Navigating the COVID-19 crisis

Update on the COVID-19 virus

8 May 2020

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INTRODUCTION

Today's update shares our evolving thinking on the epidemiological nature of the COVID-19 virus and its public health implications for New Zealand

Our update is the fourth in a series on navigating the COVID-19 crisis

- The first provided a high-level overview of the crisis
- The second outlined why we think the recession will likely be long and severe
- The third identified which industries and communities will be most affected by the crisis

Emerging information about the disease and New Zealand's success with the elimination strategy prompted us to focus on the virus this week and delay the release of our long-term scenarios until next week

Content presented should be considered "draft" and "work-in-progress"

- It is not complete without accompanying verbal commentary
- The situation is changing rapidly, and our thinking is evolving. It is likely that some content will be out of date quickly

More information on Stakeholder Strategies can be found at http://www.stakeholderstrategies.co.nz and you can sign up to receive our future COVID-19 research summaries here

NEAR-TERM SCENARIO PLANNING CANNOT JUST ASSUME ELIMINATION UNTIL 2021 VACCINATION

New Zealand is successfully eliminating the virus and has achieved a much lower overall death rate than the world

- NZ's success rests on strong targeted restriction capacity[1] and low virus lethality
- Virus lethality is low in New Zealand and limited to older people
- New Zealand's public health measures are near best practice

But, evolving understanding of public health requirements and virus characteristics provide sufficient concern to consider downside scenarios

- Evolving understanding of the virus suggests people with cardiovascular conditions are at greater risk which, if true, may put developing countries at a significant disadvantage
- Antibody testing, while less important in New Zealand due to successful elimination, is facing challenges globally
- Having a vaccine available within 12-18 months is possible but highly uncertain

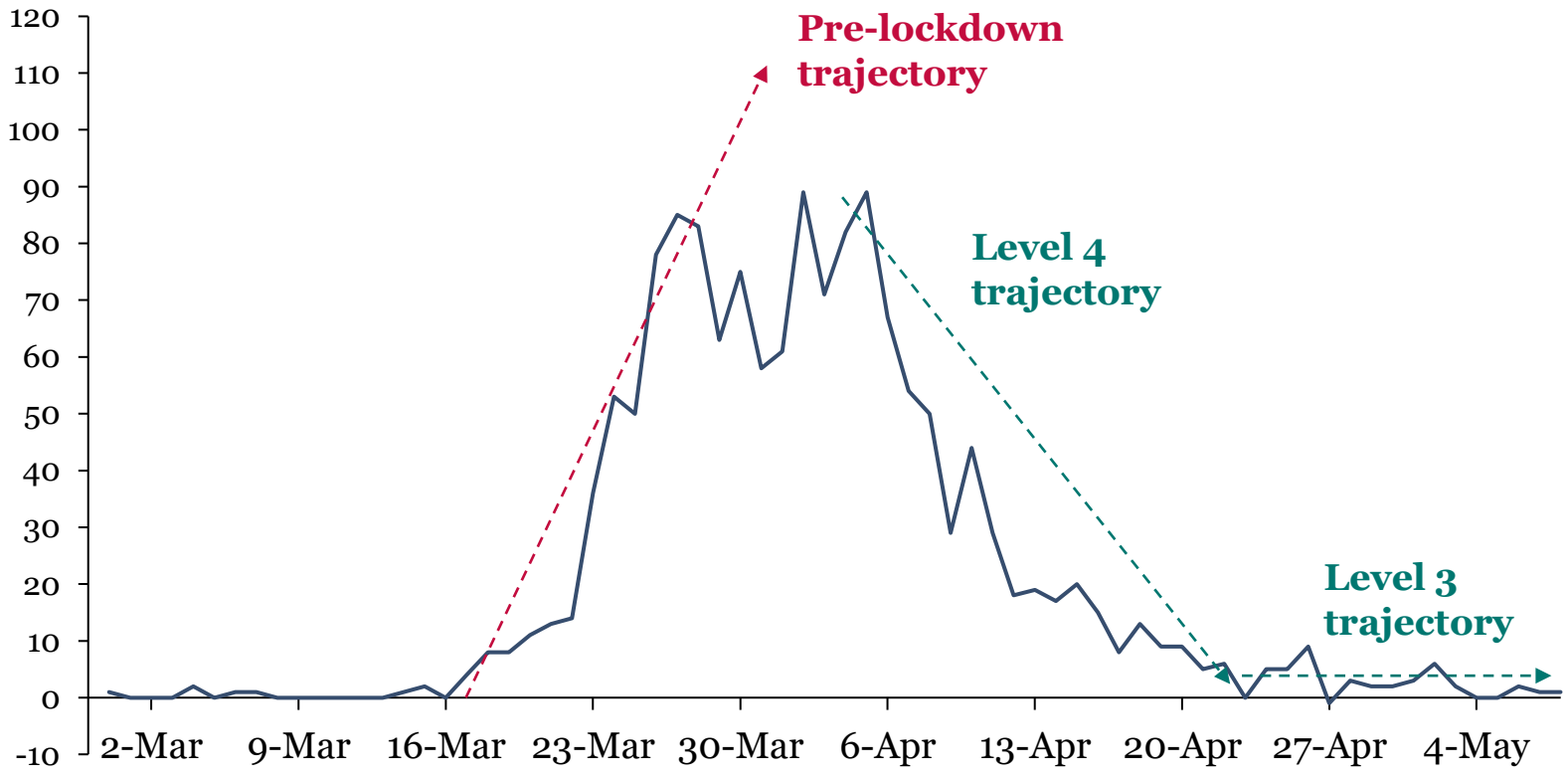
Crisis period scenarios should be considered to assess risks and opportunities

- Scenario deep dive: "NZ Elimination" sees New Zealand return to (near) normal relatively quickly

1. Contact tracing, testing and quarantining which enable targeted public health interventions (eg individual quarantining) instead of mass interventions (eg lockdowns)

NEW ZEALAND IS SUCCESSFULLY ELIMINATING THE VIRUS…

Daily new confirmed and probable COVID-19 cases in New Zealand



Source: Ministry of Health data; updated as at 1pm 8 May 2020. Note that on 27 April there was a net reduction of one new case as there were five new cases on the day but six previous cases were reclassified as still under investigation or not a case

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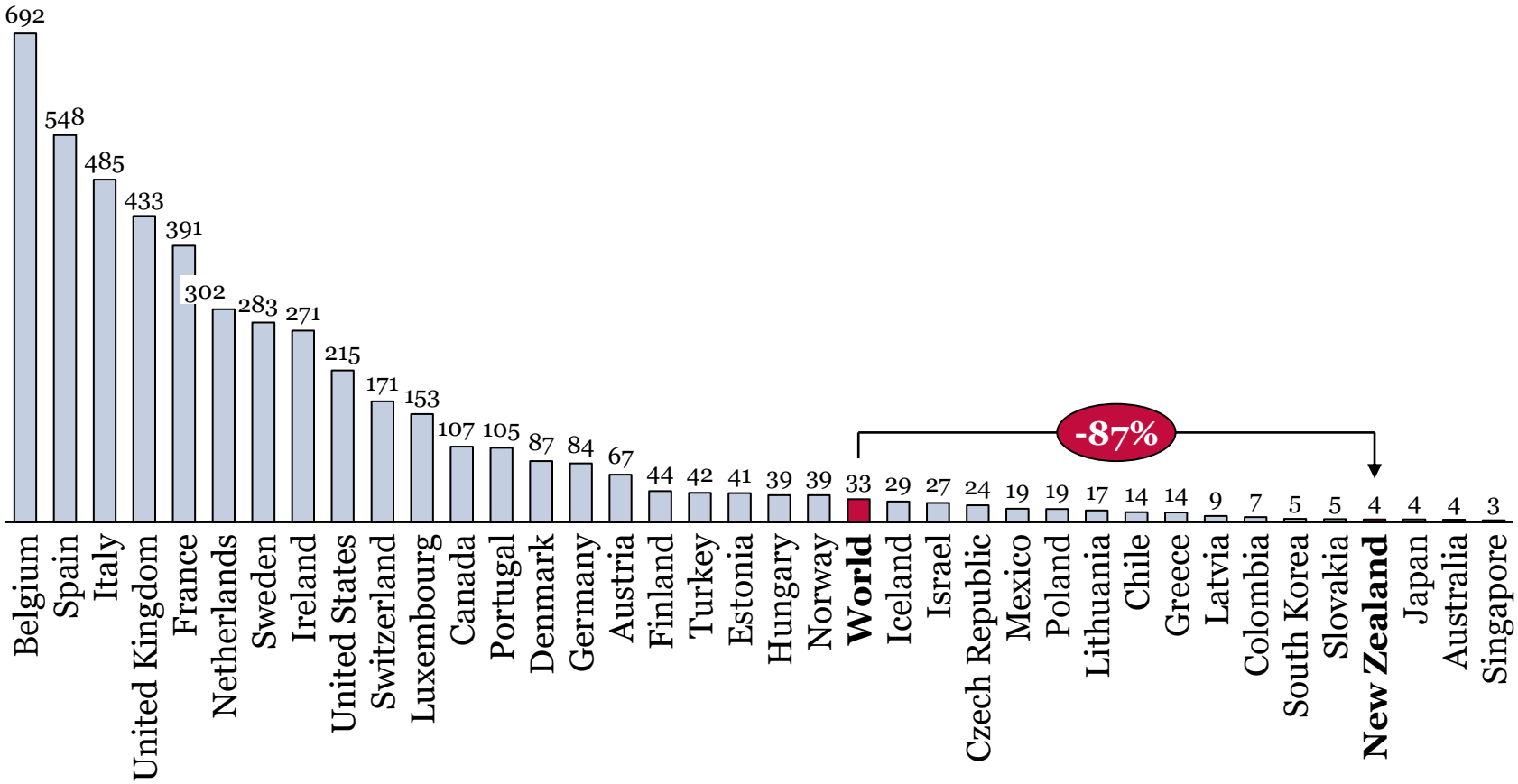
…AND HAS ACHIEVED A MUCH LOWER DEATH RATE THAN THE WORLD'S AVERAGE

Confirmed COVID-19 related deaths per million people by country
(as at 6 May 2020)



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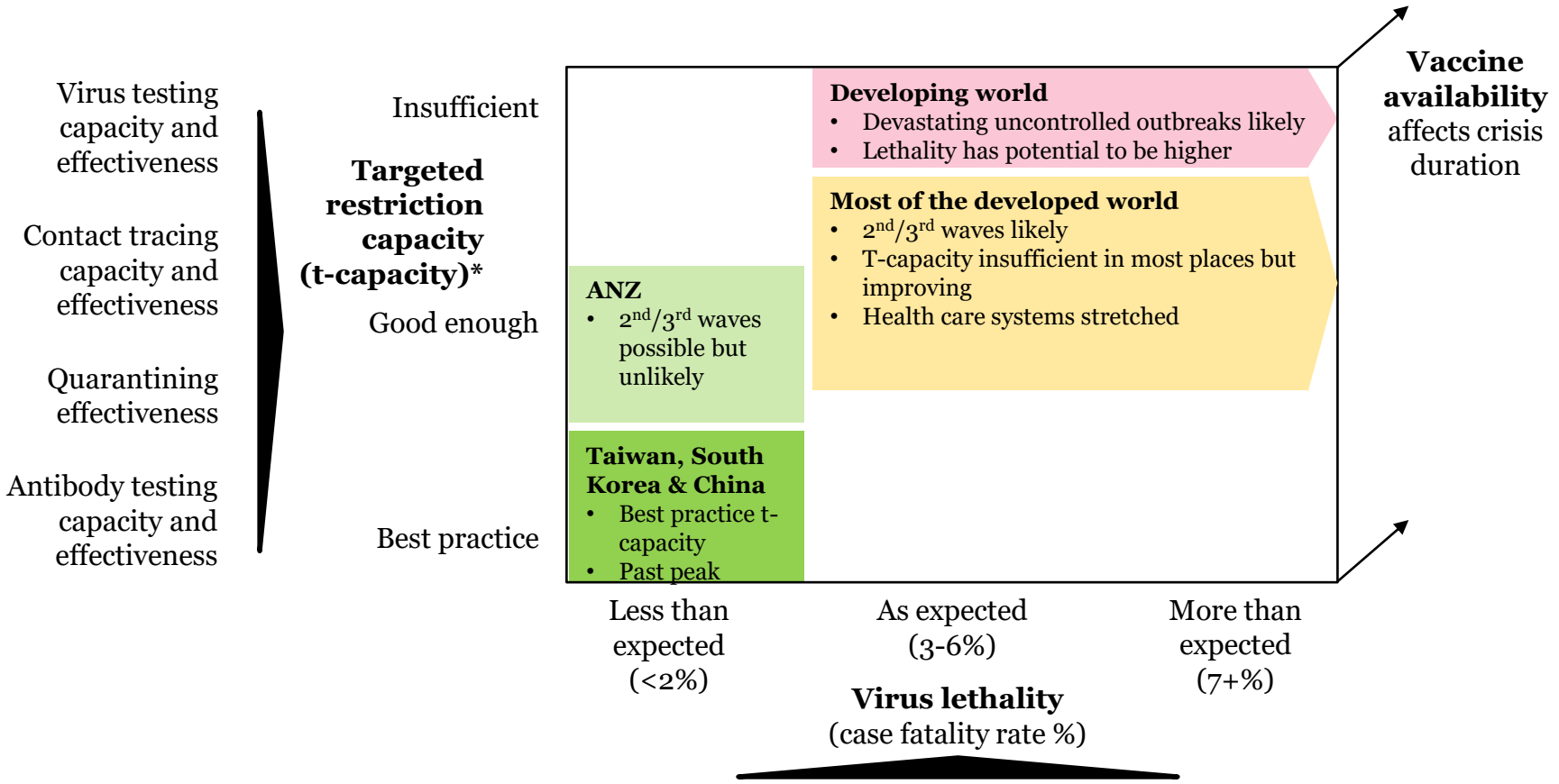
Source: Our World in Data.

NZ'S SUCCESS RESTS ON STRONG TARGETED RESTRICTION CAPACITY AND LOW VIRUS LETHALITY

Current state of COVID-19 globally



*The ability to rely on targeted public health interventions (eg individual quarantining) instead of mass interventions (eg lockdowns)

NEW ZEALAND'S PUBLIC HEALTH MEASURES ARE NEAR BEST PRACTICE…

	Testing	Contract tracing	Case/contact isolation
What good looks like	Reach testing level such that only ~3% are positive	Trace high proportion of contacts through: • Manual calling • GPS and surveillance data • High penetration apps	High isolation rate of: • cases as soon as symptomatic • contacts of confirmed cases within a day of case confirmation
New Zealand is currently tracking at <10 new cases daily, under lockdown for ~6 weeks	• Average positivity rate <1% • Equivalent to 32.5 tests per thousand people	• 80% of contacts being traced within 48 hours (in lockdown conditions) • App in development • Privacy concerns with data sharing	• Quarantine facilities for inbound travellers • Home self-isolation for cases and contacts with phone and police checks • Widespread lockdown
South Korea has reported its first day with zero local infections without having to enforce full lockdown	• Average positivity rate 1.7% • Equivalent to 12.4 tests per thousand people	• Law enables personal tracking data to be shared • Apps enable people to check whether they have crossed paths with a case	• Isolation centres for ill • Home self-quarantine for cases and contacts with phone check ins, wristbands • Mobile testing deployed
Singapore was praised for its control of the virus but surge in March/April resulted in lockdown	• Average positivity rate 8.16% • Equivalent to 1.5 tests per thousand people	• 40% of infections detected through contact tracing • Bluetooth app only 20% penetration • Digital tools stepped up after surge	• Some public centres for case isolation • Contact self-isolation at home • Widespread lockdown (only recently)

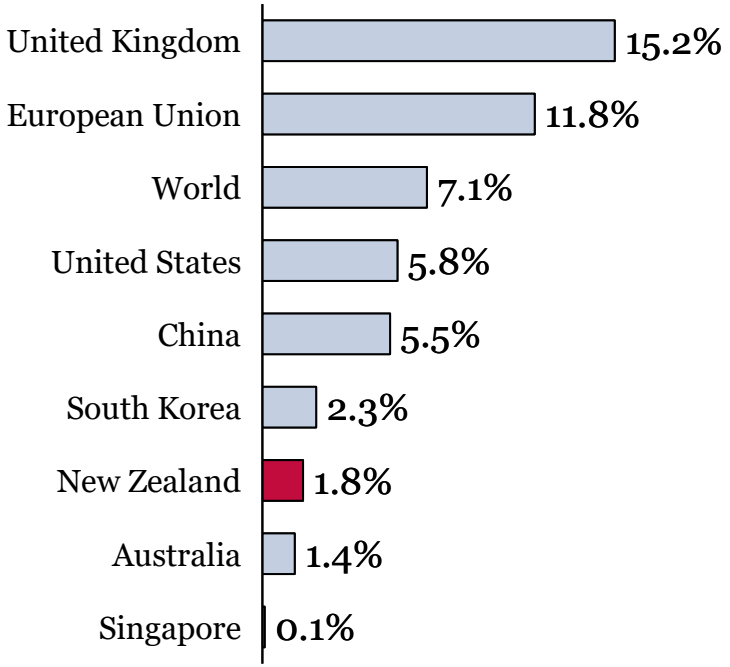
Sources: *NZ wasn't ready for a pandemic,* Newsroom. *Rapid Audit of Contact Tracing for COVID-19 in New Zealand,* Dr Ayesha Verrall. *Coronavirus: Learning How to Dance* series, Tomas Pueyo. *Dancing with Myself,* Genevieve Gee.

VIRUS LETHALITY IS LOW IN NEW ZEALAND AND LIMITED TO OLDER PEOPLE

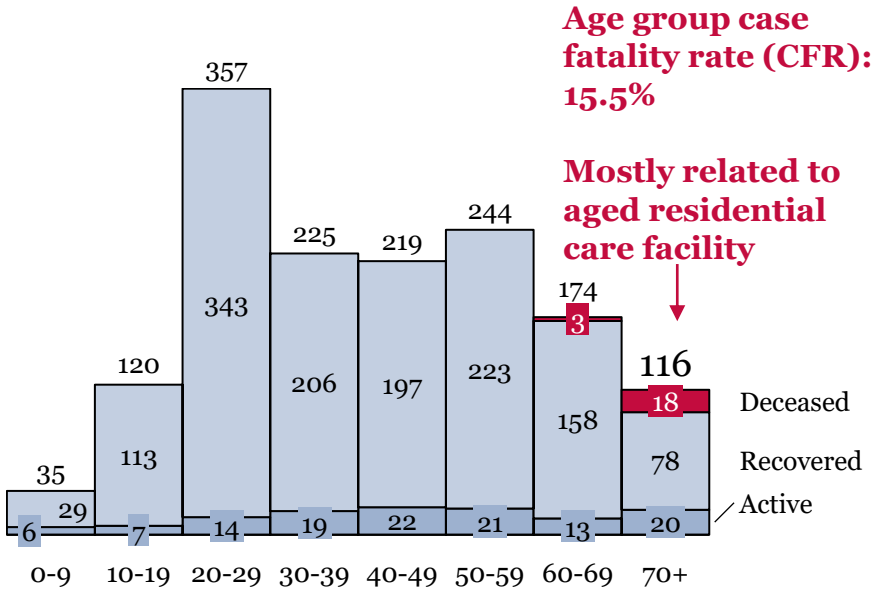
New Zealand's case fatality rate is low compared to other developed countries…

…and follows the trend of older people having a higher mortality rate

Case fatality rate by country
(as at 4 May 2020)



New Zealand cases by age and status
(as at 8 May 2020)



New York reported CFR of **47.7% in patients aged 75+**

South Korea reported CFR of **6.3% in 70-79** and **13% in 80+**

Italy reported CFR of **12.8% in 70-79** and **20.2% in 80+**

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Sources: Our World in Data and Ministry of Health.

EVOLVING UNDERSTANDING OF VIRUS SUGGESTS A WIDER RANGE OF PEOPLE ARE AT GREATER RISK…

Emerging research suggests that the progression of COVID-19 in a person may be associated with oxidative stress caused by the virus binding with and destroying the ACE2 receptor

- ACE2 receptor is critical to inhibiting the production of super oxides which cause oxidative stress
- ACE2 found in cells in various organs such as the blood vessels, lungs, intestine, kidney, brain

Initially, COVID-19 was labelled a respiratory disease and therefore concentrated in the lungs, however emerging oxidative stress theory may explain reports of unexpected symptoms such as:

- Blood clotting, decreasing blood flow in lungs and other critical organs, including skin
- Fives cases of stroke in Manhattan were treated for large-vessel blockages, under the age of 50
- Early data shows 14-30% of ICU patients in New York and Wuhan lost kidney function

Oxidative stress theory may also provide insight to relative risk factors of developing complications

- Oxidative stress related co-morbidities (cardiovascular disease, diabetes, hypertension) may be exacerbated further
- Ability to prevent oxidative stress decreases with age
- Women may be more protected due to higher levels of oestrogen which may increase ACE2 levels

Research is underway to understand the relationship between COVID-19 and ACE2 levels further, and identify or progress potential therapies that intervene in the virus binding process

Sources: *Coronavirus Pandemic Update* series, MedCram. *Oxidative Stress as Key Player in Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) infection*, Archives of Medical Research. *COVID-19 Infection and Circulating ACE2 Levels: Protective Role in Women and Children*, Front. Pediatr.

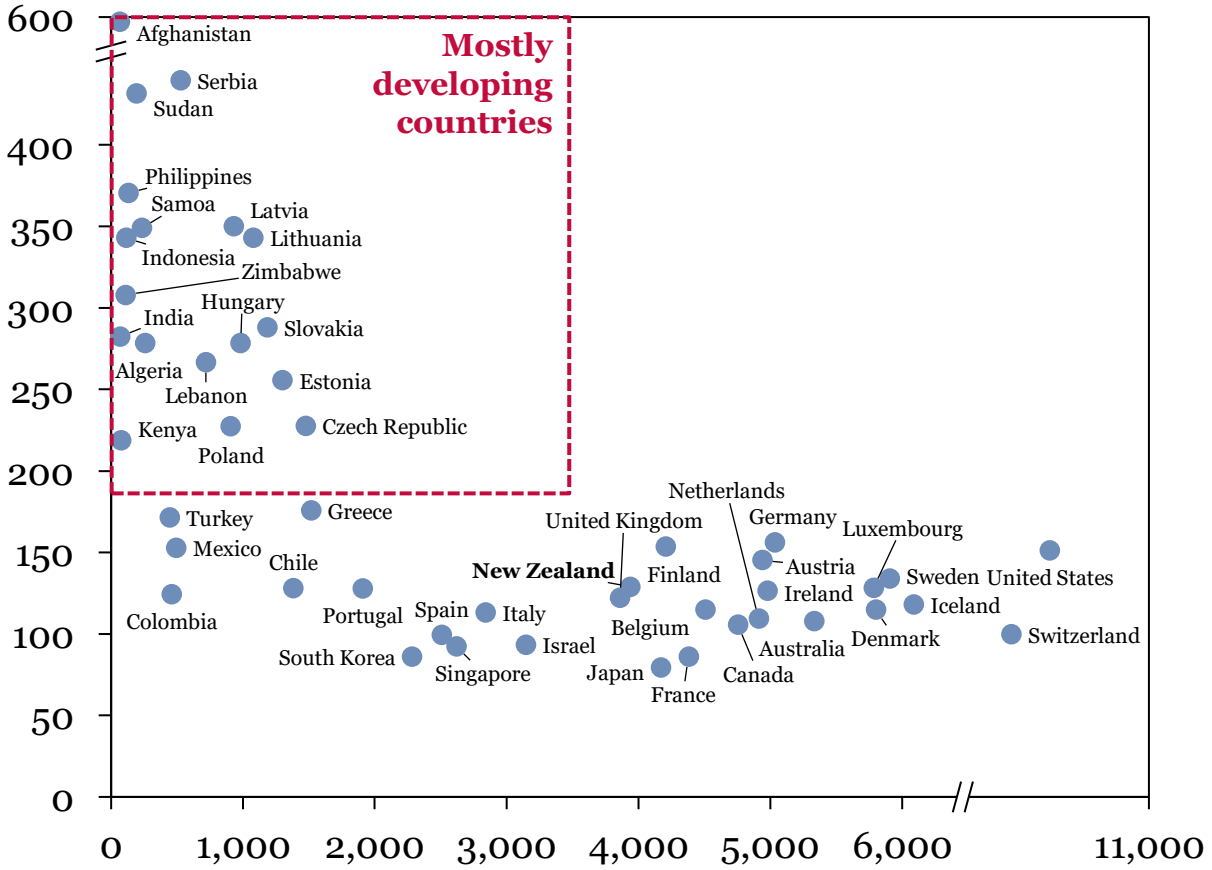
…WHICH, IF TRUE, MAY PUT DEVELOPING COUNTRIES AT A SIGNIFICANT DISADVANTAGE

Comparison of prevalence of cardiovascular disease and healthcare expenditure
(deaths per 100,000 people by healthcare expenditure per capita, $USD, 2017)

Deaths from cardiovascular disease per 100,000 people is used as an indicator for prevalence of oxidative stress related conditions

If oxidative stress theory holds true, then countries with higher rates of cardiovascular disease and less capable healthcare systems may be at greater risk of severe outbreak

Limited testing regimes in developing nations are likely masking the true extent of the severity of the COVID-19 outbreaks



Healthcare expenditure per capita (2017 $USD) is used as an indicator of a country's healthcare system capability

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Sources: Out World in Data, World Bank.

ANTIBODY TESTING, WHILE LESS IMPORTANT IN NZ, IS FACING CHALLENGES GLOBALLY

In the absence of a vaccine, tests that can determine a person's immunity from further infection will be key to lifting restrictions on the economy, allowing 'immune' individuals to travel or work more freely

Serological antibody testing is one of the methods being explored to identify whether a person has previously been infected with COVID-19 and is now immune, but studies are still inconclusive

- On 24 April, WHO stated that no study has evaluated whether the presence of antibodies to SARS-CoV-2 confers immunity to subsequent infection
- Early evidence points to only temporary protection against reinfection as for the common coronaviruses, which could imply a future where COVID-19 is a seasonal super flu with a high fatality rate

Despite inconclusive studies, serological tests are already being developed and deployed rapidly overseas, but their accuracy is presenting issues

- In the UK, scientists have warned that even highly accurate antibody tests could leave more than a quarter of people who were told they were immune at risk of infection
- Two studies in America were heavily criticized for using a test with high false positive rates

These tests may not be critical to New Zealand's immediate future if the country is able to eliminate the virus and maintain high levels of swab testing, contact tracing and isolation when restrictions are relaxed

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Sources*: COVID-19 Serology Surveillance Strategy*, CDC. *What if immunity to covid-19 doesn't last?*, MIT Tech Review. *"Immunity passports" in the context of COVID-19,* WHO.

HAVING A VACCINE AVAILABLE WITHIN 12-18 MONTHS IS POSSIBLE BUT HIGHLY UNCERTAIN

Layers	Options	Status	Barriers
Vaccines	• Traditional protein-based (longer timeframe but proven approach) • mRNA-based (quick to design but less proven tech and efficacy) • DNA-based (quick to design but less proven tech)	• Five candidate vaccines in clinical evaluation, 71 in preclinical (WHO) • World leaders and organizations pledged $NZ 13 billion to joint effort • Researchers collaborating globally	• 12-18 months required to conduct safety and efficiency clinical trials, even if 'fast tracked' • Average development time is 5 years, with 4 years being the fastest • Significant manufacturing and distribution capacity required to ramp up production
Therapeutics	• Antiviral – slows virus spreading • Symptom relief • Immune system enhancement/antibodies	• Currently, potentially 199 therapeutics being investigated • Trials are underway to test efficacy of existing drugs; e.g. Remdesivir trials showing promising results • Front-line physicians are using some therapies off-label	• If off-label efficacy is confirmed, significant manufacturing and distribution capacity required to ramp up production; current global stores insufficient • Existing therapies which may be effective, such as Remdesivir, may not be effective for everyone

Source: Credit Suisse Equity Research via Oliver Wyman; *Draft landscape of COVID-19 candidate vaccines*, WHO, 20 April 2020; *Potential COVID-19 Treatments and Vaccines In Research Pipeline*, Milken Institute, 6 May 2020.

CRISIS PERIOD SCENARIOS SHOULD BE CONSIDERED TO ASSESS RISKS AND OPPORTUNITIES

Crisis period scenarios (now to 2022)[1]

	Scenario drivers			
Scenario	**Elimination in NZ?**	**Containment Globally?**	**NZ's economic recovery commenced?**	**High-level story**
NZ Elimination	✓	✘	✓	• New Zealand maintains elimination and reopens the economy (including limited international tourism) • Most of the rest of the world struggles to contain the virus and experiences multiple or prolonged waves of infections • New Zealand's economy begins to recover but is constrained by dependence on the faltering global economy
Global Containment	✓	✓	✓	• New Zealand maintains elimination • Most of the rest of the world successfully contains the virus but large numbers of people are still harmed • New Zealand's economy recovers more rapidly, supported by the global economic recovery
Global Infection	✘	✘	✘✘	• Elimination and containment fails in New Zealand and globally • Some countries retain strict public health restrictions while others alleviate restrictions and accept higher levels of fatalities • A severe global recession is experienced during the crisis

Wildcards:

- **Mutation** – the virus mutates, prohibiting faster than normal vaccine development and potentially becoming more deadly
- **Endemic** – a vaccine is not developed quickly and the disease becomes endemic, appearing more like Measles or Dengue

1. Post-crisis scenarios will be released next week.

DEEP DIVE: "NZ ELIMINATION" SEES NEW ZEALAND RETURN TO (NEAR) NORMAL RELATIVELY QUICKLY

Crisis scenario: "NZ Elimination"

"Elimination" in New Zealand

- New cases remain very low during May/early-June
- Alert Level downgraded to 2 in May, then to 1 in May-June
  - Dropping to Alert Level 0 may be possible
- Businesses and education facilities able to reopen, with some restrictions
- Domestic travel restrictions lifted and some international travel to/from other countries that have eliminated the disease (eg Australia) is allowed

Containment globally

- In most developed countries, the virus is on partially contained until a vaccine is available, balancing lower economic cost with some viral spread
- Developing countries may experience more devastating and uncontrolled outbreaks, but the severity will vary according to each country's ability to contain the virus

New Zealand's economic recovery

- Keynesian economic stimulus prioritises green infrastructure investment
- Austerity and material inflation avoided
- Domestic and limited international tourism promoted
- Changes in consumer preferences and new ways of working, learning and playing solidify (eg preference for sustainability and less commuting)

FURTHER INFORMATION

For further information on how we can help you, please contact:

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Thank you,

The Stakeholder Strategies team