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The strong case for mask requirements in public transportation and border control settings in NZ's current COVID-19 pandemic context

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In this blog we identify six likely benefits from requiring fabric mask use in public transportation and border control settings in the "peri-elimination" context that New Zealand is currently in. Given these likely benefits and the relatively low costs (especially if the Government provides free masks as per Hong Kong), such

a policy should be given very serious consideration by health authorities in the transition to level 2.

As detailed in a previous blog post, the case for mass masking (i.e., wearing masks for source control as a population health intervention) for SARS-CoV-2 control is becoming increasingly compelling and many countries are adding masking policies to their pandemic response. High quality randomised controlled trial (RCT) evidence on mass masking is not available. However, there is significant indirect evidence from natural experiments occurring within mask-wearing countries which indicates mask use is an effective public health measure when combined with hand washing and physical distancing. SARS-CoV-2 is highly infectious, with a large proportion of asymptomatic (including pre-symptomatic) transmission, implying the need for additional control measures, notably widespread use of masks by the public [1].

Current pandemic control policies such as physical distancing, hand washing and coughing into elbows are also not based on extensive data from high quality RCTs, but on a collection of imperfect evidence. The high societal and economic cost of prolonged lockdowns should prompt policy makers to carefully consider every potentially beneficial tool to curb pandemic spread. Mass masking is a low-cost intervention with minimal risks and significant potential benefits.

In this blog we focus on mass masking for just two settings which are particularly relevant to the current New Zealand situation: public transportation and the connected area of border control. We first review the benefits of mass masking in these settings, and then review updated information on mass masking efficacy against respiratory viruses.

Benefit 1: Improved pandemic control by minimising transmission in public transportation and border control settings

Leading up to, and after New Zealand achieves its SARS-CoV-2 elimination goal, assuming this is successful, our borders will remain a risk for importing new cases. Although we appear to have effective quarantine processes in place at present, they are not immune to error and cases may slip through the net (in particular, air-crew and ship-crew who are currently exempt from quarantine laws). There is also evidence that some cases (~1%) may still be incubating COVID-19 even after 14 days in quarantine [2]. We therefore face the risk of re-introducing COVID-19 to New Zealand through these means. Mass masking in high-risk settings such as public transport and border control, which are closely connected with points of entry, will potentially prevent further local outbreaks and so lower the risk of subsequent lockdown. Public transport settings are particularly difficult for rapid contact tracing, though it will be easier when New Zealand has digital technologies to assist this process.

Benefit 2: Increased mask acceptance if more widespread use is needed after any setbacks in pandemic control

Despite evidence that mass masking has been a useful strategy in containing COVID-19 in a number of countries (e.g., Taiwan, Hong Kong – see below; and recent uptake in France, Spain and Germany); there is still limited public engagement with this intervention in some western countries. Insights from behavioural science suggests that people perceive an action as correct if they observe others performing it [3] [4]. Mass masking in appropriate

contexts, such as public transport, could develop a critical mass of adherence and set new norms around mask use. This would make the transition to more widespread mass masking easier if we experience setbacks in pandemic control. In addition, engaging with a new norm (such as mask wearing) may increase the likelihood that people will engage with related practices (such as hand washing and physical distancing) [5]. Face masks are a visible sign of the ongoing pandemic and a reminder that life is not fully “back to normal”.

Another benefit of mass masking over the winter months is the suppression of influenza and other respiratory viruses. So mask use in winter will improve the efficiency of COVID-19 outbreak detection by reducing the amount of testing required.

Benefit 3: Increased confidence for New Zealanders as the economy re-opens

As New Zealand moves down the alert level scale and before the country has declared successful elimination (as per a scientific definition), New Zealanders may be concerned about ongoing silent transmission. This fear could potentially hamper efforts to get the society moving again and return to a “new normal” economy. Mass mask use as source control (at least in public transport settings) could increase people’s confidence and sense of safety, allowing more rapid re-engagement in society and the economy.

Benefit 4: Improved confidence in New Zealand by international students and safety on “Trans-Tasman Bubble” flights

New Zealand may soon have the relatively novel opportunity to attract international students to a COVID-19-free country (albeit with quarantine until reliable antibody testing is available). Travellers planning essential and/or long visits to New Zealand might also be prepared to have two weeks quarantine (especially if there were quality hotel-level options for this).

To provide added confidence to these students and other travellers (many of whom come from Asian nations where mass masking is routine), it would help to have mass masking – at least in public transport and border control settings. Similarly, if both New Zealand and Australia succeed with COVID-19 elimination and open up a trans-Tasman bubble, traveller confidence is likely to increase with mask wearing required on all flights and transit areas.

Of particular note here is a study of pandemic influenza spread on a trans-Pacific flight which found that masks appeared effective in preventing infection of those passengers wearing them [6].

Benefit 5: Occupational health

Employers have a responsibility to protect transportation and border control staff. Even if domestic spread is virtually eliminated, the border remains an ongoing risk. Given infection risk appears to be dose related, transport and border control workers in indoor environments face higher risk from prolonged exposure to aerosolised viral particles. A stark example of this is the nearly 100 New York transit workers who have died from COVID-19 already. Masks are a low-cost way to provide additional protection and a sense of safety for these important workers.

Benefit 6: Environmental and sustainability benefits from more efficient use of public transport

An effective mass masking policy may support a return to safe, affordable, and efficient public transport. Costs will be lower if mass masking can be used to avoid the need for having “empty seats” between passengers on buses, trains and aircraft. Furthermore, if people have more confidence in the safety of public transport options such as trains and buses, they may be more likely to shift from private car transport back to these less polluting options. Achieving this goal may support the substantial improvement in air quality seen during lockdown when levels of nitrogen oxides (air pollutants caused mainly by traffic exhaust) dropped by more than two-thirds across New Zealand’s cities.

*Photo by **Anna Shvets** from **Pexels***

Addressing the downsides of mass masking in public transportation settings

We acknowledge that mass mask requirements in public transportation settings are a small extra constraint on individual freedom, can sometimes involve minor discomfort, and could require a modest expenditure on masks. However, the latter problem can be minimised by free provision of masks by employers and by the government. For example, the Government of Hong Kong delivers free and re-usable (washable) masks to all its citizens (they can be ordered online).

Updated evidence for mask use in reducing of respiratory virus transmission

There are five strands of evidence favouring mask effectiveness as detailed below.

Basic biology of SARS-CoV-2: This pandemic virus replicates in the upper respiratory tract and is most infectious early in the course of the disease [7]. Asymptomatic or pre-symptomatic detection is now well documented. The majority of the known clusters occur from transmission indoors [8]. A notable example of indoor spread from an asymptomatic carrier was the choir that met in Seattle where 45 out of 60 singers were infected at a

single event.

The potential risk from public transport exposure is illustrated by a report of a COVID-19 outbreak in Zhejiang province, China, during which attendees were transported to and from an event on two buses [9]. Travellers on the same bus as the index case had an infection risk ratio of 41.5 (95% CI: 2.6–669.5) compared with travellers on the other bus.

Extrapolation from surgical mask use in healthcare settings: There is no doubt that surgical masks can be used to reduce the spread of respiratory infections [10]. In health care settings masks are used widely for infection control, even though there are still gaps in the evidence base (e.g. it is still not proven that N95 respirator masks are superior to surgical masks for preventing influenza infection [11]).

Experimental evidence: The most compelling evidence that cloth masks can reduce droplet spread, the likely main mode of transmission of SARS-CoV-2, is from research using laser light scattering during speech. Anfinrud et al demonstrated 99% blockage of droplets expelled when using a damp washcloth attached with two rubber bands across the head [12]. There is also research on seasonal coronaviruses [13] that shows that a non-fitted surgical mask can block up to 100% of droplets containing coronavirus. Another study looked at cotton mask use on COVID-19 infected patients and reported a 96% reduction in viral load from a cough [14]. Other work suggests that a cloth mask may be less effective than surgical masks in blocking emissions of particles – but still more effective than not wearing a mask at all [15]. Another study of masks which included homemade masks made of “four-layer kitchen paper and one-layer cloth”, has found that these could block 95% of avian influenza virus in aerosols (compared to 97% for medical masks) [16].

Evidence from epidemiological studies: A cluster randomised controlled trial on mask use in Australian homes found a reduction in influenza-like illness in those who were highly mask adherent vs the non-mask users (albeit using surgical masks and other high quality masks) [17]. Similarly, there is evidence that mask wearing by Japanese school children is effective in preventing seasonal influenza infection [18]. In a case-control study of the risk factors for infection with another coronavirus (SARS), “the use of masks was strongly protective” [19]. A study on COVID-19 [20] reports that mask use (at up to 99% when outside the home), along with other control measures has been “associated with reduced transmission of COVID-19 in Hong Kong, and are also likely to have substantially reduced influenza transmission in early February, 2020.” Mask use has also been described as being important for control of COVID-19 in South Korea [21]. Taiwan’s success in containing COVID-19 has been partly attributed to its policy of recommending the use of masks early in the pandemic [22].

Recent reviews published in the peer-reviewed journal literature: A published review stated: “Weighing up all these considerations, there is modest evidence to support widespread community use of universal masking, which includes cloth masks to help reduce transmission of SARS-CoV-2. It will be important to examine evidence from countries such as China, Hong Kong and Singapore, where the majority of residents (as high as 98%) use masks in public, and where to a significant extent, COVID was contained in combination with known effective strategies” [23].

Greenhalgh et al concluded that: “Masks are simple, cheap, and potentially effective. We believe that, worn both in the home (particularly by the person showing symptoms) and also outside the home in situations where meeting others is likely (for example, shopping, public transport), they could have a substantial impact on transmission with a relatively

small impact on social and economic life” [24].

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