

## **Masking for Covid in New Zealand: Research insights and recommendations on strategic implementation in anticipation of the arrival of Omicron and subsequent variants**

**White Paper on New Zealand National Masking Strategy, 13 January 2022 (v1.1)**

### **Introduction**

This white paper seeks to describe, inform, and recommend a general masking strategy for New Zealand's population, from the perspective of a New Zealand owned and based company that has been designing and manufacturing respiratory protection products for the past 7 years.

The paper is presented with relevance to and at the time of an imminent community spread of Omicron variant of Covid-19.

The views here represent those of Lanaco Limited, based at 2-4 Sultan Street, Ellerslie, Auckland. This paper uses a mix of scientific and non-scientific sources and is not intended to be a solely scientific paper that is written for publication.

### **The current situation of Covid-19 and masking in New Zealand**

As of early 2022, New Zealand is probably the only OECD country that has not been inundated with rising Omicron cases. The rapid transmission of the very infectious Omicron variant, while not contributing to high fatality rates, has led to large disruptions in supply chains and livelihoods due to its ability to cause large portions of the workforce to be sick at once.

As Omicron remains contained within New Zealand, it is important to understand what can be done in the immediate and short term to reduce the speed of its inevitable spread, as to prevent large-scale disruptions in the community when Omicron reaches beyond MIQ.

Within New Zealand, use of masking to manage Covid-19 spread has not been taken as seriously as it has been in other countries. Our observations are that less than 10% of the population wears tight-fitting respirators (or similar products) with the balance of the population split about 40/60 between wearing loose-fitting surgical procedure masks and loose-fitting cloth masks, both of which do virtually nothing – as evidenced below - in terms of protecting their users from getting infected with Omicron.

### **Masking strategies globally**

In this paper, we use the term “respirator” to refer specifically to respiratory protection devices which are certified by a jurisdiction or notified body and have stringent testing and manufacturing standards applied to them. Common labels are AS/NZS 1716 P2, NIOSH N95, EN 149 FFP2, and KN95. When referring to “masks”, contextually it will either refer to **all** respiratory protection products, otherwise it refers to a specific device (e.g. if we denote them as surgical, cloth, or KN95 mask).

Our observations are that the economies of East Asia (particularly Taiwan, Japan, China, and Hong Kong) are the strictest on masking, with very high proportions of their population wearing higher-level quality masks/respirators. In the EU/UK, FFP2 (an EU performance rating for respirators) respirators have been enforced in certain regions since early 2021. North America lags behind these two regions in general. In Australia, use of respirators have been heavily encouraged and promoted on news outlets over the past 2 weeks.

Specifically, in the latest spread of Omicron, particular interest has been placed on the use of respirators over any other types of face coverings. Below is a sampling of different news articles collected from sources globally from

late-December 2021 until mid-January 2021, educating the public and discussing the necessary shift from cloth and surgical masks to respirators.

- 29/12/2021 – **There’s no mask shortage. You can buy certified N95s for \$1**  
Fast Company (<https://www.fastcompany.com/90709869/theres-no-mask-shortage-you-can-buy-certified-n95s-for-1>)
- 30/12/2021 – **Ministers know which masks provide the best Covid protection – why not tell the UK public?**  
The Guardian (<https://www.theguardian.com/commentisfree/2021/dec/30/masks-best-covid-protection-ffp2-ffp3>)
- 30/12/2021 – **Seriously, Upgrade Your Face Mask. Omicron is everywhere. Dr. Abraar Karan explains why cloth masks don’t cut it.**  
NY Mag Intelligencer (<https://nymag.com/intelligencer/2021/12/why-you-should-upgrade-your-face-mask-to-an-n95.html>)
- 30/12/2021 – **Infectious Omicron Drives More Americans to Up Mask Game to N95s**  
Bloomberg (<https://www.bloomberg.com/news/articles/2021-12-29/as-omicron-spreads-so-does-demand-to-up-your-mask-game>)
- 05/01/2022 – **Calls to swap cloth masks for respirators to counter Omicron wave**  
Sydney Morning Herald (<https://www.smh.com.au/national/calls-to-swap-cloth-masks-for-respirators-to-counter-omicron-wave-20220104-p59lpr.html>)
- 06/01/2022 – **France’s Omicron wave fuels soaring sales of FFP2 masks**  
thelocal.fr (<https://www.thelocal.fr/20220106/frances-omicron-wave-fuels-soaring-sales-of-ffp2-masks/>)
- 08/01/2022 – **We need to wear better masks. Cloth masks won’t cut it against omicron.**  
Vox (<https://www.vox.com/2022/1/8/22873390/covid-19-better-masks-n95-respirator-surgical-omicron>)

Our observations are that a lot of these “battle-hardened” jurisdictions already had higher respirator use in the community (i.e. FFP2 respirators in Europe, N95 respirators in North America) relative to New Zealand, and they are simply transitioning to a situation where the use of respirators is more normalised in their communities.

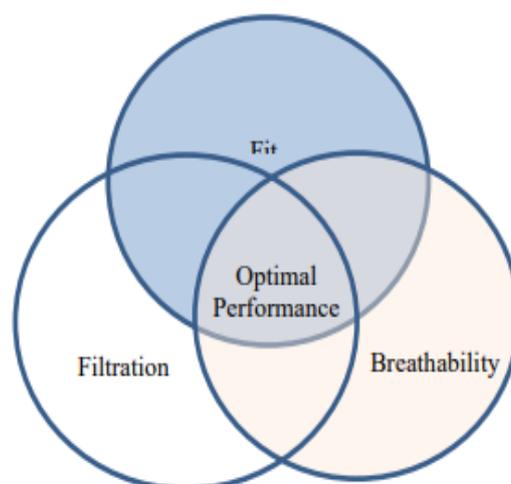
In New Zealand, most of the masking focus is simply on the reduction of droplet and aerosol spread, which is simply insufficient to counteract the highly infectious Omicron variant. The moment it becomes endemic, if nothing is done to change the way our community masks up, it will probably spread through our community in a similar manner as experienced this month in Australia, despite our very high vaccination rates.

## Filtration science and the standards

This paper does not go into great depth on the range of global masking standards available. However, we will start this section with a quick bullet point summary on the science and standards of masking, alongside some definitions.

- Broadly speaking the most common masks we see in the community are surgical procedure masks, cloth masks and respirators. There are also a range of intermediary products which have mixed performances.
- Some definitions that we will use in this section are:
  - **Filtration efficiency** – the degree to which a mask or filter material within a mask removes viral particles. Sometimes also referred to as a mask’s or filter’s “performance”. Not to be confused with “protection” (see below).
  - **Breathability** – how easy it is to breathe through a mask. Inversely proportional to “breathing resistance”. The higher the breathability, the more likely it will be worn comfortably. Having a mask with a low breathing resistance also reduces the chance of leakage, since inhaled air takes the path of least resistance to enter the mask. Conversely if the mask is hard to breathe through, the air has no choice but to bypass the mask and leak through, unfiltered.
  - **Fit and seal** – a measure of the mask’s ability to hold itself against the face, forming a secure seal, which ensures that as much as the inhaled air passes *through* the mask as possible. A mask’s fit can be qualitatively or quantitatively measured using a process called “fit testing”. A poor fit means a high level of leakage, both inwards and outwards, which is clearly undesirable.

- **Protection** – the ability of the mask to prevent the user from inhaling viral particles. Not always correlated with “mask performance”, as a high filtration efficiency paired with poor fit gives poor protection.
- **Surgical masks** have a mixed level of filtration performances as, after all, the required filtration standards for a surgical mask are a low bar to cross (e.g. bacterial filtration efficiency). It is almost impossible to recognise whether any products made are of a sufficient quality. They have mixed breathability and very poor fit (high amount of bypassed air), given that they were only designed to reduce droplet and aerosol transmission. Overall, very poor levels of protection for the wearer. **We score them 2/10 for protection.**
- **Cloth masks** also have a mixed level of filtration performances. There are no filtration standards for cloth masks and any issued guidelines for 3-ply cloth masks only exist to maximise droplet capture and not aerosol inhalation. They also have mixed breathability, and mixed fit. Some masks have a slot available for filter inserts or drop-ins, which may increase filtration efficiency at the expense of breathability. Overall, also not a good level of protection for the wearer. **We score them 1/10 for protection.**
- **Respirators** are normally designed with the requirement to have both high filtration efficiency filter media incorporated with a high level of fit against the face. Some standards do not prescribe a leakage test (e.g. N95, KN95 standards) but some do (e.g. EN149/FFP2 and AS/NZS 1716 standards). They have a range of breathability results but are generally perceived as being better than that of surgical or cloth masks. Respirators are supposed to be properly marked (i.e. printed) with the code and name of the certifying body and performance levels, which allows the wearer to independently verify their authenticity if this is required – though this is frequently not found in some N95/KN95 products sold. Respirators are required to have a very high level of fit and as such provide the wearer with a very high level of protection. **We score them 9/10 for protection.**
- **Barrier face coverings (BFCs)** are a range of masks which cover standards which have been derived by the US (through ASTM F3502) and the EU (through CWA 17553) that provide an intermediary performance standard level between surgical/cloth masks and respirators. These standards often cite filtration efficiency tests which are more like those of respirators but have slightly looser requirements for fit and seal. While they do not provide as high a protection level as a respirator, they are a significant step up compared to surgical and cloth masks. **We score them 7.5/10 for protection.**
- The ideal mask is one that has a high filtration efficiency, has good fit and has good breathability. The WHO issued this graphic in their mask recommendations document in Dec 2020. ([https://apps.who.int/iris/bitstream/handle/10665/337199/WHO-2019-nCov-IPC\\_Masks-2020.5-eng.pdf?sequence=1&isAllowed=y](https://apps.who.int/iris/bitstream/handle/10665/337199/WHO-2019-nCov-IPC_Masks-2020.5-eng.pdf?sequence=1&isAllowed=y))



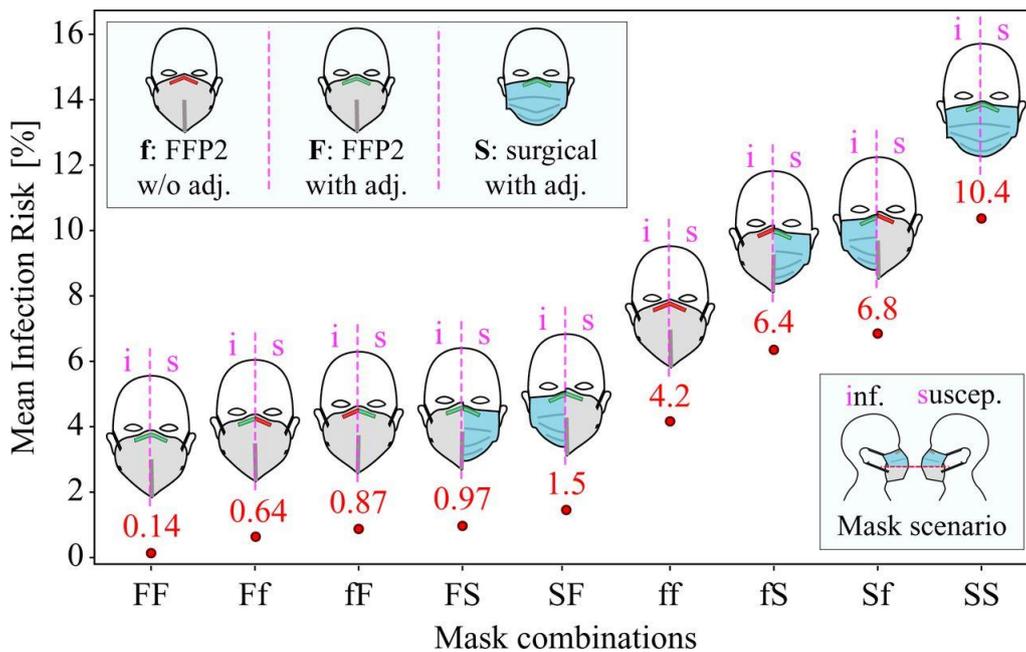
The summary on the following page shows our observations of the availability of mask options offered globally, how easy it is to source them and our anecdotal assessment of how often they are used in the community (as assessed through media and general reporting).

	Respirator	High performance barrier face covering	Surgical masks	Cloth masks
Standards	NIOSH N95, AS/NZS 1716 P2, EN 149 FFP2, KN95	ASTM F3502, CWA 17553	ASTM F2100, EN 14683, AS 4381	None
Filtration efficiency	Very high	High	Medium (variable quality)	Very low (variable quality)
Breathability	Medium	High	Medium-high (variable quality)	Medium-high (variable)
Fit and seal	Very good	Good	Poor	Poor
<b>Overall protection</b>	<b>Very high (9/10)</b>	<b>High (7.5/10)</b>	<b>Low (2/10)</b>	<b>Low (1/10)</b>
Prevalence in East Asia	High (40-60%)		Medium (20-40%)	Low (<20%)
Prevalence in EU	Medium (20-40%)		Medium (20-40%)	Medium (20-40%)
Prevalence in NA	Medium (20-40%)		Medium (20-40%)	Medium (20-40%)
Prevalence in Australia	Medium (20-40%)		Medium (20-40%)	Medium (20-40%)
Prevalence in NZ	Low (<20%)		Medium (20-40%)	High (40-60%)

### The importance of fit in protection

There has been a range of articles and papers published in the past 6 months discussing why highly protective tightly-fitting masks (i.e. respirators) are required for effective protection against Omicron, but we are only going to focus on a couple here.

In late 2021, a paper jointly written by the Max Planck Institute in Germany and Cornell University in the USA described both empirical and mathematical modelling in terms of looking at how one infected mask wearer will transmit Covid to another susceptible mask wearer. One key graphic that displays this is below:



In this graphic, within the parameters set by the experiment, the mean infection risk (MIR) lies at 10.4% when both infected and susceptible wearers each wear a surgical mask that has an adjusted nose-wire. On the other end of the scale, if both infected and susceptible wearers wear an FFP2 respirator with an adjusted nose-wire, the MIR drops to

just 0.14%, indicating an **80-fold** decrease in risk of infection. Even in various cases where both individuals wore their respirators incorrectly (e.g. one or the other wore them without an adjusted nose-wire, where there is some leakage), this risk is still reduced to around the 0.8% mark, which is still more than a **10-fold** decrease in risk of infection. This study shows how and why it is important to have both good fit and filtration efficiency, and in some cases, fit is even more important than filtration efficiency.

Another interpretation of this can be seen in the Wall Street Journal’s summary of the ACGIH Pandemic Response Task Force results. N95 respirators, even those which are not effectively fitted, give results which are orders of magnitude better than their cloth or surgical mask counterparts. If the respirators are very tightly sealed, then it is anticipated that the protection level is even higher. If two people wear cloth masks and one was infected, infection would spread in under 30 minutes, as opposed to 25 hours (1,500 minutes) in a poorly-fitted N95 respirator, or 2,500 hours (150,000 minutes) in a well-fitted N95 respirator. These numbers are orders of magnitude apart, which further reinforces the need to have widespread use of respirators.

Keep in mind that both these studies rely on results generated pre-Omicron. We would expect the transmission times to be far lower for poorly-protected mask wearers during the upcoming outbreak. This emphasises the urgency of policy implementation and that a lot of existing information already exists for use cases – there is no more need for further deliberation.

Sources:

- 07/12/2021 – **An upper bound on one-to-one exposure to infectious human respiratory particles** PNAS (<https://www.pnas.org/content/118/49/e2110117118>)
- 06/01/2022 – **Why Cloth Masks Might Not Be Enough as Omicron Spreads** Wall Street Journal (<https://www.wsj.com/articles/cloth-face-mask-omicron-11640984082>)  
Image from Twitter (<https://twitter.com/seungminkim/status/1478867026542219264>)

## Why Cloth Masks Might Not Be Enough as Omicron Spreads

Time it takes to transmit an infectious dose of Covid-19

		PERSON NOT INFECTED IS WEARING			
		Nothing	Cloth mask	Surgical mask	N95
PERSON INFECTED IS WEARING	Nothing	15 min.	20 min.	30 min.	2.5 hours
	Cloth mask	20 min.	27 min.	40 min.	3.3 hours
	Surgical mask	30 min.	40 min.	1 hour	5 hours
	N95	2.5 hours	3.3 hours	5 hours	25 hours

It will take 25 hours for an infectious dose of Covid-19 to transmit between people wearing non-fit-tested N95 respirators. If they’re using tightly sealed N95s—where only 1% of particles enter the facepiece—they will have 2,500 hours of protection.

Note: Results published in Spring 2021. The CDC expects the Omicron variant to spread more easily.  
Source: ACGIH’s Pandemic Response Task Force

## What Lanaco has learnt

Lanaco is in a unique position being a filter media manufacturer for the past 7 years, and a mask manufacturer since early 2020. It has supplied respirators and general use masks to the NZ Olympic Committee for use by medical and support staff as well as all athletes for the Tokyo 2020 games; to Rotary New Zealand as part of the 1 Million Masks campaign (where 150,000 P2-level masks have already been donated to Pacific nations); as well as large volumes for local exporting primary producer factories and travelling sports teams. It has a fully-equipped manufacturing facility for filter media and face masks, and test lab with a Palas MFP 1000 HEPA to test masks and filter media. It has a TSI PortaCount 8048 unit to fit test masks and has supplied filter media to 3M and NASA historically. It has worked with NZ Health Partnerships, two DHBs (Auckland and Waikato) and Otago University in R&D into mask shapes and designing a next-generation respirator that is able to work with the wide range of face shapes for the NZ health workforce, focussing on and satisfying the most difficult and hard to fit individuals.

Our observations on masking and the New Zealand mask market are as follows:

- Respirators are available in the community but are rarely worn. If worn, the most common sorts are KN95 masks (that have ear loops and not head straps), which are often unmarked (hence have unknown quality).
- Duckbill respirator mask styles are generally troublesome for fit, dome masks are found to be extremely uncomfortable for long term wear, and 3-panel and flat fold masks tended to be most popular with users.
- Once Omicron arrives, respirator demand will likely skyrocket, as it has for our Australian counterparts who have experienced the Omicron surge over the past few weeks.
- Cloth masks are the most common form of mask worn by the New Zealand public, followed by surgical masks. Lanaco supplies pre-cut aluminium nose wire to the mask-making community so we have an idea of how many people in the country are using cloth masks.
- Children often have difficulties finding masks that fit. We have many enquiries on this specifically in the last 2-3 months as children were advised to return to school unprotected. Schools are one place where poor ventilation, high densities and unmasked/unvaccinated are present and therefore there is a very high chance of transmission amongst the unprotected. We have subsequently developed and produced a smaller mask size to cater to this need and it has now received very good feedback from parents, as well as adults that have smaller faces, which have a size overlap with children in this sense.
- Breathability can sometimes be a challenge for adults. However it is a larger issue for children. While adults might be able to cope wearing a respirator for short periods of time, this option is inadvisable for children. Therefore a mask product for children really sits in a niche on its own.
- Paradox of protection – increased protection leads to reduced breathability. The focus of our development and technology is to provide world best performance while balancing breathability at the same time. As the world has tried to understand masking in a very tight time frame, the issue of breathability has not been addressed as fully as it could. It is here that Lanaco has produced a technological solution.
- The Brezy mask that Lanaco has designed is intended as a barrier face covering that has a fit and performance level closer to that of a P2 respirator yet is 5x more breathable than a P2 mask. This has seen consumer success but is not a regulated product. We have undertaken independent testing to verify performance and benchmarked against ASTM F3502 standards in an offshore laboratory where it passed a Level 2 rating with high scores (>80% filtration efficiency). When tested on a TSI PortaCount unit, the Brezy mask is able to achieve fit factors above 100, equivalent to a low “pass” result on a respirator. There is no product in the market in NZ (or the world to our knowledge) that has similar performance to this.
- Business(es) and organisations have varying degrees of policy when it comes to risk tolerance and it might not be related to actual risk. Some businesses where employees work in close proximity indoors are comfortable wearing surgical masks. Others that work in lower risk outdoor environments insist their workers wear respirators. Quite a mixed bag as they get conflicting advice from the Ministry of Health, MBIE, and Worksafe New Zealand.
- During 2020 we received numerous enquiries from private companies flying KN95 masks into the country (as Lanaco was the only test facility capable) to test them to see if the masks worked. Disturbingly we found that a large portion (over half) would have defective materials or flaws in them. In addition, KN95 masks often do not have a stiff nose wire so they will leak easily around the nose. There are hundreds of mask lines globally

now making this type of product, all with differing quality yet identical appearance. We do not endorse KN95 masks for these reasons.

- In terms of mask features, one position that Lanaco has always taken is that head straps are superior to ear loops as a method of secure attachment. This is because head straps offer a higher degree of fit, and tightness compared to ear loops and can be worn for a longer period without any discomfort. Unfortunately most of the market does not see this benefit as they have rapidly become more accustomed to the ear loops seen in surgical and cloth masks and public communications. All reputable respirator manufacturers globally offer (e.g. 3M) have head straps for this reason – they work better.
- Washability is a common question as the cost per use for a cloth mask is low since it can be washed often. Unfortunately, if a mask is to retain a high filtration efficiency after post use wash, there is no way to get a mask's performance back up to the initial level, even if all the other functionality of the mask is still to be retained (e.g. integrity of mask body to maintain a high level of fit).
- In general, respirators do not degrade tremendously while they are used, provided they are not subjected to high degrees of moisture (even humid breath is acceptable) or high temperatures. Internal testing has shown that the Brezy BFC mask will experience degradation over time of use (e.g. 2-3 days continuous use). Studies conducted into mask washing, while interesting as theoretical studies examining the changes in performance as masks are used, are not necessarily useful in practice as the washing methodologies cannot be matched by the public.
- Generally speaking, “mask communications” in New Zealand seems to use the same language as the rest of the world used in mid-2020 rather than the language now used in early 2022. For some reason, there is still a perception that respirators are a limited commodity that should be saved for frontline workers (despite there being no respirator shortage) and that the general population should only be using “face coverings” because a respirator that isn't well fitted does not function as well as it could. This approach is wrong as the previously quoted studies show that even poorly-fitted respirators perform substantially better than any cloth or surgical mask.
- In official government advice on community safety and protection, anything about protection levels above “face coverings” is not even mentioned (e.g. <https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-health-advice-public/covid-19-use-masks-and-face-coverings-community> or <https://covid19.govt.nz/prepare-and-stay-safe/keep-up-healthy-habits/wear-a-face-covering/>). Searching “N95” or “P2” in both sites yields no meaningful results. For the common citizen, it gives the impression that what they are currently wearing is the best available, which is simply untrue.
- In contrast, this is the advice issued by the government of Ontario ([https://www.publichealthontario.ca/-/media/documents/ncov/voc/2021/12/omicron-variant-community-masking.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/documents/ncov/voc/2021/12/omicron-variant-community-masking.pdf?sc_lang=en)) which suggests using N95 and KN95 masks, even if they are non-fit-tested. The Federal Government in Canada gives equally good information and advice on respirators (<https://www.canada.ca/en/public-health/services/publications/diseases-conditions/types-masks-respirators.html>) as does the CDC in the US (<https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/types-of-masks.html>)

## Our recommendations and strategy

Lanaco recognises the difficulties in changing public perception and existing systems. However, it is possible as other countries have shown. In making this change, this would be the desired wish list:

- Respirators be immediately recognised as the best form of protection for all adults and the myth of an unfitted respirator being ineffective dispelled immediately.
- Next tier down, for those who are unable to wear respirators or for children, barrier face coverings recognised as the next best thing. This is because BFCs often have better breathability characteristics while simultaneously having a high degree of fit, ensuring that a good level of protection is achieved. This should also help scenarios such as schools, where keeping the mask on for an extended period is a requirement.
- Surgical masks are strongly discouraged, but only offered as disposable alternatives as a source of last resort (e.g. a box sitting at the entrance to a supermarket in case somebody forgot their respirator). Once Omicron is prevalent in the community, surgical masks will barely act as a deterrent for transmission or protection.
- Cloth masks are strongly discouraged, for the same reason as surgical masks above in terms of having little to no effect in preventing the spread of Omicron.
- If the use of surgical and cloth masks is not discouraged, then it will give the public a false sense of security that they are protected when they wear these face coverings, when in fact they are not.

Given that Omicron is on our shores and can sweep through our community very quickly if we do not act appropriately enough, **Lanaco recommends that some of these actions be implemented quickly and at scale.** Here are some ideas and comments on potential issues, as well as some ideas which could be used for a rollout strategy.

- Supply and speed to market – currently, most of the public and private sector works predominantly with offshore suppliers of PPE manufacturers for respirator supply. There are already several local manufacturers that can help address this spike in demand. Lanaco can work closely with current importers as well as manufacturers like QSI to help coordinate manufacture and rollout effectively by engaging with other companies. This will require coordination between multiple producers to satisfy demand.
- Cost of respirators – this is often cited as a significant blocker to superior protection as respirators or BFCs generally cost more per use than surgical or cloth masks. Since the goal of respirator/BFC use is to flatten the curve, **not** to prevent everyone from getting sick indefinitely, it would be wise to do what has been done in countries like Germany, where the government subsidises the purchase of approved respirators for a short period of time (e.g. 1-2 months) to reduce the R-value in the community. If it is too expensive to use one respirator per day, then a system can be developed where one is used over multiple days, with a gap in between days to allow for the mask to dry between uses. Such a subsidy would allow an appropriate level of protection for the same cost to the consumer as current low-cost options.
- Mask re-use to reduce cost – this is an essential tool to improve supply and reduce waste and cost. Cost should be assessed on a cost per day basis. Similar to recommendations by the CDC for healthcare workers in case of PPE shortages, a similar advisory can be issued to the general public on re-use of respirators and BFCs if there is a shortage in the short term. Sources on multiple use guidelines can be found here (see <https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/decontamination-reuse-respirators.html> and <https://www.miamiherald.com/news/coronavirus/article257183537.html>). Mask rotation is a common practice in cloth mask wearers, and therefore a limited rotation of respirators and BFCs can be equally effective by applying CDC style guidelines.
- Large-scale respirator distribution – certain cities in the US have already started to distribute respirators to resident in Omicron hit areas. Milwaukee has started to distribute 500,000 N95 masks to its citizens (08/11/2022 <https://www.tmj4.com/news/local-news/city-begins-handout-of-half-million-n95-respirators>) and Salt Lake City has begun distribution of respirators for the 30-day mask mandate which **requires** respirator use, and cloth masks (08/11/2022 <https://www.fox13now.com/news/coronavirus/local-coronavirus-news/salt-lake-county-offering-free-respirator-masks-as-new-mandate-takes-effect>). On a Federal scale, the US government is considering distributing N95 or KN95 masks to all Americans (11/01/2022 <https://www.politico.com/news/2022/01/11/biden-n95-mask-distribution-526889>).

- Mask subsidy – the use of a subsidy will lower the R-value in the community by providing a significantly higher level of protection at no greater cost to the consumer than exists at present. A quick calculation of the costs behind a mask subsidy:
  - Assuming respirators or BFCs cost \$4 (average for both models), with both reusable 4 times.
  - For an 8-week (56-day) “flatten the curve” period, that means 14 respirators are used per person.
  - Giving one to each person in New Zealand (5M people) means 70M respirators at a cost of \$280M.
  - A subsidy of \$2 per respirator (\$140M total at \$17.5M/week) means that the cost to the individual is \$2 per respirator, spread across 4 days means the cost per day is \$0.50, which makes it affordable.
  - The net cost of the subsidy is estimated (but not yet modelled) to have a net gain directly due to the reduction in workplace illness affecting education, healthcare, infrastructure, supply chain and export industries.
- Mask cost/day comparison – by looking closer at practical and typical current cost structures, below we compare respirator and BFC solutions with existing use products. The table shows incremental cost of having higher protection products versus the trade-offs of having poor protection.

	Cloth mask	Surgical mask	Barrier face covering	Respirator
Cost per unit	\$25.00	\$0.30	\$3.00	\$5.00
Number of uses per mask	50	1	4	4
Number of uses per day	1	2	1	1
Cost per day	\$0.50	\$0.60	\$0.75	\$1.25
Number of uses per week	5	5	5	5
<b>Cost over 8 weeks</b>	<b>\$20.00</b>	<b>\$24.00</b>	<b>\$30.00</b>	<b>\$50.00</b>
<b>Protection level</b>	<b>1/10</b>	<b>2/10</b>	<b>7.5/10</b>	<b>9/10</b>

- Existence and supply of BFCs – this is less common as Lanaco has been the sole manufacturer of this product type in New Zealand. Lanaco is open to working with other manufacturers to implement this class of product openly with shared know-how and technology, otherwise it can help classify existing products in the market to see if they reach this intermediate performance level.
- Quality of imported goods – there are only 2-3 private companies in the country which can perform testing of masks to ensure a high level of protection is retained. Using its knowledge supplying into local and offshore markets, and dealing with multiple offshore laboratories, Lanaco has the capability to standardise testing and standards across the 2-3 labs across the country capable of delivering lab test capability to ensure that masks produced and/or supplied into New Zealand have a high degree of consistency.
- Education and general communication – New Zealand can draw upon many sources of offshore media and literature to educate the population on the importance of respirators.

Some of these systems and strategies can be implemented in the immediate to short-term (e.g. 0-3 weeks) if adequately resourced and well-communicated. At the time of writing, New Zealand has little time to react – the do-nothing approach will see the equivalent of what is happening in Victoria and NSW to repeat here.

## Summary and conclusions

An analysis of global trends show that New Zealand is lacking behind the rest of the world when it comes to equipping the general population with the necessary tools to slow down the spread of the Omicron variant. Most of the OECD facing the Omicron variant has looked to deploy respirators over cloth or surgical masks, given their high degree of effectiveness and their relative availability.

There is a large performance gap in the masks that currently exist in New Zealand – both supply and perceptions of use – which renders a large portion of the population vulnerable and unprotected when a highly infectious variant becomes endemic. As a manufacturer and supplier of respiratory protection PPE into New Zealand, Lanaco has a unique perspective in how New Zealanders treat masks and the culture of masking over the course of the pandemic.

It is Lanaco's recommendation to the Government that the respirator be immediately recognised as the best level of protection for the general adult population, with barrier face coverings (BFCs) forming a second line of defence. Surgical and cloth masks are almost ineffective against Omicron and form a false sense of security that individuals are protected. Lanaco recommends to the Government that the use of these products be strongly discouraged and be available only as a last resort.

Lanaco has provided recommendations to implement a masking strategy that will increase the knowledge, availability, and supply of higher performance respiratory protection products into the community, which can be implemented in the coming weeks, to prepare the country for the inevitable spread of Omicron. It is recommended the relevant Ministries act on this as soon as possible, as a do-nothing approach will see the equivalent of Victoria and NSW repeat itself in New Zealand.

Yours sincerely,

Shaun Tan, PhD  
Head of Technology  
Lanaco Ltd  
Auckland, New Zealand