

# COVID-19

## Aotearoa New Zealand's COVID-19 Surveillance Strategy

Effective December 2021

Previous versions	July – December 2021 January – June 2021
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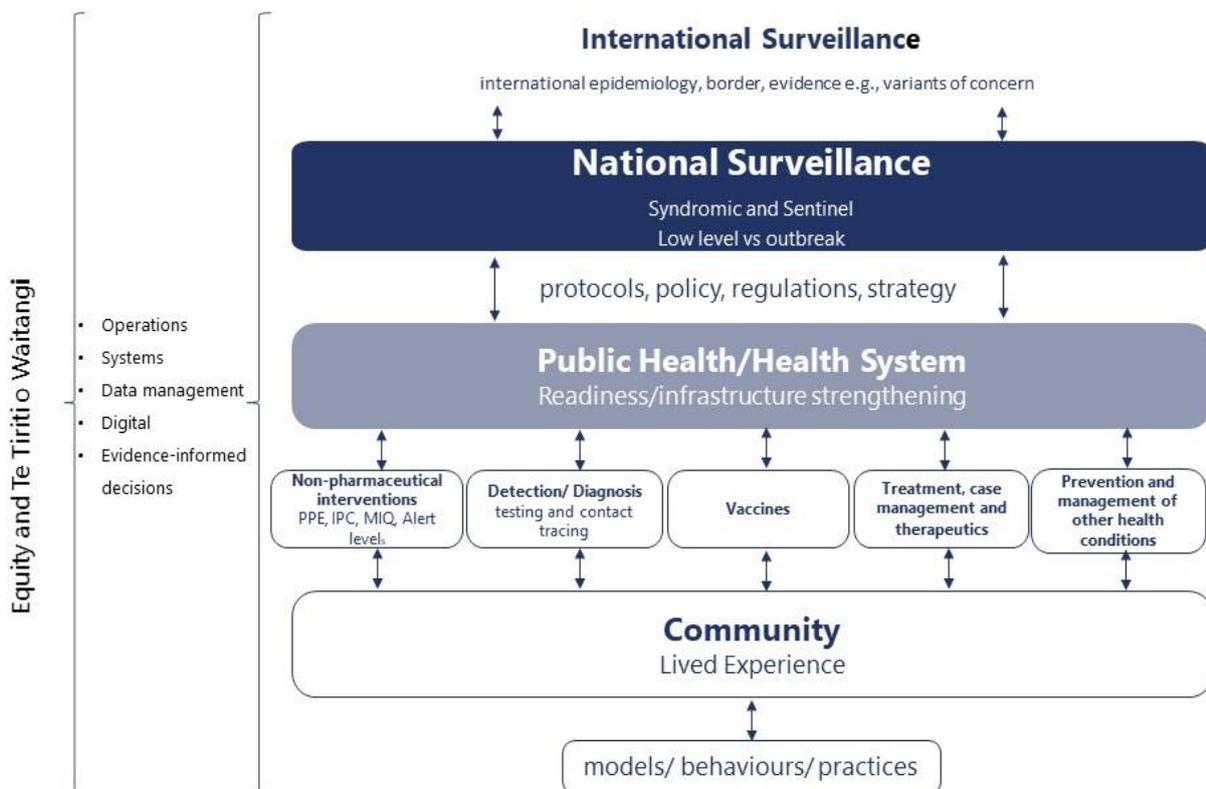
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## Purpose

Aotearoa New Zealand has moved from an Elimination Strategy to a minimisation and protection strategy as part of the COVID-19 Protection Framework. This change of approach means that the surveillance strategy that has been in place to-date needs to be reviewed and updated. This update reflects the change in orientation of surveillance to include the impact of COVID-19 on communities and the health system.

The purpose of this updated COVID-19 Surveillance Strategy is to identify the information needed to inform and monitor the pandemic response in Aotearoa New Zealand as part of the new COVID-19 Protection Framework (CPF). Priority areas have been outlined for monitoring and measuring the ongoing pattern of COVID-19 disease occurrence and tracking the potential for disease in the population in order to effectively investigate, control, and prevent disease burden and wider impacts. Furthermore, it will monitor the impact of decisions taken on disease trends and virus transmission dynamics.

The following indicates where surveillance is placed within the broader COVID-19 public health response.



The surveillance strategy is intended to be a nation-wide strategy, including equity considerations; and guiding the actions of all parties, including the Ministry of Health, other central government agencies, District Health Boards (DHB), Public Health Units (PHU), health service providers, iwi, and community leaders.

This nationwide strategy provides clear guidance for COVID-19 surveillance under a Minimisation<sup>1</sup> and Protection<sup>2</sup> Strategy (of which the COVID-19 Protection Framework will be part).<sup>3</sup> The COVID-19 Protection Framework, also known as traffic lights, commenced on 3 December 2021 and minimises the impact of COVID-19 through 3 settings — red, orange, and green.

The objective of minimisation is to contain the spread of COVID-19 and hospitalisations at as low a level as possible. Outbreaks in high-risk settings will be contained and controlled, and if practical, stamped out. There will likely be some level of cases in the community on an ongoing basis. There is a priority to monitor and measure risk to vulnerable populations in such a situation.

The system should be seen as part of wider surveillance activities and will allow for integrated surveillance of COVID-19, influenza and other respiratory pathogens that are likely to co-circulate in the population. The surveillance system will also enable monitoring of vaccine effectiveness, which may require ad hoc studies possibly embedded within it.

The strategy will also be reviewed and updated regularly.

## Background

The Elimination Strategy successfully mitigated the burden of COVID-19 since the start of the COVID-19 pandemic in Aotearoa New Zealand. The use of strong public health measures, such as Alert Level 3 and 4 lockdowns when needed, has allowed the country to keep cases, hospitalisations, and death rates very low by international standards. This approach was determined necessary for responding to COVID-19 prior to vaccines being widely available.

On 18 October 2021, Cabinet agreed to shift away from an elimination strategy for responding to COVID-19 to a “minimisation and protection” approach based on the protection vaccines provide and the challenges containing the delta variant.<sup>4</sup> Maintaining the Elimination Strategy from 21 March 2020 – 18 October 2021, delayed COVID-19 spread within Aotearoa New Zealand. This provided time to increase vaccination rates and prepare for living with the virus through minimising the impact and protecting communities.

The country is now entering that next phase as we exceed 90 percent vaccination rates across the country. However, some sub-populations have lower rates of vaccine uptake; and some vulnerable groups are at higher risk of severe outcomes, for example, those with pre-existing conditions and/or immunocompromised. Equity and vulnerability are priority issues for surveillance going forward.

Vaccination provides high levels of protection against symptomatic and severe disease as well as death caused by the Delta variant.<sup>5</sup> A risk-based approach to surveillance will be necessary in order

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<sup>1</sup> Minimisation means that we are aiming to keep the spread of COVID-19 as low as possible so while there will be some level of cases in the community on an ongoing basis, we will work to contain and control any outbreaks, and if practical to do so, stamp them out.

<sup>2</sup> Protection means that we won't just treat COVID like a seasonal illness. We will protect people from it with vaccination, active public health measures including testing, isolation and contact tracing, and a response that focusses on minimising the significant health impacts we know it can have.

<sup>3</sup> <https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-response-planning/covid-19-minimisation-and-protection-strategy-aotearoa-new-zealand>.

<sup>4</sup> CAB-21-MIN-0421.

<sup>5</sup> BMJ 2021;374:n2320 <http://dx.doi.org/10.1136/bmj.n2320>.

to assess vulnerability and pandemic progression; and to adjust response measures to protect our communities and health system capacity. This monitoring will be implemented while being mindful not to stigmatise less vaccinated groups.

An important element of surveillance in the next phase will be a system to provide early warning of potential large or otherwise risky clusters, and of their potential to overwhelm of the public health and healthcare system. This will enable resources to be directed to where they are most needed.

An implementation plan is in development to complement this surveillance strategy. It will identify information needed to inform the COVID-19 Protection Framework and traffic light system, as well as areas to monitor for an early warning system. This strategy incorporates other frameworks, including the testing strategy, and the case and contact management plan. Changes in testing capacity, test availability, changing testing policy, sustainability of testing capacity, sequencing strategy, and capacity (especially in relation to all the cases of the delta and other variants of concerns) influence surveillance.

## Surveillance Objectives

Public health surveillance provides the scientific and factual information essential to inform decision-making and appropriate public health action. It is a tool to estimate the health status and behaviour of populations.

The next phase for COVID-19 surveillance need to be a more sustainable, objective-driven, surveillance system for integrated surveillance of COVID-19, influenza and other respiratory pathogens that are likely to co-circulate in the population. With the shift to the Protection Framework, there is an increased focus on monitoring the impact of COVID-19 on the health system. There will be a shift from focusing on the number of cases to the number of hospitalisations and deaths. However, there will still be a focus on understanding the ongoing pattern of disease occurrence, including the number of cases as these will give early warning on increasing risk to communities and the health system in general.<sup>6</sup>

The overarching aim of COVID-19 and national notifiable disease surveillance aims to minimise and suppress onward transmission of SARS-CoV-2.

The following objectives and key surveillance questions have been prioritised to guide COVID-19 surveillance at this stage of the pandemic in Aotearoa New Zealand:

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<sup>6</sup> Nsubuga P, White ME, Thacker SB, et al. Public Health Surveillance: A Tool for Targeting and Monitoring Interventions. In: Jamison DT, Breman JG, Measham AR, et al., editors. Disease Control Priorities in Developing Countries. 2nd edition. Washington (DC): The International Bank for Reconstruction and Development / The World Bank; 2006. Chapter 53. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK11770/> Co-published by Oxford University Press, New York.

Objective	Questions
<p><b>Objective One</b> - Monitor and describe the incidence, prevalence, geographic spread, and severity of COVID-19 in the population to estimate the burden of disease, assess trends, viral changes, and inform appropriate prevention and mitigation measures.</p>	<ul style="list-style-type: none"> <li>• What are the trends in SARS-CoV-2 infection, symptoms, clinical disease, hospitalisation, and mortality?</li> <li>• What are the transmission dynamics of SARS-CoV-2 and characteristics of the virus and its variants?</li> <li>• What is the vaccine coverage and effective population immunity?</li> <li>• How is the genomic epidemiology shifting internationally and within Aotearoa New Zealand and can we detect early warning signals for the presence of new variants?</li> <li>• What are the trends in vaccine and/or testing hesitancy?</li> <li>• What is the seasonality of infection, severity, and mortality rates?</li> </ul>
<p><b>Objective Two</b> - Assess COVID-19 relevant data and impacts on equity settings and populations at higher-risk for transmission, and poorer clinical and other outcomes.</p>	<ul style="list-style-type: none"> <li>• How will we monitor the impact on specific population groups?</li> <li>• What is the distribution of risks of infection, transmission, or consequences of COVID-19 amongst individuals, iwi, and communities?</li> <li>• What are the equity considerations for at risk populations particularly for Māori, Pacific and the disabled?</li> <li>• Has the Tiriti o Waitangi partnership been enacted in all decision-making and implementation of public health measures?</li> <li>• Which population groups are at higher risk of infection, transmission, or consequences of COVID-19?</li> <li>• Do Māori, Pacific Peoples and disabled populations have the support and information they need to adhere to control measures?</li> <li>• How equitable is:             <ul style="list-style-type: none"> <li>○ Testing?</li> <li>○ Case management and contact tracing (when applicable)?</li> <li>○ Infection, prevention, and control measures?</li> <li>○ The effect of public health measures at the border and in the community?</li> </ul> </li> <li>• Is the public health response supporting surveillance systems appropriate for local iwi and regional needs?</li> <li>• Is there meaningful community partnership and input from at-risk populations in the development and implementation of early warning systems?</li> </ul>

Objective	Questions
<p><b>Objective Three</b> - Monitor critical health services, systems, and behaviours with the specific objective of measuring the potential impact of the COVID-19 pandemic on the delivery of care in hospitals and the health system, including impact on the workforce and community care.</p>	<ul style="list-style-type: none"> <li>• Is overall health system performance and capacity at risk; and if so, in what areas?</li> <li>• What is the level of community acceptance of and adherence to control measures?</li> <li>• What is the occupancy rate of total ICU beds (overall and for COVID-19 patients)?</li> <li>• What is measles incidence and proportion of all cases among unvaccinated children whose first dose of the MMR (Measles, Mumps, Rubella) vaccine was during the COVID-19 pandemic?</li> <li>• What is the diphtheria-tetanus-pertussis (DTP)-3 vaccination coverage in children under 12 months of age?</li> <li>• What are the trends in fatigue with testing guidance and public health interventions?</li> <li>• What are the trends in QR scanning and Bluetooth use for contact tracing purposes?</li> <li>• What are the barriers discouraging desired behaviours?</li> </ul>
<p><b>Objective Four</b> - Monitor COVID-19 at the international border, international intelligence and evidence related to the pandemic, and other health security risks (i.e., other communicable and infectious diseases) to determine how they may impact Aotearoa New Zealand.</p>	<ul style="list-style-type: none"> <li>• How effective are the public health measures at the border and in the community?</li> <li>• How can pre-departure testing, asymptomatic testing, vaccination of travellers and border workers, and other public health measures enable safe and proportionate border health controls?</li> <li>• What are the risks associated with countries, regions, and individual travellers?</li> <li>• How can home self-isolation and quarantine for populations at-risk be undertaken safely and in proportion to risk?</li> <li>• What is happening outside of the country that may impact the risks to people or the possible mitigation measures available?</li> <li>• What are the other communicable and infectious diseases that could impact the COVID-19 response (e.g., influenza, RSV, measles)?</li> </ul>
<p><b>Objective Five</b> - Evaluate the impact of central decision making on the public health response to adjust the choice of strategies, as well as timing and intensity.</p>	<ul style="list-style-type: none"> <li>• What is the impact of policy and/or operational decisions (as they occur) on trends and transmission dynamics?</li> <li>• Are interventions having a measurable effect on trends, transmission dynamics and distribution of risk and disease burden?</li> </ul>

The system that surveillance activities sit within is described in Appendix 2. National and international surveillance and evidence generation impact how the health system functions, through a number of mechanisms. Communities are active participants in both undertaking the behaviour changes and other practices, as well as informing the health system about what needs truly are. The whole system is supported by tools and processes and held within the frame of equity and Te Tiriti o Waitangi.

## Te Tiriti o Waitangi and Equity Obligations

Historically, pandemic responses have preferentially disadvantaged Māori, and failed to protect whānau, hapū, iwi and Māori communities from the worst outcomes. The proportion of Māori cases in the Auckland/Waikato Delta outbreak has been very high.

Te Tiriti o Waitangi and other equity considerations have been prioritised across the pandemic management objectives. Quality assurance & control, risk and performance management are key areas to enhance and monitor at this stage of the COVID-19 pandemic. The use of surveillance can provide insights about the experience and health outcomes of populations or priority groups at higher risk during the COVID-19 pandemic and can inform effective responses that will support equitable outcomes.

Equity applies to a variety of groups defined by ethnicity, location, socio-economic status, visa status, gender, age, and health status. In addition to surveillance in the context of the Te Tiriti o Waitangi, this strategy considers equity for all population groups at risk of poor health outcomes when SARS-CoV-2 is being transmitted in the community.

The shift to the COVID-19 Protection Framework means the Surveillance Strategy requires data collection, monitoring, and measurement of structural risk factors with regards to settings and communities.

Risk for individuals and communities from COVID-19 has three-parts: 1) risk of exposure, 2) risk of transmission, and 3) risk of poor outcomes, if contracted. Poor outcomes can be measured on an individual level but also on households and beyond. The elements to consider in a disease management approach include clinical outcomes, high transmission, impact on individuals, whānau, iwi and communities from COVID-19, health behaviours, mental health and addiction, disability, and public health restrictions.

**Māori research principles** will be used to guide evaluation and behavioural studies with communities, and this will ensure any outputs are responsive to Māori and Te Tiriti. Integrating a Mātauranga Māori/Equity lens to the public health applied science studies will deliberately enable the exploration, discussion, and analysis of information according to what is meaningful to Māori.

### Principles for surveillance in the context of Te Tiriti o Waitangi

Principle	In the context of surveillance
<p><b>Tino rangatiratanga</b> The guarantee of tino rangatiratanga provides for Māori self-determination and mana motuhake in the design, delivery and monitoring of health and disability services. As much as possible, surveillance will be co-designed with iwi, hapū and whānau.</p>	<p>Surveillance enables Māori self-determination in the collection, analysis and use of Māori data and information. Māori Data Sovereignty principles to be applied and Māori governance for the surveillance strategy.</p>
<p><b>Equity</b> The principle of equity requires the Crown to commit to achieving equitable health outcomes for Māori.</p>	<p>Surveillance seeks to monitor inequities in health outcomes for Māori from COVID-19 through assessment of outcome and system access variations.</p>

Principle	In the context of surveillance
<p><b>Active protection</b></p> <p>The principle of active protection requires the Crown to act, to the fullest extent practicable, to achieve equitable health outcomes for Māori. This includes ensuring that it, its agents, and its Treaty partner are well informed on the extent and nature of both Māori health outcomes and efforts to achieve Māori health equity</p>	<p>Surveillance must proactively identify and address gaps and inequities in the protection of Māori from COVID-19 that may arise from surveillance approaches and processes.</p>
<p><b>Options</b></p> <p>The principle of options requires the Crown to provide for and properly resource kaupapa Māori health and disability services. Furthermore, the Crown is obliged to ensure that all health and disability services are provided in a culturally appropriate way that recognises and supports the expression of hauora Māori models of care</p>	<p>Surveillance should be flexible and enable Māori models of care and te ao Māori perspectives in how the strategy is enacted and applied. This will include feedback provided through Te Reo population-based surveys from tangata whenua with lived COVID-19 experience.</p>
<p><b>Partnership</b></p> <p>The principle of partnership requires the Crown and Māori to work in partnership in the governance, design, delivery and monitoring of health and disability services. Māori are co-designers with the Crown of the primary health system for Māori.</p>	<p>Surveillance enables and encourages partnership with iwi Māori at all levels of the system in the design, delivery, and monitoring of surveillance activities.</p>

## Community Engagement

Relationships with key providers and community representatives provide important intelligence and advice that inform community (e.g., Māori, Pacific, Disability, and other high-risk populations) COVID-19 response plans. The Ministry and DHB/PHUs will foster relationships with existing and new networks, including iwi and other community leaders. As partnerships develop, processes to enable reciprocal and routine information sharing, effective communication, and collaboration to improve the intelligence will be created to inform the response at a national level. Where fundamental data limitations are contributing to inequity, proactive solutions will be found to ensure the lack of data is not preventing action that may save lives and further exacerbating health inequities. Principles of equitable use of data and information, including data sovereignty and equal explanatory power, will be built into COVID-19 surveillance collection, analysis, and reporting with transparency and timeliness. The balance between privacy rights and public health will also be explicitly considered.

## Pacific Peoples in the Surveillance Strategy

Pacific communities are especially vulnerable to COVID-19 and are inequitably impacted. Pacific providers will be actively engaged by the health system and implementation of this strategy will continue to include collaboration with Pacific leadership through the establishment of expert advisory mechanisms, existing groups, and community engagement. Pacific providers should be prioritised in local and regional tactical approaches and overarching decision-making by the health system to ensure that the needs of their communities are central to surveillance efforts; and that a Pacific-specific-approach can be facilitated where appropriate.

## Disabled Communities in the Surveillance Strategy

Disabled people are especially impacted by the disease, with significantly higher death rates than other groups.<sup>7</sup> This is across all types of disability, including physical, intellectual, sensory, cognitive, accident and age-related disabilities, people with mental health and addiction issues, and people with long-term health conditions. Local advisory groups of disabled people, carers and support providers should be engaged with to provide tactical advice on how the system in each region can best respond to disabled people and their whānau. The implementation of the Surveillance Strategy will incorporate the views and needs of disabled communities.

## Other Vulnerable Populations in the Surveillance Strategy

In addition to Māori, Pacific, and disabled people, we also acknowledge under-served populations that are also at greater risk of poor outcomes due to COVID-19. The expectation is that local and regional plans will find meaningful and durable ways to embrace and engage groups, including migrants & refugees, LGBTQ+ identified, remote and rural people, people with mental health and addiction issues, people experiencing homelessness and those in transitional housing, and other groups experiencing disadvantages.

Local and regional plans should also address older people, and people with significant long-term health conditions, known to be at high risk of poor outcomes from COVID-19. These stakeholders will be critical partners in ensuring that the system meets the ongoing needs of whānau and communities.

Surveillance will continue to operate in collaboration with the Health & Disability sector through connecting to existing networks and community engagement. Providers and community intermediaries should be prioritised in local and regional tactical approaches and overarching decision-making by the health system.

## Disease Surveillance Approach

In order to answer the key surveillance questions and meet the objectives, the following approaches are outlined:

**Data collection, management, integration, and analysis** – of quantitative and qualitative data on cases, testing, wastewater testing, contact tracing, molecular epidemiology, border management and public adherence to public health advice.

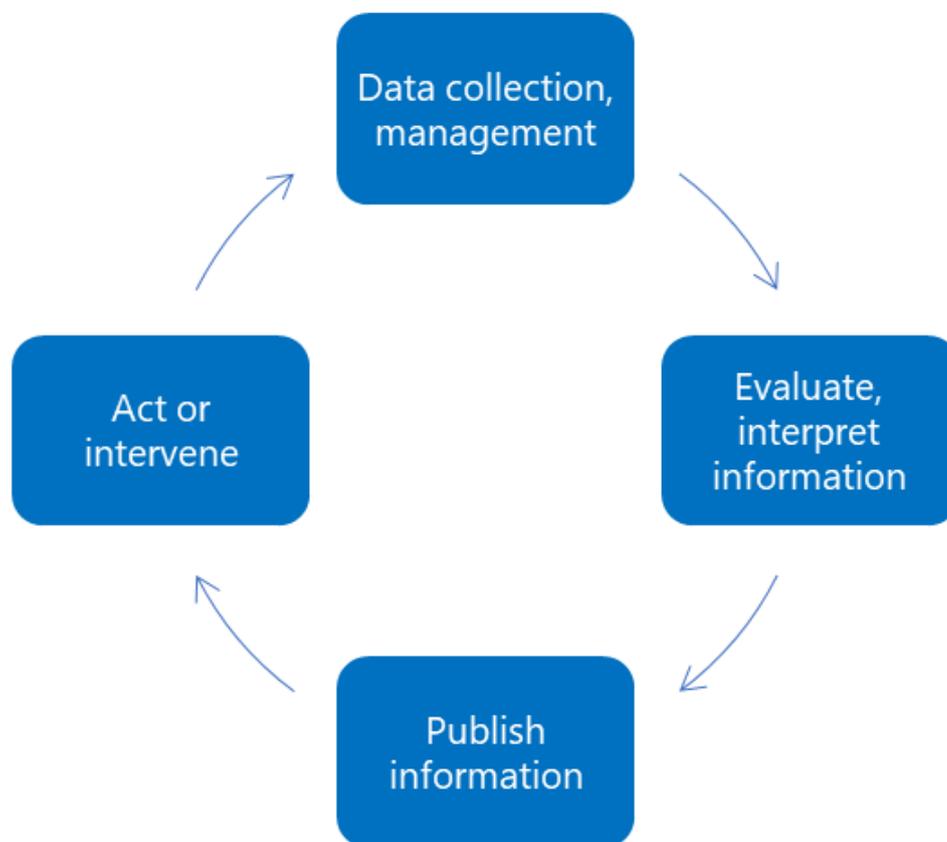
**Evaluation and interpretation** – evaluate, interpret, and model specific surveillance questions, drawing on public health, communicable diseases, microbiology, epidemiology, statistics, social science, behavioural studies, disability, and Māori and Pacific health reports.

**Information for action** – to enable others to act on the information, recommendations, and guidance.

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<sup>7</sup> Shakespeare T, Ndagire F, and Seketi Q. Triple jeopardy: disabled people and the COVID-19 pandemic. In: The Lancet, April 2021 397(10282): 1331-1333. DOI: 10.1016/S0140-6736(21)00625-5. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7963443/>

## The cycle of public health surveillance



## Surveillance Systems

The following surveillance systems will generate the evidence needed for public health decisions.

### Routine Surveillance Systems

There are currently three data management systems supporting reporting for COVID-19: NCTS and Episurv. Both are monitored and all analyses reconciled. Episurv is the national notifiable disease surveillance database on behalf of the Ministry. The National Contact Tracing Solution (NCTS), and the National Border Solution, are tools increasingly used to support surveillance monitoring. Under the Health Act 1956 and the Tuberculosis Act 1948, health professionals are required to inform their local Medical Officer of Health of any suspected or diagnosed notifiable disease. Since December 2007, laboratories have also been required to report notifiable diseases to their local Medical Officer of Health.

Notifiable disease data reported to the Medical Officer of Health at each PHU are entered via a secure web-based portal into the EpiSurv national database. The near real-time data are collated and analysed by the Institute of Environmental Science and Research Ltd (ESR) on behalf of the Ministry of Health.

Case definition and clinical testing guidelines will be maintained and updated to identify and test those individuals who may have a higher risk of having COVID-19. It includes clinical criteria of

COVID-19, the Higher Index of Suspicion (HIS) criteria (for lab processing prioritisation), case definitions and notification procedures.<sup>8</sup>

## Border and international surveillance

Surveillance at and beyond the borders aims to:

- Manage the risk of community outbreaks being seeded by arriving travellers
- Protect the border workforce including aircrew and people working at maritime ports
- Mitigate risks at the maritime border, especially from commercial ship crews who arrive by sea and air
- Manage the risk of new variants of concern entering the country
- Support safe travel and minimise infection risk during travel
- Give the country advance warning of significant changes in infection or the nature of the virus in travel partner countries
- Learn from the experience of other countries in managing the pandemic
- Monitor other health hazards and infectious diseases that pose a domestic risk

International travel is actively managed at the air and maritime borders. Travellers from most countries have been required to enter managed isolation and quarantine since early in 2020.

Based on the reconnecting New Zealanders programme, full international travel is planned to resume in stages during 2022. Air travellers will enter the country through one of three different 'pathways.' The pathway depends on the country of departure, and on the traveller's visa and vaccination status. Each pathway has different testing modalities and quarantine settings, ranging from minimal pre-departure and arrival testing to full managed quarantine. Surveillance informs decisions on whether to change the controls in a pathway, or to change which types of travellers go through each pathway.

Border surveillance activities include testing before departure; analysis of travel plans and origins registered through the online Traveller Health Declaration system; testing on and after arrival, and scheduled testing of border workers including aircrew. It may be possible to use whole genomic sequencing of wastewater to track the introduction of new variants of concern.

International surveillance includes general monitoring of COVID-19 trends and public health actions in other countries, so that the New Zealand response can be informed by experience from around the world.

## Syndromic and sentinel surveillance

There are established surveillance systems originally set up to monitor influenza and influenza-like illnesses (ILI) that currently support the surveillance of COVID-19.

Syndromic systems include people presenting with acute respiratory infections (ARI) and sentinel systems include surveillance of influenza-like illness (ILI) syndromes in the community, and with severe acute respiratory infection (SARI) in hospitals. These systems will be used to:

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<sup>8</sup> <https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-information-health-professionals/case-definition-and-clinical-testing-guidelines-covid-19>

- Monitor Healthline ILI related calls, FluTracker ILI, ARI surveillance (survey-based), and HealthStat ILI primary care presentations
- Extract information safely and anonymously on consultations with key words related to ILI, ARI, and COVID-like symptoms
- Develop capacity for ILI surveillance in aged residential care settings

## **Routine health system capacity information**

The likelihood that parts of the health systems become overwhelmed, regular reports about other disease programmes and health system capacity will be monitored. It will be necessary to identify critical health system resources and to describe how surveillance indicators will pre-empt the lead time to system overload. This is fundamental to the next phase of COVID-19 surveillance and details will be reflected in the surveillance implementation plan.

A core public health capacity issue relates to the effectiveness of the contact tracing function, which is monitored by a set of metrics around contact tracing and the presentation/testing/ diagnosis process, and the process of identifying and quarantining of close contacts.

The capacity of the health system to respond to COVID-19 more broadly has been monitored based on reports from individual DHBs, advising on the availability of inpatient beds, intensive care beds and ventilators. Personal protective equipment (PPE), testing, and other critical consumables are also monitored. Intensive care unit capacity is tracked in real time. The Ministry of Health is working with DHBs to move more capacity metrics to real-time reporting.

Maintaining population trust in the capacity of the health system to safely meet essential healthcare needs, and to control infection risk in health facilities is key to ensuring appropriate care-seeking behaviour and adherence to public health advice. Surveillance efforts will integrate the indicators and framework currently under development for monitoring health system capacity in the health system readiness workstream. The National Collections data workstream within the Ministry captures some data on health system capacity, and this information will help to inform surveillance monitoring.

## **Enhanced surveillance of outbreaks and clusters**

The protection framework relies on the ability to rapidly identify cases, and manage clusters and transmission, particularly among at-risk populations and in high-risk settings. By using targeted case-finding with more in-depth contact tracing and targeted population, surveys will aim to:

- Provide proactive and timely interrupt transmission and ring-fence the outbreak cluster
- Increase symptomatic and asymptomatic testing in neighbourhoods and communities where there has been a spike in cases
- Provide targeted contact tracing and population testing of at-risk groups
- Allow for rapid implementation of additional wastewater testing in and around affected areas
- Provide routine surveillance in frontline settings such as primary care and pharmacies

While the primary aim of enhanced surveillance is to inform immediate control, a more in-depth analysis of clusters and outbreaks, and associated risk factors will also be used to inform targeted public health action to prevent further outbreaks. Key stakeholders include Māori and Pacific providers who have been essential for effective contact tracing during recent outbreaks and play a critical role in surveillance efforts.

## Viral genomic sequence surveillance

The purpose of whole genome sequencing (WGS) is to provide precise geographical delineation of spread and enable incidence monitoring of pathogens at genotype level. Coupled with epidemiological and environmental investigations, this information provides intelligence for tracing sources of epidemic infections.<sup>9</sup>

Aotearoa New Zealand has employed a comprehensive strategy to-date aiming to sequence all PCR positive samples, facilitated by low SARS-CoV-2 prevalence. However, with the shift to the Protection Framework and rising case numbers a more selective approach is now being applied.

Highest priority is given to cases in certain high-risk settings such as healthcare, those working at or crossing the international border, those who present with particularly severe or unusual symptoms and cases in new geographical areas. In addition to these priority groups, a random geographically representative sample of cases will continue to undergo whole genome sequencing for surveillance purposes.

## Wastewater surveillance

In areas or sites with no known cases of COVID-19, wastewater testing can provide an early warning system for the presence of infection in the community and at specific sites. At higher prevalence, wastewater testing can track trends in community outbreaks and provide an indication of whether an outbreak is increasing or decreasing. Investigation into the quantification of SARS-CoV-2 in the wastewater is ongoing and may be able to be used as a leading indicator COVID-19 prevalence in the community in the near future. Higher concentrations of virus in the wastewater indicates higher numbers of cases in that community, however, an estimate of the numbers of cases using wastewater is currently unavailable.

Wastewater-based epidemiology is a rapidly evolving field. Studies have shown that wastewater testing is able to monitor variants and mutations of SARS-COV-2 and other infectious diseases - these are directions for future applications.

Unfortunately, there are limitations for this type of surveillance since wastewater testing is not possible for rural communities on septic tank systems (non-public main wastewater). Other surveillance methods (i.e., periodic community testing) will be used for some at-risk remote rural communities that have low vaccination rates.

## Seroprevalence surveillance

Population-based serosurveys are considered as a valuable tool in estimating the proportion of the population previously infected with SARS-CoV-2.<sup>10</sup> Monitoring population immunity of Aotearoa New Zealand will likely increase the reliability of our estimate of population-level immunity, over and above our COVID-19 vaccination coverage. One benefit of our successfully implemented elimination strategy to date is a low number of people who have had COVID-19 and recovered. In other nations where the disease has circulated through 2020 and 2021, some virus-induced immunity will be contributing to total effective immunity alongside vaccination. Recovered cases are not a large contribution to Aotearoa's total effective immunity at the moment but may be in the future. Total

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<sup>9</sup> <https://doi.org/10.3389/fpubh.2017.00347>

<sup>10</sup> Clapham H Hay J, Routledge I, et al., Sero-epidemiologic study designs for determining SARS-COV-2 transmission and immunity. *Emerg Infect Dis.* 2020; 26: 1978-1986.

effective immunity is recovered cases and immunised people, minus the waning immunity derived from these sources.

## **Behavioural risk factor and community surveillance**

Human behaviour will determine how quickly COVID-19 spreads, and morbidity and mortality rates. This is especially relevant for behaviours related to non-pharmaceutical public health interventions, vaccination, and use of therapeutic agents.

Responding effectively to the pandemic requires large-scale behaviour change and places significant psychological burdens on individuals, whānau, iwi and communities. It also requires insights from the social and behavioural sciences in order to help align human behaviour with the recommendations of public health experts and government.

An active system of repeated surveys, which will have diversity incorporated into their design, that measure behaviours will help to understand current attitudes and practices towards public health measures, as well as barriers individuals and communities face. Capacity will need to be enhanced to ensure diversity is considered for survey participants (i.e., translation of languages for those most impacted/at-risk, Te Reo, Pacific languages, etc.).

Surveys are also useful for providing timely measures of programme effectiveness and intelligence for health communications messaging.

This new direction in surveillance will embed behavioural and applied science skills, tools, and frameworks in monitoring and analyses. Utilising the vast range of qualitative and quantitative tools, this type of applied public health science will help to identify problems within operations and service delivery, test feasible solutions, and evaluate and document learnings. Conducting culturally sensitive and relevant research involving communities and key stakeholders with lived experience will inform solutions and be foundational to this new surveillance approach. The behavioural and community surveillance efforts will use mixed methods to monitor, measure and evaluate the following:<sup>11</sup>

- Population levels of knowledge, sentiments, and trust, attitudes towards COVID-19 public health measures, and the influence of communication strategies on these variables
- Impacts of public health measures on priority populations, including vital feedback from communities affected by the current outbreak
- Barriers and facilitators for public health interventions including, for example, adherence to self-isolation protocols, infection, prevention & control and control measures, mask usage, testing, and vaccination
- Information needs for sub-populations and communities, including health care and front-line workers
- Intended and unintended psychological and social impact of public health and behavioural interventions designed to change transmission-related behaviours (e.g., anxiety, stigma)
- Concerns, practices and behaviours of healthcare workers and other frontline workers

Analysis and interpretation will include:

- Qualitative methods, particularly interview, case studies, and focus group design, delivery, and analyses

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<sup>11</sup> Measurements approved by Cabinet in CAB-20-MIN-0387 included.

- Quantitative methods, particularly, survey design and analysis
- Descriptive sociology analyses, and multivariable analyses
- Qualitative analysis through case studies
- Interpretation of survey and digital data, and secondary research
- Targeted evaluation studies of interventions and policies

## Structural and population risk factors surveillance

Structural risk factors include material deprivation (including measures in NZDep18), occupation, employment, income, rural/urban segmentation, housing (including transitional, boarding and emergency housing), homelessness, historical inequalities, racism, stigma, discrimination, access to services, social determinants, risk of exposure, transmission, and poor outcomes. Furthermore, poverty, health literacy, mental health and addictions, disability, age, sex/gender, ethnicity, over-crowding,<sup>12</sup> comorbidities, smoking, illicit drug use and distribution (and associated social exclusion), vaccine status and health service use (including primary care, mental health, CADS) determine the risk of both poor clinical and non-clinical outcomes. These structural risk factors represent leading risk for COVID-19 in the community. Māori and Te Tiriti organisations will be important partners for monitoring risk.

The Ministry of Social Development (MSD) is collecting information based on vulnerability for those who have required care and support services. Multivariate analyses will be conducted with data measuring hardship payment claimant rates, main benefit claimant rates, housing benefit claimant rates, against the health indicators referenced above.

These factors provide a focus for surveillance to monitor transmission dynamics and distribution of disease by lead risk factors that increase risk of exposure, transmission, and poor outcomes.

If case rates grow by structural risk factors, then more targeted interventions such as care and support services through case management may be offered to prevent exposure, transmission and/or poor outcomes to individuals, their whānau, iwi, and community.

Structural risk factors will be assessed regularly through the Structural Risk Factors matrix and the results of this analysis will inform early warning systems and the COVID-19 Protection Framework lights system, as well as testing and vaccination systems.

## Key outputs of the surveillance system

Transitioning regionally between COVID-19 protection framework levels will rely on the use of expertise and data to inform a robust assessment of both the evolving COVID-19 situation, and the capacity and capability of the health system to respond. Decisions will need to be based on data, public health science, and local and regional knowledge about impact, health system capacity and capability. Structural risk factors, epidemiological insights, and other information will enhance the robustness of intelligence. The decision-making process will draw in expertise from local and regional District Health Board leaders, Māori/iwi leaders, and other stakeholders.

Ultimately, effective implementation of COVID-19 surveillance gives decision-makers timely access to information and evidence that is generated from a complex and ever-changing data environment.

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<sup>12</sup> The presence of multiple generations does not necessarily determine risk. Papakāinga housing is not necessarily riskier if not overcrowded and managed well in terms of public health approaches.

The strengthening of surveillance systems is a partnership between the health sector, social development sector, border agencies and experts about what information Aotearoa New Zealand needs for decision-making; and what should be measured and how data can be collected.

Analysis and interpretation will include:

- descriptive analyses, multivariable analyses, reporting numbers, proportions, and distributions by cluster, population group, person, place, and time
- quantitative epidemiology focused on gathering and analysing data to answer carefully formulated questions about the nature of the disease and its transmission
- short-term forecasting and mathematical modelling of pandemic and response scenarios to explore options for control
- genomic analysis to identify viral lineages with features of concern, monitoring new introductions of variants from beyond the border, supporting epidemiological investigations and studying transmission dynamics
- monitoring of vaccine effectiveness through secondary evaluations and ad hoc studies
- other analysis such as surveys and other research methods to answer specific questions, such as understanding societal behaviours and risk factors in response to public health measures

Many surveillance systems contribute to more than one surveillance objective. The surveillance systems range from existing and COVID-19-specific collections to research and intelligence from front line workers, the health sector, and community. COVID-19 disease surveillance will inform many aspects of disease management and impact mitigation. Data management and reporting requirements will include:

- a. High-level daily data for national and regional situational awareness and early warning indicators
- b. Structural risk factors matrix
- c. Epidemiological trends and insights report
- d. Reporting on new variants and global health intelligence
- e. Modelling and forecasting
  - For system-level risk models and strategic planning
  - For local/regional case number and health system impact forecasting
- f. Operational changes as required, such as adjustment to regional testing plans

## Surveillance Indicators

Each surveillance objective links to multiple surveillance indicators. Indicators are assessed through a variety of data sources and analysis methods. An illustrative example of indicators by surveillance objective are in Appendix 1. Monitoring of each indicator will be undertaken by the full range of surveillance activities, nationally and locally. The analyses will contribute to several products and processes, including advising on CPF colour change. The links between these parts of the system are described in Appendix 2.

## Factors to inform CPF changes

Cabinet agreed to the following health-based factors to inform colour changes in the CPF:

- Vaccination coverage across the overall population and equity of vaccination coverage
- Capacity of the health and disability system to manage COVID-19 cases, including across public health, primary care, community services, and secondary care
- Testing, contact tracing and case management capacity
- Transmission of COVID-19 within the community, including its impact on the most vulnerable populations

In addition, Cabinet agreed to consider evidence of the impact of COVID-19 mitigation measures on the populations a whole, and for at-risk populations specifically. Surveillance indicators are designed to monitor these factors, as well as others as defined by the surveillance objectives. The implementation plan will provide further detail.

## Population Risk and High-Risk Settings

The surveillance system considers the importance of integrating equity values and principles in order to measure and monitor population risk and high-risk settings. Data will be recorded and presented by age, sex/gender, ethnicity, income, and exposure to risk by geography.

High vaccination rates provide a level of population and individual protection from COVID-19. However, groups who are likely to have poor outcomes will require additional layers of support and protection as restrictions are relaxed.

When decisions are made about the level of protection a community may need, local population risks are assessed with the community leadership. This may be over and above the usual public health measures included in the COVID-19 Protection Framework. The information and processes outlined in this strategy will be the base for a risk-based assessment, including through Structural Risk Factors analysis.

## Defining structural, population and community risks

Risk for individuals and communities from COVID-19 has four parts: 1) risk of introduction, either of any virus in elimination state, or new variants across international border, 2) risk of exposure, 3) risk of transmission of the virus, and 4) risk of poor outcomes if contracted. Therefore, the elements to consider in a disease management approach are risk of:

- a. Clinical outcomes, such as hospitalisation, long-term impacts of COVID-19, and death
- b. High rates of transmission, even without the additional risk of poor clinical outcomes, and/or
- c. Communities and individuals for whom large numbers of cases and/or lockdown restrictions will be more difficult to withstand and recover

Several factors have the potential to impact on the above elements that are specific for COVID-19. These include vaccination, age, occupation, ethnicity, access to health services, cultural safety of health services, and socio-cultural and socio-economic factors.

The factors for higher COVID-19 risk tend to compound for the Māori and Pacific communities. While ethnicity is not a risk factor in and of itself, these groups are at high risk of poor outcomes

from COVID-19 because of the compounded effects of underlying health conditions, socio-economic disadvantage, and historical and structural racism and discrimination.

We use the term structural risk factors to explain how the disparities of class, culture, sex/gender, and ethnicity impact on individuals, whānau, iwi, and communities. Living in temporary, rudimentary, or inadequate housing, overcrowding, poor maintenance, intermittent power, lack of fuel and water, an insanitary environment, and lack of municipal services, compromised health, and exacerbating mental health problems all nurture the transmission of COVID-19. Early indication of COVID-19 transmission in communities of highest risk can help direct resources to where it will support the aims of minimisation and protection the most.

## Factors that determine risk of exposure, transmission, and poorer outcomes

The aim of determining population risk factors is to identify regions and population groups that are exposed to an underlying structural risk factor, and their relation to COVID-19 specific risk.

**COVID-19 specific risks** in terms of factors that can change include:

1. Low/high vaccination rates
2. Low/high testing rates
3. Wastewater detections
4. As cases increase – high prevalence estimates
5. As booster vaccines are used – low uptake of vaccine booster shots
6. Health behaviours; and adherence to testing, infection, prevention, and control requirements

**Underlying structural risk factors** that could be considered as part of defining 'population risk factors' in the context of the COVID-19 pandemic include:

- **Vaccine status** - Vaccination against COVID-19 is effective at preventing infection, symptoms, hospitalisation, severe disease, death, and reducing transmission. Vaccination therefore protects individuals and the health system from the impact of severe disease. However, vaccine effectiveness is reliant on several factors, such as time since full immunisation, interval between vaccines, virus variants, and an individual's immune function, and other host factors. Vaccinations do not eliminate the risk of transmission and breakthrough cases can still be highly infectious, particularly during the presymptomatic period at the beginning of their illness. Therefore, even those fully vaccinated who are at risk from structural vulnerabilities will experience more transmission and severity of illness and require more care and support.
- **Age** - Risk of poorer outcomes from COVID-19 is somewhat J-shaped, with very young children at slightly higher risk, 1–10-year-olds at lowest risk, and then an exponential increase in risk with advancing age. Young children are not generally efficient transmitters of COVID-19 (although sporadic superspreading events may occur with young index cases), while risk of transmission and exposure gradually increases, peaking in young adults with high levels of social mixing and behaviours conducive to transmission.
- **Sex/gender** - Men are at higher risk for poor outcomes, transmission, and exposure to COVID-19 but women are over-represented in essential work in high-risk healthcare and social care settings and are more likely to suffer secondary effects such as family violence, loss of income, and inordinate domestic and household workloads due to parenting and children not being

able to attend school. The LGBTQ+ community experience more health disparities compared to their straight counterparts, in part due to sexual stigma and discrimination. These health disparities also make them more likely to be exposed (i.e., through housing instability or overcrowding), and more susceptible to infection.<sup>13</sup>

- **Pregnancy** – Pregnancy is associated with worse outcomes from COVID-19. Pregnancy is associated with a higher rate of hospitalisation, transfer to ICU, ventilation and ECMO, and a 70% higher mortality risk compared to non-pregnant women.<sup>14</sup> Vaccination substantially reduces the risk of severe outcomes for pregnant women. In one study among women with COVID-19, approximately one third (31.5%) of pregnant women were reported to have been hospitalized compared with 5.8% of nonpregnant women. After adjusting for age, presence of underlying medical conditions, and race/ethnicity, pregnant women were significantly more likely to be admitted to the intensive care unit (ICU).<sup>15</sup>
- **Ethnicity** - Historically, Māori and Pacific communities both in Aotearoa New Zealand and in the Pacific have had worse experiences of pandemics. They also have a higher risk of poor outcomes due to having higher likelihood that socially determined health conditions, pre-existing co-morbidities, systemic racism, and discrimination, and/or historic mistrust in the healthcare system are serious barriers to accessing healthcare, testing and vaccination services.
- **Co-morbidities** – pre-existing health conditions, such as cardiovascular disease, respiratory disease, diabetes, inflammatory conditions, immunodeficient states and autoimmune diseases, increase the risk of poor outcomes from COVID-19, including in children with these chronic conditions.
- **Disability** – those with an intellectual or physical disability, or living in shared residential care homes, may be at higher risk of transmission and poor clinical outcomes of COVID-19. The reasons are multifactorial and may include shared living, accessibility to services, and interactions with more healthcare providers.
- **Mental health and addictions** – Mental health and addiction issues are pre-existing health conditions that place people at higher risk of serious outcomes or illness. People with mental health and addictions have two to three times the risk of dying before the age of 65 compared to the general population. Smoking, and synthetic and methamphetamine drug use are major co-morbidities and risk factors for transmission and exposure to COVID-19. The reasons for these associations have not yet been fully explained but are thought to be based on causal mechanisms and shared determinants.<sup>16</sup> Causal mechanisms include a variety of biological, psychological, pharmacological, and service delivery pathways, combined with racism and discrimination.<sup>17</sup> Other factors leading to potentially greater risk of COVID-19 and poor clinical

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<sup>13</sup> <https://www.tengakaukahukura.nz/covid19>.

<sup>14</sup> Kasehagen L, Byers P, Taylor K, et al. COVID-19–Associated Deaths After SARS-CoV-2 Infection During Pregnancy — Mississippi, March 1, 2020–October 6, 2021. *MMWR Morb Mortal Wkly Rep*. ePub: 19 November 2021. DOI: <http://dx.doi.org/10.15585/mmwr.mm7047e2>.

<sup>15</sup> Zambrano LD, Ellington S, Strid P, et al. Update: Characteristics of Symptomatic Women of Reproductive Age with Laboratory-Confirmed SARS-CoV-2 Infection by Pregnancy Status — United States, January 22–October 3, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:1641–1647. DOI: <http://dx.doi.org/10.15585/mmwr.mm6944e3>.

<sup>16</sup> Scott KM, Lim C, Al-Hamzawi A, et al. Association of mental disorders with subsequent chronic physical conditions: World mental health surveys from 17 Countries. *JAMA Psychiatry*. 2016;73(2):150–8. doi: 10.1001/jamapsychiatry.2015.2688.

<sup>17</sup> Te Pou [Internet]. Achieving physical health equity for people with experience of mental health and addiction issues: Evidence update. Auckland: Te Pou; 2020 [cited 2021 Mar 4]. 36 p. Available from:

outcomes include appropriate and considerate provision of testing and other COVID-19-related services.

- **Material deprivation and poverty** – are highly correlated to both poor outcomes and transmission risk for COVID-19. Those living with socio-economic disadvantages and inequalities are more likely to experience poorer health, housing and education, and lower income.
- **Access to health care** – Appropriate local, culturally-relevant health care services that provide the range of services the community needs are essential to support public health initiatives and preventative healthcare programmes. These include access to COVID-19 specific health care services.
- **Timely COVID-19 testing** – Symptomatic individuals undertaking testing as soon as symptoms emerge reduces the chance of widespread onwards transmission as isolation of the case and effective contact tracing can be undertaken. The timeliness of testing is dependent on multiple variables, including access to testing, lab capacity, and willingness to be tested (including the perceived consequences of a positive test).
- **Occupation** – Workplaces and whole of life occupational roles, are significant influences on likelihood of exposure and transmission risk for COVID-19. Occupational roles of work and unpaid occupations are both similarly implicated due to the activities involved in them. For example, transport workers who travel across boundaries, people attending a faith-based event or attending a gym, are all occupations that have risk due to the environments and activities involved. Health and safety measures are pertinent, such as proximity to others, precarious and informal work contracts, in any setting. Occupational status and factors such as low pay, inadequate access to sick pay, financial insecurity, and unemployment are also considerations for risk. Working in occupations requiring vaccine certification or with workplace vaccination policies is likely to reduce risk of exposure and transmission.
- **Household tenure type and characteristics** - Overcrowded houses lacking adequate amenities for separation of cases and/or contacts from other household members, poor ventilation, and multigenerational households where different risks overlap. Inability to access food and other essentials deliveries due to geographical location may increase risk of onwards transmission due to cases/contacts leaving the place of isolation.
- **High-risk settings** - Settings with poor ventilation and lack of space for physical distancing, and/or large numbers of people who are at high risk of poor outcomes from COVID-19 (e.g., aged residential care facilities, hospitals, shelters, and prisons).
- **Spatial distribution of vaccination centres, testing services and other essential services** – inadequate access to vaccination and testing centres, health, and social services and other essential services increase all COVID-19 related risks and of poor outcomes.

Underlying structural risk factors are intersectional. They layer over and compound the effects of other risk factors on individuals and communities.

## Method for monitoring structural, population and community risk factors against COVID-19 specific risk

For the surveillance implementation plan, a matrix is under development identify geographic regions and population groups that are exposed to underlying structural risk factors and their relation to COVID-19 specific risk. Surveillance data will be combined with datasets that capture socioeconomic, demographic, health service use and spatial access of services.

There will be a matrix of different representations of potential structural vulnerabilities. Surveillance will be focused on finding where the regions of that matrix correlate with COVID-19 specific risks that can change, including:

- i. Total effective immunity
- ii. Low testing rates
- iii. Low MIQ capacity/likelihood of adherence to community-based self-isolation
- iv. (Possibly) consistent (multiple positives temporally and/or geographically) or quantitative increase in wastewater detection
- v. (Future) high prevalence estimates
- vi. (Future) low uptake of vaccine booster shots
- vii. (If approved) vaccination rates of 5–11-year-olds

**The matrix of structural risk factors<sup>18</sup>** will be constructed from the following datasets:

- viii. Data from the Integrated Data Infrastructure (IDI) will be utilised alongside the 2018 Index of Multiple Deprivation (IMD18) designed by Auckland University's 'Health geography and Deprivation' research group that uses IDI. IMD is a deprivation indicator that has been developed to use as either an overall deprivation score or by separate domains. It is comprised of 28 indicators grouped into seven domains of deprivation: Employment, Income, Crime, Housing, Health, Education and Access to services. <https://hgd.auckland.ac.nz/imd18/>
- ix. A recently developed rural/urban classification protocol for New Zealand Health research and policy <https://pubmed.ncbi.nlm.nih.gov/34494690/>
- x. Demographics, age, ethnicity, and sex/gender (using the Ministry of Health HSU population estimates)
- xi. The Ministry of Health's M3/P3 comorbidity estimates. This dataset catalogues comorbidities based on previous hospitalisation and prescription records
- xii. People who don't interact with the health system. There is work currently underway to understand the differences between StatsNZ collection of all New Zealanders and the Ministry of Health's HSU. Areas with a large number of people who do not appear in the HSU should be considered as lack of engagement with the health system could indicate underlying vulnerability.
- xiii. Public health response needs to facilitate timely dispensing of physical resources to the community through case management (e.g., wrap around care and support services).

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<sup>18</sup> Auckland's experience has shown that the homeless/emergency housing/Kāinga Ora housing population has been a major determinant, therefore, regional information from the Ministry of Social Development (MSD) will need to be reflected.

Plans for timely dispensing include explicit attention to the needs of and opportunities to involve disadvantaged populations, including by geographic location, sex/gender, ethnicity, and age.<sup>19</sup>

- xiv. Of particular interest will be the urban/rural segmentation of these indicators.

An immediate area of development is the work to identify which of the underlying structural risk factors are stronger predictors of a COVID-19 case growth. The analyses will be able to be disaggregated by the factors listed above; and can be spatially mapped down to SA2 level to be used by DHBs and PHUs for surveillance and risk assessments. An immediate area of development of this work is to identify which underlying structural risk factors are stronger predictors and can be used as leading indicators for country risk assessments. There will be ongoing assessment of the predictive value of each factor and the evaluation of potential new factors.

The risk factor matrix will provide a focus for surveillance to monitor transmission dynamics and distribution of disease by lead risk factors that increase risk of exposure, transmission, and poor outcomes.

If cases rates grow in a community with high structural risk factors, then more targeted interventions such as care and support services through case management can be offered to prevent poor outcomes to the individuals, their whānau, iwi, and communities.

## Roles and Responsibilities

Comprehensive surveillance should ensure the systematic and ongoing, collection, management, analysis, and interpretation of data, closely integrated with the timely dissemination of those data to the people and agencies responsible for health action. In this context, fostering partnerships is important to empower decision makers and stakeholders to manage COVID-19 more effectively by providing timely and accurate information.

Surveillance is a nation-wide activity. It is carried out by and informs the actions and decisions of communities, health service providers and funders, public health units, front-line agencies, iwi, universities and researchers, testing laboratories, the Institute of Environmental and Science Research (ESR), and local and central government. The following highlights key partner groups and agencies that are part of the implementation structure for ensuring that the surveillance objectives are met.

### The Ministry of Health

The Ministry is responsible for updating the COVID-19 Surveillance Strategy and is the responsibility of the COVID-19 Science & Insights Group, in consultation with the Office of the Director of Public Health, Communicable Disease team, Population Health and Prevention Directorate, Māori Insights Team, Pacific Insights Team, COVID-19 Oversight Equity Advisory Group, Public Health Units, and ESR as a lead provider of surveillance to the Ministry. Advisory groups, including the Public Health

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<sup>19</sup> Connected to surveillance activities, public health applied and behavioural science studies that may include assessing the cultural safety and cultural circumstances are a consideration in terms of dispensing of resources; whether assets and resources considered include distance to and availability of food during red light status; distance to testing; access to primary health care and hospitals; ability to self-isolate safely; and critical care, as well as, availability of reliable internet and transportation.

Advisory Group and Te Kōtuku e Rere, and the COVID-19 Surveillance Oversight Group will provide coordination and prioritisation of surveillance actions.

The Ministry's Data Governance Group has overall responsibility for the governance of information, routine collection and use of information. The Group has responsibility for considering issues of governance and data sovereignty over surveillance information, while respecting the principle of being open and transparent. The Ministry is responsible for commissioning, maintaining, and operating the National Contract Tracing Solution (NCTS).

## **District Health Boards and Public Health Units**

DHBs provide key elements of surveillance information to aggregate to a national picture and are producers and users of surveillance information to support their response. Much of their key information is available from local sources, although guidance on surveillance testing is provided nationally. District Health Boards include operating PHUs and responsibility for key elements of the front-line public health response, including notification, contact tracing and investigation of outbreaks.

## **Primary Health Organisations**

Primary Health Organisations and community care are taking on more of the workload of managing and supporting people with COVID-19 as the country moves towards an endemic situation. In surveillance, primary health organisations both create and rely on valuable information. Some of these organisations have developed their own COVID-19 intelligence functions to allow them to allocate resources effectively at a very localised level. Primary Health Organisations deliver clinical care for the majority of COVID-19 cases; and much of the COVID-19 testing for diagnosis and surveillance in general practice and through community-based assessment centres and other community settings.

## **Institute of Environmental Science and Research (ESR)**

ESR is contracted by the Ministry to undertake national, real-time surveillance for notifiable communicable diseases. For COVID-19, ESR is part of the Surveillance Oversight group. They have also developed and operated non-notifiable disease surveillance systems, including syndromic surveillance of acute respiratory illnesses. ESR has a central role as the national public health reference laboratory, undertaking diagnostic and reference testing, including genetic analysis of COVID-19 variants. ESR also conducts and reports on wastewater testing. The ESR national surveillance team operates EpiSurv, the national disease database, and other national information systems.

## **Diagnostic Laboratories**

Processing, interpreting, and reporting on tests, validation of new assays, design and setup of new testing platforms, pooling of specimens and specimen types to support the surveillance strategy objectives.

## **Other Government Agencies**

The Ministry of Foreign Affairs and Trade (MFAT) provides an important contribution to the Ministry of Health's global surveillance efforts, ensuring that the latest international COVID-19 reporting from New Zealand's offshore network is shared with the Ministry's Science & Insights Group. MFAT's work includes reporting by New Zealand embassies and high commissions on the evolving COVID-19 situations in host countries, and comprehensive COVID-19 international policy reporting on issues including border security, vaccine certification and vaccine rollout progress. The Ministry of Social Development (MSD) will also have critical data on vulnerability, care and support needs pertaining to structural risk factors.

## **Community Groups and Non-Governmental Providers**

Māori and Te Tiriti o Waitangi partners will be forefront of community partnerships. Community, hapū, iwi, grassroots organisations, women, youth or religious leaders and civil society groups may provide informal reports of unusual health events or health risks that they witness in their communities. The Ministry's COVID-19 Lived Experience and Equity Advisory Group provides important access to information regarding local community support and contact tracing, and supporting welfare, manaaki and community isolation.

## Appendices

### Appendix 1

#### *Illustrative example of indicators and data sources by surveillance objective.*

**Objective 1:** Monitor and describe the incidence, prevalence, geographic spread, and severity of COVID-19 in the population to estimate the burden of disease, assess trends, viral changes, and inform appropriate prevention and mitigation measures.

Indicators	Principle data source
<b>Daily number of infections by region</b>	NCTS / EpiSurv
<b>Ratio of COVID-19 cases to ILI (?)</b>	Cases – NCTS ILI - ESR HealthStat ILI surveillance and FluTracker
<b>Regional distribution and strength of SARS-CoV-2 RNA detected in wastewater</b>	ESR wastewater report
<b>Case hospitalisation and ICU admission rate and hospitalisation/ICU duration</b>	NMDS and ED
<b>Variants sequenced in cases and the wastewater (could include but this is a future thing)</b>	ESR WGS report

**Objective 2:** Assess COVID-19 relevant data and impacts on equity settings and populations at higher-risk for transmission, and poorer clinical and other outcomes.

Indicators	Principle data source
<b>Vaccine status by region</b>	CVIP database
<b>Age by region</b>	HSU
<b>Sex/gender by region</b>	HSU
<b>Ethnicity by region</b>	HSU
<b>Co-morbidities by region</b>	M3 and P3 indicators
<b>Disability by region</b>	(TBC)
<b>Mental health by region</b>	(TBC)
<b>Deprivation by region</b>	2018 Index of multiple deprivation (IMD2018)
<b>Occupation by region</b>	(TBC)
<b>Population density by region</b>	HSU
<b>Crowded living conditions by region</b>	Statistics NZ
<b>Testing rates</b>	Éclair

## Appendix 2

### **THE ROLE OF THE MINIMISATION AND PROTECTION STRATEGY**

To minimise community transmission of COVID-19, particularly in areas of higher risk, in order to protect the health system as well as communities and individuals at highest risk of serious illness.



### **THE ROLE OF THE SURVEILLANCE STRATEGY IN ACHIEVING THIS**

Surveillance must provide guidance related to ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementation, and evaluation of public health practice



### **HOW WILL WE DO THIS?**

#### **Collection and Analysis of Data by:**

Monitor and describe the incidence, prevalence, geographic spread, and severity of COVID-19 in the population to estimate the burden of disease, assess trends, viral changes, and inform appropriate prevention and mitigation measures.

Through disaggregated assessment of COVID-19 data, assess impacts on equity settings and populations at higher-risk for COVID-19 transmission, and poorer clinical and other outcomes.

Evaluate the impact of national decision on the public health response to inform authorities so they may adjust their choice of strategies, as well as their timing and intensity.

Monitor the pandemic's impact on the healthcare system, including impact on resilience, moral distress, and moral injury in the workforce, and provide evidence to inform resource allocation and mobilisation of surge capacity, as well as external emergency care and support.

Monitor COVID-19 at the international border and certain aspects of the global COVID-19 pandemic (i.e., viral changes, emerging evidence, response measures), and the risk this poses to Aotearoa New Zealand.

**EACH OBJECTIVE LISTED ABOVE WILL HAVE MULTIPLE KEY QUESTIONS, INDICATORS AND DATA SOURCES.**

#### **Key Outputs:**

**High-level daily data for national situational awareness**

**Structural risk factors matrix**

**Epidemiological trends and insights report.**

**Reporting on new variants and global health intelligence**

**Modelling and forecasting**

**Operational changes as required, such as adjustment to regional testing plans.**

Evidence for Action

Evidence for Action