

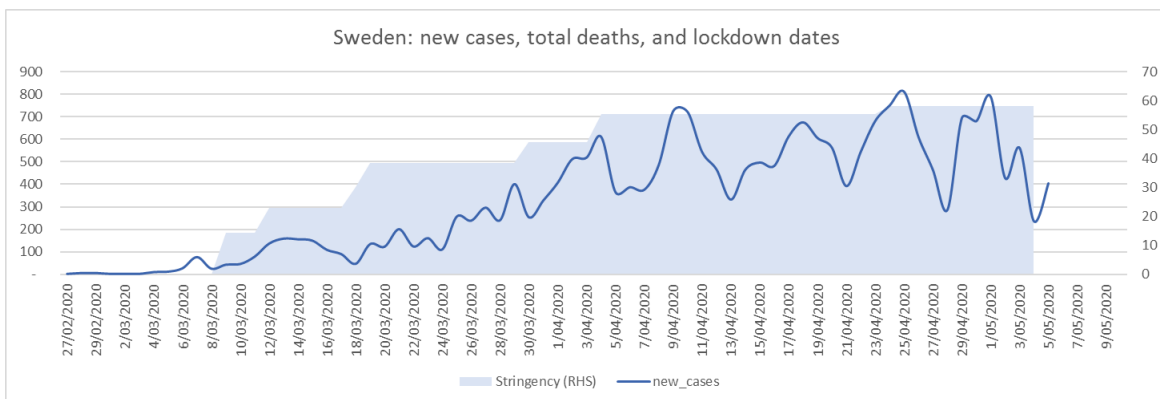
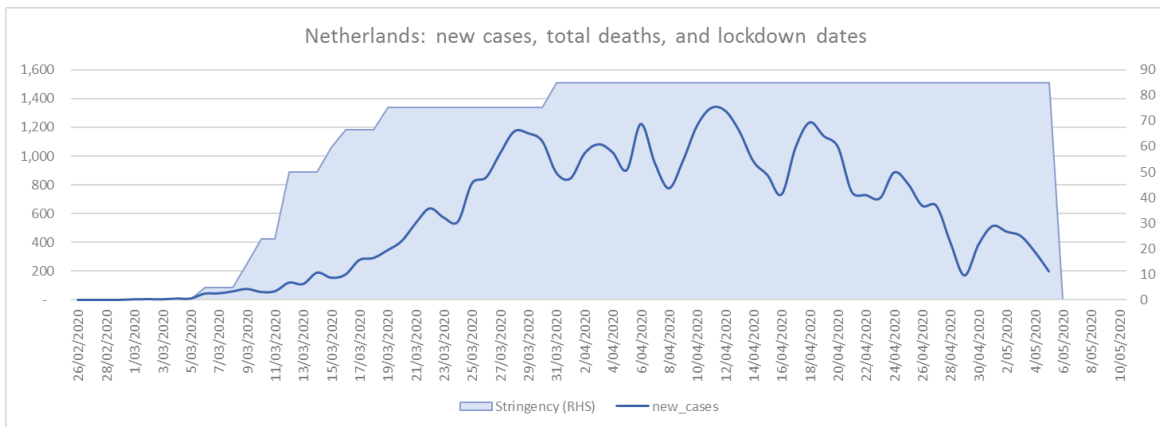
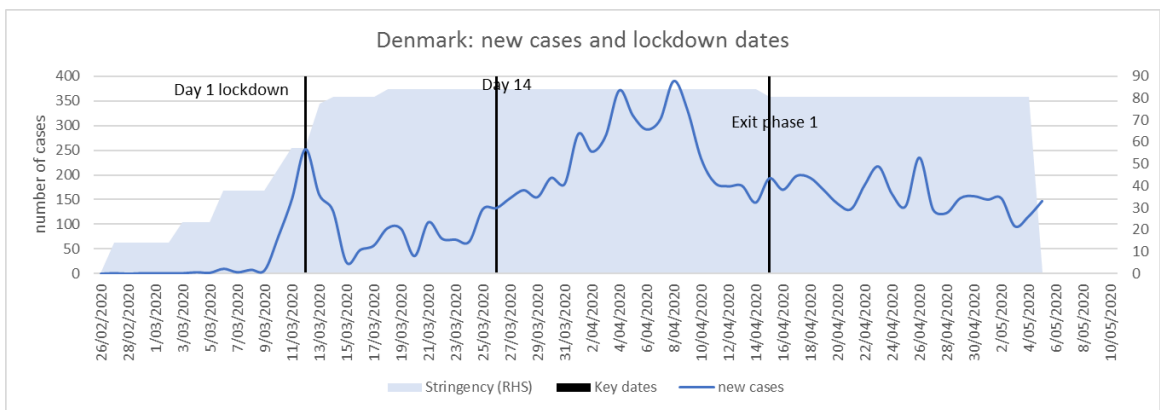
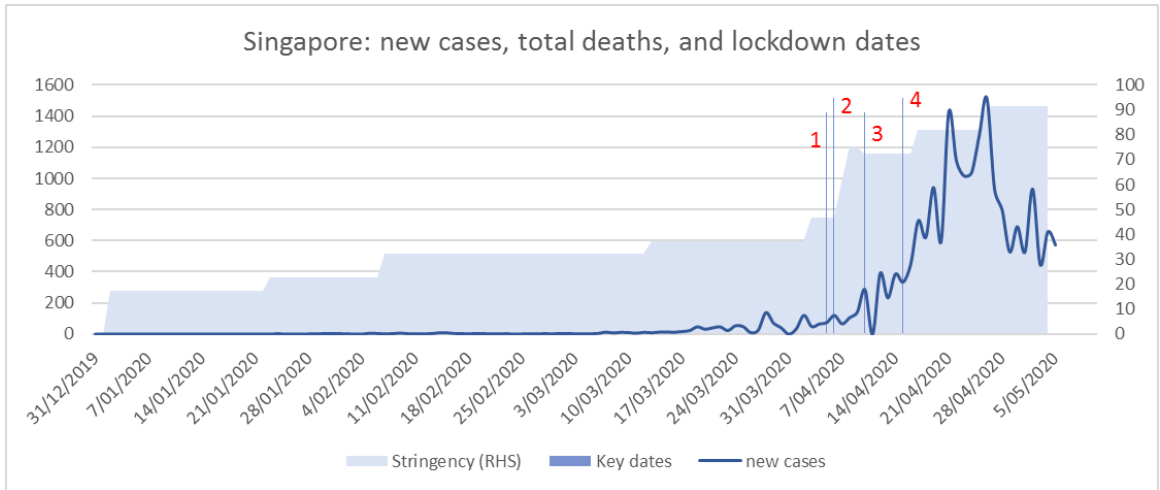
Review of science and policy around face masks and COVID-19

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Science

1. There are no clinical trials on the efficacy of public face coverings to protect against COVID-19. Therefore, evidence is being pulled from indirect research. Much of this is around influenza, SARS, clinical settings, or N95 v surgical, for example.
 2. [From the WHO](#): The use of masks made of other materials (e.g., cotton fabric), also known as nonmedical masks, in the community setting has not been well evaluated. There is **no current evidence to make a recommendation for or against their use in this setting.**
 3. The [debate](#) about public use of face coverings is heated.
 4. Based on a non-systematic review, the [Royal Society](#) DELVE Initiative supports public mask use.
 5. This report has been [criticised](#) by other scientists "... warning that it amounted to no more than opinion and overstated the available evidence."
 - o "That is not a piece of research. That is a **non-systematic review of anecdotal and non-clinical studies**," said [Dr Antonio Lazzarino](#), of University College London's (UCL) Department of Epidemiology and Public Health.
 - o "Based on what we now know about Covid-19", Dr Lazzarino said, "the negative effects of wearing masks outweigh the positive".
 6. The CDC recommends the use of face masks but [cannot find any data to quantify the risk reduction from wearing masks](#).
 7. Singapore made public mask wearing compulsory on April 15th. The daily number of new cases is still higher than prior to this enforcement. Singapore has also had specific COVID-19 restrictions in place since the beginning of January.
 - o For a comparison, see Denmark with no policy on face masks, and the Netherlands with a formal no-mask policy, and Sweden with no formal restrictions at all.
 - o The "[stringency index](#)" is a score ranging from zero to 100, calculated by the Blavatnik School of Government, University of Oxford, to track and compare policy responses around the world, rigorously and consistently.
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8. The physical properties of a cloth mask, reuse, the frequency and effectiveness of cleaning, and increased moisture retention, may [potentially increase the infection risk](#)
 - The effectiveness of public mask wearing is speculative “would probably intercept the transmission link”.
 - Cloth masks may be cost effective, but there is no clinical evidence in the COVID-19 context to suggest that they are effective as source control.
 9. The rates of all infection outcomes were highest in the cloth mask arm. The results caution [against the use of cloth masks](#).
 10. Seasonal influenza: Wearing masks (OR0.859; 95%CI 0.778-0.949) had significant [protective association](#). Effectiveness of protection methods differed between old and young schoolchildren."
 11. Rapid expert consultation: There is [only limited, indirect evidence regarding the effectiveness of \[home-made fabric\] masks](#) for protecting others, when made and worn by the general public on a regular basis. That evidence comes primarily from laboratory studies testing the effectiveness of different materials at capturing particles of different sizes. The current level of benefit, if any, is not possible to assess.
 12. The [majority of studies](#) have not demonstrated benefit in cluster randomized controlled trials evaluating the effect of members of the general public wearing masks in non-healthcare settings to prevent the acquisition of viral respiratory infections.
 - There is variability in the effectiveness of homemade and cloth masks.
 - If masks are not used appropriately, and not combined with meticulous hand hygiene, there is a theoretical risk of increased infection risk through [self-contamination](#).
 - Any potential benefits of mask wearing are likely [less impactful than physical distancing and hand hygiene](#).
 13. The use of non-medical masks in the community setting has [not been well evaluated](#). There is [no current evidence to make a recommendation for or against their use](#) in this setting. WHO stresses that it is critical that medical masks and respirators be prioritized for health care workers.
 14. [CDC](#) recommends wearing cloth face coverings in public settings where other social distancing measures are difficult to maintain (e.g., grocery stores and pharmacies) especially in areas of significant community-based transmission. Can be used as an [additional, voluntary public health measure](#).
 15. The [efficacy of three types of masks](#) and instant hand wiping was evaluated using avian influenza virus to proxy the coronavirus. N95 masks, medical masks, and homemade masks made of four-layer kitchen paper and one-layer cloth could block 99.98%, 97.14%, and 95.15%, respectively, of the virus in aerosols. Authors propose that [combined mask-wearing and instant hand hygiene](#) (MIH) to slow the exponential spread of the virus.
 16. The [Lancet](#) compares face mask use recommendations by different health authorities. There is consistency in the recommendation that symptomatic individuals and those in health-care settings should use face masks, but [wide discrepancies were observed in recommendations for the general public and community settings](#).
 17. The [precautionary principle](#) suggests acting without definitive evidence. Whether masks will reduce transmission of covid-19 in the general public is contested. Even limited protection could prevent some transmission of covid-19 and save lives. Because covid-19 is such a serious threat, wearing masks in public should be advised.
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18. Considers the [quantity of masks required](#) if everyone must wear them daily, repeat use of single-use masks in the face of shortages, and what to do with the rubbish. Used masks have been discarded in different places, such as buses, train stations, hospitals, streets, etc. These **discarded masks may cause secondary infections**.
19. With a [shortage of N95 masks](#), surgical masks afford varying degrees of protection, dependent upon proper usage. **Cloth masks carry unclear and variable benefits** and may be a last-resort option only when respirators and surgical masks are unavailable.
20. [JAMA](#): **Unless you are sick, a health care worker, or caring for someone who has COVID-19**, medical masks (including surgical face masks and N95s) **are not recommended**.
21. In what circumstances are standard masks [putting healthcare workers at risk](#) of contagion compared to respirator masks. **Standard surgical masks are as effective as respirator masks** (e.g. N95, FFP2, FFP3) for preventing infection of healthcare workers.
22. [Centre for Evidence-Based Medicine](#): Whether in the current pandemic we should all be wearing wear masks or not and if so in what circumstances. But what of the folk walking down the road, going to the supermarket or watching the ducks in the pond? **The answer is simple: we do not know**.

Science outside the COVID-19 context

1. [Among Saudi women](#) who wear a face veil: Respiratory infections and asthma were significantly **more common in veils users**.
 2. [Meta-analysis](#): **insufficient data to determine definitively whether N95 respirators are superior to surgical** masks in protecting health care workers against transmissible acute respiratory infections in clinical settings.
 3. [Systematic review](#): None of the studies established a conclusive relationship between mask/respirator use and protection against influenza infection. Some evidence suggests that mask use is best undertaken as part of a **package of personal protection especially hand hygiene**. The effectiveness of masks and respirators is likely **linked to early, consistent and correct usage**.
 4. [Canada](#). Collateral damage: the **unforeseen effects of emergency outbreak policies**. A review of policies and their success/failure.
 - Concerns that **improperly fitted masks may have contributed to a nosocomial cluster** led the POC to issue a province-wide requirement for N95 mask-it testing.
 - With a focus on masks, there was concern that staff **might ignore important control measures such as hand washing and avoiding self-contamination**, and actually increase their risk of acquiring infection.
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Benefits and advantages v. Risks and pitfalls

Benefits and advantages

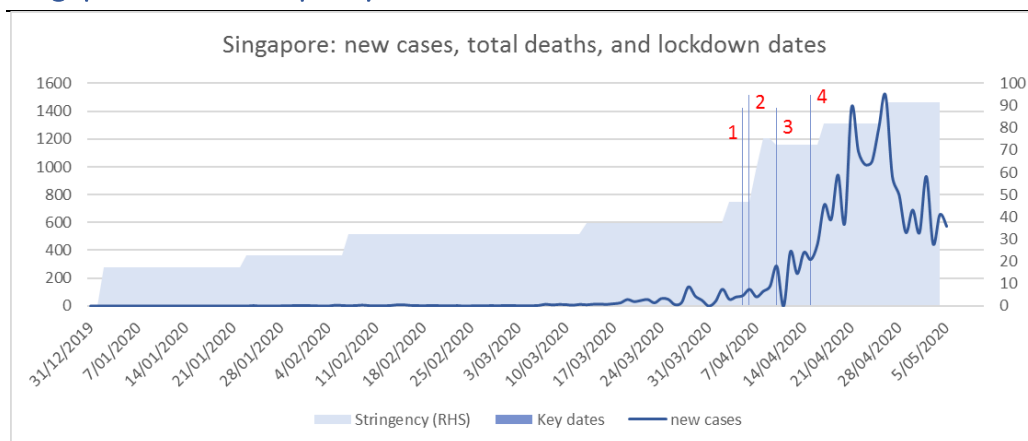
1. May [reduce viral spread](#) from viral shedders. This might be particularly important in the context of asymptomatic and pre-symptomatic people
2. Masks may provide protection in [closed spaces](#), such as public transport
 - a. Considers protection by face masks against influenza A(H1N1)pdm09 virus on trans-pacific passenger aircraft, in 2009. "Wearing a face mask was a protective factor against influenza infection. We recommend a more comprehensive intervention study to accurately estimate this effect."
3. Masks may provide some protection at [mass gatherings](#)
 - a. The paper concludes "A modest proportion of attendees of MGs [mass gatherings] use facemask, the practice is more widespread among health care workers. Facemask use seems to be beneficial against certain respiratory infections at MGs but its **effectiveness against specific infection remains unproven.**"
4. Masks can be effective when used [alongside hand hygiene](#)
 - a. Objective: "To investigate whether hand hygiene and use of facemasks prevents household transmission of influenza."
 - b. Conclusion: "Hand hygiene and facemasks seemed to prevent household transmission of influenza virus **when implemented within 36 hours of index patient symptom onset**. These findings suggest that nonpharmaceutical interventions are important for mitigation of pandemic and inter-pandemic influenza."
 - c. Importantly: "Adherence to interventions varied."
5. Cloth masks can be [made at home](#) at low cost washable and reusable and therefore reduce the demand on the ones needed by healthcare professionals
6. [Universal wearing](#) of masks fosters a sense of social solidarity in response to the pandemic
7. Masks were a [potential link to lower risk of SARS](#) amongst people without known contact during the SARS epidemic
8. Medical masks and N95 masks can be [reused for a few days with steam decontamination](#) between use.

Risks and pitfalls

1. Masks are [not as effective hand-washing](#)
 2. Not as effective as [social distancing](#).
 3. [N95 masks are most effective](#), followed by surgical masks. **Homemade masks are least effective**
 4. [Used/dirty masks](#) not disposed of correctly become a health hazard
 5. [Difficult to use](#) for some people to use, such as young children or people with respiratory issues
 6. [Self-contamination](#) by touching and reusing contaminated mask
 7. Cloth (homemade) masks can become a [breeding ground for pathogens](#) due to irregular washing, moisture retention, and poor filtration
 8. May be used [instead of, rather than as well as, hand-washing](#) and social distancing
 9. Mandatory wearing [increases demand, stretches supply](#) - particularly for those required by health professionals
 10. Masks must [fit correctly to be effective](#)
 11. Masks must be [used correctly to be effective](#)
 12. Researchers have found that masks may [not be as effective at filtering COVID-19](#)
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13. Masks can instil a [false sense of security](#) which could lead to engaging in higher risk behaviours
 14. [Low compliance](#) for mask wearing in uninfected close contacts
 15. Masks could create a false sense of security that could end up putting people at greater risk. [Even with the mouth and nose fully covered, the virus can still enter through the eyes.](#)
 16. Depending on type of mask used, potential [breathing difficulties](#)
 17. Masks associated with increased face-touching
 18. [Improper decontamination](#) of medical masks or N95 masks can damage the blocking structure of masks
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Singapore face mask policy



1. Face mask distribution begins, wearing is not compulsory
2. Lockdown starts
3. 73% of Singaporeans report wearing a mask when in public
4. Wearing a mask when leaving home becomes mandatory

[April 17:](#) Those caught not wearing masks when they are out of their homes will be **fined S\$300 (NZ\$351)**. About 100 people were fined on Friday (April 17) for not wearing face masks in public. The Government said it will **exercise flexibility** in its enforcement as some people, such as children with special needs, may have difficulties wearing a mask.

[April 15:](#) **Mandatory** to wear a face mask **when they leave their homes, exemptions for children age <2y**. People may remove their masks when engaging in strenuous exercise, but they must put it back on afterwards.

[April 14:](#) Government directive: As of 14 April 2020, you are required to wear a mask if you need to leave your house.

When should I wear a mask?

- When outside of your home
- On public transport, taxis, and private hire cars
- Walking to or at markets
- For essential workers at all workplace premises

Wearing of reusable masks

- For those who need to go out, wear a reusable mask to provide some protection:
- Reusable masks complement safe distancing measures and provide some basic protection
- The mask helps protect others from you, in case you are infected but unaware

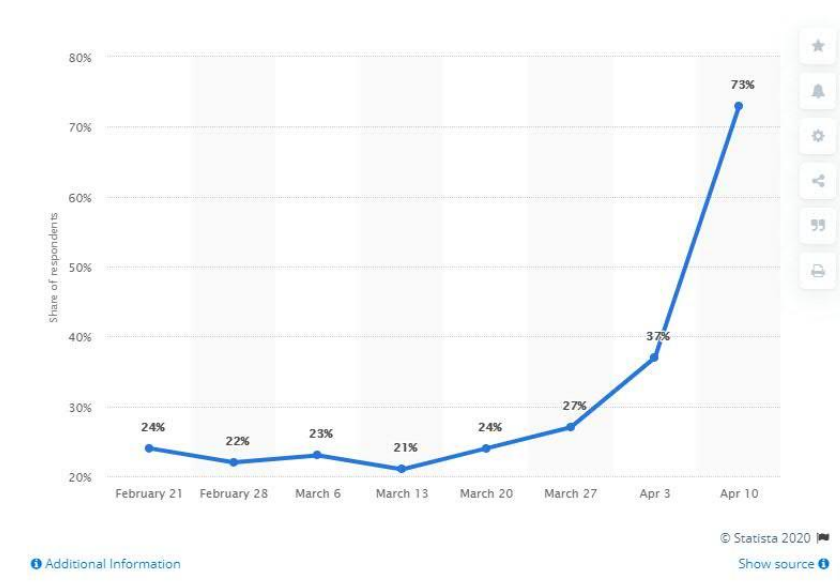
Prioritising surgical masks for healthcare workers

- Because there is currently a global shortage of surgical masks, Singapore needs to conserve these masks for those who need them most: our healthcare workers, and those who are sick.

April 11: Masks to be made compulsory on public transport. To prepare for this, we will get commuters to wear masks, NOW, when using public transport. Those who have not **collected their free reusable masks** to do so at their nearest community centre by Sunday. Previously, the Government advised masks to only be worn when a person was not feeling well.

April 10: As of April 10, 2020, **73% of Singaporean respondents stated that they were wearing face masks when in public places** during the COVID-19 outbreak, up from 24% on Feb 21, 2020.

Figure 1 Share of Singaporean population who wore face masks in public places during COVID-19 outbreak from February to April 2020 ([source](#))



April 05: **Reusable masks will be distributed** from April 5.

April 04: Singapore U-Turns on wearing masks as local virus cases climb. For months, Singapore's leaders urged citizens to wear masks only when ill. The government will stop discouraging the general public from wearing face masks in public. The decision was made **following new evidence that an infected person can show no symptoms yet still spread the disease**.

April 03: The Singapore Government will **no longer discourage people from wearing face masks** and will be **distributing reusable masks to all households**, Prime Minister Lee Hsien Loong said on Friday (Apr 3).

Country/State Policies

Country	Formal policy	Compulsory wearing	Policy	Mask type	Enforcement
Australia	N	N	Recommended for those who are sick and health care workers; not for healthy public to prevent community transmission. Specific requirements are in place for people who have returned from a country or region that is at high or moderate risk for COVID-19, or think they may have been in close contact with a confirmed case of coronavirus.	surgical masks	-
Austria	Y	Y	Compulsory in public transport, supermarkets, other food and drug stores. Supermarket needs to provide masks to the customers if they don't have one.	DIY	-
Belgium	Y	N	The federal government has not recommended facemasks for citizens unless someone suspects they actually have the virus. However, once the stay-at-home restrictions are lifted, sometime after 3 May, the wearing of facemasks will be "advised for any situation where a contact of at least 1.5 meters cannot be kept and in places where there will be a lot of people (for example in public transport and supermarkets)"	-	-
Bulgaria	Y	Y	Mandatory to wear a protective mask when in indoor or outdoor public places. Effective until April 26.	DIY	-
Canada	Y	y	Minister of Transport (April 20) announced requirement for all air passengers to have a non-medical mask or face covering to cover their mouth and nose during travel. Medical masks, including surgical, medical procedure face masks and respirators (like N95 masks), must be kept for healthcare workers and others providing direct care to COVID-19 patients. Also provide considerations on homemade masks, which could be used for short periods of time when physical distancing is not possible but has limitations.	Medical or DIY	-
CDC	N	N	CDC recommends wearing cloth face coverings in public settings where other social distancing measures are difficult to maintain (e.g., grocery stores and pharmacies) especially in areas of significant community-based transmission.	"some form of covering"	-

China (varies by province)	-	-	-	-	-
Cuba	Y	y	As reported on 1 Apr 2020, Cuban authorities are requiring the use of facemasks for anyone leaving their homes, threatening fines of up to 70 US dollars for those caught without a face covering.	home-made masks	fines of up to \$70USD
Czech Rep	Y	y	Introducing a ban on any movement outside one's place of residence without protective respiratory equipment.	no guidance	-
Finland	N	N	Finnish health officials have not recommended the use of protective masks for ordinary people, but there is dissent in the ranks	-	-
Germany, Bremen	Y	y	Compulsory on public transport	no guidance	-
Germany, Berlin	Y	y	Compulsory on public transport Not when shopping	no guidance	-
Germany, Rhineland	Y	y	Compulsory on public transport Pupils will be given masks as part of lockdown exit from end May.	no guidance	-
Germany, Bavaria	Y	y	Compulsory on public transport Compulsory for everyone age >7y	surgical masks	-
Germany, BW	Y	y	Compulsory on public transport	no guidance	-
Hong Kong	N	N	Should put on surgical mask if travelling outside of Hong Kong and when returning to keep it on for 14 days; essential to wear surgical mask if symptomatic and if taking public transport or staying in crowded places. N95 respirators generally not recommended for general public due to training required and inadvertent risk of exposure	surgical masks	-
Ireland	N	n	Wearing a mask is unlikely to be of any benefit if you are not sick.	-	-
Israel	-	-	Israeli guidelines added the obligation to wear reusable (home-made) masks in public environment/places where you can't keep social distance.	-	-

Italy, Lombardy, Tuscany	Y	y	Lombardy, Tuscany make face masks compulsory; Authorities in Lombardy have introduced a law obliging citizens to wear face masks when they go outside	no guidance	-
Japan	N	N	Advised for use in confined and badly ventilated spaces; not considered efficient for open air environment	-	-
Lithuania	Y	y	Wearing a face mask or any other means of covering one's nose and mouth in public places is compulsory in Lithuania	no guidance	-
Luxembourg	Y	y	Wearing a mask is mandatory in places where it is not possible to keep enough distance to others such as supermarkets or on public transport	no guidance	-
Mexico, 11 states and Mexico City	Y	Y	Reported on 17/04/2020 that at least 11 states and Mexico City have declared the mandatory use of face masks in public places or in certain locations. However, it appears unlikely that Federal Government will make face mask usage mandatory given Deputy Health Minister Hugo López-Gatell's statement the week prior that there was no solid evidence about its widespread use and that it can lead to false sense of security.	no mention of type	some local authorities are imposing fines or other sanctions
Mongolia	Y	Y	If caught not wearing masks, in public places will result in fine of MNT 150,000 as it would be considered intentional to harm other people's health.	single use surgical masks or reusable cotton face masks	Fine MNT 150,000, ≈NZ\$90.
Netherlands	Y	n	The Dutch government is holding firm to its refusal to make the wearing of face masks compulsory, despite mounting pressure from MPs.	-	-
Norway	Y	N	Norwegian Institute of Public Health: Not recommended to use face masks outside the healthcare service	-	-
Poland	Y	y	Covering the nose and mouth every time people leave their house	no guidance	fine
Portugal	N	N	No guidance, but government is thinking about it.	-	-
Russia, Khabarovsk	Y	y	Wearing of face masks is obligatory in the eastern Russia city	no guidance	-

Singapore	Y	y	As reported on 14 April, the Multi-Ministry Taskforce decided to make it mandatory for all persons to wear a mask when leaving their home during the period 7 April till 5 May 2020. This includes public transport, taxis, when in private cars, walking to or at markets and for all essential workers at all workplace premises. Surgical masks to be prioritised for health care workers due to global shortage of masks	reusable masks	First-time offenders charged \$300, and repeat offenders will face higher fines or prosecution in court.
Slovakia	Y	y	Compulsory once you leave home	-	-
Slovenia	Y	y	For those who do venture to shops, face masks, even ones made at home, or equivalents such as scarves that cover the mouth and nose will be mandatory along with protective gloves; masks and gloves need to be worn in indoor public spaces.	DIY	-
South Korea	N	n	Health authorities are advising everyone to wear masks in the presence of others and to change into a new mask everyday.	-	-
Spain	N	n	the government distributes free face masks for commuters in large transportation hubs, but it is not mandatory to wear them	no guidance	-
Switzerland	Y	n	Not a requirement	-	-
Taiwan	Y	y	In addition to requiring physical distancing of more than 1 meter in public, as of April 1, face masks are mandatory when taking public transportation	-	-
UK	N	n	The government's scientific advisory group for emergencies (Sage) met on Tuesday to review the evidence on wearing face masks. The Guardian understands that the group is split on the best policy to adopt because the evidence is so weak. The public should not and must not divert medical-grade supplies.	-	-
USA, NY and NJ	Y	y	Requirement for people to wear masks or face coverings in public whenever social distancing was not possible, to be effective from 17 April. Governor Murphy issued similar requirement for New Jersey with exception for children under 2 and those with a medical condition that prevents them from wearing masks.	DIY	civil penalties are being considered but not criminal penalties in New York. Some arrests made by police in New

					Jersey for non-compliance with requirements
USA, MD	Y	y	Effective on 18 April, masks are required to be worn at all retail establishments including grocery stores, pharmacies and public transportation. All people over age 9 to comply. Medical grade masks to be reserved for health care workers and first responders.	DIY	subject to imprisonment not exceeding one year or a fine not exceeding \$5,000 or both.
USA, PA	Y	y	State order on the use of face masks or face coverings in grocery stores, markets and pharmacies or any businesses providing essential services during the pandemic. Employees and customers must wear face masks whenever on the premise of a business. Exceptions for businesses that provide medication, medical supplies or food, which provide pick-up or delivery service	DIY	none stated
USA, CT	Y	y	Effective on 20 April, state order issued by Governor Lamont on use of cloth face coverings or higher level protection in public whenever close contact is unavoidable. This includes using taxi, car, livery, ride-sharing or similar service or means of mass public transit, or while within any semi-enclosed transit stop or waiting area. Exemption for children under 2, older child who cannot and anyone whose medical condition prevents them from doing so.	DIY	none stated
USA, RI	Y	y	Executive order on mandatory use of masks by businesses and customers. Exception for children age <2 and those for whom masks can endanger their life.	DIY	non compliance by customers can mean being denied entry and provision of service

USA, HA	Y	y	State order mandates the use of face coverings by customers and employees of essential businesses. It does not apply to persons who are engaged in permissible outdoor exercise activities so long as social distancing requirements are maintained. Masks should not be worn by children $\leq 2y$, or anyone who has trouble breathing.	DIY	none stated
USA, CO	Y	y	Critical workers to wear a non-medical face covering. This includes workers in critical business, and critical functions, like grocery store workers, staff at senior care facilities, food supply or roads.	DIY	none stated
USA, IL	N	N	Some municipalities require everyone to wear a mask while in public. Exceptions are when exercising or doing other physical activities outside, riding in a personal vehicle, or while eating or drinking. But no statewide order issued mandating this.	DIY	Some reports in municipalities that are mandating requirements for face coverings, where arrests for non compliance and denial of services have occurred.
USA, CA	N	N	Face covering guidance from California Department of Public Health states that counties that intend to promote face covering policies should ensure that they do not put increased pressure on demand for medical masks - these should be reserved for health care workers. Other evidence based interventions such as social distancing and hand washing should be encouraged in conjunction.	DIY	-
USA, FL	N	N	Provides guidance on use of face masks when one is sick and is coughing or sneezing. The carer of sick person should also wear a face mask. Discouraged from using masks if not sick - due to shortage of supply of masks.	-	-
USA, WA	N	N	Based on recommendation from CDC that people wear cloth face coverings when they are in public settings where they cannot maintain 6 feet of distance from others. This includes trips to the grocery store, pharmacy, hardware store, health	DIY	-

			clinic or similar places. Does not mandate face covering - considers it as an additional layer of protection.		
WHO	Y	n	Medical masks should be reserved for health care workers. The use of a mask alone is insufficient to provide an adequate level of protection, and other measures should also be adopted	single use surgical masks or reusable cotton face masks	-