

Potential Preventive Interventions for the “Stamp it out” and
“Manage It” Phase of the Covid-19 Pandemic in New Zealand:
Commissioned Report for the New Zealand Ministry of Health

Prepared for the Ministry of Health

by

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NOTE

Although this report was correct at the time of writing, the information it presents may no longer be current because of continuing evolution of the COVID-19 pandemic and our understanding of it.

Unless otherwise indicated, peer review and full consultation with relevant agencies was not always possible in the timeframe available for producing this report.

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Abstract

This Report identifies 31 preventive interventions relevant to reducing the health burden of the Covid-19 pandemic in NZ during the “stamp it out” and “manage it” phase. We coin the term “intensive containment” to describe the option of scaling up a generic clinical and public health response. This has all the components of the current response with additional interventions to ensure it is rapid, reliable and effective in regional centres as well as cities. Some of these interventions are already being used in advance by the NZ Ministry of Health (eg, hygiene promotion). Others have been used in past pandemics (in NZ and elsewhere) and others have been used in various international jurisdictions in the current Covid-19 pandemic. Given the potential severity of the spread of Covid-19 in New Zealand (see our modelling work provided to the Ministry of Health), we recommend the NZ Government give these interventions timely and serious consideration. The selection, combination, and timing of these interventions depends on the goal of Covid-19 control. An elimination goal (which we strongly recommend) would require use of more intensive and disruptive interventions early in the pandemic to interrupt transmission. This approach can be compared with a mitigation/suppression goal which would involve increasing interventions as the pandemic intensifies to ‘flatten the curve’ and reduce its health impact.

Recommendations

1. Intensive containment

- There are two critical control measures that require scaled up capacity:
 - a. **Rapid case detection** identified by **widespread testing**, followed by **case isolation**
 - b. **Contact tracing** and **quarantine for contacts**
- Both measures will require a rapid and potentially large expansion of workforce and support systems (eg information systems for case and contact management)
- Health promotion messages: stay at home if sick and access sources of healthcare information

2. Intensive hygiene promotion

- Provision of effective hand hygiene facilities in public settings
- Health promotion messages: cough etiquette and handwashing

3. Intensive physical distancing, scalable as required

- Implement low cost forms now, eg work from home

- Plan now, and implement when indicated, stopping mass gatherings, school closures, workplace closures, mass transit closures
- Plan now, and implement when indicated, movement restrictions
- Potentially combine all physical distancing and travel restrictions into ‘lock down’ to support an elimination goal, particularly if combined with intensive containment.
- Health promotion messages: Inform the public about the measures that may be needed so they can prepare

4. Safe haven programme to protect vulnerable populations in their own homes, institutions and communities.

- Plan now, including guidelines and sector and public engagement
- Roll out by city, region and nationally based on the spread of the pandemic

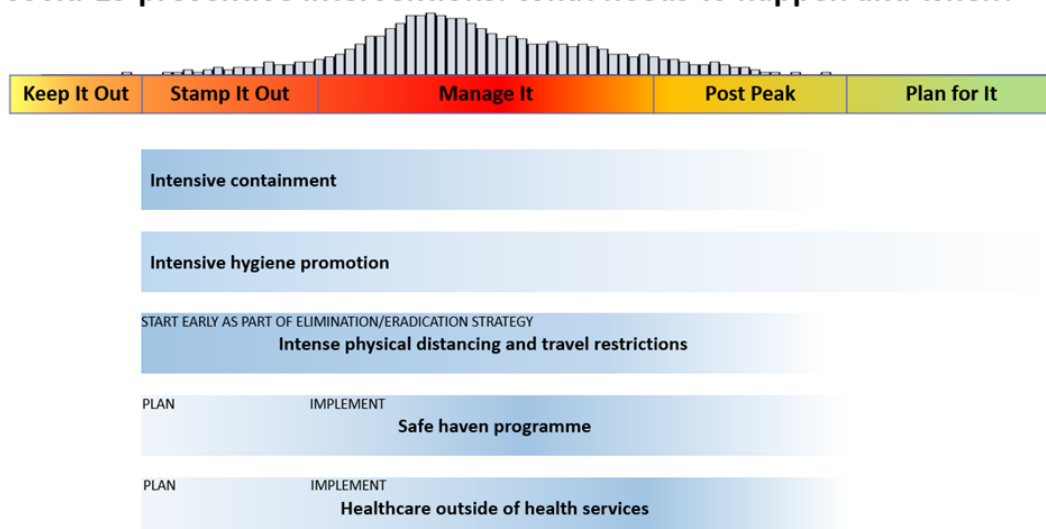
5. Healthcare outside of health services

- Plan now, including guidelines and sector and public engagement

Notes and limitations.

- These measures focus on the “stamp it out” and “manage it” phases (we have reported separately on the “keep it out” phase).
- The scope of these recommendations does not include healthcare systems.
- They do not contain full details about transition points and stopping points which require more investigation.
- The goal of these measures is elimination (which is eradication within a defined country or region). If successful, containment has huge health and economic benefits.

Covid-19 preventive interventions: What needs to happen and when?



Introduction

As the Covid-19 pandemic spreads,¹ a number of countries/territories (notably China, Singapore, Hong Kong) appear to be adopting very vigorous and at least partially successful containment measures (equivalent to New Zealand's "stamp it out" stage). Indeed parts of China may be largely through this phase and are beginning to wind down interventions. New Zealand is now at the containment phase ("keep it out" and "stamp it out"). Hence there is need for a stocktake of the available control options, as detailed in this Report.

This Report focuses on non-pharmaceutical public health measures that could be implemented rapidly if considered feasible in the NZ setting. The Report does not consider preventive interventions within healthcare settings or currently unavailable public health interventions such as a SARS-CoV-2 vaccine campaign.

Method

We first developed a classification framework of potential preventive pandemic control interventions for the containment phase (but excluding those specific to healthcare settings and concerning vaccination). These interventions came from those used by various countries to control Covid-19 (eg, China²) and as reported in journal publications, pre-prints and media sources. We also considered literature on the control of past pandemics (eg, pandemic influenza). We then provided additional comment on the likely effectiveness and feasibility of some of these interventions in the New Zealand context. We anticipate peer review of this draft work to come from Ministry of Health colleagues.

Results

The list of 31 potential preventive interventions that we identified are detailed in Table 1. Many of these are already referred to in New Zealand's current influenza pandemic plan.³ Some are also being currently enacted in New Zealand (eg, hygiene messages and improving access to soap supplies). But some are novel and have been used by China or other jurisdictions in response to the spread of Covid-19. In Table 2 we provide additional comments on intervention effectiveness and feasibility. Then in Table 3 we give some potential sequencing of these interventions by intensity and by pandemic phase.

Table 1: Proposed classification framework of preventive pandemic control interventions in the containment phase (“stamp it out) and “manage it” phase (but excluding those specific to healthcare settings and concerning vaccination)

Preventive intervention	Brief comments, eg, including if detailed in NZ’s current influenza pandemic plan” ³
“Intensive containment” targeting sick individuals and their contacts (especially important in the containment (“stamp it out”) phase to slow and ideally interrupt spread)	
1) Case isolation of identified cases (generally home isolation given most cases are mild) with health worker surveillance	In the current NZ plan and being used in the current “stamp it out” phase (actions by DHB staff).
2) Scaled up testing capacity (expanded assessment and testing settings, additional testing test kits and laboratory services)	In the current NZ plan and being currently operationalised (but probably not in the scale as operationalised in China).
3) Case detection via “universal temperature monitoring ” in public settings (as used in Chinese settings ²) to then allow for case isolation and quarantine of contacts	Not in the NZ plan. Would place high demands on the health workforce and might not be socially/ethically acceptable in the NZ context.
4) Use/promotion of voluntary quarantine for potentially exposed individuals (generally home quarantine)	In the current NZ plan and being used in the current “stamp it out” phase (with Healthline available to offer advice).
5) Promotion of staying at home when symptomatic (eg, for fever, cough, fatigue) – for all conditions that cause these symptoms	Currently underway in NZ (and promoted in the 2009 influenza pandemic in NZ).
6) Home support systems for people in home isolation and quarantine (via government health and social services; voluntary sector).	Alluded to in the NZ plan, but little detail. Voluntary workers were used in Chinese settings. ²
7) Health status shown on mobile phones. In China colour codes on mobile phone screens (in which green, yellow, or red designate a person’s health status) allowed guards at train stations and other checkpoints to know who to let through. ⁴	Not in the NZ plan. May not be ethically acceptable in the NZ situation without substantial adaptation.
8) Temporary requisitioning of facilities to allow isolation of large numbers of cases or for quarantine purposes (ie, vacant hotel rooms, vacant houses, holiday homes and caravans, with potential government funded compensation for owners)	Not in the NZ plan (but within the legal powers of the NZ Government in emergencies).
Promoting Public hygiene	
9) Environmental public hygiene measures by private organisations and local government (provision of hand sanitiser and soap provision in entrances to buildings and public toilets)	Some local initiatives currently underway in NZ (eg, soap for public toilets ⁵ and placement of hand sanitiser dispensers in various settings).
10) Promotion of public hygiene behaviours (hand hygiene, cough etiquette etc)	Currently underway in NZ with government-funded mass media messages.

Preventive intervention	Brief comments, eg, including if detailed in NZ's current influenza pandemic plan ³
11) Mask wearing in public places (made compulsory in some Chinese settings ²).	Not in the NZ plan and the compulsory approach may not be socially/ethically acceptable in NZ. It may also deplete mask supplies needed for health workers and other frontline workers (police, border control staff etc). It may also conflict with the message of staying at home when sick.
12) Promotion of temporary alternative greeting behaviours to hand shaking and customary greetings (eg, hongji)	Not in the NZ plan but some individuals and groups in NZ may already be initiating their own actions. Promoted in China in 2020 and also during the SARS pandemic (eg, touching of elbows instead of handshakes)
<i>Voluntary and enforced movement restrictions to limit spread of infection and protect vulnerable populations (travel restrictions/cordon sanitaire/lock-downs, protective sequestration, safe havens (for the vulnerable))</i>	
13) Internal Travel restrictions (lock-downs, Cordon sanitaire)	These measures are being used internationally in the face of intense Covid-19 pandemic spread in China and Italy. They are not highly developed in the NZ plan except for protecting specific location (see Protective sequestration below).
14) Protective sequestration around a region or island (eg, West Coast; Waiheke Island),	Referred to in the NZ plan eg, "Isolate the New Zealand areas affected, if possible."... "Protect unaffected islands." "Attempts to restrict movement within New Zealand may be practicable only for geographically distinct communities (for example Great Barrier Island, the Chatham Islands, the West Coast and Tairāwhiti). However, even in these communities, such measures are likely to be considered only in exceptional circumstances (eg, when infection results in high mortality rates)."
15) "Safe havens" to protect vulnerable populations. This intervention could operate at multiple scales from: <ul style="list-style-type: none"> • Individual/whanau level • Institutional level eg existing rest homes, specifically created facilities (eg marae, requisitioned hotels) • Community level (where it overlaps with protective sequestration) 	The concept of identifying high-risk populations and designing specific measures to protect them has limited development in the Pandemic Plan. There is mention of rest homes. Focussing on such populations has multiple potential benefits (see Table 2): <ul style="list-style-type: none"> • Reduces mortality impact • Compatible with reducing health inequalities • Reduces demand on limited secondary healthcare facilities

Preventive intervention	Brief comments, eg, including if detailed in NZ's current influenza pandemic plan ¹³
Physical (formerly termed social) distancing – closures and reductions in gatherings etc	
16) Extension of public holidays (as per in China with the extended “Spring Festival holiday” ²)	Not in the NZ plan. This would probably be popular with much of the public, but would have adverse economic impacts.
17) A temporary adoption of a four-day working week	As above.
18) Closing/restricting early childcare education services, schools, and tertiary education facilities (plus or minus compensatory financial packages). Alternatives are 4 day weeks and staggered timing of lunch and other breaks.	Detailed in the NZ plan (but while school closures can be particularly effective for influenza pandemics, benefits are less clear with Covid-19). School closures have occurred recently in a number of countries: Italy, France, Japan (and colleges for Italy).
19) Closing government workplaces (or increasing staged work hours)	Not specifically in the NZ plan but probably covered under “restrictions on public gatherings and venues”.
20) Closing private sector workplaces as used in China (plus or minus compensatory financial packages as used in China)	As above.
21) Setting an upper limit on mass gathering sizes (eg, for concerts, sporting events, faith-based meetings, educational event), plus or minus compensatory financial packages	Detailed in the NZ plan (ie, “compulsory cancellation of public gatherings”).
22) Closing/restricting entertainment, sports and other venues (plus or minus compensatory financial packages). Opening hours can be constrained and “one metre” apart rules are options (eg, as per Italy).	Probably covered in the NZ plan under “restrictions on public gatherings and venues”. See Appendix 1 for what Italy has done.
23) Government measures to improve internet access to all New Zealanders (to facilitate staying at home and working from home; including government subsidies for low-income households)	Not in the NZ plan.
24) Campaigns to promote home cooking to reduce eating out	Not in the NZ plan. This could have health benefits and be cost saving for families since home cooking can favour both in the NZ context. ⁶ But it would exacerbate impacts on the café/restaurant sector.
Physical distancing – public transport interventions	
25) Restrict mass urban transit (or completely ban it as in some Chinese settings ²)	Detailed in the NZ plan (eg, “imposing restrictions on public transport”).
26) Provide discounts for off-peak travel to reduce density of people on buses and trains (or free off-peak travel)	Already used in some mass transit systems in NZ (albeit these could be extended).

Preventive intervention	Brief comments, eg, including if detailed in NZ's current influenza pandemic plan^{7,3}
27) Banning of side-by-side seating (as per some Chinese settings) ie, a single person per double seat on buses, trains, ferries, and possibly even planes (with exemptions re small children etc).	Not in the NZ plan.
28) Suspend the " gold card " for free public transport until the post-pandemic period to protect older New Zealanders and reduce the density of people on public transport	Not in the NZ plan. May have adverse impacts on public morale.
Healthcare outside of health services	
29) Campaign messaging around calls to Healthline or telephoning primary care facilities in advance (for those with fever, cough or fatigue symptoms)	Currently underway in NZ (at least via MoH spokespeople).
30) Facilitation of full electronic communication between the public and health workers (eg, for consultations and prescribing), by private sector and with potential central government support.	Not in the NZ plan. Aspects of this approach have been used in China. ⁷
31) Promotion of home care information for provision of care by relatives/friends of the sick in the home setting (for mild illness and for if hospitals become overloaded)	This is signalled in the NZ plan: "Families need to be prepared to care for each other at home", but there is little additional detail.

Table 2: Specific notes on selected preventive interventions for the containment (“stamp it out”) and early “manage it” phase referred to in Table 1, with a focus on intervention effectiveness and feasibility

Preventive intervention	Comment on intervention effectiveness and feasibility
Contact tracing and isolation of cases	<p>This combination of measures has apparently has been effective in China at containing the pandemic there.² But China was able to mobilise a very large workforce (eg, including non-health workers recruited for contact tracing). In the NZ setting retired health and other workers could potentially be recruited for contact tracing work. The National Health Coordinating Centre (NHCC) in NZ is currently recruiting retired health workers (though potentially they will be needed for more clinical tasks). There is also favourable modelling evidence with Hellewell et al reporting that: “In most scenarios, highly effective contact tracing and case isolation is enough to control a new outbreak of COVID-19 within 3 months.”⁸</p>
Quarantine	<p>One recent Chinese study concluded that both “...quarantine and traffic blockage are effective ways to control the spread of COVID-19. However, the efficacy of quarantine is found to be much stronger than that of traffic blockage.”⁹</p> <p>Historically one NZ town (Coromandel) in 1918 appears to have benefited from local quarantine measures against the 1918 influenza pandemic.¹⁰ (might be better described as ‘protective sequestration’).</p> <p>A Canadian study relating to the SARS pandemic found that self-reported compliance with all required quarantine measures was low at only 16%.¹¹ It also reported that higher scores for a scale measuring post-traumatic stress disorder were related to: increasing perceived difficulty with compliance, being a healthcare worker, longer quarantine and compliance with quarantine requirements. Similarly, a Chinese study found that around 10% of the hospital employees “had experienced high levels of posttraumatic stress (PTS) symptoms since the SARS outbreak” (with exposures including quarantine).¹²</p> <p>We also note potential challenges for home quarantine for a range of groups in the NZ setting: older people and disabled people needing support, those facing language barriers, and those who are not able to use internet/smartphone technologies.</p>
Physical distancing measures in general	<p>The effectiveness of these measures against Covid-19 is still uncertain but some research from China is suggestive of benefit.¹³ In particular: “Among individual control measures investigated, the most effective were suspending intra-city public transport, and closing entertainment venues and banning public gatherings.” The recent WHO-China Report also provides indications of markedly successful pandemic control in China.² It stated that “China has rolled out perhaps the most ambitious, agile, and aggressive disease containment effort in history” (which obviously included multiple interventions that went beyond physical distancing). But it is an open question around the generalisability of all of these approaches to other countries.¹⁴</p> <p>Historically there is some evidence for the effectiveness of physical distancing interventions from the 1918 influenza pandemic.^{15 16} A recent systematic review also provides some evidence for workplace physical distancing interventions – at least for influenza.¹⁷ Another review reported that: “Voluntary isolation at home might be a more feasible physical distancing measure, and pandemic plans should consider how to facilitate this measure. More drastic physical distancing measures might be reserved for severe pandemics.”¹⁸</p>
Internal travel restrictions	<p>Internal travel restrictions have been used in China to control Covid-19 spread and so may have contributed to successful control.² Historically, road blocks and maritime quarantine were effective in limiting the spread of the influenza pandemic in Iceland in 1918.¹⁹ Even in Iceland’s current pandemic plan, there is a map showing where roads could be blocked by police (page 6 of the plan).²⁰</p>

Preventive intervention	Comment on intervention effectiveness and feasibility
Protective sequestration of small communities	<p>This approach worked in some US settings for the 1918 pandemic ie, zero cases and zero deaths in: Yerba Buena Island in California; the town of Gunnison, Colorado; and Trudeau Sanatorium, New York.²¹ Border control for islands off the coast Alaska were also successful in 1918 (Shishmaref).²² In NZ for the 1918 pandemic, students from Nelson Boys' College avoided infection by going to summer camp early in Maitai Valley.²³</p>
Safe havens for vulnerable individuals	<p>The data from China shows older age-groups and those with co-morbidities are at relatively much greater risk of death than younger and healthier groups.²⁴ Previous NZ research on influenza has identified markedly higher rates of hospitalisation for those living with long-term conditions.²⁵</p> <p>This pattern suggests a potentially large mortality reduction benefit from ensuring such vulnerable people have the option of moving to or living in "safe havens" for the duration of the pandemic, or for periods when it is at its most intense. Options include a range of scales from:</p> <ul style="list-style-type: none"> • Specific measures for those living in their own homes (eg advice and support from organisations like Grey Power) • Specific measures for those living in institutions (eg aged care facilities with staff living on-site) • Voluntary relocation to specific locations (eg boarding schools, marae, military bases, hotels/motels, collections of holidays homes) that can be protected • Use of specific geographic areas (eg offshore islands, discrete communities) (see protective sequestration) <p>Such actions may also reduce the impact of the pandemic in exacerbating ethnic inequalities in health in NZ as seen for previous pandemics.^{26 27} If this "safe haven" approach was to be considered, then the costs and feasibility of this approach would need to be explored rapidly and potentially supported by large mobilisation of community organisations (eg Grey Power, Māori Women's Welfare League), service providers (eg Presbyterian Support NZ) and supported by central government using facilities it controls (eg, using military bases).</p> <p>But regardless of government action there might be independent initiatives by the aged residential care sector. In this case guidance and protocols could still be produced by central government. In terms of saving the most years of life, safe havens could potentially be prioritised to younger adults with serious co-morbidities (but this is a value judgement that decision-makers would have to address, in the context of NZ-specific ethical guidance²⁸).</p>
Hygiene measures	<p>There is Cochrane Systematic Review evidence indicating that hand hygiene is effective in preventing the spread of respiratory viruses.²⁹ There is also ample NZ evidence around large gaps in hand hygiene,^{30 31} respiratory hygiene,³² and soap provision in toilets.^{33 34 35} In March 2020 the Napier City Council started to add soap dispensers to its public toilets in response to the threat from Covid-19 (previously these were removed due to vandalism).⁵</p>
Home care	<p>There is some suggestive evidence for such home support in reducing the impact of the 1918 pandemic in some NZ settings.³⁶ The difference in the provision of such support may have been a factor in why NZ cities had lower mortality rates than large towns, and why large towns had lower mortality rates than small towns in 1918.³⁷</p>
Combinations of some of the above interventions	<p>Some packages of these type of preventive interventions (specifically combining: case isolation, quarantine, personal hygiene measures, physical distancing and travel restrictions) have been reported to work better in combination than when used individually according to one systematic review.³⁸</p>

Table 3: Potential timeline for optimal intervention use and intensity in the “stamp it out” phase and two sub-components of the “manage it” phase (three levels of shading indicate potential intensity)

Intervention grouping	“Stamp it out” phase	“Manage it” – early	“Manage it” – late
<p>1. Intensive containment*</p> <p>Targeting the identification of sick individuals with widespread testing, and then isolating them and identifying their contacts and quarantining them</p>	Maximal application	Strong application	Phase down and divert health workers to boosting treatment services
<p>2. Intensive hygiene</p> <p>Hygiene measures (promotion, supportive environments)</p>	Maximal application	Maximal application	Routinise at a more sustainable level (mindful of long-term benefits for preventing other diseases)
<p>3. Intensive physical distancing and travel restrictions*</p> <p>Physical distancing interventions (micro behavioural level to venue closures, mass transit closures) and travel restrictions</p>	<p>Begin now with low cost forms (eg, promoting working from home where highly feasible);</p> <p>Scale up now if elimination/eradication is the strategic goal (potentially as a ‘lock-down’)</p>	Maximal application	Routinise at a sustainable level and phasing down the most restrictive and costly forms first
<p>4. Safe havens</p> <p>Identify high-risk groups and mobilise efforts to protect them at an individual/whanau, institutional and community level</p>	Planning, preparing guidance & protocols, engaging sector	Strong application in a severe pandemic; but more individual level household/ organisation if not so severe	Routinise at a sustainable level while phasing down the most restrictive and costly forms first
<p>5. Healthcare outside of health services</p> <p>Intensive planning and implementation</p>	Improve internet access, guidance and mass media materials	Maximal application (eg, home care to reduce hospital overload)	Routinise at a more sustainable level

* All of these interventions required a large scaling up of resources for all aspects of response management. This requirement is particularly important for ‘Intensive containment’ which requires a large increase in staff for case and contact follow-up. This intervention needs to be coordinated with intensive physical distancing. Both of these measures require high quality surveillance and a series of agreed trigger points and communication and coordination mechanisms.

Discussion

The selection of interventions in the “stamp it out” and “manage it” phase of a pandemic depend on the strategic goal. For pandemic influenza, the focus is ultimately on mitigating the effects of the pandemic, since elimination/eradication is not an option. For Covid-19, we suspect that elimination can probably be achieved, based on the experience in China.² An elimination goal (which we strongly recommend) would require use of more intensive and disruptive interventions early in the pandemic to interrupt transmission. This approach can be compared with a mitigation/suppression goal which would involve increasing interventions as the pandemic intensifies to ‘flatten the curve’ and reduce its health impact.

All of these interventions have some costs, ranging from reducing individual freedoms, to government expenditure on campaigns and the costs of enforcement (eg, by police and the military assisting with any internal travel restrictions). Policy-makers should also consider the ethical dimensions of all pandemic controls,²⁸ the potential psychological harms (eg, from quarantine [Table 2]), and also the literature on the cost-effectiveness and resourcing implications of pandemic control/respiratory virus control measures (eg, as per these two systematic reviews:^{39 40}). For example, for “mild” pandemics (as per the 2009 H1N1 pandemic) one of these systematic reviews states that school closures and physical distancing may not qualify as efficient measures (when using a willingness-to-pay threshold of \$45,000 per disability-adjusted life-year).³⁹ But it does note that such interventions “may become cost-effective for severe crises”. The other systematic review noted that the relatively low cost of personal protective equipment and its increased usage during epidemics and pandemics, can make its provision “economically attractive”.⁴⁰

Some of the interventions we identified in Table 1 may be politically controversial. For this reason (and especially since it is an election year in New Zealand), it seems highly desirable for a cross-party group of leaders to be involved in pandemic decision-making in all pandemic phases. This would lower the risk of distracting political competition at a time of potential national crisis.

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Appendix 1: Summary of Covid-19 control interventions in Italy (March 2020)

In addition to a large quarantine area in northern Italy (impacting around 16 million people), the following interventions were reported as of 8 March⁴¹

For areas in Northern Italy covered by a national-level decree (covers the Lombardy region and at least 15 provinces in neighbouring regions)

- “All sports competitions and events, whatever their nature, are suspended. Only those linked to Olympic Games preparations, or major national or international events will be allowed – and only behind closed doors.
- Ski resorts are closed until further notice.
- All cultural, sporting, religious or festive events are suspended. Cinemas, pubs, theatres, museums, dance schools, gaming arcades, casinos, nightclubs and other such places will have to remain closed.
- Bars and restaurants can remain open from 0800 to 1800 CET as long as they respect a security distance of at least a metre between customers.
- Schools and universities must remain closed and all exams suspended.
- Shopping centres and major shops must remain closed on public holidays and preceding days.
- Religious venues remain open on condition they respect the one-metre distance rule. However religious ceremonies such as weddings and baptisms are banned until further notice.”

At a national level of Italy

- “As in the north, cinemas, pubs, theatres, museums, dance schools, gaming arcades, casinos, nightclubs and other such places will have to remain closed.
- Sporting competitions are suspended but some can take place behind closed doors.
- It will still be possible to go shopping or to bars and restaurants as long as a security distance of one metre between customers is respected.”

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