcomes of policy decisions and to actively protect Māori health and wellbeing. This report argues that the persistent disparities observed in New Zealand are in effect a breach of the crown's treaty obligations. Issues identified include government inadequately taking account of Te Tiriti in the legislative and policy frameworks, inadequately funding Māori specific health services, and lack of accountability to Māori for deficits in funding and service delivery. [268]

Appendix 2: Study components and analyses

Strategy	Sample/Data sources	Aims	Analysis
Policy Mapping	Publicly available material on New Zealand government websites and RNZCGP, and New Zealand Doctor (public domain materials) New Zealand Legislative databases	• To contextualize the policy features of the New Zealand response to the Covid-19 pandemic and the implications of these for the delivery of primary care services in New Zealand following declaration of a global pandemic. • Map legislation across the pandemic • Describe political context, the elimination strategy and any constraints and opportunities identified in policy documents for the primary care response to the pandemic. • Refine the conceptual framework.	Document review and data charting and basic qualitative analysis of content

Literature Review	Published literature in electronic databases.	• Review the evidence on how primary care services have evolved in response to Covid-19 nationally and in comparable health systems, and the response activities undertaken including: • Examples of primary care roles and responsibilities during the pandemic, in New Zealand and internationally. • Examples of how service delivery changed and adapted in response to the pandemic • Any barriers and enablers identified in the literature.	Qualitative synthesis
Key Informant Interviews (semi-structured)	Purposive Sample: • Those involved in planning and commissioning of regional primary care services:	• To understand the perspectives of key stakeholders in primary care in the Nelson- Tasman region of New Zealand with a key focus on: • Characterizing primary care responses to the pandemic. • To identify barriers and facilitators to successful control of the pandemic in primary care.	Thematic analysis using NVIVO

	• District Health Board lead staff in primary care contracting. • Those involved in or organization and support of primary care: • Public Health • PHO • Those involved in care delivery: • Individual practices –GPs, practice nurses, and administrative support staff	• "Lessons learned" to improve preparedness for future pandemics.	

Appendix 3: Phase 1 Policy inclusion and exclusion criteria

Overall:	**Explanation:**
Legislation passed in parliament or policy published after January 1st, 2020.	It is anticipated that law or policy published earlier than this will not be specific to the Covid-19 response.
Legislation that is published on https://www.legislation.govt.nz OR a policy document published by one of the following agencies: • The New Zealand Ministry of Health • The Department of Prime Minister and Cabinet • The New Zealand Legislation Website • The Royal New Zealand College of General Practitioners • The New Zealand Medical Council	These are identified as locations where laws and policies to which effect can be given would be published.
The language was limited to English	Legislation and policy in New Zealand is published in English which is the main language of government.
Inclusion criteria:	

The law or policy must be applicable to primary care whereby applicable means: "affecting or relating to a person or thing".	Primary care is the setting of interest and thus laws or policies, to be relevant, must be applicable to this setting.
AND	
The law or policy must relate to the Covid-19 pandemic.	This study is specifically interested in the impact of Covid-19 on primary care.
Exclusion criteria:	
Laws or policies that are not applicable to primary care	Insufficient information to answer review questions.
Laws or policies that are not related to Covid-19	Insufficient information to answer review questions.
Laws or policy published prior to Jan 1st, 2020	Prior to emergence of Covid-19
Laws or policies developed by countries, institutions or agencies that are not from New Zealand	Not applicable to the New Zealand context.

Appendix 4: Phase 2 Scoping review inclusion and exclusion criteria

Overall:	**Explanation:**
Published after January 1st, 2020, and before December 31st, 2023.	It is anticipated that studies published earlier than January 2020 will not be specific to the Covid-19 response as the disease had not yet emerged.
Publications were limited to the peer reviewed literature.	
Studies for inclusion were limited to quantitative or qualitative research where there was new primary data collection.	Due to the diversity of study types identified in preliminary analyses the decision was made to only include original research but to encompass a variety of data collection methods including surveys, interviews, case studies and other methods.
The language was limited to English.	Due to inability to access reviewers with advanced language skills in other languages.
Inclusion criteria:	

Study must be set in primary care	Primary care is the setting of interest and thus studies that describe the experiences of secondary and tertiary are excluded from analysis.
AND	
Study must describe impacts of the Covid-19 pandemic (either due to the new roles and responsibilities assumed or the change in existing roles and responsibilities).	This study is specifically interested in the impact of Covid-19 on primary care.
AND	
Study must be set in New Zealand or Australia.	Due to the surfeit of publications the decision was made to limit the review to New Zealand and to Australia as a directly related and comparable health system where finding may be more readily generalizable.
Exclusion criteria:	
Studies that are not set in primary care.	Insufficient information to answer review questions.
Studies do not address the impacts of Covid-19.	Insufficient information to answer review questions.

Published prior to Jan 1st, 2020.	Prior to emergence of Covid-19 and therefore not relevant to this pandemic.
Studies occurring in countries other than Australia and New Zealand.	Unable to effectively compare health care systems

Reasons for excluding papers on full-text review:
Research describes the experiences of the Covid-19 pandemic in secondary or tertiary care settings or on specific medical specialties other than primary care.
Research does not involve primary data collection e.g., opinion pieces, commentary, editorials or other anecdotal evidence.
Scoping or literature reviews excluded as objectives did not include metanalyses.
Research was conducted prior to the Covid-19 pandemic but reported in the context of Covid-19 e.g. in interpretation of findings.
Research that does not include results of primary data collection e.g. clinical trials that are registered or where a study protocol is available but where there are no results available.
The data collection includes primary and secondary or tertiary care, but results are not stratified i.e. it is not possible to identify primary care results separate to other practice types.
Scientific or technical papers that do not address the change in roles and functions of primary care including: Testing of diagnostic or therapeutic agents for Covid-19 in primary care.

Research on pathogenesis and disease characteristics of Covid-19 e.g. duration of infection, transmission pathways, prevalence of infections. Research focused on patient outcomes related to Covid-19 e.g. physiological parameters or resolution of infection. Research addressing vaccination uptake or beliefs in patient populations. Research addressing vaccines safety, immunogenicity, efficacy in health care workers. Analyses of changes in visit volumes in primary care.
Scientific or technical papers where there is no primary data collection including: ExpeSDDrt opinion or interpretation of ethical issues related to the pandemic. Clinical guidelines
Research addressing the experiences of providing education and training to medical students or other healthcare workers training in primary care during the Covid-19 pandemic.
Insufficient detail to generalize roles or functions to primary care team e.g., specialized programs in primary care where target population is a subpopulation of general practice population or where focus is novel management of a specific health care issue e.g., group sessions for chronic disease management, addiction services, targeted programs for homelessness, or domestic violence.

Appendix 5: Phase 2 Scoping review search terms

Search terms:
(“primary care” OR “primary health care” OR "primary healthcare" OR "general practice” OR “general practitioner” OR “general practitioners” OR “primary care practitioners” OR “primary care physicians” OR “family practice” OR “family physician” OR “family physicians”)
AND*
(“Covid-19” OR “COVID-19” OR “SARS-CoV-2” OR “coronavirus”)
AND*
("roles" OR "responsibilities" OR "service delivery" OR "barriers" OR "enablers")

Appendix 6: Phase 2 Scoping review included articles

Study Author	**Country**	**Study type**	**Study population**	**Time period of data collection**	**Key findings**
Ng, I, et al. [234]	Australia	Quantitative - survey	GPs and hospital medical staff (GPs n=389)	August to October 2020	Compared with hospital medical staff, GPs received significantly less training on PPE and caring for Covid-19 patients. GPs were more concerned about household income, and disease transmission to family. Significantly more GPs reported burnout, and experienced moderate-to-severe emotional exhaustion than HMS.
Nepal, S, et al. [233]	Australia	Quantitative - survey	Staff at Aboriginal Community Controlled Health	June to August 2020	36% reported a COVID-19-related change in their role and 64% were concerned about becoming infected. Despite the pandemic, most staff (69%) were satisfied with their job. Overall, 25% had high

			Services (clinical and non-clinical) (n=92)		emotional exhaustion and 30% had high to very high psychological distress.
Ashley, C, et al. #1 [209]	Australia	Qualitative - interviews	Primary care nurses (n=25)	September to November 2021	Nurses were concerned about disease transmission to family. Nurses varied in their perspective as to whether they felt valued in their workplace and by the community. Some nurses were concerned about job losses, especially as they (at that stage of the pandemic) did not have billable items for telehealth and there was much less face to face care being provided. This caused stress and anxiety.
Haque, M, et al. [225]	Australia	Qualitative - interviews	GPs, Practice nurses and Practice	August and October 2020	Discusses barriers to providing testing for Covid-19 in general practice including personal factors such as risk of catching Covid-19, lack of appropriate PPE, ack of appropriate clinic facilities, financial

			managers (n=14)		risk, and lack of knowledge and guidelines on testing.
Chiu, K, et al.[216]	Australia	Policy space analysis	Pharmacists	April 2020 to July 2021	Discusses opportunities that have arisen from the pandemic and how they might constrain or expand a pharmacist's scope of practice. For example, electronic prescribing or pharmacist-administered vaccinations.
Wilson, G, et al. #1[241]	New Zealand	Qualitative - free text survey responses	GPs, nurse practitioners, practice nurses and practice managers (n=78)	May to August 2020	There was a rapid adoption of electronic prescribing in general practice. This has some benefits including minimising in-person consultations and paper prescription handling and efficient and streamlined processes. Potential issues included technical barriers e.g. incompatible systems. There was initially increased demand for repeat medications, and at the same time, concern that

					vulnerable patients did not have usual access to medication.
Campbell, C, et al. [215]	New Zealand	Qualitative - interviews	GPs and community pharmacists (n=8)	October to December 2020	E-prescribing transformed workflow. This was generally positive for GPs (time saved and work flexibility). Positive benefits for pharmacists were offset by new challenges in managing software, timing of dispensing and patient expectations).
Wilson, G, et al. #2[242]	New Zealand	Qualitative - free text survey responses	GPs, nurse practitioners, practice nurses and practice managers (n=78)	May to August 2020	Telehealth was perceived to improve flexibility, convenience and save time and transport costs by allowing patients and GPs to operate the technology in the location of their choice. Technical issues were a problem for both patients and providers and there was concern some priority groups may be missing out. There were concerns about its financial acceptability to patients Overall it was envisioned

					as part of the future model of care for general practice.
Smyth, L, et al.[237]	Australia	Qualitative - interviews	GPs (n=11)	January to May 2021	Telehealth use was expanded due to circumstance of pandemic requiring limited social contact and facilitating payment for telehealth. It was seen as beneficial especially for rural patients. Risks were identified of missing something when limited to phone or video consultation. Technological barriers were identified e.g. with internet availability.
Mullan, J, et al. [232]	Australia	Qualitative – Focus and group, interviews and free text responses	GPs (n=36)	June to October 2020	Describes a "virtual community of practice" initiated to support GPS with learning and advocacy. This was seen as an effective model both for information transfer and to provide support to individual practitioners, and very important as an advocacy channel for issues impacting primary care. It was unclear how this could be sustained

					over time and what the measures of success would be.
James, S, et al. [211]	Australia	Qualitative - interviews	Primary care nurses (n=25)	June to August 2020	Reviewed nurse use of telehealth in general practice. Some were experienced with telehealth and were relatively better prepared in terms of having the technology available and knowing how to use it. Telehealth enabled patients to access care but did not support complex clinical assessment. Participants indicated that patient engagement in telehealth was dependent on having technology available and confidence using technology, and the value they placed on care via telehealth. Many participants expressed frustration about (what was initially) limited telehealth funding in Australia limiting their ability to undertake billable consultations.

Hardie, R, et al. [226]	Australia	Qualitative - focus group.	GPs and primary health network staff (n=11)	August 2021	Discussed the rapid evolution of telehealth. Barriers included privacy risks when using own devices, reimbursement and availability of the technology and knowing how to use it and concerns about internet availability. There were concerns that telehealth would impact and worsen quality of care e.g. because a physical examination couldn't be performed.
Wikaire, E, et al. [240]	New Zealand	Qualitative - interviews	GPs (n=5 out of 14 total interviews)	Not described	Benefits of telehealth included convenience (time saving), safer and more private. Challenges included the right equipment (for patients and providers) and knowing how to use it. Providers acknowledged for patients a barrier could be understanding health literacy to participate in the consultation actively e.g. to take their own temperature.

Halcomb, E, et al. #1 [222]	Australia	Quantitative - survey	GPs, nurses or allied health professionals in primary care (n=217)	December 2020 to March 2021	Telephone was the dominant method of providing telehealth, with less than 50% of participants using a combination of telephone and video. Barriers to telehealth use related to the inability to undertake physical examination or physical intervention. Telehealth was perceived to improve access for some priority populations (e.g. elderly, low income, disabled) and rural patients but there was concern about access for people from non-English-speaking backgrounds. Quality of telehealth care was considered mostly or somewhat the same as care provided face-to-face, though there was a concern about missed or delayed diagnosis.
Ashley, C, et al. #2 [214]	Australia	Qualitative - interviews	GPs, nurses or allied health	July to August 2021	Discussed the rapid adaptation to telehealth, with the perspective that the pandemic would be a catalyst for long-term adoption of telehealth. The

			professionals in primary care (n=33)		sustainability of telehealth depended of sustainable funding, recognising it was a convenient and safe option alternative and developing hybrid models that integrated telehealth alongside face-to -ace care and developing better support (infrastructure, training etc).
Snoswell, C, et al. [238]	Australia	Quantitative – descriptive statistics	NA	March to and May 2020.	From Feb 2020 to May 2020 in person consultations reduced form 10.8 million to 8.2 million and Covid-19 related telephone billable episodes of care increased from zero to 4.2 million. Covid-19 related videoconference items went from 0 to 0.1 million.
Giles, M, et al. [221]	Australia	Quantitative and Qualitative - survey	GPs, Primary care nurses, Midwives and	November to December 2020.	Vaccination services adapted because of the pandemic introducing infection control procedures (booked appointments, triaging, waiting in cars, reduced observation period etc.).

		with free text responses	Pharmacists (n=850)		
Abdi, I, et al. [213]	Australia	Quantitative and Qualitative - survey and interviews	GPs, Primary care nurses, and Pharmacists (survey n=341 and interviews n=19)	Survey January to March 2022. Interviews December 2021 to February 2022	Discussed communicating with patients about Covid-19 vaccines. Almost half of survey participants reported that they often were communicating with people who were hesitant about Covid-19 vaccines 1 in 5 reported inadequate time to address concerns during consultations. Barriers included time constraints, difficulties addressing and eliciting patient concerns, and keeping up to date with changing information.
Morgan, T, et al. [231]	Australia	Qualitative - interviews	GPs and primary care nurses (n-=15)	April to July 2021	The roll out of the Covid-19 vaccine was seen as difficult for general practice and came at the cost of routine care. Vaccine hesitancy and fear was a major challenge to the provision of all

					immunizations, exacerbated by shifting policy recommendations related to COVID-19 vaccine adverse events and poor communication from government bodies, which contributed to a perceived erosion of patient trust in general practice. Routine immunization was minimally disrupted.
O'Brien, K, et al. [235]	Australia	Quantitative and Qualitative - survey with free text responses	GPs (n=72)	July 2021	Counselling patients about COVID-19 vaccines and vaccination was common, increasing the duration of routine consultations by 6 min on average. Challenges included resulting time pressures, patient anxiety and navigating shifting government recommendations and the way these had been communicated which was perceived as increasing anxiety.

Ashley, C, et al. #3 [210]	Australia	Qualitative - interviews	Primary care nurses (n=25)	June to August 2020	The sudden disruption caused by the pandemic required rapid adjustment to service provision to ensure safety including stopping some services. Telehealth became an important tool for care delivery. The impact of changes to service delivery was particularly challenging for priority populations and there were concerns about the potential long-term health impact on communities due to delayed and deferred care.
Hor, S, et al. [227]	Australia	Qualitative - interviews	GPs, nurses or allied health professionals in primary care (n=20)	November 2020 to August 2021	Participants described a variety of infection prevention strategies utilised to stop the spread of Covid-19 in primary care—including telehealth, screening of patients and staff, altered physical layouts and portable outdoor shelters, and PPE use. These were guided by local protocols and national

					policies, which changed frequently as the pandemic evolved.
Eggleton, K, et al. #1 [219]	New Zealand	Qualitative - free text survey responses	GPs, practice nurses and practice managers (n=482)	May 2020 to February 2021	The rapid institution triage, e-prescribing and telehealth was noted. It was perceived that while it was challenging to move rapidly to this, it was ultimately a positive change to the model of care. Challenges included technology availability and whether it could be used e.g. by person with English as a second language, patient perception of the value of telehealth and concern that something might be missed in a telephone or video consultation. The rapid changes in primary care included infection prevention and control practices such as “streaming” patients and seeing patients in portable shelters. In general, a rapid upskilling of staff was required.

Atmore, C, et al. [143]	New Zealand	Quantitative – descriptive statistics	A single general practice	Two weeks in 2020 (24 March to 3 April) were compared to the same two weeks in 2019 (26 March to 5 April).	20% of the patient population had contact with the practice in both years. In 2020 there were similar visit numbers for accidents or acute care, but less reviews of long-term conditions and more repeat scripts than in 2019. here may have been more access to face-to-face consultations for patients living in the most and least deprived areas compared to others.
Copp, T, et al. [217]	Australia	Quantitative and Qualitative - survey including some free	GPs and GP registrars (doctors in training) (n=295)	March 2021	Challenges for GPs include patients presenting in person with flu-like symptoms, fears for themselves and their family and concerns about delayed and deferred care. More education and resources about vaccines was identified as the top information need, which will assist with what GPs perceived to be a

		text responses			key role in patient education and providing COVID-19 vaccines.
Ashley, C, et al. #4 [212]	Australia	Qualitative - Interviews	Primary care nurses (n=25)	June to August 2020.	Participants described challenges including lack of availability of appropriate PPE or directives suggesting they did not need a certain level of PPE due to lower community risk and the impact that had including fears for their own safety. They described risk mitigation including limiting face-to-face interactions by reducing patient access or reducing time spent with a patient. Some described fear for their families. Many identified fear and anxiety amongst patients and were concerned this led to deferred care due to reluctance to attend for face-to-face care.

Halcomb, E, et al. #2 [223]	Australia	Quantitative and Qualitative - survey with free text responses	Primary care nurses (n=637)	Not described	44% reported a decrease in hours and threatened or actual loss of employment. Respondents had good knowledge of Covid-19 but were concerned about risks to themselves and their family. Most respondents described never or only sometimes having adequate PPE available.
Halcomb, E, et al. #3 [224]	Australia	Quantitative and Qualitative - survey with free text responses	Primary care nurses (n=637)	April 2020	Nurses identified the ley supports required to successfully deliver care during the OCivd-19 pandemic. These included access to PPE, Communication supports, including protocols, education and up to date information, better funding for nurse provided services and job security. Nurses noted concerns in their workplace relating to feeling supported by management and overall, the need for greater recognition of their orle and service.

Davis, J, et al. [218]	New Zealand	Qualitative - Focus group	Primary care nurses (n=3)	August to September 2021	Describes the experience of three nurse -leaders working with Māori as a priority population. Identifies their role in providing health information and navigating a complex health system on behalf of their communities.
Sotomayor-Castillo, C, et al. [239]	Australia	Quantitative and Qualitative - survey with free text responses	GPs (n=244)	June to September 2020	Most GPs (77%) had a good knowledge of Covid-19 and felt prepared to manage patients but over half had not received training in PPE use. Concerns included the risk of catching Covid-19 at work, scarcity of PPE, managing information overload and dealing with stress and a heavy workload.
Wilson, G, et al. #3[243]	New Zealand	Qualitative - free text survey responses	GPs, nurse practitioners, practice nurses and	May to August 2020	GPs were concerned about the early pandemics impact on delaying patient care as patients were not seeking care as they normally would for new problems. Due to fear of Covid-19. This was

			practice managers (n=78)		especially noted for elderly and other high-risk populations. Other contributing factors were financial (cost of appointments when employment was scarce) and delays form the wider health system. A risk of missing things due to lack of physical examination was noted. A number of adverse events were reported but this study could not quantify the risk of serious sequelae overall.
Eggleton, K, et al. #220	New Zealand	Quantitative and Qualitative - survey with free text responses	GPs, practice nurses and practice managers (n=482)	May 2020 to February 2021	Rural practices less likely to use telehealth than urban practices and had fewer staff absent from work and possibly lower reductions in patient volumes. These variations might be related to personal characteristics of rural as compared to urban practices or different models of care.

Mashal, N, et al. #1 [229]	New Zealand	Qualitative - embedded multiple case study design	Sixteen general practices (86 interviews with GPs, nurses and Practice managers and administrative staff)	Not described	Case study discusses the role of practices in the public health response as CBACs. Practices implemented a variety of infection prevention and control practices. Practices planned outreach to priority populations including Māori and Pacific patients. Telehealth was adopted rapidly.
Mashal, N, et al. #2 [230]	New Zealand	Qualitative - embedded multiple case study design	Sixteen general practices (86 interviews with GPs, nurses and	February to April 2021	Telehealth uptake was rapid requiring short-term solutions while longer term use was planned for. Enablers of a rapid transition to telehealth and other technological supports such as e-prescribing included agility and adaptability of general practices.

			Practice managers and administrative staff)		Major barriers to digitalisation in the early stages of Covid-19 included lack of organisational leadership, lack of financing and staff and patient availability of technology and knowledge on how to use it. There were concerns that telehealth had adversely impacted quality of care.
Russell, G, et al. [236]	Australia	Qualitative - multiple case study design	Six general practices (26 practice employees interviewed)	April 2020 to February 2021.	Issues that arose due to the pandemic included shortages of PPE, frequently changing advice from government bodies and issues with reimbursement of telehealth and overall practice income. Practices instituted infection control practices, but staff were fearful for their and their family's health. Telehealth use expanded but there were concerns about missed diagnosis and quality of care,

Kippen, R, et al. [228]	Australia	Quantitative and Qualitative - survey with free text responses	GPs (n=572)	April and May 2020	Though 57% had a pandemic plan, for half of these it was not fit for purpose. Practices note an array of challenges that affected practice operations across domains including infection control complexities, communication and reimbursement issues. The majority of respondents had experienced increased workload and reduced income.

Appendix 7: Phase 3 Participant Information and Consent form

What is this research study about?

The purpose of this research study is to understand the context and experiences across the Covid-19 pandemic in primary care services in the Nelson-Marlborough region of New Zealand. This includes describing the impact of the pandemic on when, where and how services were delivered, describing the new roles that were undertaken by primary health organizations and practitioners in the pandemic, outlining any challenges that emerged for primary care services as the pandemic response evolved, and understanding what policy and system settings supported or prohibited an effective response to the changing circumstances of the pandemic. The interviewer will seek your opinion and perceptions based on your experience working in the primary care sector during the pandemic, including what worked well and what we can learn from.

Why have you been chosen to take part in this research study and what happens next?

You have been identified as being a "Key Informant" because you have worked extensively as a manager, administrator, or primary care practitioner (GP or Nurse) during the pandemic. Your participation is voluntary. If you would like to learn more, then you are welcome to send any questions via return email and/or a brief telephone call can be arranged to discuss the study. If you agree to participate, your written consent will be sought for involvement in the study prior to commencement of the interview.

What will you be asked to do?

You will be asked to participate in an approximately one-hour individual or group interview which will be conducted over zoom. The interview will be recorded digitally for the purpose of being typed up into an interview transcript. Interviews will be undertaken by the study investigator - Dr Alexandra Greig. All interviews will be individual unless you and a colleague notify the researcher that you would prefer to take part in a joint interview.

Do you have to participate?

No, you do not have to participate. If you decide not to participate, it will not impact in any way on your relationship with the investigator, Nelson Marlborough Health or the George Washington University. You do not need to give any reason for declining to participate. You can also change your mind about participating once you have started and withdraw from the study at any point prior to the conclusion of the analysis. If you withdraw from the study prior to data analysis concluding any previous interview you have contributed will be excluded from analysis and all data files deleted. If you withdraw subsequent to data analysis having concluded your interview will be retained in the analysis, however only aggregated, de-identified data collected from interview transcripts will be analyzed for the emergence of broad themes. You may also request to review or amend your interview transcript, if you wish to do so, by contacting the study investigator.

What are the benefits and risks of participation?

Participating in this interview will not benefit you directly. However, it does provide an opportunity to share your views and contribute to our understanding of the experiences and perspectives of those working in primary care during the pandemic. The possible risks to participation are emotional distress – for example if questions in the interview cause you to reflect on difficult experiences that occurred during the pandemic. This risk will be moderated by the interview questions which focus on broad and general questions describing the roles and responsibilities of primary care, the activities undertaken in response to the pandemic and the barriers and facilitators identified. This risk will be mitigated further by providing you with the opportunity for a one-on-one individual interview. You are able to omit questions at any time if you feel uncomfortable without needing to provide explanation.

A further possible risk is the loss of confidentiality - although every attempt is made to keep your personal information and reflections confidential, this cannot be guaranteed. The measures to reduce this risk of loss of confidentiality are described in the next paragraph.

Will my responses be confidential?

Every attempt will be made to keep your personal information and responses confidential. You are encouraged to use personal email address for any correspondence with the study investigators about the study or contents of the interview. You are asked not to name yourself or any others during the interview in order to preserve privacy. You may to refuse to answer or skip any question at any time. If you prefer to be interviewed jointly with a

colleague, while we cannot guarantee the confidentiality of the discussion, we request that all present respect the group by not repeating what is said, outside the group.

Following the interview, the audio recording will be tagged with a unique identifier known only to the interviewer. The unique identifier will be unrelated to the interviewees name. The details of the interviewee(s) associated with the unique identifiers will be stored in a separate password-protected data file available only to the interviewer (who is also the study investigator). This file will be retained only till completion of the data analysis. The interview will then be transcribed by a professional transcription service. Following receipt of the transcription by the investigator it will be checked, and any identifying names or other material will be removed. At this point the audio file will be deleted. Anonymized interview transcripts will only be available to the investigator who will collate and summarize responses for analysis. Interview transcripts from you will not be shown to anyone else. All reports using the interview data will use aggregated data with any identifying information removed to ensure individuals retain anonymity. Direct quotes may be used to illustrate themes that emerge, but these will also be de-identified and not attributable to any individual or entity.

How will the information I provide be used?

The information will be summarized and used to provide general feedback on the experience of the primary care sector during the pandemic including identifying areas where there are potential improvements.

What if you are not happy with the way the study is run?

The Office of Human Research of George Washington University, at telephone number (202) 994-2715, or email address ohrirb@gwu.edu can provide further information about your rights as a research participant.

Who do I contact if I have questions?

Should you want to know more about this study, please contact the study investigator Dr Alexandra Greig at alexandragreig@gwmail.gwu.edu

Dr Greig is a Public Health Physician and Medical Officer of Health in the Nelson Marlborough Public Health Service and is also a doctoral candidate in the degree of Doctor of Public Health at the Milken Institute School of Public Health at the George Washington University in Washington DC. This study is being undertaken by Dr Greig, separate to her role in Nelson Marlborough Health, for the purposes of completing her dissertation.

Appendix 8: Phase 3 Interview Guide

1. **Introduction/opening:**

- Could you tell me a little bit about your background and training, your role, and your practice [name of practice] and how long you have been in your position?
- How would you describe the current status of the Covid-19 response in primary care?
- How did the way you deliver primary care change during the pandemic?
- Did you treat/Did your practice manage nay patients with Covid-19?
- What have been some of the key features or elements that have enabled you/your practice to deliver high quality care in the Covid-19 response?
- What have been some of the key features or elements that have inhibited you/your practice from delivering high quality care in the Covid-19 response?
- How did the Covid-19 pandemic affect the vulnerable and priority populations you and your practice care for?

Specific elements of the response (aligned to the conceptual framework)

2. **Clinical services:**

- What new tasks was your clinic/PHO required to undertake because of the pandemic?
- What activities were dropped or de-prioritized due to Covid-19?
- How did the primary care team change during the pandemic?
- What new skills did you learn because of the pandemic?

- Was there a surge in patients presenting with acute respiratory illnesses during the pandemic?
- If yes, how did you manage this surge in demand?

    Prompts:

    What strategies did you put in place? e.g., triaging patients via phone or nurse triage, extending hours, employing new staff?

    Was any care deferred or delayed?

- What was your experience of accessing specialist consultation and secondary/tertiary care for patients presenting with acute respiratory illnesses?
- Did this impact your ability to manage other non-Covid related illness presenting?

    Prompts:

    What was your experience of accessing specialist consultation and secondary/tertiary care for your patients for non-Covid related problems?

3. Public health responsibilities:

- What did you perceive the role of primary care in surveillance for Covid-19, to be?

    Prompts:

    What role did you have in undertaking testing for Covid-19 in the community?

- What did you perceive the role of primary care in controlling the spread of Covid-19 to be?

    Prompts:

    What was your experience of providing medical care to those in isolation or quarantine for Covid-19?

What was your experience of providing assessment and care for those in aged residential care?

What role do you perceive primary care has in the delivery of Covid-19 vaccinations?

4. Internal environment of the General Practice unit

Physical environment:

- What strategies did you practice put in place to minimize the risk of spread of Covid-19? For example, use of PPE, Separation of practice into red or green zones, Perspex barriers for reception areas, etc.
- Were there any features that acted as barriers/made it harder to minimize the spread of Covid-19 in your practice?
- Were there any features that enabled/made it easier to minimize the spread of Covid-19 in your practice?
- Did you feel safe in going to work that the physical environment did not put you at risk of contracting Covid-19 yourself?

Organizational environment:

- Did you experience any challenges in maintaining a supply of essential goods and services? e.g., PPE, medications etc.
- What promoted or enabled the supply of essential goods and services?
- What inhibited or disabled the supply of essential goods and services?
- Did you experience any challenges with maintaining the primary care workforce during the pandemic? Prompts: Staff sickness (Covid or non-Covid related), existing

staff shortages, staff moving to work in MIQ, Testing or Vaccination centers, early retirement, burnout or mental health issues, indemnity insurance.

Ongoing support for communications:

- How did you keep in touch with your patients during the pandemic?
- How did you use telemedicine during the pandemic?
- Were there other ways technology helped in the way the practice was managed during the pandemic? Or in the way patient care was delivered?

Organizational arrangements:

- How did the Covid-19 pandemic impact business continuity?

Clinical decision making:

- How did you stay updated on changes in clinical advice and policy changes relating to Covid-19?
- Did you receive any additional training or education?
- Were the available guidelines useful to you in delivering care during the pandemic?

5. Macro-environment of General Practice:

Planning

- How were you engaged in local/regional/national planning during the pandemic?

Legislation/Policy

- How did government legislation/policy/decision-making promote effective care during the pandemic?
- How did government legislation/policy/decision-making inhibit effective care during the pandemic?
- Were you able to implement government legislation/policy/decision-making?
- Was there anything that you were unable to implement? Why?

Financing

- How did the Covid-19 pandemic affect financing of primary care/your practice?

6. Closing:

- Is there anyone else inside your organization or outside your organization that you would recommend we should we speak to?
- Is there anything important that we have not asked about that you would like to share with us?

Appendix 9: Phase 3 Themes emerging from the key informant interviews with exemplary quotes	
Concept/domain	***Exemplary quote(s)***
Theme 1: The current status of the pandemic	
1A. Returning to business as usual	"*It's … become business as usual now. So, we are seeing far less positive cases (and) that's not actually seeing them… That's positive cases registered within the practice. So, in terms of our business, we still screen for respiratory illness and isolate it, but other than that it's business as usual." (Interview 1, Nurse)* *"I'd call it business as usual now. We've got some really good systems and processes internally and externally in place. Which allows it to be embedded into that normality. It does increase workflow and pressure, but there's a sustainable method in the delivery." (Interview 5, Leader)* *"It's a welcome relief. You get back to pharmacy again, really." (Interview 3, Pharmacist)*
1B. Recognition covid-19 is still a concern	*"I suppose it's been moved a little bit to the back burner but (Covid-19 is) … still simmering away". (Interview 12, GP)*

	"It ha(s) become much more normal work, but just making life a little bit harder because of the PPE component and the needing to keep physical separation between people and respiratory medicine being … a very common thing that you see in primary care." (Interview 13, GP) *"It's almost like being in cancer remission. We know it's there and … pharmacy at the moment is going through a bit of a recovery period where we're able to re-look at ourselves and rebuild ourselves and our energy, but mindful of the fact that we're still very active in COVID care in the community, particularly through our antiviral services and ongoing COVID vaccinations, which are actually still quite surprisingly high. And getting sort of the community prepped for what could be the next wave potentially, or the next big vaccination campaign potentially as well." (Interview 4, Pharmacist)*
Theme 2: Public health responsibilities – new tasks	
2A. Successful delivery by PHO of the CBAC	*(Discussing the establishment of the first CBAC in Nelson) "That was no easy task, getting that done. We got that set up within five days from processes, pathways, location, set it up internally. But not only that, we actually built it, got the IT system internally so we could make sure it was digitized right from the beginning, so all the results could be transferred to the GPs. Because …we wanted to*

	make sure all our practices were aware when a patient was testing and what that result was. … And it was initially all primary care. So, I had communicated out to partners to look at a way that we could utilize our GP teams to run the CBAC. So, we used pretty much all the PHO staff to do the admin side and get things done in the background. So, we stopped the majority of PHO services..." (Interview 5, Leader) *"One of the first things that was established was what we called the CBAC…that was a Sunday conversation all of a sudden when the pandemic, at that point we didn't have cases in New Zealand or not known cases anyway, but literally within... I think it took us four days from the request to establish to actually having the first CBAC." (Interview 9, Leader)* *"There was huge uptake in staffing that has occurred, both to be able to do the testing and the vaccination components, but also for providing the (care coordination) hubs some support as well. … all of those things became seven day a week operation for months, if not over a year …and also longer hours. So, where we might have people who would usually finish at four o'clock, some of those services were running into later evenings to enable access for people. The flexibility, I think, by*

	primary care and the PHOs has been absolutely phenomenal to contribute to this." (Interview 15, Leader) *"The PHO did a fantastic job with that. They just did a phenomenal job getting the initial CBAC up and running and like a lot of things that's come out of the pandemic, they realize they had to be adaptable. There'd be a few people through one day and then there'd be an outbreak and there'd be several hundred if not a thousand the next day." (Interview 12, GP)*
2B. Roles for urban general practice staff to work in CBACs	*"I mean, we had a very minimal part to play in that because in this PHO, the PHO set up surveillance CBACs and so they took the bulk of that work. So out from the terms of primary care in general practice, our role was quite minimal." (Interview 1, Nurse)* *"And then we created contracts with the GPs and nurses because at that time GPS had to do swabbing. Things have evolved dramatically since then." (Interview 5, Leader)*

	Interviewer: "And did you have to provide staffing for (vaccination centers) or did that have any impact on your practice in terms of how those operated and worked?" *Participant: "No, there was no obligation to provide staff. I did quite a lot voluntarily, especially initially. I was actually the first GP to put my hand up for that, which I was quite proud of at a time when I didn't even bother to ask whether we were going to get paid for it or not. We were actually paid quite well, which became a major incentive for a lot of people." (Interview 12, GP)* *(Discussing the establishment of CBACS) "Look, (this was) at the time of lockdowns and the business took a financial reduction because we weren't seeing patients. The CBACs were doing all the swabbing, which is actually a time where in general practice terms we could have actually still maintained that financial benefit." (Interview 1, Nurse)*
2C. More limited role for urban general practice in testing	*"Screening for COVID, so the PCR testing initially and then the RAT… that was probably the biggest change. And that included …, when travel was allowed, for those that were traveling (they) needed PCRs initially. So, I think that was the most major change implemented at that time." (Interview 1, Nurse)*

	"We were still offering testing here also at the practice just to minimize patients going to the sites. If they were really elderly or unwell, we would actually test them here as well." (Interview 14, Nurse)
2D. Rural practice role in testing and vaccination	*(Regarding testing:) "We did it ourselves with PHO support. The PHO sometimes sent someone… The swabbing basically, …that was done with our staff entirely. And then the immunization, so we did some of it in clinic and then we also did some in the local stadium. In that the PHO … actually sent … clinicians to help do that because we didn't have sufficient staff. So that was really good. And we got lots of people. We did get lots of people immunized in those more event type immunizations." (Interview 13, GP)*
2E. Community outreach for vaccination	*"When I think about being in full PPE with a bag on my back with emergency equipment and vaccines and then having to literally climb up the gang plank of a ship that was being filled with logs to vaccinate the crew of Filipino crewmen, I had a moment then thinking, oh, I'll probably never have to do this again." (Interview 7, Nurse)*

2F. Establishment of community based Covid-19 vaccination centers	*"And again, with the vaccinations, they (referring to the PHO) took on the lead for providing the majority of the vaccination clinics as well." (Interview 15, Leader)* *"So, we had a huge amount of testing response that we were putting in place… When that was morphing, the immunization program decided to come out, which was great. But we quickly realized we needed more staff… The first day we did 50 (vaccinations), we thought, that was a massive amount. And we had to manage every single dose at that time. So, there was a lot of math's going on at the end of each day. And that was really, we didn't want to lose a dose, but we weren't allowed to offer it to the person walking by. We had to make sure they fitted the criteria. And then that continued, but at the same time we had to open up (site 2) … and then also (site 3)." (Interview 5, Leader)* *"There were days when we first launched the vaccination program where we literally did move workforces between vaccination sites and testing sites depending on where the demand was". (Interview 9, Leader)*

	"I do agree that the health hubs worked well for vaccinating to get the numbers up there and get them up really quick because you simply had to have that resource available for the numbers to get through." (Interview 3, Pharmacist) *"The vaccination clinics... I think this is probably one of the biggest revolutions that the pandemic has brought us… who'd have thought five years ago … that we would have a shopfront clinic, easy access, walk in, no cost, that you could just walk in and get your flu vaccination or your MMR or your Covid vaccination and talk to some nurses. It's changed. People love that." (Interview 7, Nurse)*
2G. Implications of provision of vaccination in general practice	*"So, we didn't take it on, we just didn't feel that we had enough resource to do that. So that was, and still is being managed by our local PHO. Our role has been … encouraging and promoting people to be vaccinated…When the vaccine rollout occurred, the ministry had a very scripted way that we would vaccinate, as in how many staff and things like that you needed…We've been vaccinating since Adam was a cowboy, but because it was a new vaccine, it had so many more criteria around it and the wait times and the staff observing. And that's why we never took that on because we just didn't have those resources to manage that kind of observation…we would (had to have) brought a new*

	fridge, and on it goes... there's some things that I don't think in terms of the cost of this pandemic that we'd ever recover from" (Interview 1, Nurse) *"And then when the vaccinations came in, that was the big one, we had to make a call there, could we do vaccinations and also do general practice? And the insurance says no, we couldn't. So, we opted not to do vaccinations, ... The staff if they wanted could still go to the vaccination hubs and the other hubs and a few of them did for a few sessions, but they found that quite tricky I think because weren't in a small functioning group, they were joining a bigger group and with all of the things that, that entails." (Interview 11, GP)*
2H. Role of pharmacy in Covid-19 vaccination, anti-viral medication and other tasks	*"We've had an increase in services that we offer, and lot of them have been COVID-related, obviously…rapid antigen testing, vaccinations, the immunization passports, vaccine certificates, COVID vaccination records, antivirals, ... So, we've offered a lot of extra … services and I think the pharmacy has done very well to be able to cope with all of that on top of everything else going on." (Interview 3, Pharmacist)*

	(Referring to new tasks) "One of them is vaccinations...we're running clinics, and we've got some amazing pharmacy hubs…second one would be, the obvious one is COVID antivirals, Molnupiravir and Paxlovid." (Interview 4, Pharmacist) *"We hire a more diverse group of healthcare workers. We've got ... nurses and pharmacists and healthcare assistants all sort of working together in a pharmacy where it used to really be pharmacy and technician and that was pretty much it." (Interview 4, Pharmacist)* *"Because of the way GPs work, they'd spit out all the scripts at the end of that five o'clock and email them to the pharmacy at five o'clock. And then on a Friday, their pharmacist couldn't talk to the doctor until Monday. So, their care got delayed, and for some people it was too late because pharmacists can't legally change prescriptions. ...there were a lot of people who were missing out nationally. ...In more recent times, the decision was made to make Paxlovid and Molnupiravir a restricted medicine, so ...if somebody rang up and said, "Hey, look, I've just tested positive. I'm Māori and I'm over 50," then they automatically can have it." (Interview 2, Participant A, Leader)*

	"And the pharmacists, including myself… have found it a really satisfying workload, even though it's extra. Because it's really using our skillsets and its increasing accessibility." (Interview 4, Pharmacist) *(Describing an administrative task that government policy had directed pharmacy to perform) "So, it wasn't something that, say you needed a medical skill to do. The post office could have done it, but they didn't have access to the IT program…" (Interview 2, Participant B, Leader)*
Theme 3: Maintaining clinical services	
3A. Organizational environment – perspectives on the shift to telehealth. **Risks and Issues**	*"So overnight, pretty much general practice, for instance, shifted from largely a face-to-face operational model to doing a lot virtually." (Interview 9, Leader)* *"A lot of our assessments are done triage on the phone. We did do some video work, not very much to be honest. The biggest problem was the quality of the... well it was our IT skills, but also the patient's IT skills and just the quality of the picture. It was much more efficient to actually use a*

	phone. It's a system we're used to using, the patient's comfortable with it. You'll often get much more down a telephone than you will on a small video screen. They'll often disclose more…" (Interview 11, GP) *"We were seeing very few people, probably we were trying to keep with the college guidelines, which I think were at least 70% consults virtual, which once people got their head around that, that was quite feasible. We did about 80% and of that 80%, 99% was over the phone. I'm actually not a big fan of Zoom or ... I don't even like using FaceTime on my phone. I don't know, probably just commensurate with my age but it also is far easier to drive the computer with MedTech up rather than having a consult by Zoom." (Interview 12, GP)* *"There ... always felt like an element of risk because we do a lot with our eyes, ... and the ability to be able to do routine observations, like blood pressures." (Interview 1, Nurse)* *"It's a human world we inhabit and there's nothing quite beats (face-to-face). And I use the monopoly money analogy, so $500 ... is a real person face-to-face, hand on touch. You can do all your stuff.*

	The $100 note is, let's call it the red zone assessment because you're got the barriers there and so forth, but at least you're face-to-face, you've got a mask on and a visor. Then the $50 is the carpark assessment… A $20 note would probably be a good phone consult, $10, you're getting more to perhaps a video Skype and emails…" (Interview 11, GP) *"When COVID first started, most GP surgeries closed the building, went away, and did telehealth. Pharmacies had to be open, and the public went to them because they were the only place that was open, and they were dealing with all sorts of stuff...There were stories like, "Oh, the GP said to come here and get my blood pressure taken because it was too risky for him to do it." (Interview 2, Participant A, Leader)*
Preferences for face to face	*"One surprise, was that we didn't find video work tremendously changed our practice, certainly post COVID as well. So, there's still some patients way up at the top of the south, Durville Island or over in Golden Bay or down in the lakes or even as far as Murchison. And we had rather hoped that after Covid that they would be very much more using video conferencing or chatting or even more keen to do phone work. But they still seem to value the face-to-face connection. They come into town, and*

	they see us, they book us and a lot of the stuff that can be done on the phone, they still want to see you and they seem to (See) value in that. And I thought that would've changed as well. It didn't, certainly not from our patient's perspective." (Interview 11, GP) *"Then when we came out of lockdown, it seemed like pretty much everyone wanted to come in, a few people who still wanted to have a phone consult. But yeah, we had difficulty encouraging people to accept phone or video consults, unless it was presented as ... Perhaps not no other option, but this is definitely the best and recommended option." (Interview 12, GP)*
3B. Upskilling to provide care	*"So, everyone's upskilling really quickly, even at a retail level. Our retail staff became Covid administration staff. Our retail staff also started a program ... which is a level three training program for healthcare assistance. And so, it's just that slight shift from retail to healthcare because they're sort of front facing, (but a) huge shift to workforce." (Interview 4, Pharmacist)* *"There were things that were taken out into… our community more, like now we do all of the diabetes. I rarely talk to a diabetic nurse at the hospital, I'll contact them if I'm really struggling with a patient.*

	But we don't seem to refer many of them now because we've just, I suppose with more experience, you get more confident in things. So, we do that. We do all our venesections, we do the iron infusions, … So yeah, primary health, we are really taking on so much more, and we're upskilling all the time." (Interview 14, Nurse)
3C. The establishment of the CCitC coordination hub in the PHO	*"So, we established what we called a PHOC team, so a PHO clinical team. And they are eight till eight, Monday to Sunday. And they support our general practices if they've got any queries. And at that time, we were all learning (hub software platform) …and the hub was in full swing, and the escalation and our clinical team were responding once the GP practices were closed and also on the weekends and the clinical handovers. So, we had all the processes and documents in play to support that pathway. … And sometimes we had two clinical nurses and two healthcare assistants as well as an administrator depending on the need and demand. Because we'd often get sent out to Rest Homes to do a full surveillance or they'd get sent out to the Camping Grounds or lots of multiple locations." (Interview 5, Leader)*

	"It was that coordination between the PHO and us. If we had people who we were concerned about, I did a lot of ... remote calling on people and if I was concerned, I'd be in contact with PHO and getting them to drop out the oximeters to patients or getting patients in that we felt… doing this sort of between the patient and the doctor, telling the doctor I wasn't happy with where the patient was at. They would ring them and then they would send them into the hospital." (Interview 14, Nurse)
3D. The establishment and impact of the CCitC coordination hub in General Practice	*"The nurses ... would review our allocation of patients every day. With that, we would look into the patient's records and identify their risk factors. If they were relatively low risk and have been vaccinated for COVID. Then we would send them a text message as a welfare, you can contact us. If any of the patients had risk factors, even if it was just one risk factor, we would phone them and just do a well-being check. And we recorded that both in their patient management system and on the (hub software platform). And if they were unwell when they required follow-up, then we would task ourselves to do that. And the next day or a couple of days, anyone that needed review or very unwell, then they were referred to the GP for either a phone consultation or a follow-up in what we called our respiratory clinic." (Interview 1, Nurse)*

	"We had a nurse that was allocated to contacting people, doing risk assessment, and then making sure that they had what they needed and that we were able to give them antivirals if they needed them or just pamol or be in touch with (contracted providers) if they needed social support or whatever to be able to isolate. That actually was relatively simple compared with the rest of it." (Interview 13, GP) *(Referring to implementing CCitC) "(It was a) massive learning curve. We were trying to get some access to (hub software platform) before the Omicron wave. We were told it would be what we're using from late 2021 but couldn't log onto it until literally once the Omicron wave started. And even then it was quite difficult to get a log on…it was still very much learning a new system on the fly with no significant amount of time to prepare…(I) actually found it far easier to work primarily in (patient management system) and then go and cut and paste stuff and then go and fill in (hub software platform), which is inherent with the fact that the software was not built obviously for that purpose." (Interview 12, GP)*

3E. Evolution of the CCitC model	*"And in the first instance when we first started isolating people, literally, (name) went to the supermarket and bought bundles of groceries to deliver to people. I mean, it was very basic, and goodwill based. But as (it) became more of a key feature, the isolating of people, and the volume grew, the contracts that we needed to have in place with various providers, the realization that the welfare aspect of this was really not what health should be doing, but that was really the role of MSD and … the responsibility to put this in place." (Interview 9, Leader)* *"And what that's doing now is …. a complimentary relationship to COVID not being a lone event in health, which probably was one of the problems. …. Those hubs now are ringing up and doing some of the callbacks, "Hey, you haven't had your smear, have you thought about booking in before Christmas?" Those kinds of things... And… (they have) been ringing and supporting some of that planned unplanned care relating to the hospital wait list management as well. So, utilizing services that may have potentially supported (the Covid-19 response)." (Interview 6, Leader)*
3F. The expansion of e-prescribing	*"(There were) concerns, early in the piece that there'd be people with COVID handing prescriptions over, having coughed on them, to the pharmacy. And because doctors were working, or prescribers*

	were working remotely; very, very quickly, overnight, after having tried for years and years and years, we got e-prescribing which took a bit of work, but we got there…the sense of urgency helped. But as well as that, the Director General, using the pandemic legislation, allowed prescribers using NZePS (electronic prescribing software), which means they've got barcoded script, and so it's mostly GPs, that they didn't have to even sign them…they could just literally email a script of pharmacy without even signed it." (Interview 2, Participant A, Leader) *"Instead of the patient being given a paper prescription, the prescription is just sent to a pharmacy similar to that of an email… So no, they don't need to sign it. The only signature that is required is for any of the controlled drugs that requires a signature. Now it's just done electronically and then it automatically prints from that system, and it's signed. So, you don't even have to think about whether it's a controlled drug." (Interview 1, Nurse)* *"The electronics has been available for quite some decades to speed this up, to make an electronic prescription to store that safely in the cloud and it can be drawn down by the chemists when they need to look at it. And it also means we can track if the prescription's been dispensed, when it's been*

	dispensed and so forth. So, it actually gives us a lot of intelligence about how our prescriptions that we write actually get used. So (use of e-prescribing) moved on really rapidly and that was fantastic. And also, the rest homes, the care homes and the hospice, they moved to electronic prescribing … and that meant we could do our job much more efficiently in our general practice". (Interview 13, GP)
3G. Issues with e-prescribing	*"One big change was we went into electronic prescribing…and unfortunately, we've always been at the peril of other people's IT software. When I mean other people, I mean doctor's surgeries and their different (software) providers and them falling over and not being able to deliver it to us and the expectations of the customer (who) get to us … and it's not even here." (Interview 3, Pharmacist)* *"It's not built for pharmacy; it was built for the prescribers … and it just goes 'dump: you got 600 scripts'. And then 500 people show up and you're like, 'Oh my god'. And they've all got texts to say, "Your script is ready" because it's all GP based. And (the prescription is) … not ready." (Interview 4, Pharmacist)*

Theme 4: The internal environment of the general practice unit	
4A. Physical environment – closing the doors	*(Describing experience of speaking up at an initial Covid-19 information evening before the first lockdown) "'Yeah, look, you're going to have to stop everyone. You're going to have to stop and then reimpose the new system. And the only way you can do that is actually lock the front door. If your front door is open, they're going to walk in and they're going speak to staff or speak to other patients. You're going to have to lock the front door.' And there was a laugh and a hoot of incredulity that we would actually have to lock the door of a general practice…" (Interview 11, GP)* *"It was the closed-door policy. So (site 1) only had one of the shuttered accesses open, and there would be a table blocking it, use of plastic screens. (Site 2) for a long time were just operating out of a sliding window, and not letting people physically into the shop unless absolutely necessary." (Interview 2, Participant B, Leader)*
4B. Physical environment – dedicated rooms	*"And so, all respiratory cases, even till this day, if they come into the practice and they have a respiratory or infectious type of … illness, they are seen in the cabin. And so … there's less contact of those more infectious patients actually coming into our waiting room…" (Interview 14, Nurse)*

4C. Physical environment - cleaning	*"I'm a lot more stringent in my hygiene methods. The swabbing down of the beds, the changing of the linen, the hand hygiene. Not that, I hope that I wasn't bad at it... but I've certainly got into very much more of a routine ... and automatic." (Interview 14, Nurse)*
4D. Patient flow strategies	*"I definitely think the phone triaging for the nurses has definitely evolved and improved because you can't see everybody. So, you've got to kind of define who needs care more urgently." (Interview 1, Nurse)* *"Initially we had people waiting in their car. We would let them in only for their consult and we didn't initially have them paying at reception, so they literally came in and went out again. So, we minimalized the amount of time that people were in the practice. Or we would start the consult on the phone while they were in their car and then just do the bare minimum assessment in a shorter period of time… we cordoned off area so that there was a flow of traffic so that patients didn't congregate together. Even now, we've got reduced seating in the waiting room and we only have patients waiting that are for their next appointment." (Interview 1, Nurse)*

	"The idea was to stream patients into either green stream or red stream and get a common language so that patients knew what we meant, and staff knew what we meant. ... There was a duty red doctor or red nurse who would see and assess all patients either in that Covid cabin area, the red zone or in the carpark. ... If we have a patient that is, we think they'd be highly infectious with COVID or even the non-Covid infectious disease, we'll still see them in the red zone." (Interview 11, GP)
4E. Organizational environment – guidelines and training	*"We, to a 100 percent degree followed the advice that came down. It started off as kind of no advice that turned into sort of generic healthcare provider advice that didn't work in a pharmacy context, so we made it up. And then it finally came through as pharmacy specific and it was really clear and then the pandemic changed, and it changed a bit with it." (Interview 4, Pharmacist)* *"Every day we were making processes up as we went along (and) really about the best way of doing things ... I think that's been really, really useful just to learn to be more flexible and not to wait for someone else to come up with a process there. ... The guidelines that we would get from the ministry were really centered around big cities and lots of stuff had to be adapted to our needs." (Interview 7, Nurse)*

	"I can total the training ... (it) would've been 20 minutes. Five minutes how to put on PPE, 20 minutes how to take a swab initially for ... Sorry, 10 minutes, and then five minutes on how to do a rat test. And that's being generous." (Interview 12, GP) *(Referring to training staff for Vaccination centers) "What our method was was a train the trainer method. Once we got our feet under the desk and understood it as a whole, we were able to utilize the key clinical leads that we had to then train and select who they felt were the up-and-coming individuals. And that has worked beautifully. So, we were able to build up maybe 20 clinical leads in the end and be able to support all those responses." (Interview 5, Leader)*
4F. Concerns with the general practice model of care	*"Whanau don't go to the doctors; (a) 15-minute appointment for $45 or $60! Heck, if you ask me how I'm doing, that'll take 15 minutes, let alone doing the examination. We need to get back to different model of community care. And it needs to be where whanau feel comfortable. I think the medical profession needs to move away from Monday to Friday, nine to five. We need to be a little*

	bit more open to that because people work, and if … you have to take time off work to go to a doctor… GP's have become a business." (Interview 8, Māori led organization) *"I just think those different ways of working definitely have helped for people to be able to access services. Where we (had) these are your hours, eight till five, Monday to Friday, if you can't come, then tough luck… (it) doesn't fit for those people… And for the hubs … to have people who are actually reaching out proactively, having nurses to reach out proactively and be checking that people are okay when these are groups who may not necessarily reach out for help, I think has been really useful." (Interview 15, Leader)*
4G. Increased workload	*"And don't forget the pressure that was put on to us. So, in those first couple of weeks, particularly around the end of lockdowns, I think I didn't leave the pharmacy before 2:00 or 3:00 in the morning any night for the first week. So that'll be back here for 8:00. So, I had fairly long days!" (Interview 2, Pharmacist).*

	"I think most of us didn't take holidays for the last two years. And I think most of us used the (workplace based) mental health support and alcohol and (medications) prescribed to get through and yeah, that's ongoing. So, trying to ... go on holiday, now COVID's settled, and it can't happen. There's no staff to come and do my job when I'm not here." (Interview 11, GP)
4H. Workforce	*"And what that then highlighted was, even though we had the money, the biggest barrier was we didn't have the workforce. So (specific role), we advertised... There were no additional people nationally. The workforce was the workforce and even though we had money to potentially pay more people, we simply couldn't find more people." (Interview 9, Leader)* *Normally, we are not a full complement of GPs. We normally are under-doctored and often under-nursed for the population. But I don't think that was particularly worse because of COVID, if that makes sense." (Interview 13, GP)* *"And people came out of the woodwork. A big part of the workforce were casual people who were either recently retired or part-time or... So not many of them were people that we recruited*

	specifically from other roles … they either shifted their day job or expanded their day job to be able to man those services." (Interview 9, Leader)
Theme 5: Collaboration and teamwork	
5A. Coordinated leadership	*"I acknowledge our Iwi chairs; they had a response to Covid in that first two weeks. ... We were working from day one, but our plan was written within two weeks. We've got the funding to be able to respond. So, they've taken the leadership here. That's why we have (new Māori-led health and social support entity) is because of their leadership. (Interview 10, Māori led organization).* *"There was leadership happening across the board. For testing for vaccination, for the strategy of the hubs being developed, the health coordination center was running as well to have a focus over the whole system. There was a lot of coordination going on all the time ... For everything that we did, there was a coordination function or leadership function that was providing some support or strategy around it." (Interview 15, Leader)*

	"We had the right people engaged, doing the right things, with the right experience. So, we had people within the system that came with a wealth of knowledge in a certain part, and we actually utilized that and grew on that, and we brought that into the whole framework of how to deliver." (Interview 5, Leader)
5B. Teams with clearly defined roles and teamwork	*"The beauty of general practice is that usually it's a small team and usually the leaders are already identified. So essentially it was just a matter of people keep doing the same roles, but they overlay that with what (aspects of) Covid actually applies to them. So, for instance, we have a nurse who's a senior nurse, there are three nurses, and she was already the lead in infection control. So, it was very easy to identify the person that you would work with to talk through about from a nursing perspective what was needed within the building." (Interview 11, GP)* *"Look, the main and most useful resource was having a great team. I imagine other people have said that to you as well. That was absolutely the key to managing the whole thing, I think. And most people step up, a few people drop off, and a few people literally ran for the hills. But in our practice,*

	everybody was happy to do what was required, what was asked of us. We were working towards a common goal." (Interview 12, GP) *"As the numbers got bigger, it became quite apparent there actually just needed to be a much wider response with all the parties who were available being able to chip in and work to top of scope of what they were able to add into the mix, so I think it became a lot more rounded once it settled in terms of roles and responsibilities within the response." (Interview 15, Leader)*
5C. Strong relationships between organizations	*"We would often have our national meetings with other PHOs or other sectors across the country. And they weren't experiencing what we were experiencing. Our (experience) was quite unique ... (because) all parts of that health response were functioning at a high level and communicating exceptionally well and just getting stuff done. And the bureaucracy and barriers were all removed, and it was able to be delivered. (During)the immunization rollout, the key contact at the time at Te Whatu Ora locally, we were probably on the phone probably 10 times a day making sure we were doing what we needed to do. And that was a really, really important part of getting it done quickly.*

	So yeah, just trust and relationships, just the importance of that and just removing all those barriers." (Interview 5, Leader) *"We had… the pre-Christmas warning of what it could be like to have COVID in the community as an outbreak. And …we suppressed that initial outbreak, which was pretty impressive. But the key features were integrated systems. That wasn't "Us: primary care! That was primary care with our healthcare partners, public health, and Te Whatu Ora services in unison, coming together with some very clear national support in regard to support for IT one system and also some of the advertising campaigns." (Interview 6, Leader)* *"But I think the biggest things that made that work were that we've had fantastic relationships with each other anyway, so there's a level of knowing the people that you are working with. There's a level of knowing their personalities and how they work as well as having trust that they're good people and they know what they're doing." (Interview 15, Leader)*

5D. Relationships between providers and the community	*"It's probably the relationships that they've already got in the community. It's building on what they're already doing, existing skills. It's having the trust and the confidence probably with the public and knowing a bit more about the patients than it's just a name. They actually know the backstory, or they know the family in the situation." (Interview 2, Participant B, Leader)*
5E. Trust in relationships	*"So, this is probably one we were really fortunate in our region because of the relationships we've got. That it was more about just do, beg forgiveness later, and we will get it sorted and trust model that we had. Because … I mean, no way you're going to wait for a contract to come through to then deliver. So, we just went with that method of it will all come out in the wash. And it has. There was never any… you could use the term risk, but we didn't feel the risk... we knew it was going to be sorted… I think that one of the biggest things was trust and that really shone through with the success. Right at the beginning, it was an unknown world for everyone involved. But we did have to go in with that mindset of trust. And we did. And we couldn't fault that of each other at all." (Interview 5, Leader)*

	"Often the piece we needed them to help with, whether it was some testing or it was dealing with someone who was being isolated, who needed some clinical supports … that's one little piece of what we were trying to do and to be able to make that call or do that email and have it picked up and know that that was going to be dealt with and we could rely that it was being dealt with, enabled us to then focus on the other pieces of the puzzle … so we could trust them and knew that they had some good systems." (Interview 15, Leader)
5F. Communicating to connect as teams	*"(And I said) bring them together and then let's just hui[15] out what that looks like. And it was about constantly having those discussions, you know, you can't just "go, well that's that done right" and wait and see…" (Interview 8, Māori led organization)* *"From that day-to-day operational perspective, it worked really, really well and we had a dedicated phone number for each of them to call. We had dedicated email addresses that were set up, so we didn't have to try and worry about, well, who's on the roster today? You knew that if you*

[15] Hui is a Māori word that means to gather or meet.

	dialed that number or you emailed, that someone was going to be keeping an eye on it." (Interview 15, Leader)
5G. Sharing resources	*(Describing a situation of limited resources) "The classic is the workforce as (organization name) because we're a non-governmental organization and also because we're a charity, we can be a lot more nimble in getting resources, employing people (compared to another government institution) they were great at the procurement of all of the things we needed or the PPE … we then quickly got all the education and training on (software system). It was easier, much easier for us …and (regarding recruiting additional staff from nursing students in training). We put out an email to them and we rang them at night from this office. We didn't have to wait. We could just do and knew how to... And also, the management of (funding body) knew the worth and value of what a primary care sector or community could do and just said, "Yep, yep." (Interview 6, Leader)* *"Information sharing would be a big one, and the analyst expertise that we had had in place. … But (new staff) joining the team, and the platform relationship that we had established across the PHOs and with their expertise around sharing NHI level data and having the ability to actually do*

	that, not just have the intent but have the IT systems that we're able to safely do that in a high trust kind of environment. … That availability of data was a huge advantage…" (Interview 9, Leader)
5H. Enabling attitudes and behaviors	*"So, we figured out what we had to work with. And then we just worked with it essentially is what was our philosophy. We didn't want to over construct, over complicate, we didn't want to put any further barriers because we just knew we had to just crack on and get it done. So just kiwi ingenuity and we just figured it out." (Interview 5, Leader)* *"For me, what changed was … people could see that they were part of a bigger whole. So, they actually then reflected on, 'I'm not just doing the work that's in front of me… in fact I'm part of a bigger whole' and (that) enables us to see the whole system of community and the whole system of healthcare activity for our organization. Right? …And that, consciously … our management team made the decision that if we were asked to do something, we would ask, "How do we do this together?" (Interview 6, Leader)*

	"I've got to say I love this Mahi. … It's a privilege working in this space. It's a privilege to be able to support whanau and it's one of the key messages for our kai mahi. Your own whanau come first. But it's a privilege to be able to support all of those whanau that are struggling." (Interview 10, Māori led organization)
Theme 6: Communication	
6A. Levels of communication **To patients**	*"Well, primary care is where most people get their health information from, especially older people who are not internet savvy and don't rely on Facebook for their science needs. So, I've worked with a lot of practice nurses, and they have, I think, been incredibly good at disseminating information to their client group. Primary health were mass texting their eligible people for vaccination as people became eligible and giving them information as well. So, I think that they have been the primary source of reassurance for many people and the first point of care, really." (Interview 7, Nurse)*

	"So, it was always trying to keep up with that so that when the patients rang, you could be very confident in what you're saying is if no, you do no longer need to test, just only if you become symptomatic, if you've already tested positive, you do not need to test again. You do not require a negative test for you to leave isolation towards the end. So, they (the guidelines) were evolving all the time too. So, it was trying to always be up with the game." (Interview 14, Nurse)
To providers	*"(For) the management of staff, we introduced a morning daily huddle, which we've continued to be able to disperse information quickly. And because we saw lots of updating of information right from those beginning months to now." (Interview 1, Nurse)*
6B. Communication **Issues with communication approaches**	*"And some days we'd get so much information, it was ... crazy to interpret what are the key messages here, what do we need to know and what can wait." (Interview 1, Nurse)*

	"It was a huge amount of extra work and often very much at the last minute. And that was probably the government's fault in that you'd be announced what you would need to be doing the next day, would be announced at a press conference and it's like, "Okay, now we've got to give everybody in our community RAT tests," and everyone's going to ring up and want them immediately. We don't even have any RAT tests. How are we going to get them by tomorrow? And knowing that that would mean that our receptionists would be abused because people had been told that they could have something that was going to be very difficult for us to be able to deliver that immediately." (Interview 13, GP) *"We found that out at 1:00 p.m. with everyone else. Then everyone piles and going, 'Where's my vaccination pass?' And we're like, 'We have no idea what you're talking about' And it would take a couple of days to trickle down to all those layers of communicators who were really good at their jobs, but they all did it. And then we'd get six emails from each of them on that thing. Every day there was a change, and we just got information overload." (Interview 4, Pharmacist)*

	"We really did get dealt some really low blows by the 1pm appointments[16]. It has been extremely frustrating for us because we were made to look stupid on multiple occasions. And that's really difficult when you're in a very busy work environment, high stress, something else is added to the mix and you can't pull in resources without knowing it's happening." (Interview 3, Pharmacist) *"So, information in and out of the center, … on the one hand it was chaotic and there was information flying in all kinds of directions and mailing lists and participants in meetings were not necessarily always exactly the right people in the right place at the right time. Having said that … there was a hell of a lot of effort and opportunity for a lot of people to be engaged in receiving information." (Interview 9, Leader)*
Strategies to manage communication flows	*(Discussing strategies for parsing information for target audience – pharmacists) "It's just what do the pharmacists need to know? Bold, highlight, bullet point, these are the phone numbers, here's the link for more information. And I've consolidated about four COVID emails together in one, … So, it's being the filter, I think. And also, probably me in particular with my role, being the go-to*

[16] Referring to the 1pm Covid-19 press conferences held at key periods during the pandemic by the Ministry of Health and Government Ministers.

	person. So, when you've got a query, you can say, "Actually, I sent you an email about this on Monday at 12:30, and if you go in your inbox, you'll be able to find it." And just providing that reiteration and support, because they can't read and retain everything as well as doing the day job. So that's been my function, has been a lot of the reading everything, knowing where to go for the answers, being able to direct them, but letting them get on with business as usual." (Interview 2, Participant B, Leader) *"Well, it is information overload, but again, that's nothing new. And I think if you've got an established team, you're used to getting a fair amount of information coming through from various people who want to influence your behavior. So rather than every single one of us read every single thing, we agreed early on, we had a huddle every morning that we would go through yesterday's emails and draw out any big changes because they were changing daily at that stage. And just keep that as a sort of learning place so that we could spend half an hour in the morning learning about COVID, learning about new things, learning about the new restrictions." (Interview 11, GP)*

	"So, to keep myself current, it's really about being quite analytical and strategic about seeing the shift. So being on the Zoom calls and reading what's coming out and actually analyzing that information very quickly and seeing how that will affect (us). It's about reading what's current now, and so staying connected to the health providers and the key chief medical officers and, because they're the ones that hear it first." (Interview 8, Māori led Organization)
6C. Misinformation and Disinformation	*(Describing an interaction with anti-vaccination campaigners) "It was pretty awful. The police were great. ... I got this letter handed to me saying... it was basically a trespass order. It was a crime against the state. On one of (the letters), there was a picture of the Nuremberg trials with people hanging and they accused me of... They went into every general practice ... and handed them out." (Interview 6, Leader)* *And one of the key things I identified as Māori don't have a lot of trust in the health system and ... to build that trust, we needed to get whanau engaged to take care of themselves. So, we had to then take a shift to a regional focus, a local focus by Māori for Māori. So that meant getting all the Māori health providers, iwi, comms, everybody together and saying, what does this look like? How do we*

	pitch to our people that this is really serious. … (Then), you had all that miscommunication as well. And so, we were managing, I guess what nationally was being put out, but also trying to balance it with how we as Māori would respond." (Interview 8, Māori led Organization)
Theme 7: The macro-environment of primary care	
7A. Emotional and Social impacts of the pandemic **Fear**	*"And of course, all the stories of nurses and doctors dying from overseas were already there … and the PPE was falling in the UK, social media, all those stories were out there. So, it was a very frightening time." (Interview 2, Participant A, Leader)* *"Once I realized just how isolated they felt, and (that) they were frightened themselves … they just needed something to hang on to about how they're going to be able to keep themselves safe. And actually, I am not an expert … but of course I've listened to everything that (local expert) has said …*

	And some of it was not bluffing, but I thought, well, you know what? This is so early, we don't really understand, but this is what we can do." (Interview 2, Participant A, Leader)
Positive relationships	*"We became this family and have developed some great collegial relationships and friendships. And we knew we were doing really good in the community. It was really rewarding." (Interview 5, Leader)*
Need time to recover	*"And just one of the nurses said the other day to me, she said, "I used to go home every night. I used to dread it thinking, I've got to go back tomorrow." And she said, "I was so close just to calling it." And she said, "But now we just take, we're on a... There's a little bit of a breather." (Interview 14, Nurse)*
	"I think all in all it's been a hell of a ride. But I would've liked a bit more time off, particularly after. That would've been pretty neat to know that in the recovery phase there was going to be some system where you could get away. Because I think that's the thing with a lot of the folk that are from my vintage, at my age, we've done this and it's fine, but we'd actually quite like a break…" (interview 11, GP)

7B. Government policy and impact on health care delivery	
Planning	*"(Naming key personnel) had planned CBACs for 20 years and never had a chance to deploy them. But when it came to deploying a CBAC, the plan that was written down was very out of date and actually wasn't much use in terms of actually deploying the CBAC... But (name) is a person of getting something (done)... In terms of practical 'nouse'[17] and standing something up and literally getting the builders and the plumbers and people to put something in place fast - fantastic! ... The downside was that it does slow you down probably. We were very reliant on people who were just very focused on getting stuff done and put a lot of hours into making sure that it did get done." (Interview 9, Leader)* *"That's probably something that could have been done better is that in terms of general practice, ... we all developed our own plans on how we were going to manage this and subsequently still have*

[17] Nous is an English colloquialism defined in the Oxford English Dictionary as intelligence and the ability to think and act in a practical way

	our own plans. ... we probably could have reduced reinvention of the wheel in many cases." (Interview 1, Nurse)
Local governance of the pandemic response	*"We had weekly Zooms all together, the leadership from all different community organizations, for probably about the first year or so. ... We met weekly via Zoom to work out what to do and how we could support each other. And that I think was a really positive thing around working together and as a community to respond to something. And I do think people felt like it went pretty well, that they felt well looked-after and that was really good." (Interview 13, GP)* *"I think one of the things right at the very start is that we were involved from the outset from March 2020. We were there, we were at the table at that governance level. And there was a huge commitment from the DHB back then to make sure that they didn't increase inequities along the way. So, we had that level of trust and collaboration with the sector right from the outset." (Interview 10, Māori led Organization)*

Lack of consultation over policy causing unintended consequences	*"And there were some cases where I said to (practitioners), "Just do it and send me the bill," because it was the right thing to do. It was not a lot of money ... that I enabled, by just saying that we're not set up, that it's the right thing to do and you are the person, Johnny on the spot, so you do it. ... There's all these scenarios you haven't thought of. I just say to just put (the claim) in." (Interview 2, Participant A, Leader)* *"And the same with the vaccinating because then they had to go and get boosters relicensed (so) that they could have (a booster vaccination) done within three months rather than six months because it'd only been licensed for six months. So, the government making the statement did not have an understanding of all the complexities involved in delivering what they're saying they were going to deliver." (Interview 3, Pharmacist)*

7C. Supply chain **Issues with PPE supplies**	*"Look, we never didn't have the equipment we needed but there were definitely times when we were running short and worried about it. Perhaps more noticeable was the myriad of different gloves, hand sanitizer, gowns." (Interview 12, GP)* *"Yes, we did have some troubles around suppliers, particularly around the testing and even with masks actually at different points. But again, I think this is where the different parts of the puzzle actually worked together to redistribute or have less than what they would've liked and have some of the coordinated ordering so that some people weren't stockpiling things when others needed them as well. I think those national meetings were really helpful in that regard. And when they did put in the national ordering system, I think that that helped, but particularly at the beginning for both of those things, it was the coordination that happened locally that helped to enable that and to try to get people to trust that ... you're only going to get a few days' worth, more will come, so don't feel that you're having to take what other people might be needing just to get us through that little period." (Interview 15, Leader)*

	"It's hard to … looking backwards, to work out in some things how much was political and supply chain influence and how much was just the evolution of knowledge? So, for instance mask wearing, for quite a while the message from the center was no evidence and not enough evidence around masks. Looking at that, we didn't have the supply chain for masks at that point. So, there was a little bit possibly of alarm under the message to match the supply chain. As soon as the supply chain issue was solved suddenly masks became... Whether that was coincidence or whether it was clinically influenced messaging, I'm not sure" (Interview 9, Leader)
Different standards for different providers.	*"The doctors had had it (PPE supplies) all, and "no pharmacy you can't have that…". And then a week later, "Oh you can have it, but you can have only so much." It's like, "Well, hang on. What part of this party are we involved in? Are we the one that gets to drink the good gin or are we the ones that are on the party punch? We're still in the front line doing all the work but you seem to be forgetting that." (Interview 2, Pharmacist)* *"And it was just such a slap in the face when we were out there. I've never been such a big turnaround though… We'll never know what the barrier really was, but three or four weeks into it the doors*

	opened, and we were allowed access. It was very bizarre … but it's such a different world now. We would never be treated like that now. Just completely different. We're seen completely different(ly) and it's lovely." (Interview 4, Pharmacist)
7D. Mask and vaccine mandates	*"There are some people that are no longer practicing nurses, doctors, and … some reception staff. And I think they've been really damaged by COVID. They lost their livelihood and … even though I don't agree with their thought, they're actually a really useful resource." (Interview 11, GP)* *"That (vaccination) was quite divisive in our community and quite challenging. And that was polarizing probably for different people in the whole country. … But (name of community … immunization was already quite a contentious thing. And so having (the mandates) and then having protocols that meant people that weren't immunized were managed outside in a facility there, that was emotional and quite triggering to some people and quite upsetting to them." (Interview 13, GP)* *"Trying to explain to them what that vaccination was doing in a positive way for our communities and the people in our communities, the susceptible people, and just trying to give them a little bit*

	more insight maybe without causing too much or causing any sort of negative kind of reactions from these people. I mean, as a practice nurse more and more so your role is of a mediator, counsellor and these delicate situations where there's lots of opinions, lots of information, lots of people at both ends of the spectrum. I call it a vaccination spectrum. So, it's trying to weave your way in and make people feel comfortable but giving them all the information at the same time so they can make an informed decision about what they want to do." (Interview 14, Nurse)
7E. Financial impacts for primary care	*"For our GP partners, there were significant impacts on their revenue, patients weren't coming, the increase in operational expenses just went out the roof because they needed to get a registering (triage) area, majority of them didn't have that availability. So, I think a lot of them had to rent portacabins ... They had to sometimes put on additional staff because of the additional workload needed to triage outside, that came as an expense. The IT infrastructure for each of these practices came an expense." (Interview 5, Leader)* *"But ACC went down. And of course, that's a problem for us or for anyone because that's about maybe 20% of our income. So that just disappeared. So, the funding that followed through for COVID*

	was really excellent and it was well priced. Of course, there was no one else to do it, so we did it, but it was well priced, and it undoubtedly stopped a lot of practices folding." (Interview 11, GP) *"Financially Covid vaccinations were some of the most well reimbursed service pharmacy has ever seen in the history of the community pharmacy … but it's a boom-and-bust cycle. It lasted for three or four months and then it's gone again. And you don't know if there's going to be another booster or whether the funding will say the same. Without that every pharmacy I know is running at a loss and so we're hitting trouble, and I don't know what's actually going to happen … I don't know any pharmacy that's making money at the moment." (interview 4, Pharmacist)* *"And (with regard to funder): we're very open and they're very open with us. They can only support us financially in terms of the resources that they're getting in from national office. So, because of current policy that's been, that was supposed to close on the 31st of December, 'Can't guarantee anything else past that. Sorry' … But we lost our comms person because we couldn't guarantee any other mahi, and … they needed to go out and find work. … Then just about, right about the Christmas*

	week also, 'Oh look, we've just been advised we can extend this out until the end of March'." (Interview 10, Māori led organization) *"(A) key enabler obviously was the money. We have never had a program that was as well funded. The money just flowed and flowed. Never (before) have we had a program where we could do what we needed to do. And we pushed money into the Māori and Pacific providers in a way that we couldn't ever do before, and we can't do now anymore either." (Interview 9, Leader)* *"I think, very positively, a lot of funding was freed up and provided into primary care to provide a lot of these functions, and ... it was really quite permissive in terms of what that was used for. And so, I think it has enabled primary care to be growing, and while it's useful for COVID, it's possibly being really useful for other things that they might be trying to achieve as well. It's enabled better infection prevention practices to be put in place within general practice and primary care settings. So yeah, I think the funding side has really enabled a whole heap of stuff that has been useful for COVID, but actually has probably put them in a better place for whatever else comes next." (Interview 15, Leader)*

7F. Priority populations	
Leadership perspective	*"The equity lens on how we tried to make sure that our access to services, including testing and vaccination and follow up care through the hub. That's strengthened in its focus. But it does also still leverage off the infrastructure of relationships that we had, both with (Māori provider), (Pacific provider) and (Māori provider) and the less strong links but nevertheless they were linked to the Marae based services, the social services that Māori (organizations) had, which we hadn't necessarily contracted with in the past, but we did at least have the communication channels in place." (Interview 9, Leader)*
Local and priority population knowledge vital for performing this work	*"The success of anything has to be the relationship that you build … my previous jobs, I had worked in government agencies and social service. So, I understood the language, I understood the thinking. And so, I felt that having someone like me there, who walks in two worlds, because I think that everybody that I met was in a similar position to me, that we were there because we needed to do something to support our whanau as Māori, but we needed to also acknowledge those that were*

	managing this issue were non-Māori. And it was about drawing on my skills … but also being mindful, too, of just that they're in this with us as well." (Interview 8, Māori led organization).
Need for culturally appropriate programs and messaging	*"It was, once again, organizations telling us as Māori what we needed to do and how to do it. And that probably was where things started to go slightly wrong because the messaging was wrong. There was offense, I think, in some of the messaging." (Interview 8, Māori led organization).*
Outreach to communities	*"During the lunch break, they took the campervan, and they went down to what we call the flying jug. It's a pub where a lot of Māori go to…They took the campervan down there and they just walked around and just talked to people … and just asked … "Wait, have you had your booster yet? Never mind that. What's that all about?" And having those types of conversations. So yeah, it's quite difficult to reach into some of those communities. Sometimes you've got to do it different ways." (Interview 10, Māori led organization).* *"We went out to French Pass, we went out to St. Arnaud, we got people in the Tiki-tour van over in Golden Bay driving around. You name it, we were doing it. Just to make sure it was accessible. While*

	all these other programs were going. We just wanted to make sure that there were no hold bars. It was all or nothing for us. On Super Saturday we were at stock cars, we were at (well-known New Zealand building and gardening supply store), we were everywhere to make sure it was an event and memorable for everybody." (Interview 5, Leader)
Theme 8: Outcomes of the pandemic experienced in primary care	
8A. Deferred or delayed care	*"And I think the elderly, some of the elderly are still in that generation where they don't want to be a bother, ... so they didn't ring. And there were a few things that we caught up on afterwards that normally we would've been on top of a lot earlier, but we didn't because they didn't say, ... we didn't see them, so we didn't ask." (Interview 14, Nurse)*
8B. Health outcomes for local communities	*"Well, there's loss of life and/or reduction. Things have been missed. And so, I've definitely had patients already pass away due to things not being picked up or acted upon within a certain timeframe…." (Interview 3, Pharmacist)*

8C. Recognition of primary care	*"Even though it was stressful, and they were often working seven days, I actually do think that part of what helped was (that) they felt valued. They felt really valued. Not just by the public, who already valued them, but by the system, if you like, and hearing the Minister suddenly talking about pharmacy, when they've never said that. They'll say doctors and nurses, but suddenly they were saying pharmacy." (Interview 2, Participant A, Leader)* *"It has really helped highlight the importance of primary care - you can get sucked into believing that all the important healthcare happens in hospitals and hospital settings. But this stuff has been led by and managed by primary care very well." (Interview 7, Nurse)* *"And as we move forward, because we proved that pharmacy could really make a big difference to vaccination outcomes, we know that we've got more coming on the line in a big flow... I'm hoping for the full schedule of vaccinations to open up to pharmacy and pharmacy to be the tried-and-true, known place that you can walk into, get your vaccination status checked and get your vaccinations. And if everyone knows that it becomes more accessible. Because it's recognized for that, that would be my ideal." (Interview 4, Pharmacist)*

	"I think primary care did a fantastic job of this … I'm really proud at what we did and how we did it ... and I don't feel that that was acknowledged enough that the primary care was actually most of the response." (Interview 13, GP) *(Regarding the profile of community pharmacy). "I feel raised but not respected. Yeah, both bottom up, top down for that, words are words but it's not coming through contractually that we've seen." (Interview 3, Pharmacist)* *(Regarding a collective pay offer for practice nurses from government) "I just feel so disheartened as a nurse that we're in the situation that we're in, and even having gone through a whole pandemic and we are still not getting recognition for what we do…It was insulting really, to be honest." (Interview 14, Nurse)*

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