

CANADIAN PANDEMIC INFLUENZA PREPAREDNESS:

Planning Guidance for the Health Sector

Public Health Measures Annex



Canadian Pandemic Influenza Preparedness Task Group

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LIST OF ABBREVIATIONS AND ACRONYMS

CDC	(US) Centers for Disease Control and Prevention
CNPHI	Canadian Network for Public Health Intelligence
CPIP	Canadian Pandemic Influenza Preparedness: Planning Guidance for the Health Sector
CPIP-TG	Canadian Pandemic Influenza Preparedness Task Group
ECDC	European Centre for Disease Prevention and Control
FNIHB	First Nations and Inuit Health Branch
FPT	federal/provincial/territorial
FP	family physician
GC	Government of Canada
GPHIN	Global Public Health Intelligence Network
HC	Health Canada
HCW	health care workers
ILI	influenza-like illness
NGO	non-governmental organization
NPI	non-pharmaceutical interventions
OBTH	Office of Border and Travel Health
PEP	post-exposure prophylaxis
PHAC	Public Health Agency of Canada
PHEIC	public health emergency of international concern
PHM	public health measures
PT	provincial and territorial
SARS	severe acute respiratory syndrome
WHO	World Health Organization



PREAMBLE

The Public Health Measures Annex of the Canadian Pandemic Influenza Preparedness: Planning Guidance for the Health Sector (CPIP) is a federal, provincial and territorial (FPT) guidance document that outlines how jurisdictions will work together to ensure a coordinated and consistent health sector approach to Canada's public health measures strategy. [The CPIP main body](#) and annexes are intended to be used together.

While it is anticipated that CPIP's strategic direction and guidance will inform FPT planning to support a consistent and coordinated response across jurisdictions, the provinces and territories (PTs) have ultimate responsibility for planning and decision-making within their respective jurisdictions.

It is important to note that CPIP is not an actual response plan. Rather, it is a guidance document for pandemic influenza that can be used to support jurisdictional pandemic plans. While CPIP is specific to pandemic influenza, much of its guidance is also applicable to other public health emergencies, such as outbreaks of other communicable diseases.

1.0 INTRODUCTION

1.1 Background

Public health is defined as an "organized activity of society to promote, protect, improve, and, when necessary, restore the health of individuals, specific groups or the entire population."¹ Perhaps nowhere is this definition more evident than in the implementation of public health measures in an influenza pandemic. Public health measures are also known as non-pharmaceutical interventions (NPI)—which are used to slow the spread of a communicable disease, such as seasonal and pandemic influenza, in communities.

1 Last JM. A Dictionary of Public Health. Oxford University Press, 2007.

Canada's public health measures strategy includes actions:

- taken by individuals, such as hand hygiene and self-isolation;
- taken in community settings and workplaces, such as increased cleaning of common surfaces and public education;
- that require extensive community planning and have considerable impact, such as closure of schools, cancellation of mass gatherings, and travel and border restrictions.

This Annex describes the many factors to consider when planning public health measures aimed at preventing, controlling and mitigating pandemic influenza. It is meant to facilitate a common approach to community-based disease control strategies across jurisdictions during an influenza pandemic.

1.2 Purpose

The purpose of this Annex is to outline Canada's approach to public health measures in an influenza pandemic and offer specific operational and technical guidance for the health sector in provinces, territories and locations where the federal government provides health care services. It is one of a series of annexes that support CPIP.

The primary audiences for this Annex are the FPT ministries of health, along with other government departments that have responsibilities for the health care of specific populations, such as Indigenous Services Canada, Department of National Defence and Correctional Services Canada. The Annex also serves as a reference document for other government departments, non-governmental organizations (NGOs), and for other stakeholders interested in Canada's strategy for public health measures in an influenza pandemic.

1.3 Changes in this Version

This version of the CPIP Public Health Measures Annex is considerably changed from the 2006 edition in both format and content. Content has been updated based on post-H1N1 pandemic reviews conducted at the FPT and international levels and by key Canadian stakeholder groups.

The underlying principles and approaches outlined in the CPIP are highlighted throughout this annex, and the CPIP's pandemic [risk management approach](#) has been incorporated. The CPIP's planning scenarios are used to identify specific risk management considerations related to public health measures in pandemics of varying impact, along with potential mitigation approaches. The key elements of the public health measures strategy are described, and triggers for key activities are identified.

Guidance documents that were produced for the 2009 influenza pandemic continue to serve as useful tools for a future pandemic, and concepts from these guidance documents have been incorporated into this Annex.



2.0 CONTEXT FOR PLANNING

2.1 Role of Public Health Measures in the Prevention of Pandemic Influenza

Public health measures are the most basic actions that can be taken to reduce community transmission of a pandemic influenza virus. In the context of pandemic influenza, public health measures seek to reduce both the occurrence and duration of human infections so as to delay the peak of pandemic influenza activity. They are commonly used across Canada for seasonal influenza and other communicable disease outbreaks and will play an important role throughout a pandemic. During the period before an effective pandemic vaccine becomes available, antiviral drugs, primarily for treatment of cases, and non-pharmaceutical public health measures will be the only tools available early on to mitigate the effects of the pandemic. According to the [CPIP Vaccine Annex](#), using the current egg-based pandemic vaccine production technology, it will take four to six months for vaccine to become available. Thus, a pandemic vaccine may not be available during the first pandemic wave in Canada.

The defining features of public health measures are that they can be implemented early and involve multidisciplinary collaboration, between and across health and non-health sector settings, including homes, workplaces, public and educational settings, ports of entry, various community-based service organizations and correctional facilities.

Public health measures include:

- **Personal protective measures** (also referred to as individual measures), such as respiratory etiquette, hand hygiene and environmental cleaning of surfaces to protect uninfected individuals against influenza, and staying home when ill (self-isolation) to prevent the spreading of infection.
- **Community-based measures** to reduce transmission of infection within community settings such as workplaces, schools, and communal living facilities. Social distancing measures (e.g., minimizing close contact with others) include proactive school closures, public gathering cancellations and alternative workplace approaches (e.g., teleworking). Since these actions may require extensive community preparation and may have significant secondary consequences, they are most applicable in pandemics of moderate to high impact.
- **Case management of individuals** with pandemic influenza in the early stage of a pandemic. Associated measures may include educating and advising individuals to self-isolate; reporting cases to appropriate public health authorities; and managing contacts of suspected or confirmed cases, which may include educating exposed individuals and advising voluntary home quarantine (i.e., in an individual's home or other setting where they reside).

- **Travel and border-related actions**, such as providing disease information to travellers and measures taken with suspected cases and their contacts (under the *Quarantine Act*) to prevent the spread of a communicable disease across Canada’s international borders. These actions depend on various factors, such as the extent of pandemic influenza virus activity in Canada at the time of detection, the pandemic’s epidemiology, and feasibility considerations.
- **Public education** to promote and to support the implementation and adoption of measures at the individual and community levels, based in a risk communications approach. It will also be important to provide educational materials to health professionals that reinforce existing recommendations for public health measures for individuals presenting with influenza-like illness (ILI).

The guidance contained in this Annex is designed to be adaptable to different situations, as well as regional and jurisdictional contexts. Many of the recommended measures are contingent upon local triggers; therefore, the timing of their implementation depends on local circumstances that may not occur simultaneously across Canadian jurisdictions. However, a consistent approach to the application of public health measures and the messaging that accompanies them will improve public perception, trust and compliance with guidance.

2.1.1 FACTORS INFLUENCING PUBLIC HEALTH MEASURES IN A PANDEMIC

When planning public health measures, decision-makers must weigh not just the costs of implementation but also any secondary impacts. Social and economic impacts on individuals, families, communities and businesses due to, for example, closing schools or cancellation of public events, should be considered with any intervention and weighed against its potential benefit. Individual behavioural measures, such as practicing hand hygiene, respiratory etiquette and self-isolation when ill, are promoted during seasonal influenza and should be encouraged in any pandemic scenario. Other measures, such as school closures and border restrictions, are complex, costly to sustain and likely to have unintended societal and economic consequences.

The success of any public health measure depends on a variety of factors, such as:

- **Epidemiology:** This factor includes the use of epidemiological tools and methods to collect, analyze and interpret data (e.g., clinical cases, hospitalizations, deaths, severe clinical outcomes and associated risk factors). Such data will help detect a pandemic, identify populations at risk, and estimate the population health burden of the pandemic, all of which will ultimately inform the planning of public health measures.
- **Timing of public health measures:** Implementing interventions early on is generally seen to be more effective than waiting until a pandemic is well under way.^{2,3} For example, early communication to the public of a potential influenza outbreak and the personal protective measures that can be taken will give health authorities more time to control viral spread and impact. However, some measures may be difficult to sustain because of their secondary impacts.

2 Institute of Medicine (US). Modeling community containment for pandemic influenza: a letter report. Washington, DC: The National Academies Press, 2006.

3 Duerr HP, Brockmann SO, Piechotowski I, Schwehm M, Eichner M. Influenza pandemic intervention planning using InluSim: pharmaceutical and non-pharmaceutical interventions. BMC Infectious Diseases. 2007, 7:76.

- Given the geographic breadth of the country and the specifics of the pandemic epidemiology, it is likely that public health authorities will implement measures at different times across Canada. Overall pandemic severity and local conditions will inform the choice and timing of measures;⁴ however, the triggers for such actions, the rationale(s) for their implementation, and clear communication to the public should remain consistent.
- For case and contact management to be most effective, follow-up of suspected or confirmed cases is recommended when the first few hundred cases occur in Canada. When data are collected from investigation and follow-up of these initial cases, the focus should shift away from individual management towards public education in order to reinforce individual and community measures.
- Decisions around when and if to initiate or discontinue a specific public health measure should consider such factors as the need to prevent case resurgence, the economic costs or social disruption, and intervention fatigue among the public.
- **Public compliance with the measures:** Previous pandemic influenza experience indicates that individuals generally comply with personal protective measures (e.g., handwashing and self-isolation) and to a lesser degree with social distancing, particularly at the early stage of a pandemic. However, as more individuals become ill, compliance wanes.^{5,6,7,8} Therefore, maintaining public engagement in and compliance with public health measures as the pandemic evolves is an important consideration. See Section 3.5 regarding specific public health measures.
- **Layering of public health measures:** No single public health measure is adequate to prevent virus transmission. It is more effective to use combinations of measures in a layered approach to reduce virus transmission. Data analysis of the 1918 influenza pandemic shows that early and sustained public health measures over several weeks may have helped to limit mortality, although no single measure could be identified as responsible.^{9,10,11} In addition to layering of measures, evidence from more recent pandemic events and modelling exercises suggests that combining public health measures with vaccination and targeted antiviral use delays and flattens the pandemic peak stage (see [Figure 1](#) on page 18).^{12,13}

4 Barrios LC, Koonin LM, Kohl KS, Cetron M. Selecting non-pharmaceutical strategies to minimize influenza spread: the 2009 influenza A (H1N1) pandemic and beyond. *Public Health Rep* 2012, 127:565–71.

5 SteelFisher GK, Blendon RJ, Bekheit MM, Lubell K. The public's response to the 2009 H1N1 influenza pandemic. *N Engl J Med*. 2010, 362:e65.

6 SteelFisher GK, Blendon RJ, Ward JRM, Rapoport R, Kahn E, Kohl K. Public response to the 2009 influenza A H1N1 pandemic: a polling study in five countries. *Lancet Infect Dis*. 2012, 12:845-50.

7 Meilicke G, Riedmann K, Biederbick W, Müller U, Wierer T, Bartels C. Hygiene perception changes during the influenza A H1N1 pandemic in Germany: incorporating the results of two cross-sectional telephone surveys 2008–2009. *BMC Public Health*. 2013 Oct 16, 13:959.

8 Aburto NJ, Pevzner E, Lopez-Ridaura R, et al. Knowledge and adoption of community mitigation efforts in Mexico during the 2009 H1N1 pandemic. *Am J Prev Med*. 2010, 39:395–402.

9 Bootsma MC, Ferguson NM. The effect of public health measures on the 1918 influenza pandemic in U.S. cities. *Proceedings of the National Academy of Sciences of the United States of America*. 2007, 104(18), 7588–7593.

10 Markel H, Lipman H., Navarro JA, Sloan A, Michalsen JR, Stern AM, et al. Non-pharmaceutical interventions implemented by US cities during the 1918–1919 influenza pandemic. *JAMA*. 2007, 298(6), 644–654.

11 Hatchett RJ, Mecher CE, Lipsitch M. Public health interventions and epidemic intensity during the 1918 influenza pandemic. *Proceedings of the National Academy of Sciences of the United States of America*. 2007, 104(18), 7582–7587.

12 Morse SS, Garwin RL, Olsiewski PJ. Public health. Next flu pandemic: what to do until the vaccine arrives? *Science*. 2006, 314:929.

13 Institute of Medicine (US). Modeling community containment for pandemic influenza: a letter report. Washington, DC: The National Academies Press, 2006.

- **Scalability, flexibility and proportionality:** Lessons learned from the 2009 influenza pandemic included the importance of scaling the public health measures response to the associated risk of disease. In addition, public health measures need to be flexible to accommodate different settings, potentially over many months. Finally, the choice of measures should be proportionate to the pandemic's severity and the transmissibility of the novel virus. To help guide decisions about the scale of the local public health measures response, public health jurisdictions would ideally have access to epidemiological data so that they can calculate attack rates, hospital and intensive care unit admission, and mortality associated with the novel virus. However, it is important to note that, during the 2009 pandemic, it was difficult to obtain such data at the initial and early stages; and this may not be an atypical experience for jurisdictions trying to contain the virus at the source in any future pandemic.¹⁴ The [Surveillance Annex](#) describes an approach to collecting additional information that may be required during the pandemic, built on existing surveillance systems for seasonal influenza.

2.2 Uncertainties and Unpredictability

Public health measures will play a significant role during a pandemic, especially before a vaccine becomes available. Aligned with the CPIP's risk management approach is the need for planners to be aware of the uncertainties associated with the use of public health measures during a pandemic.

In addition to the areas of uncertainty outlined in the CPIP [main body](#) (i.e., when and where a pandemic will occur, nature of spread, the virus's characteristics), specific uncertainties are associated with the selection and timing of the implementation of public health measures. They include:

- *Effectiveness of measures*—In general, public health measures for communicable disease control are now studied and reported in the scientific literature more regularly. However, many of the studies are not of high quality, making it difficult to draw conclusions; therefore, expert opinion continues to inform recommendations about public health measures where there is a lack of scientific efficacy and effectiveness data.
- *Selection of appropriate measures*—Public health authorities will have to judge what measures are most appropriate when working under the condition of scientific uncertainty and public pressure to “do something.”
- *Public acceptance and adoption of measures*—Key to the success of public health measures is public adherence to them. To comply with a measure, the public needs to understand not only how to perform the measure properly, but also the rationale behind the measure's implementation. Therefore, comprehensive public messaging about how and why specific measures are being implemented is critical to their adoption during an evolving pandemic. [The Communication and Stakeholder Liaison Annex](#) provides a strategic approach to risk communications during a pandemic.
- *Assessment of potential societal and economic consequences of selected measures*—Public health measures do not take place in a vacuum. When choosing and implementing measures, public health authorities will have to account for a variety of societal and economic realities within their communities, realities that may be adversely affected by any given measure. For example, closing schools may delay the transmission of a novel influenza virus but will have significant consequences for certain groups, such as single parents and caregivers, children who participate in school-based nutrition programs, families who cannot afford increased child care costs, and parents without flexible work arrangements or paid leave benefits.

14 World Health Organization. Pandemic influenza risk management: A WHO guide to inform and harmonize national and international pandemic preparedness and response. Geneva, 2017, www.who.int/influenza/preparedness/pandemic/PIRM_withCoverPage_201710_FINAL.pdf. Accessed 14 December 2018

2.3 Lessons Learned from the 2009 H1N1 Pandemic

Following the 2009 pandemic, FPT governments and other expert stakeholder groups reviewed Canada's H1N1 response efforts, including guidance documents that were produced by the health portfolio on a variety of public health measures, such as hand hygiene and respiratory etiquette for various settings (e.g., home, schools, summer camps, daycares). Those reviews produced valuable lessons learned about the type, use and impacts of public health measures and will be used to inform future pandemic planning.

2.3.1 PROGRAMMATIC LESSONS LEARNED

Many of the lessons learned that were related to planning and implementation of public health measures have been incorporated into this Annex, such as:

- Public health measures should be chosen according to the pandemic's anticipated impact and should be implemented early in a targeted and layered manner to be most effective.
- The public health benefits of any given measure must be weighed against the economic and social costs of its implementation.
- General public health measures and principles applicable to any pandemic influenza event (e.g., hand hygiene, self-monitoring, staying home when ill, environmental cleaning) are key, and the rationales for implementing them must be clear and consistently communicated to the public and updated as the situation evolves.
- Local public health authorities must provide specific, in-depth guidance to non-health sectors on when and if they need to take specific actions to reduce the spread of the virus (e.g., closing schools, delaying mass gatherings) and when to stop or scale back these actions.
- Preparedness and response activities must be tailored for remote and isolated communities to address issues such as: their limited access to health care workers and supplies; the distance required to travel to hospital for acute care; the overall difficulty in gaining timely access to a full complement of health care services; high rates of pregnancy; overcrowding; and, in some communities, limited access to running water for hand hygiene.¹⁵
- Widespread restrictions of movement to contain or slow an emerging pandemic are impractical, if not impossible, to implement.
- To achieve a flexible response that will serve a variety of settings and populations, public health measures must be implemented at the right time and tailored to the specific setting and population. Specific settings that may require unique considerations or guidance include:
 - workplaces;
 - residential facilities (retirement homes, group homes);
 - correctional facilities;
 - schools, daycares, post-secondary institutions and camps (e.g., children's summer camps, work camps);
 - shelters, drop-in centres and other settings with transient populations;
 - mass gatherings (concerts, sporting events, large meetings and conferences);
 - conveyances (aircraft, passenger trains, ferries, buses, cruise ships) and transit terminals; and
 - remote and isolated communities.

15 Public Health Agency of Canada. Lessons Learned Review: Public Health Agency of Canada and Health Canada response to the 2009 H1N1 pandemic. Government of Canada, 29 Dec. 2010, www.phac-aspc.gc.ca/about_apropos/evaluation/reports-rapports/2010-2011/h1n1/index-eng.php. Accessed 14 December 2018.

Populations that may require unique considerations, guidance or tailored approaches include:

- populations with vulnerabilities such as isolation, poverty, etc. (see CPIP, Section 2.4);
- essential service workers (e.g., police, firefighters, paramedics); and
- employees involved in pandemic response activities.

Following the H1N1 pandemic, detailed influenza-specific pandemic planning guidance was developed to address vulnerabilities of populations in Canada. Some of the challenges related to implementation of public health measures included implementing social distancing due to lack of space, and difficulty in accessing sufficient supplies of masks and gloves.^{16,17,18}

2.3.2 SCIENTIFIC FINDINGS

Public health measures studies conducted during and after the 2009 influenza pandemic produced many key findings that have informed Canada's public health measures strategy and are further discussed in Section 3.5. The key findings include:

- Masks worn by ill individuals may protect uninfected individuals from virus transmission, but little evidence exists that mask use by well individuals avoids infection.^{19,20}
- The combination of good hand hygiene and early initiation of mask use by ill individuals reduced influenza transmission within households^{21,22} and among university students in residence.^{23,24}
- A growing body of evidence indicates that pre-emptive school closures can help prevent or reduce the spread of influenza,^{25,26,27,28,29} but the extent of the social and economic impacts of school closures in a pandemic of mild to moderate severity is not yet known.^{30,31}

16 International Centre for Infectious Diseases. Flu season and the most vulnerable people. Preparing your organization, staff, volunteers and clients for seasonal and pandemic flu. The Homeless Hub, 2010, <http://homelesshub.ca/resource/flu-season-and-most-vulnerable-people-preparing-your-organization-staff-volunteers-and>. Accessed 14 December 2018.

17 International Centre for Infectious Diseases. Issues in pandemic influenza responses for marginalized urban populations; key findings and recommendations from consultation meetings and key informant interviews. The Homeless Hub, March 2010, www.homelesshub.ca/sites/default/files/attachments/Issues%20in%20Pandemic%20Preparedness%20-%20Final%20report.pdf. Accessed 14 December 2018.

18 Buccieri K, Schiff R., eds. Pandemic preparedness and homelessness: Lessons from H1N1 in Canada. Toronto: Canadian Observatory on Homelessness Press, 2016.

19 Cowling BJ, Zhou Y, Ip DK, Leung GM, Aiello AE. Face masks to prevent influenza transmission: a systematic review. *Epidemiol Infect.* 2010, 138:449–56.

20 Bin-Reza F, Lopez VC, Nicoll A, Chamberland ME. The use of masks and respirators to prevent transmission of influenza: a systematic review of the scientific evidence. *Influenza Other Respi Viruses.* 2012, 6:257–67.

21 Suess T, Remschmidt C, Schink SB, et al. The role of facemasks and hand hygiene in the prevention of influenza transmission in households: results from a cluster randomized trial; Berlin, Germany, 2009–2011. *BMC Infect Dis.* 2012, 12:26.

22 Cowling BJ, Chan KH, Fang VJ, et al. Facemasks and hand hygiene to prevent influenza transmission in households: a cluster randomized trial. *Ann Intern Med.* 2009, 151:437–46.

23 Aiello AE, Murray GF, Perez V, et al. Mask use, hand hygiene, and seasonal influenza-like illness among young adults: a randomized intervention trial. *J Infect Dis.* 2010, 201:491–8.

24 Aiello AE, Perez V, Coulborn RM, Davis BM, Uddin M, Monto AS. Facemasks, hand hygiene, and influenza among young adults: a randomized intervention trial. *PLoS One.* 2012, 7(1):e29744.

25 Earn DJ, He D, Loeb MB, Fonseca K, Lee BE, Dushoff J. Effects of school closure on incidence of pandemic influenza in Alberta, Canada. *Ann Intern Med.* 2012, 156:173–181.

26 Jackson C, Vynnycky E, Hawker J, Olowokure B, Mangtani P. School closures and influenza: systematic review of epidemiological studies. *BMJ Open.* 26 Feb 2013, 3(2).

27 Chao DL, Halloran ME, Longini IM Jr. School opening dates predict pandemic influenza (A) H1N1 epidemics in the USA. *J Infect Dis.* 2010, 202:877–80.

28 Copeland DL, Basurto-Davila R, Chung W, et al. Effectiveness of a school district closure for pandemic influenza A (H1N1) on acute respiratory illnesses in the community: a natural experiment. *Clin Infect Dis.* 2013, 56:509–16.

29 Chowell G, Echevarría-Zuno S, Viboud C, et al. Characterizing the epidemiology of the 2009 influenza A/H1N1 pandemic in Mexico. *PLoS Med.* May 2011, 8(5):e1000436.

30 Community Preventive Services Task Force. Emergency preparedness: school dismissals to reduce transmission of pandemic influenza [Internet]. The Community Guide, 2012, www.thecommunityguide.org/findings/emergency-preparedness-and-response-school-dismissals-reduce-transmission-pandemic-influenza. Accessed 14 December 2018.

31 Roth DZ, Henry B. Social distancing as a pandemic influenza prevention measure. National Collaborating Centre for Infectious Diseases, July 2011.

- International border entry screening is ineffective, largely because of limited sensitivity in detecting all cases. At best, it can delay local epidemics by only a few weeks.^{32,33,34,35,36} Border departure screening has a higher reported effectiveness, which seems to be related to the reduced numbers of infected passengers on board the conveyance and the consequent decreased transmission.^{37,38}

More details on Canada's lessons learned from the 2009 influenza pandemic can be found in the reports from the [Government of Canada](#) and the [Standing Senate Committee on Social Affairs, Science and Technology](#).^{39,40}

2.4 Program Delivery in the Canadian Context

The responsibility and legislative authority for implementing the majority of public health measures belong to the relevant PTs and local public health authorities, with the exception of international border and travel-related issues, for which the federal government is responsible.

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- 32 Mateus ALP, Otete HE, Beck CR, Dolan GP, Nguyen-Van-Tam JS. Effectiveness of travel restrictions in the rapid containment of human influenza: a systematic review. *Bulletin of the World Health Organization*. 2014, 92(12):868–80D.
- 33 Yu H, Cauchemez S, Donnelly CA, Zhou L, Feng L, Xiang N et al. Transmission dynamics, border entry screening, and school holidays during the 2009 influenza A (H1N1) pandemic, China. *Emerging Infectious Diseases*. 2012, 18(5):758–66.
- 34 Cooper BS, Pitman RJ, Edmunds WJ, Gay NJ. Delaying the international spread of pandemic influenza. *PLoS Medicine*. 2006, 3(6):845–855.
- 35 Cowling BJ, Lau LLH, Wu P, Wong HWC, Fang VJ, Riley S, et al. Entry screening to delay local transmission of 2009 pandemic influenza A (H1N1). *BMC Infectious Diseases*. 2010, 10(1):82.
- 36 Malone JD, Brigantic R, Muller GA, Gadgil A, Delp W, McMahon BH, et al. U.S. airport entry screening in response to pandemic influenza: modeling and analysis. *Travel Medicine and Infectious Disease*. 2009, 7(4):181–191.
- 37 Baker MG, Thornley CN, Mills C, Roberts S, Perera S, Peters J, et al. Transmission of pandemic A/H1N1 2009 influenza on passenger aircraft: retrospective cohort study. *BMJ* 2010, 340:c2424.
- 38 Bell DM, World Health Organization Writing Group. Non-pharmaceutical interventions for pandemic influenza, international measures. *Emerging Infectious Diseases* 2006, 12(1):81–87.
- 39 Public Health Agency of Canada. Lessons Learned Review: Public Health Agency of Canada and Health Canada Response to the 2009 H1N1 Pandemic. Government of Canada, November 2010, www.phac-aspc.gc.ca/about_apropos/evaluation/reports-rapports/2010-2011/h1n1/index-eng.php. Accessed 14 December 2018.
- 40 Senate of Canada. Standing Senate Committee on Social Affairs, Science and Technology. Canada's Response to the 2009 H1N1 Pandemic. Parliament of Canada. Dec. 2010, <https://sencanada.ca/content/sen/committee/403/soci/rep/rep15dec10-e.pdf>. Accessed 14 December 2018.

The Canadian Armed Forces Health Services is responsible for implementing public health measures on all Canadian Forces establishments, bases, wings and stations across Canada and for Canadian Armed Forces personnel deployed abroad. Indigenous Services Canada provides health services to Indigenous communities and develops context-specific guidance for them while also encouraging the inclusion of Indigenous considerations in on-reserve First Nations communities to align and to be integrated with the provincial public health authority planning. In addition, there is ongoing federal responsibility for the provision of health services and advice on any public health measures aligned to other specific federal populations (e.g., Global Affairs Canada to missions abroad, Correctional Services Canada to federal inmates). The planning guidance for the health sector provided in the CPIP main body (Section 3.4.2) and throughout this Annex also applies to these federal departments or agencies.

2.4.1 UNDERSTANDING CANADA'S DIVERSITY

Canada is diverse in terms of language, religious beliefs, ethnicity, culture and lifestyle. Many public health measures used during a pandemic will be modifications of existing practices for seasonal influenza and will therefore be familiar to public health jurisdictions and the public. Nevertheless, there may be individuals in any community whose needs are not being fully addressed by standard services, or these individuals may not be able to access and use resources, making them more vulnerable to infection or complications of influenza during a pandemic (e.g., those who are physically or mentally disabled, homeless or street involved, housebound or frail seniors, socially isolated, new immigrants, refugees, and persons who do not speak English or French). These groups will need special consideration to support their adoption of recommended public health measures.

It will also be important to consider the circumstances of individuals living in remote and isolated communities in Canada because such circumstances may make them more susceptible to infection and complications of influenza in an influenza pandemic. These include social, environmental and economic factors, including the state of their housing, water, food security, personal health, education and income, in addition to limited access to health care services due to lack of health care professionals and geographical considerations. It will be important for planners to take these circumstances into account when planning for the implementation of public health measures in a pandemic.⁴¹ Appendix B provides more pandemic planning considerations for remote and isolated communities.

It was anecdotally reported that, during the 1918–19 Spanish influenza pandemic, small villages in Alaska that stringently restricted movement in and out of the village remained free of influenza. During the 2009 pandemic, some remote and isolated communities experienced early and intense outbreaks. In response, a task group was formed to provide technical advice on the public health pandemic response and delivery of health services in remote and isolated communities. Local planners should consider ways to leverage the potential for pandemic delay in isolated communities, for example by engaging the residents in the planning process to explore their potential support for early measures. These measures must be evaluated carefully in the context of the pandemic impact, potential benefit and social acceptability.

The main body of the CPIP (Section 2.4) further discusses the planning considerations related to the Canadian context.

41 Public Health Agency of Canada. Guidance for remote and isolated communities in the context of the pandemic (H1N1) 2009 outbreak. Nov. 2009, https://web.archive.org/web/20100129052023/http://www.phac-aspc.gc.ca/alert-alerte/h1n1/guidance_lignesdirectrices/ric-cei/index-eng.php. Accessed 14 December 2018.

2.5 Ethical Considerations

The ethical principles set out in the [main body](#) of the CPIP ([Section 2.5](#))—trust and solidarity, reciprocity, stewardship, equity and fairness—inform decision-making for implementing the public health measures strategy. Ethical decision-making also involves openness and transparency, accountability, inclusiveness and reasonableness.

These principles should guide all decision-making around the selection and implementation of public health measures in an influenza pandemic, including those situations in which information is limited. As noted in the [CPIP Communications and Stakeholder Liaison Annex](#), jurisdictions need to communicate proactively with the public, even when gaps in scientific evidence exist or information is limited, to help ensure the public's trust in those managing the pandemic response.

Several aspects of the public health measures strategy have specific ethical considerations, including the need to:

- Balance respect for individual freedoms with the duty to protect the population's health, especially when deploying more restrictive measures (i.e., adhere to the guiding principles of proportionality and flexibility as well as the ethical concept of reciprocity).
- Aim for an equitable distribution of public health resources, benefits and burdens for all groups, including remote and isolated communities and other individuals identified in [Section 2.4](#), whose circumstances require special consideration to support the adoption of recommended public health measures. If these circumstances result in a distribution of resources that is not equitable, a clear and transparent rationale should be provided to explain the decision-making process.
- Inform the public about the rationale for implementing individual and community-based restrictions to mitigate influenza transmission.

2.6 Legal Considerations

The authority to implement public health measures in a pandemic may lie at the federal, provincial/territorial or local public health level, depending on the particular setting and measure. For example, the federal government has authority under the [Quarantine Act \(2005\)](#) to take public health measures to prevent the introduction and spread of communicable disease at Canada's international borders. PT and local governments also have authority for certain public health measures and health emergency management activities under their respective legislation.

In addition, the [International Health Regulations \(IHR\)](#), which aim to prevent the international spread of disease while limiting interference with international traffic and trade, establish processes to be followed by Member States, including Canada, when responding to a public health emergency of international concern. Therefore, a collaborative and co-ordinated approach that includes all levels of government and awareness of obligations under the IHR is essential, both when identifying gaps in the ability to undertake certain public health measures and when measures are actually implemented during a pandemic.



3.0 CANADA'S PANDEMIC PUBLIC HEALTH MEASURES STRATEGY

3.1 Objectives

The public health measures strategy supports Canada's goals for pandemic preparedness and response:

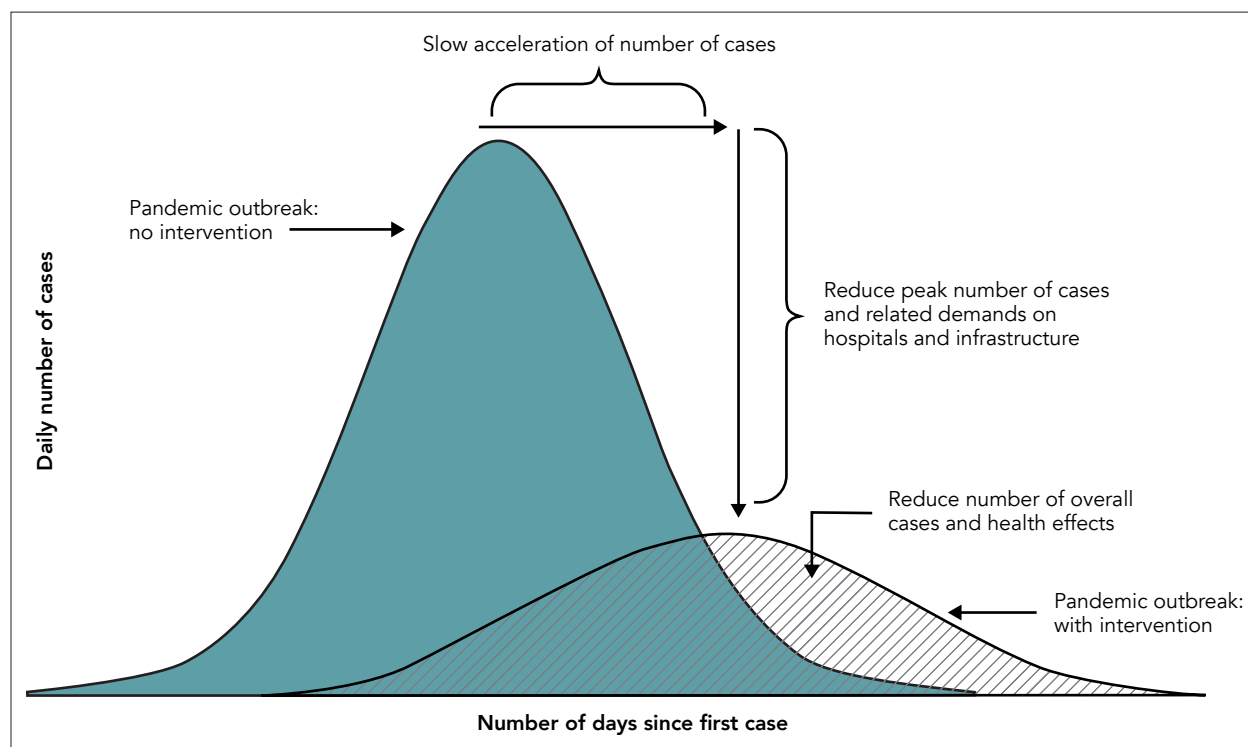
First, to minimize serious illness and overall deaths, and second, to minimize societal disruption among Canadians as a result of an influenza pandemic

The specific objectives of the public health measures strategy are:

- To reduce the overall transmission and slow the rate of transmission of the novel or pandemic virus, thus lowering the total number of severely ill cases and deaths and delaying the accumulation of cases.
- To reduce peak demands on health care institutions, thereby protecting to the greatest extent possible against societal disruption and the overwhelming of community services, and buying time before an effective vaccine is produced.

The epidemiologic curve below illustrates the goal of flattening and delaying the peak of the epidemic by implementing public health measures to reduce and slow transmission of a novel influenza virus.

FIGURE 1: GOAL OF PUBLIC HEALTH MEASURES FOR PANDEMIC INFLUENZA



Source: Adapted from CDC. Interim pre-pandemic planning guidance: community strategy for pandemic influenza mitigation in the United States—early, targeted, layered use of nonpharmaceutical interventions. Atlanta, GA; US Department of Health and Human Services, CDC; 2007. <https://stacks.cdc.gov/view/cdc/11425>.

3.2 Guiding Principles and Approaches

All principles underpinning Canadian pandemic preparedness and response activities and decision-making (see CPIP main body, [Section 3.2](#)) apply to the public health measures strategy, especially:

- *Collaboration*—All levels of government as well as health care stakeholders need to work together to help ensure that individuals and communities understand and adopt public health measures.
- *Evidence-informed decision-making*—Decisions related to public health measures should be based on the best available evidence.
- *A precautionary or protective approach*—Public health measures are implemented in a timely manner and include reasonable preventive actions that are proportional to the threat. This principle is particularly important in the pandemic's early stage, when evidence-informed decision-making is challenged by a lack of data.
- *Proportionality*—Public health measures should be appropriate to the level of the threat and tailored to the anticipated pandemic impact and local situation.
- *Flexibility*—Public health measures are local by nature and subject to change as new information arises. Thus, flexibility will likely be needed when scaling and timing interventions to reflect local conditions.
- *Use of established practices and systems to the extent possible*—Effective seasonal influenza activities support a strong pandemic response, as these well-practiced public health measures can be rapidly ramped up to manage the pandemic.

Ethical decision-making—When implementing, communicating and managing public health measures, decision-makers must always balance collective versus individual rights, interests and values. This aspect of decision-making is discussed in more detail in [Section 2.5](#).

3.3 Public Health Measures—Specific Assumptions

Identifying assumptions is a way to deal with uncertainty and provide a useful framework for planning. However, while rooted in evidence as much as possible, assumptions should *not* be regarded as predictions. As the pandemic unfolds, new and emerging evidence will be incorporated to guide the response.

Informing the planning assumptions identified below are the WHO's Pandemic Influenza Risk Management guidance,⁴² the UK's Scientific Summary of Pandemic Influenza and Its Mitigation⁴³ and discussions from the Canadian Pandemic Influenza Preparedness Planning Assumptions Workshop held in 2011. The CPIP [main body](#) contains a number of assumptions related to a pandemic that are particularly relevant to the public health measures context:

- The pandemic virus will behave like seasonal influenza viruses in significant ways:
 - incubation period—expected to last from 1–3 days;
 - period of communicability—adults are infectious from 24 hours before and up to 5 days from the onset of symptoms, and children may be infectious for up to 7 days. Longer periods have been found, especially in persons with immune compromising conditions;
 - methods of transmission—mainly by large droplet and contact (direct and indirect) routes; the role of airborne transmission is unclear and unproven.
- Most communities will experience two or more pandemic waves of different magnitudes. In any locality, the length of each wave will be from several weeks to a few months but may vary by community.
- There will be geographic variability with regard to the timing and intensity of waves, although some jurisdictions will be affected simultaneously.
- The pandemic impact will vary across communities, and some members of the public may be affected more severely than others.
- In addition to workers' illness, workplace absenteeism may be higher than the estimated clinical attack rate because of caregiving or concern about personal safety in the workplace.
- Vaccine is expected to be available in time to have an impact on the overall pandemic but is unlikely to be available for the first wave. Given current technology, it will take four to six months for vaccine to become available. The earlier the vaccine is available, the greater its impact on the pandemic.
- Individual personal protective measures are expected to help reduce transmission between individuals and within households and other settings.
- Impact will vary across communities, and vulnerable populations are expected to be affected more severely.

42 World Health Organization. Pandemic influenza risk management: A WHO guide to inform and harmonize national and international pandemic preparedness and response. Geneva, May 2017, www.who.int/influenza/preparedness/pandemic/PIRM_withCoverPage_201710_FINAL.pdf. Accessed 14 December 2018.

43 Government of United Kingdom. Department of Health. Scientific summary of pandemic influenza and its mitigation. UK, 2011, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/215666/dh_125333.pdf. Accessed 14 December 2018.

There are additional assumptions specific to the public health measures response:

- Public health measures will be the primary means for slowing down transmission in the early stages of a pandemic. Should resistance to antivirals occur, public health measures will become even more important.
- The pandemic will evolve over time, requiring flexibility and scalability in terms of public health measure responses (see section 3.6).
- Decision-makers will need to establish triggers to indicate when to scale up and scale down public health measures within their response strategy, and these may vary across the country.
- Canadians will seek information or public health advice, requiring effective communications strategies.
- Public acceptance of restrictive control measures will correlate with the process used to arrive at these decisions, the transparency and inclusiveness of the process, the articulation of explicit and transparent rationales for measures, and the public's perception of risk.

3.4 Pandemic Roles and Responsibilities

The public health measures strategy requires a collaborative approach with clearly defined roles and responsibilities. This section focuses on FPT government responsibilities, although it is recognized that local public health authorities may have a role in the activities listed under PT responsibilities.

The roles and responsibilities for the pandemic public health measures strategy (Table 1 on page 21) are adapted from those set out in the CPIP [main body](#), Section 3.4.2. Note that some roles and responsibilities, such as FPT decision-making processes, are beyond the scope of this annex.

It is also acknowledged that other partners play important roles in a pandemic with respect to public health measures, such as sharing credible information, supporting new and flexible policies and in the area of communications. These partners include the private sector (e.g., workplaces), NGOs, municipalities and international organizations.

TABLE 1: FPT GOVERNMENTS' ROLES AND RESPONSIBILITIES FOR PUBLIC HEALTH MEASURES

LEVEL OF GOVERNMENT	ROLES AND RESPONSIBILITIES
FEDERAL GOVERNMENT	<ul style="list-style-type: none"> • Developing recommendations for populations who are beneficiaries of federal health programs and services (e.g., some First Nations communities, Canadian Armed Forces, federal correctional facilities). • Providing travel health notices and other health-related information relevant to international travel. • Exercising powers under the Quarantine Act to protect public health by taking comprehensive measures to help prevent the introduction and spread of communicable diseases in Canada. Such measures may include, but are not limited to, the screening, examining and detaining of arriving and departing international travellers, conveyances (e.g., airplanes and cruise ships) and their goods and cargo. • Engaging with stakeholders (e.g., national health-sector NGOs, professional associations) to facilitate information exchange aimed at supporting public education efforts around public health measures.
PT GOVERNMENTS	<ul style="list-style-type: none"> • Developing a pandemic public health measures strategy for their respective jurisdiction that addresses a wide range of settings and groups. • Adapting, implementing, maintaining, monitoring, discontinuing, evaluating and communicating on specific public health measures that are within their authority and associated guidance during a pandemic. • Engaging and communicating the jurisdictional public health measures strategy to local public health agencies, regional health authorities, municipalities, other health system partners, other PT ministries, relevant stakeholders, PHAC and the public.
FPT GOVERNMENTS IN COLLABORATION	<ul style="list-style-type: none"> • Co-ordinating and facilitating consistent messaging around public health measures for Canadians. • Establishing and supporting pan-Canadian recommendations on the use of public health measures during a pandemic. • Developing, implementing and disseminating public health guidance. • Coordinating and aligning plans and activities for federal populations (including Indigenous Peoples), where relevant.

3.5 Key Elements of the Response

Public health measures for influenza pandemics are a modification and intensification of existing public health practices. Since public health measures are implemented by many people in a variety of settings, context is important when planning and implementing a layered approach to public health measures.

3.5.1 INDIVIDUAL MEASURES

Individuals play an important role in an influenza pandemic and must feel equipped to adopt personal protective measures to protect themselves, their families and their communities. These measures are at the core of good public health practice for influenza and other respiratory illnesses and are routinely recommended during seasonal influenza campaigns. During an influenza pandemic, they become even more crucial.

3.5.1.1 Hand Hygiene and Respiratory Etiquette

The effectiveness of rigorous hand hygiene and respiratory etiquette in limiting the spread of a novel virus should be emphasized. The public should be strongly encouraged to undertake proper hand hygiene and respiratory etiquette when at home and in all community settings.

New studies have found that hand hygiene and respiratory etiquette are generally well accepted by the public.⁴⁴ However, some individuals may view these more common personal measures as trivial and therefore neglect them. Consistent messaging about these measures and their benefits may reinforce them in the public's mind so that ignoring them becomes socially unacceptable.

These measures are applicable in all pandemic scenarios.

3.5.1.1.1 Hand Hygiene

Hand hygiene is a comprehensive term that refers to hand washing or hand antisepsis and to actions taken to maintain healthy hands and fingernails.⁴⁵ Hands can become contaminated with the influenza virus through direct contact (e.g. hand-to-hand) with an infectious individual or through indirect means (e.g. contact with contaminated fomites).⁴⁶ Influenza survives on hands for roughly three to five minutes⁴⁷ and, in some cases, infectious influenza virus remains detectable after 30 minutes.⁴⁸ Studies have identified that frequent handwashing, across a variety of settings, reduced viral transmission by up to 44%.^{49,50,51,52} A systematic review on hand hygiene in office settings demonstrated that hand hygiene

44 Teasdale E, Santer M, Geraghty AWA, Little P, Yardley L. Public perceptions of non-pharmaceutical interventions for reducing transmission of respiratory infection: systematic review and synthesis of qualitative studies. *BMC Public Health*. 2014, 14:589.

45 Public Health Agency of Canada. Routine practices and additional precautions for preventing the transmission of infection in healthcare settings. Government of Canada, 2016, www.canada.ca/content/dam/phac-aspc/documents/services/publications/diseases-conditions/routine-practices-precautions-healthcare-associated-infections/routine-practices-precautions-healthcare-associated-infections-2016-FINAL-eng.pdf. Accessed 14 December 2018.

46 Brankston G, Gitterman L, Hirji Z, Lemieux C, Gardam M. Transmission of influenza A in human beings. *Lancet Infect Dis*. 2007, 7:257–65.

47 Bean B, Moore BM, Sterner B, Peterson LR, Gerding DN, Balfour HH. Survival of influenza viruses on environmental surfaces. *J Infect Dis*. 1982, 146:47–51.

48 Thomas Y, Boquete-Suter P, Koch D, Pittet D, Kaiser L. Survival of influenza virus on human fingers. *Clin Microbiol Infect* 2014; 20:058.

49 Rabie T, Curtis V. Handwashing and risk of respiratory infections: a quantitative systematic review. *Trop Med Int Health*. 2006; 11:258–67.

50 Fung IC-H, Cairncross S. Effectiveness of handwashing in preventing SARS: a review. *Tropical medicine and international health*. 2006, 11(11):1749–58.

51 Jefferson T, Del Mar C, Dooley L, Ferroni E, Al-Ansary LA, Bawazeer GA, et al. Physical interventions to interrupt or reduce the spread of respiratory viruses: systematic review. *BMJ (Clinical research ed.)* 2009, 339:b3675.

52 Luby SP, Agboatwalla M, Feikin DR, Painter J, Billhimer W, Altaf A, et al. Effect of handwashing on child health: a randomised controlled trial. *Lancet (London, England)* 2005, 366(9481):225–33.

was effective in reducing respiratory and GI illness in office employees.⁵³ The use of antibacterial soap for hand washing is generally not recommended due to a lack of evidence of its superiority to plain soap and water and potential adverse health effects, and concern that their frequent use may contribute to antimicrobial resistance.^{54,55}

HAND HYGIENE

Regularly and thoroughly wash hands (i.e., washing all surfaces of the hands including between fingers, under and around fingernails using friction) with soap and water. If soap and water are not available, use alcohol-based hand sanitizers containing at least 60% ethanol or isopropanol.

Avoid touching the mouth, nose or eyes with unwashed hands to prevent self-inoculation.

Another systematic review conducted in 2018 identified 16 studies that assessed the impact of hand hygiene practice in the community setting on influenza infection or transmission. This review restricted its scope to hand hygiene interventions independent of other public health measures; it is not reflective of the recommended multi-layering approach to public health measures for reducing the spread of influenza. Findings were mixed as to whether hand hygiene practices helped to prevent laboratory-confirmed or possible influenza infection. Further, the evidence identified by this review must be considered within the context of (1) the methodological challenges of studying the effectiveness of hand hygiene in the community setting, (2) the already documented potential benefits of hand hygiene for general infectious disease prevention and control, and (3) the fact that hand hygiene is one of several non-pharmaceutical protective measures that can be taken to prevent influenza infection, and is difficult to assess in isolation from other measures. The review concluded that good hand hygiene practice should continue to be recommended as a public health measure to reduce the risk of influenza infection and transmission in the community setting, given its non-invasiveness and broad applicability as an infection prevention and control intervention.⁵⁶

Unlike most urban communities in Canada, some remote and isolated communities have limited access to clean running water for hand hygiene. Therefore, public health planners and health service providers should increase awareness among individuals and families in these communities about alternative means for effective hand hygiene.⁵⁷ Guidance developed during the 2009 pandemic for communities without clean running water recommended treating available water (i.e., boiling for one minute, adding chemicals such as chlorine bleach), using two separate containers to hold the water (e.g., pail, bowl), and moving the hands around to mimic running water.⁵⁸

53 Zivich PN, Gancz AS, Aiello AE. Effect of hand hygiene on infectious diseases in the office workplace: a systematic review. *Am J Infect Control*. 2017, 46, 4, 448–455. <https://doi.org/10.1016/j.ajic.2017.10.006>.

54 Kim S.A., Moon H., Lee K., Rhee M.S. Bacteriocidal effects of triclosan in soap both in vitro and in vivo. *Journal of Antimicrobial Chemotherapy*. 2015, 70(12):3345–52.

55 Public Health Ontario. Best practices for hand hygiene in all health care settings, 4th edition. Government of Ontario, 2014, www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/Best_Practices_Hand_Hygiene.aspx. Accessed 14 December 2018.

56 Moncion K, Young K, Tunis M, Rempel S, Stirling R, Zhao L. Effectiveness of hand hygiene practices in preventing influenza virus infection in the community setting: A systematic review. *Can Commun Dis Rep* 2019;45(1):12–23. <https://doi.org/10.14745/ccdr.v45i01a02>.

57 Public Health Agency of Canada. Guidance for remote and isolated (RI) communities in the context of the pandemic (H1N1) 2009 outbreak. Nov. 2009. https://web.archive.org/web/20100129052023/http://www.phac-aspc.gc.ca/alert-alerte/h1n1/guidance_lignesdirectrices/ric-cei/index-eng.php.

58 Public Health Agency of Canada. Hand hygiene recommendations for remote and isolated community settings. Oct. 2009, <https://web.archive.org/web/20100129051514/http://www.phac-aspc.gc.ca/alert-alerte/h1n1/public/handhygiene-eng.php>. Accessed 14 December 2018.

3.5.1.1.2 Respiratory Etiquette

Respiratory etiquette is the term used to describe a combination of measures intended to minimize the dispersion of influenza virus via droplets through coughing, sneezing and talking.

While there is no direct evidence that respiratory etiquette prevents respiratory virus transmission, this assumption is indirectly supported by scientific studies showing that droplets generated by coughing or sneezing among those not practicing respiratory etiquette can travel up to two metres and potentially can infect others within that distance.^{59,60,61} It is a practice commonly recommended by experts and was adapted by many Canadians during the 2009 pandemic. This practice continues to be promoted today during seasonal influenza campaigns.

RESPIRATORY ETIQUETTE

Cover coughs and sneezes with a tissue. Dispose of tissues in a container and perform hand hygiene immediately after a cough or sneeze.

OR

Cough and sneeze into the bend of your arm, not your hand.

Wear a mask if you have ILI and must leave the house

3.5.1.2 Environmental Cleaning (home/personal environment)

Influenza viruses have been detected on surfaces in homes and daycare centres during regular influenza seasons,⁶² with higher rates of contamination found in some homes with young children.⁶³ Viruses can survive on hard non-porous surfaces for 24 to 48 hours,⁶⁴ during which time they can spread to human hands. Recent literature on influenza survival on dry surfaces determined that the virus may survive for longer periods, in some cases, up to months, on a variety of materials.⁶⁵ Although influenza viruses survive on hands for three to five minutes,⁶⁶ touching contaminated surfaces followed by touching the eyes, nose or mouth can result in self-inoculation.

59 Barrios LC, Koonin LM, Kohl KS, Cetron M. Selecting non-pharmaceutical strategies to minimize influenza spread: the 2009 influenza A (H1N1) pandemic and beyond. *Public Health Rep.* 2012, 127:565–71.

60 Monto AS, Webster RG. [Chapter 2]. In: Webster RG, Monto AS, Braciale TJ, Lamb RA, eds. *Textbook of influenza*. 2nd. West Sussex, UK: John Wiley and Sons, Ltd. 2013, 20–33.

61 Monto AS, Webster RG. [Chapter 2]. In: Webster RG, Monto AS, Braciale TJ, Lamb RA, eds. *Textbook of influenza*. 2nd. West Sussex, UK: John Wiley and Sons, Ltd. 2013, 20–33.

62 Boone SA, Gerba CP. The occurrence of influenza A virus on household and day care center fomites. *J Infect.* 2005, 51:103–9.

63 Simmerman JM, Suntarattiwong P, Levy J, et al. Influenza virus contamination of common household surfaces during the 2009 influenza A (H1N1) pandemic in Bangkok, Thailand: implications for contact transmission. *Clin Infect Dis.* 2010, 51:1053–61.

64 Bean B, Moore BM, Sterner B, Peterson LR, Gerding DN, Balfour HEH Jr. Survival of influenza viruses on environmental surfaces. *J Infect Dis.* 1982, 146:47–51.

65 Otter JA, Donskey C, Yezli S, Douthwaite S, Goldenberg SD, Weber DJ. Transmission of SARS and MERS coronaviruses and influenza virus in healthcare settings: the possible role of dry surface contamination. *J Hosp Infect.* 2016, 92:235–50.

66 Moncion K, Young K, Rempel S, Stirling R, Zhao L. Effectiveness of hand hygiene practices in preventing influenza virus infection and transmission in the community setting: a systematic review. *Can Commun Dis Rep* 2018; 45(01) (pending publication).

To reduce their risk of exposure to infectious droplets, individuals may consider more frequent cleaning of their home environments, especially in cases of home isolation of an ill individual. Influenza viruses can be removed from surfaces by routine cleaning practices that use detergent-based cleaners (e.g., dish soap) or disinfectants (e.g., bleach).⁶⁷ As a result, frequent cleaning of potentially contaminated surfaces, such as commonly touched surfaces, will potentially protect others sharing the same space.

ENVIRONMENTAL CLEANING (HOME/PERSONAL ENVIRONMENT)

Frequently clean and disinfect potentially contaminated and commonly used surfaces, such as:

- telephone handsets, mobile phones;
- tablets
- TV remotes;
- keyboards;
- faucets;
- table and desk tops;
- door knobs/handles;
- light switches;
- toys;
- kitchen appliances.

Many readily available household or commercial disinfectant cleaning products are effective against influenza viruses.

Dishes, clothing and sheets used by an individual with influenza-like illness (ILI) can be washed using ordinary detergent and water.

Waste should be handled according to usual practices.

It is recommended that businesses and community organizations increase the frequency of cleaning high-touch surfaces (at least twice daily) and ensure that adequate hand hygiene supplies are available at all times.

Adapted from: Public Health Agency of Canada. Individual and community-based measures to help prevent transmission of influenza-like-illness (ILI), including the pandemic influenza (H1N1) 2009 virus, in the community. Guidance Document (archived).

3.5.1.3 Voluntary Self-isolation

To help reduce transmission between ill persons and those who are healthy during an influenza pandemic, prompt recognition of symptoms and early self-isolation of symptomatic individuals are key. Individuals with ILI should self-isolate while symptomatic and for at least 24 hours after the resolution of acute ILI symptoms, unless there is a need to visit a health care provider or to seek other forms of support.⁶⁸

For self-isolation to be effective, prompt recognition of illness onset will be important; therefore, public health messaging about self-isolation should instruct the public about the signs and symptoms of pandemic influenza.^{69,70} Also, individuals will need to know that illness onset and deterioration in health may be sudden and be aware of how and when to obtain further medical care or access to support systems (e.g., neighbours, family), while minimizing the risk of exposing others.

67 Bloomfield, S., Exner, M., Fara, G. M., and Scott, E. A. Prevention of the spread of infection—the need for a family-centred approach to hygiene promotion. *Euro Surveill.* 2008, 13(22).

68 Qualls N, Levitt A, Kanade N, et al. Community mitigation guidelines to prevent pandemic influenza—United States, 2017. *MMWR Recomm Rep* 2017, 66(No. RR-1):1–34.

69 Zhang, Q., and Wang, D. Assessing the role of voluntary self-isolation in the control of pandemic influenza using a household epidemic model. *International Journal of Environmental Research and Public Health.* 2015, 12(8), 9750–9767.

70 Wu, J. T., Riley S., Fraser C., and Leung G. M. Reducing the Impact of the next influenza pandemic using household-based public health interventions. *PLoS Medicine.* 2006, 3(9), e361.

Voluntary self-isolation can potentially delay the spread of the virus in the community and therefore will likely have high public acceptance, especially if the pandemic has higher clinical severity. During the 2003 severe acute respiratory syndrome (SARS) outbreak, compliance with this measure was generally high in many affected centres.⁷¹ Moreover, some studies indicate that the public complies better with voluntary and common-sense measures than with those that are mandatory and enforced.^{72,73}

However, it is important to recognize that this measure may be disruptive to businesses and other social settings, as well as for self-isolating individuals. Staying home while ill can be financially and practically challenging (e.g., tolerance of employers for absences, availability of paid leave while in isolation, loss of income from self-employment, households with ill children also requiring care). It is also recognized that, in Canada, up to 30,000 people experience homelessness on any given night.⁷⁴ Shelters, drop-in centres and other day programs play a key role in supporting and co-ordinating support for infected individuals in their programs. Self-isolation will be challenging in these and other circumstances, such as crowded households or institutions, and for travellers. Individuals in these circumstances may need additional supports and alternate strategies to protect others (e.g., wearing a mask, being provided with an area that allows for a two-metre distance from others, limiting the number of people providing care).

VOLUNTARY SELF-ISOLATION WHEN ILL

Stay home (from work, school, daycares) and away from large crowds (e.g., malls, mass transit, public events) when ill and for at least 24 hours after symptom resolution.

Family and other household members in homes with ill persons can continue their normal daily activities but should self-isolate if they develop symptoms of ILI.

See Section 3.5.1.5 (page 27) for advice on the use of masks when self-isolating

Adapted from: Individual and community based measures to help prevent transmission of influenza-like-illness (ILI), including the pandemic influenza (H1N1) 2009 virus, in the community. Guidance Document (archived).

Employers should be encouraged to consider implementing flexible work arrangements and sick leave policies that support individuals who adhere to self-isolation advice, such as teleworking and suspending the need for a medical leave note. Studies conducted during the 2009 pandemic indicated that the availability of paid sick leave reduced H1N1 infection in the workplace by 20%⁷⁵ and found that higher ILI incidence was linked to the lack of paid sick leave.⁷⁶

71 Health Canada. Learning from SARS. Renewal of public health in Canada. A report of the National Advisory Committee on SARS and Public Health, October 2003. [Archived] <https://www.canada.ca/en/public-health/services/reports-publications/learning-sars-renewal-public-health-canada.html>. Accessed on 14 December 2018.

72 Blendon RJ, DesRoches CM, Cetron MS, Benson JM, Meinhardt T, and Pollard W. Attitudes toward the use of quarantine in a public health emergency in four countries. *Health Affairs*. 2006, 25(2), w15–25.

73 Lau JT, Kim JH, Tsui HY, and Griffiths S. Anticipated and current preventive behaviors in response to an anticipated human-to-human H5N1 epidemic in the Hong Kong Chinese general population. *BMC Infectious Diseases*. 2007, 7, 18.

74 Buccieri K, Schiff R., eds. *Pandemic preparedness and homelessness: lessons from H1N1 in Canada*. Toronto: Canadian Observatory on Homelessness Press, 2016.

75 Miyaki K, Sakurazawa H, Mikurube H, et al. An effective quarantine measure reduced the total incidence of influenza A H1N1 in the workplace: another way to control the H1N1 flu pandemic. *J Occup Health*. 2011, 53:287–92.

76 Kumar S, Quinn SC, Kim KH, Daniel LH, Freimuth VS. The impact of workplace policies and other social factors on self-reported influenza-like illness incidence during the 2009 H1N1 pandemic. *Am J Public Health*. 2012, 102:134–40.

3.5.1.4 Voluntary Home Quarantine

Voluntary home quarantine of healthy contacts of infected individuals may help reduce community transmission from households to schools, workplaces, neighbouring households and other settings. Household contacts of an individual with pandemic influenza are at increased risk for infection or may already be infected but asymptomatic. For quarantine measures to be effective, exposed household members should stay home, starting from the time of their initial contact with the symptomatic ill individual(s), for up to three days following the last contact with the ill individual, in order to assess for early signs and symptoms of pandemic influenza virus infection.^{77,78} If other household members become ill during this period, the quarantine may need to be extended for another three days. If they then become ill, they should voluntarily self-isolate.

The evidence indicates that voluntary home quarantine, like voluntary self-isolation, can help prevent the spread of pandemic influenza when used in combination with other measures, such as hand hygiene, respiratory etiquette and antiviral prophylaxis.^{79,80}

VOLUNTARY HOME QUARANTINE (BY HEALTHY CONTACTS OF PROBABLE OR CONFIRMED CASES OF INFLUENZA)

Household members exposed to someone with influenza should remain at home from the time of initial contact and for up to three days after the last contact with the symptomatic ill individual.

Monitor for signs and symptoms of infection and practice voluntary self-isolation if ILI develops.

Given the secondary consequences for healthy individuals who undertake home quarantine (e.g., absence from work), this measure may be recommended during pandemics of moderate to high impact, in combination with respiratory etiquette and hand hygiene, to help reduce transmission beyond households. Planning for supporting members of households in quarantine should also be considered (e.g., access to essential medications, food).

3.5.1.5 Use of Masks

Face masks (i.e., disposable surgical, medical or dental procedure masks) provide a physical barrier that may help prevent the transmission of influenza viruses from an ill person to a well person by blocking large-particle respiratory droplets propelled by coughing or sneezing.⁸¹ It will be important for planners to consider the number and availability of masks that may be required for this measure, taking into account the range of pandemic scenarios (see Section 3.6).⁸²

77 Cori A, Valleron AJ, Carrat F, Scalia Tomba G, Thomas G, Boëlle PY. Estimating influenza latency and infectious period durations using viral excretion data. *Epidemics* 2012; 4:132–8.

78 Qualls N, Levitt A, Kanade N, et al. Community mitigation guidelines to prevent pandemic influenza — United States, 2017. *MMWR Recomm Rep* 2017, 66(No. RR-1):1–34.

79 Tognotti E. Lessons from the history of quarantine, from plague to influenza A. *Emerg Infect Dis.* 2013; 19:254–9.

80 Wu JT, Riley S, Fraser C, Leung GM. Reducing the impact of the next influenza pandemic using household-based public health interventions. *PLoS Med.* 2006 Sep; 3(9):e261.

81 Cowling BJ, Zhou Y, Ip DK, Leung GM, Aiello AE. Face masks to prevent influenza transmission: a systematic review. *Epidemiol Infect.* 2010; 138:449–56.

82 Cristina C, Rainisch G, Shankar M, Adhikari BB, Swerdlow DL, Bower WA, Pillai SK, Meltzer MI, Koonin LM. Potential demand for respirators and surgical masks during a hypothetical influenza pandemic in the United States. *Clin Infect Dis.* 1 May 2015, 60 Suppl 1:S42–51.

During the 2009 pandemic, some studies showed that the combination of good hand hygiene and early initiation of mask use by ill individuals reduced influenza transmission within households^{83,84} and among university students in residence.^{85,86} The use of masks may be recommended for individuals with ILL, especially in pandemics of moderate to high impact since this measure may prevent viral spread to household members or to others in the community if the ill individuals must leave the place of residence.

Little evidence exists as to how effectively the wearing of a mask by well individuals will prevent them from becoming infected.^{87,88} However, mask use by well individuals, in combination with other protective measures, might be beneficial in certain situations (e.g., when high-risk individuals must be in crowded settings or for well parents caring for ill children at home).

For masks to be effective, individuals must wear them consistently and correctly; these actions can be challenging. Masks must be worn only once, never shared and always changed when soiled or wet. If not used properly, masks may lead to a greater risk of pandemic influenza transmission because of contamination, or they may make the user overconfident and hence neglectful of other personal protective measures, such as hand hygiene, respiratory etiquette and self-isolation when ill⁸⁹—measures that have been deemed important complementary actions to the use of masks for the reduction of disease transmission.⁹⁰ Finally, given that masks cannot be used when eating and drinking and may make communication difficult, wearing them for prolonged periods may be impractical and ineffective. It is important to present the limitations of mask use to the public.⁹¹ Advice on proper disposal of used masks should accompany any recommendations for their use in the community setting.

Providing masks to well people is unlikely to be feasible or sustainable on a population basis in a pandemic and may not be an appropriate use of public resources since little evidence exists regarding their effectiveness in reducing the spread of disease in the general population.

83 Suess T, Remschmidt C, Schink SB, et al. The role of facemasks and hand hygiene in the prevention of influenza transmission in households: results from a cluster randomized trial; Berlin, Germany, 2009–2011. *BMC Infect Dis.* 2012, 12:26.

84 Cowling BJ, Chan KH, Fang VJ, et al. Facemasks and hand hygiene to prevent influenza transmission in households: a cluster randomized trial. *Ann Intern Med.* 2009, 151:437–46.

85 Aiello AE, Murray GF, Perez V, et al. Mask use, hand hygiene, and seasonal influenza-like illness among young adults: a randomized intervention trial. *J Infect Dis.* 2010, 201:491–8.

86 Aiello AE, Perez V, Coulborn RM, Davis BM, Uddin M, Monto AS. Facemasks, hand hygiene, and influenza among young adults: a randomized intervention trial. *PLoS One.* 2012, 7(1):e29744.

87 Cowling BJ, Zhou Y, Ip DKM, Leung GM, Aiello AE. Face masks to prevent influenza transmission: a systematic review. *Epidemiol Infect.* 2010, 138:449–56.

88 Bin-Reza F, Lopez VC, Nicoll A, Chamberland ME. The use of masks and respirators to prevent transmission of influenza: a systematic review of the scientific evidence. *Influenza Other Respi Viruses.* 2012, 6:257–67.

89 Qualls N, Levitt A, Kanade N, et al. Community mitigation guidelines to prevent pandemic influenza—United States, 2017. *MMWR Recomm Rep* 2017, 66 (No. RR-1):1–34.

90 United States Department of Health and Human Services. Interim public health guidance for the use of facemasks and respirators in non-occupational community settings during an influenza pandemic. Washington, DC: US Department of Health and Human Services, 2007.

91 Qualls N, Levitt A, Kanade N, et al. Community mitigation guidelines to prevent pandemic influenza—United States, 2017. *MMWR Recomm Rep* 2017, 66 (No. RR-1):1–34.

3.5.2 COMMUNITY-BASED MEASURES

Community-based measures, such as school closures or cancellation of mass gatherings, are disease-control strategies aimed at reducing and slowing the transmission of influenza in communities. Decisions about implementing these measures will likely be made at the level of the local public health authority (i.e., Medical Officers of Health) with co-ordination by the PTs or regional levels to ensure the consistency of a broad-based approach. The experience of past pandemics indicates that early decisions about whether to implement these measures are often made before complete information about the impact of the pandemic is known. The choice and timing of implementation of these measures will depend on the pandemic's impact, as well as the local community context.

Community-based measures are likely to have secondary consequences for individuals, families and communities, such as loss of income, an elevated need for support services, and potentially reduced availability of certain services. During a pandemic of lesser severity, the infection control benefits of implementing some community measures (e.g., proactive school closures) may not be offset by the cost and societal disruption caused by these measures. Hence, such measures are likely to be implemented only during a high impact pandemic or in certain situations in some communities.⁹²

3.5.2.1 Environmental Cleaning (Public Spaces)

Environmental cleaning (see [Section 3.5.1.2](#)) of public spaces is a community-based measure to consider in keeping with usual pre-pandemic practices (e.g., cleaning products used, surfaces cleaned). More frequent cleaning is likely not practical or sustainable in high-traffic public settings (e.g., airports, malls). Therefore, more frequent cleaning may be desirable, but this is not an evidence-based recommendation in the context of community-based measures in public settings.

Instead, it would be more effective for public health communications to continue to promote individual practices (i.e., hand hygiene, respiratory etiquette, self-isolation at home when ill) in all settings. Also, private companies, institutions and organizations can be encouraged to increase the frequency of cleaning their own sites, particularly where hand and surface contacts are greatest (e.g., shared work stations or items, such as phones, elevators, washrooms) and recommend increased hand hygiene before eating, touching one's face, etc.

3.5.2.2 Social Distancing Measures

Social distancing measures (e.g., cancelling or limiting communal events or activities) aim to reduce viral transmission by limiting the frequency and duration of close contact among individuals of all ages in settings where people congregate, such as workplaces, schools, shelters, spiritual or cultural settings (e.g., churches, mosques, synagogues, sweat lodges) and mass gathering venues (e.g., concerts, sporting events).

These measures are most applicable in pandemics of moderate to high impact since they can be associated with significant societal and economic costs. The measures should align with the anticipated pandemic impact and the local situation, while supporting the principles of flexibility and proportionality.

92 European Centre for Disease Prevention and Control. Guide to public health measures to reduce the impact of influenza pandemics in Europe: 'The ECDC menu', 2009.

During the 1918 influenza pandemic, which exhibited high virulence and high transmissibility, there was a strong correlation between the early, sustained and layered application of public health measures aimed at social distancing, and reduced mortality. School closures and public gathering bans were associated with reductions in the weekly death rate. Early bans on public gatherings (e.g., early closures of churches and theatres) were associated with a lower mortality peak.⁹³ Overall, there was a statistically significant association between increased duration of public health measures and reduced total mortality burden in the municipalities studied; conversely, with the deactivation of those interventions, death rates rose.⁹⁴ However, the implementation and effectiveness of these measures in the 2009 H1N1 pandemic were not documented.

3.5.2.2.1 School and Daycare Closures

Children shed more virus for a longer period of time, making them more infectious.^{95,96} They are also less likely to practice effective hand hygiene and respiratory etiquette. In addition, research indicates that the presence of school-aged children in a household is a risk factor for influenza virus infection in families.⁹⁷ Many studies have shown that higher attack rates among children increased influenza virus transmission in schools over other community settings.^{98,99,100,101,102} These studies suggest that the closing of schools and daycare centres to allow students and staff to remain at home may help reduce influenza transmission during a pandemic.

During the 2009 pandemic, proactive school closures were not recommended as a widespread measure in Canada due to the less severe nature of the clinical illness. While a growing body of evidence indicates that pre-emptive school closures can help prevent or reduce the spread of influenza,^{103,104,105,106,107} it is still unclear whether those health benefits outweigh the social and economic impacts of school closures

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- 93 Hatchett RJ, Mecher CE, and Lipsitch M. Public health interventions and epidemic intensity during the 1918 influenza pandemic. *Proceedings of the National Academy of Sciences of the United States of America*. 2007, 104(18), 7582–7587.
- 94 Markel H, Lipman HB, Navarro JA, Sloan A, Michalsen JR, Stern AM, et al. Non-pharmaceutical interventions implemented by US cities during the 1918–1919 influenza pandemic. *JAMA*. 2007, 298(6), 644–654.
- 95 Sato M, Hosoya M, Kato K, Suzuki H. Viral shedding in children with influenza virus infections treated with neuraminidase inhibitors. *Pediatr Infect Dis J*. 2005, 24:931–2.
- 96 Hall CB, Douglas RG, Geiman JM, Meagher MP. Viral shedding patterns of children with influenza B infection. *J Infect Dis*. 1979, 140:610–3.
- 97 Qualls N, Levitt A, Kanade N, et al. Community mitigation guidelines to prevent pandemic influenza—United States, 2017. *MMWR Recomm Rep*. 2017, 66(No. RR-1):1–34.
- 98 Chen SC, Liao CM. Modelling control measures to reduce the impact of pandemic influenza among schoolchildren. *Epidemiology and Infection*. 2008, 136(8):1035–45.
- 99 Zhao H, Joseph C, Phin N. Outbreaks of influenza and influenza-like illness in schools in England and Wales, 2005/06. *Euro Surveill*. 2007, 12(5):E3–4.
- 100 Jongcherdchootrakul K, Henderson AK, Iamsirithaworn S, Modchang C, Siriaryapon P. First pandemic A (H1N1) outbreak in a private school, Bangkok, Thailand, June 2009. *Journal of the Medical Association of Thailand, Chotmaihet Thangphaet*. 2014, 97 Suppl 2:S145–52.
- 101 Cauchemez S, Bhattarai A, Marchbanks TL, Fagan RP, Ostro S, Ferguson NM, et al. Role of social networks in shaping disease transmission during a community outbreak of 2009 H1N1 pandemic influenza. *Proceedings of the National Academy of Sciences of the United States of America*. 2011, 108(7):2825–30.
- 102 Guclu H, Read J, Vukotich CJ Jr, Galloway DD, Gao H, Rainey JJ, et al. Social contact networks and mixing among students in K-12 schools in Pittsburgh, PA. *PLoS One*. 2016, 11(3):e0151139.
- 103 Earn DJ, He D, Loeb MB, Fonseca K, Lee BE, Dushoff J. Effects of school closure on incidence of pandemic influenza in Alberta, Canada. *Ann Intern Med*. 2012, 156:173–181.
- 104 Jackson C, Vynnycky E, Hawker J, Olowokure B, Mangtani P. School closures and influenza: systematic review of epidemiological studies. *BMJ Open*. 26 February 2013, 3(2).
- 105 Chao DL, Halloran ME, Longini IM Jr. School opening dates predict pandemic influenza (A) H1N1 epidemics in the USA. *J Infect Dis*. 2010, 202:877–80.
- 106 Copeland DL, Basurto-Davila R, Chung W, et al. Effectiveness of a school district closure for pandemic influenza A (H1N1) on acute respiratory illnesses in the community: a natural experiment. *Clin Infect Dis*. 2013, 56:509–16.
- 107 Chowell G, Echevarría-Zuno S, Viboud C, et al. Characterizing the epidemiology of the 2009 influenza A/H1N1 pandemic in Mexico. *PLoS Med*. 2011 May, 8(5):e1000436.

in a pandemic with lower impact.^{108,109} One post-H1N1 pandemic study indicated that decision-making around measures carrying potential societal conflict will be affected by a “conflict avoidance” mindset of decision-makers, wanting to avoid the potentially large societal costs of closing schools.¹¹⁰

Planners should weigh potential health benefits against the secondary consequences of school and daycare closures; principally, this involves the potential shift of transmission from schools and daycares to other community settings where children congregate, such as malls or community centres.¹¹¹ Equally important with respect to health equity is the fact that particular groups may be disproportionately affected in other ways, such as children no longer being able to receive school-based meals or counselling, single parents having to make arrangements for childcare, low-income families and parents lacking flexible work arrangements or paid leave allowing them to stay home to care for their children. Advance planning will be needed to reduce the secondary effects of this measure (e.g., replacing school-based meals).

It is important to note that, while PTs and federal public health authorities can make recommendations about school closures, the authority to close schools lies with local Medical Officers of Health or individual school boards. With potential public fear about sending children to school when a pandemic influenza case has been identified and the need for school boards to consider any increased risk to their employees in school settings, school boards—and daycare administrators—may choose to close facilities regardless of FPT recommendations or the pandemic’s epidemiology.¹¹⁰ Therefore, school boards should be encouraged to plan for teaching disruptions and find means to continue education (e.g., online submission of assignments for older students) in the event of a school closure. Schools may also elect to close due to high staff or student attack rates and absenteeism.

This measure is most effective in pandemic situations where there are high attack rates in pre-school or school-aged children. In addition, school closures would need to be proactive, that is, started before there are significant levels of viral transmission in the community. Once the virus is established in children and there is an observable level of school absenteeism caused by ILI, “reactive” closing of schools is unlikely to slow further viral transmission.¹¹² In this scenario, it is also recommended that all symptomatic individuals from schools (e.g., teachers, support staff, students) be encouraged to practice voluntary self-isolation at home.

In remote and isolated communities, school closures may have an even greater impact. Given limited qualified substitute staff in the community, the school may not be able to implement a business continuity cycle in a pandemic with higher transmissibility, potentially causing the school closure to be longer than in urban communities. Public health planners should actively involve schools in monitoring and surveillance to identify cases before an outbreak occurs and develop a business continuity plan.¹¹³

108 Community Preventive Services Task Force. Emergency preparedness and response: school dismissals to reduce transmission of pandemic influenza. *The Community Guide*, 2012, www.thecommunityguide.org/findings/emergency-preparedness-and-response-school-dismissals-reduce-transmission-pandemic-influenza. Accessed 14 December 2018.

109 Roth DZ, Henry B. Social distancing as a pandemic influenza prevention measure. *National Collaborating Centre for Infectious Diseases*. July 2011.

110 Rosella LC, Wilson K, Crowcroft NS, Chu A, Upshur R, Willison D, Deeks SL, Schwartz B, Tustin J, Sider D, Goel V. Pandemic H1N1 in Canada and the use of evidence in developing public health policies—a policy analysis. *Soc Sci Med*. April 2013, 83:1–9.

111 Antommaria AHM, Thorell EA. Non-pharmaceutical interventions to limit the transmission of a pandemic virus: the need for complementary programs to address children’s diverse needs. *Journal of Clinical Ethics*. 2011, 22(1):25–32.

112 Community Preventive Services Task Force. Emergency preparedness and response: School dismissals to reduce transmission of pandemic influenza. *The Community Guide*, 2012, www.thecommunityguide.org/findings/emergency-preparedness-and-response-school-dismissals-reduce-transmission-pandemic-influenza. Accessed 14 December 2018.

113 Public Health Agency of Canada. Guidance for remote and isolated (RI) communities in the context of the pandemic (H1N1) 2009 outbreak. Nov. 2009. https://web.archive.org/web/20100129052023/http://www.phac-aspc.gc.ca/alert-alerte/h1n1/guidance_lignesdirectrices/ric-cei/index-eng.php. Accessed 14 December 2018.

3.5.2.2.2 *Alternative Social Distancing Approaches*

Alternative social distancing measures can help reduce the spread of influenza in settings where people have frequent close contact and share equipment (e.g., computers, desks, lunch tables), such as workplaces, shelters, churches, fitness centres and other public spaces where people congregate.

Although the evidence is not conclusive, increasing the distance between work stations and school desks to at least one metre between individuals may reduce viral transmission. In a severe pandemic, the minimal distance between people might be increased.¹¹⁴ Symptomatic individuals should be separated from well individuals and then sent home.

In workplaces, adjustments to policies and procedures may be made to help workers enact measures aimed at reducing social contacts, such as teleworking arrangements and flexible hours allowing start times to be staggered. A modelling study on combined social distancing measures found that staggered workforce shifts in combination with school closures would decrease attack rates and disease incidence, thus delaying a pandemic's peak.¹¹⁵ Recent evidence indicates that teleworking and workplace closures are somewhat effective in reducing viral transmission and are readily complied with; however, the resulting business disruption may have significant secondary effects.¹¹⁶

3.5.2.2.3 *Cancellation of Mass Gatherings*

Mass gatherings occur in a range of public places (e.g., spiritual and cultural settings, theatres, sports arenas, festivals) and result in a large number of people being in close contact for extended periods of time.

Cancelling large events may be feasible, but compliance and sustainability may be difficult and may cause significant social disruption. This is particularly true for the discontinuation of gatherings and activities that are considered essential. Therefore, this measure is generally not recommended on a widespread basis.

Instead, it is recommended that public education be intensified to support acceptance of the need to make the decision personally to avoid or not avoid mass gatherings by, for example, not attending non-essential gatherings, arranging to work from home or refraining from running errands during peak hours.¹¹⁷ Reinforcement of individual measures (i.e., hand hygiene, respiratory etiquette and voluntary self-isolation at home of symptomatic individuals) should be included in the messaging, which should emphasize in particular that people who are ill should not attend mass gatherings.

With respect to remote and isolated communities, the potential for spread of infection during public gatherings may put undue strain on already limited resources in these communities. Therefore, public health planners should take into account the presence of ILI activity as well as the availability of health care providers, basic medical supplies, medications, isolation beds, etc. when considering the cancellation or postponement of public gatherings.¹¹⁸

114 Qualls N, Levitt A, Kanade N, et al. Community mitigation guidelines to prevent pandemic influenza—United States, 2017. *MMWR Recomm Rep.* 2017, 66 (No. RR-1):1–34.

115 Zhang T, Fu X, Ma S, et al. Evaluating temporal factors in combined interventions of workforce shift and school closure for mitigating the spread of influenza. *PLoS One.* 2012, 7(3):e32203.

116 Rashid H, Ridda I, King C, et al. Evidence compendium and advice on social distancing and other related measures for response to an influenza pandemic. *Paediatr Respir Rev.* 2015 16(2):119–26.

117 Roth DZ, Henry B. Social distancing as a pandemic influenza prevention measure. National Collaborating Centre for Infectious Diseases. July 2011.

118 Public Health Agency of Canada. Guidance for remote and isolated communities in the context of the pandemic (H1N1) 2009 outbreak. Nov. 2009. https://web.archive.org/web/20100129052023/http://www.phac-aspc.gc.ca/alert-alerte/h1n1/guidance_lignesdirectrices/ric-cei/index-eng.php.

Guidance developed during the 2009 H1N1 pandemic stressed how important it is for planners of mass gatherings to consult with public health officials and conduct a risk assessment in order to determine the extent of local influenza activity and the capacity of the health care system to respond.¹¹⁹

3.5.3 BORDER AND TRAVEL MEASURES

The response to an emerging influenza pandemic will include the use of public health measures targeted to international travellers arriving in or departing from Canada. Such measures will be based on federal programs and procedures that are already in place; these include:

- Providing education and issuing travel health advisories or notices to inform Canadians about specific situations in other countries that may pose a health risk to Canadian travellers. The information is communicated via the [Government of Canada's Travel Health and Safety](#) web site and social media platforms (e.g., Twitter); it may also be provided directly to persons travelling to or from areas of the world affected by a specific communicable disease. This information advises travellers about the health risks of concern and provides recommendations on actions travellers can take to protect themselves before, during and after travel. Additionally, health care providers are provided with information about health events that may impact Canadian travellers.
- Administering the Quarantine Act at all international points of entry. The Quarantine Act aims to prevent the introduction and spread of the novel/pandemic influenza virus into or out of Canada. It imposes obligations on arriving and departing travellers, including the obligation to present to a screening officer, who may be a border services officer, to provide information to that officer, and to disclose if they have or might have a communicable disease.
- Designating quarantine officers, as defined in the *Quarantine Act*, who are authorized to implement various control activities and measures with arriving or departing international travellers or conveyances in order to prevent the introduction and spread of certain communicable diseases that pose a risk of significant harm to public health. These activities include performing health assessments on travellers who are suspected of having, or of having been exposed to, a communicable disease, and referring ill travellers and their contacts for a medical examination or to local public health authorities for monitoring and follow-up.

At the time of an emerging influenza pandemic, it is expected that the volume, intensity and/or frequency of border and travel health activities and measures will be increased, particularly in the early stages before there are cases and sustained viral transmission in Canada. Travel health advice may evolve and be updated more frequently, and there may be more targeted messaging for persons travelling to affected areas. While research is lacking on the effectiveness of traveller education in reducing transmission of pandemic influenza, a broader body of evidence presented in the CPIP supports the value of communication and public education campaigns in promoting the adoption of behaviours that will help reduce the risk of exposure to, or transmission of, the virus. These strategies need to be considered early on and adapted as necessary. There may also be an increase in the number of travellers referred to local public health authorities near ports of entry. FPT and local health planners will want to consider the impact that this increase in referrals will have on their programs.

119 Public Health Agency of Canada. Public health guidance for the prevention and management of influenza-like-illness (ILI), including the pandemic (H1N1) 2009 influenza virus, related to mass gatherings. Sept 2009, <https://web.archive.org/web/20100129051541/http://www.phac-aspc.gc.ca/alert-alerte/h1n1/phg-ldp-eng.php>. Accessed on 14 December 2018.

Decisions to implement specific border measures in respect of a traveller, to make emergency orders under sections 58, 59 or 60 of the *Quarantine Act* (e.g., to prohibit entry into Canada), and to implement any other measures at borders, will be informed by many factors, including the characteristics of the virus (e.g., transmissibility, virulence, risk factors), evidence of the effectiveness of the measures, and the risk posed to the traveller and the public.

Where appropriate, public health measures implemented at Canada's borders in an influenza pandemic will be coordinated with, and be complementary to, PT and local public health actions for communicable disease control, containment and mitigation.

In accordance with the *Quarantine Act*, all ill travellers are subject to entry and departure screening at Canada's borders. Currently, identifying cases of novel or pandemic influenza at points of entry is difficult owing to the similarity of influenza symptoms to various other respiratory viruses. In addition, using entry and departure screening measures for detecting influenza cases may be challenging, given the current inadequate sensitivity of detection methods. These measures may identify more people without influenza than with it (low specificity) and may fail to identify asymptomatic cases and those in the incubation phase (low sensitivity). Departure screening is deemed to be more effective than entry screening in decreasing influenza transmission because it reduces the number of ill travellers boarding conveyances.^{120,121}

Travel restrictions—The effectiveness of international travel restrictions on the containment of influenza pandemics may be limited. International travel restrictions may delay influenza transmission but appear unlikely to prevent it, except in unique settings (e.g., on a small island).^{122,123} Such restrictions may delay the peak of the pandemic curve, but even with scrupulous limits on air travel, by only two to three weeks.^{124,125,126} Moreover, such restrictive measures may result in significant social and economic burdens.

At the time of a pandemic, consideration of the use of travel restrictions will need to take into account evidence for their effectiveness and Canada's existing international obligations, such as the [North American Plan for Animal and Pandemic Influenza \(NAPAPI\)](#) and the IHR.

The NAPAPI outlines how Canada, Mexico and the US intend to prepare for and manage animal and pandemic influenza, and implement appropriate public health measures at shared borders in order to mitigate the impact of a novel strain of human influenza in North America. The Plan notes that highly restrictive measures aimed at controlling the movement of people, live animals and goods might initially delay but would not stop the eventual spread of a novel strain of human influenza within North America, and could have significant negative social, economic and foreign policy consequences.¹²⁷

120 Baker MG, Thornley CN, Mills C, Roberts S, Perera S, Peters J, et al. Transmission of pandemic A/H1N1 2009 influenza on passenger aircraft: retrospective cohort study. *BMJ*. 2010, 340: c2424.

121 Bell DM, World Health Organization Writing Group. Non-pharmaceutical interventions for pandemic influenza, international measures. *Emerging Infectious Diseases*. 2006, 12(1):81–87.

122 Mateus ALP, Otete HE, Beck CR, Dolan GP, Nguyen-Van-Tam JS (2014). Effectiveness of travel restrictions in the rapid containment of human influenza: a systematic review. *Bulletin of the World Health Organization* 92(12):868–80D.

123 Roth DZ, Henry B. Social distancing as a pandemic influenza prevention measure. *National Collaborating Centre for Infectious Diseases*. July 2011.

124 Ferguson NM, Cummings DAT, Fraser C, Cajka JC, Cooley PC, Burke DS. Strategies for mitigating an influenza pandemic. *Nature*. 27 July 2006, 442, 448–452.

125 Mateus ALP, Otete HE, Beck CR, Dolan GP, Nguyen-Van-Tam JS. Effectiveness of travel restrictions in the rapid containment of human influenza: a systematic review. *Bulletin of the World Health Organization*. 2014, 92(12):868–80D.

126 Cooper BS, Pitman RJ, Edmunds WJ, Gay NJ. Delaying the international spread of pandemic influenza. *PLoS Med*. 2006, 3(6):e212.

127 Public Safety Canada. North American Plan for Animal and Pandemic Influenza. 2012, www.publicsafety.gc.ca/cnt/rsrscs/pblctns/nml-pndmc-nflnz/index-en.aspx. Accessed 14 December 2018.

The IHR provide a framework for monitoring and enhancing global public health capacity and international communication regarding potential public health emergencies of international concern (PHEIC). The aim of the IHR is to prevent the international spread of disease while limiting interference with international traffic and trade. If the WHO Emergency Committee determines that a PHEIC is occurring, the Director General of the WHO will issue temporary recommendations under the IHR involving measures relating to persons, baggage, cargo, containers, conveyances, goods and postal parcels, in order to prevent or reduce the international spread of the specific disease.

Countries that are State Parties to the IHR, including Canada, may implement additional measures in response to a specific health risk or PHEIC. In determining whether to implement such measures, the State Party is required to base the determination on scientific principles, evidence of risk to public health and any available guidance from the WHO. If the additional measures significantly interfere with international traffic, the State Party is required to provide the WHO with the public health rationale and relevant scientific information for the measures.

3.5.4 CASE AND CONTACT MANAGEMENT MEASURES

The event of a novel or pandemic influenza virus first being detected in Canada or elsewhere in the world will trigger public health activities aimed at preventing or limiting the spread of the virus in Canada. It will include various surveillance activities to detect, monitor, describe and report on the novel influenza virus. Some circumstances may also warrant public health management of cases and their close contacts. These circumstances might include:

- an individual case or cluster involving a novel virus;
- suspected human infections associated with an animal influenza outbreak; or
- initial cases of the pandemic virus.

The findings from public health case and contact management will provide essential epidemiological information on the virus that will inform risk assessments. The [CPIP Surveillance Annex](#) indicates that FPT surveillance plans call for comprehensive case and contact investigation on the [first few hundred cases](#) and provides details of FPT reporting protocols. National case definitions will be developed early in the pandemic; these will provide the definitions for confirmed and probable cases, and persons under investigation, as well as the definition of close contacts.

It will be important for planners to consider the implications of the management of cases (confirmed, probable or persons under investigation) of novel or pandemic viruses and their contacts by public health authorities. This measure would likely be implemented most aggressively in the early stages of a pandemic, before there is sustained transmission in Canada, in an effort to contain or delay the spread of the virus. Once there is sustained pandemic virus transmission in Canada, public health activities will shift from individual management to public education in order to reinforce individual and community measures.

When it is determined that case and contact management is required, national-level public health guidance on the management of cases and contacts will be developed collaboratively by FPT public health authorities, informed by the available epidemiological data and anticipated pandemic impact. The guidance should provide public health authorities with recommendations on:

- Case management:
 - [Data collection and reporting](#) protocols (or identifying where the protocol is found);
 - Monitoring: type (active vs. passive), frequency of monitoring (e.g., daily), method (e.g., in person, by phone); duration (i.e., until illness resolves or until novel influenza virus infection is ruled out);
 - Education to be provided on care of ill persons: when, where, how to access medical care and treatment, prevention of transmission to others (e.g., voluntary self-isolation, hand hygiene, respiratory etiquette, use of masks and environmental cleaning);
 - Clinical management: public health will need to facilitate appropriate clinical management by providing relevant information and instructions to front-line clinicians; it is expected that virus-specific clinical guidance on the use of antiviral drugs will be developed at the onset of the pandemic ([see Antiviral Annex](#));
 - Laboratory testing (per virus-specific laboratory protocols); and
 - Infection control measures for cases and others in their living environment.
- Contact management:
 - Confirm definition of a close contact (proximity to patient, e.g., within two metres of a case; duration of an exposure, e.g. may be variable); these factors will need to be considered as part of the risk assessment;
 - [Data collection and reporting](#) protocols;
 - Monitoring: type (e.g., active, passive), frequency (e.g., daily), method (e.g., in person or by phone); and length of monitoring period (i.e., number of days from date of last exposure);
 - Education to be provided to the contact: period of monitoring, voluntary home quarantine; use of personal protective measures (e.g., hand hygiene, social distancing and environmental cleaning of household surfaces), self-monitoring for symptoms of ILI, what to do if symptoms develop; and
 - Circumstances for which antiviral prophylaxis should be considered: it is expected that virus-specific clinical guidance on the use of antiviral drugs will be developed at the onset of the pandemic ([see Antiviral Annex](#)).

3.5.5 PUBLIC EDUCATION

During an influenza pandemic, public demand for information is expected to be extremely high and sustained as the illness spreads in Canada and into local communities. Before a pandemic vaccine is available, public health measures will be the primary means to slow transmission in the early stages of a pandemic. Preventive actions taken by the public will be informed by timely public education messages.

Most public health authorities already see public education as one of their key responsibilities. In several Canadian jurisdictions, public surveys conducted after the 2009 pandemic found that education on hand hygiene, respiratory etiquette and staying home when ill were delivered effectively and resulted in positive behaviour change.¹²⁸ Indeed, many public health measures direct the public to restrict specific

128 Public Health Agency of Canada. H1N1 synthesis report: Synthesis of findings from the FPT and other reviews of Canada's pandemic planning and response to the 2009 H1N1 influenza pandemic. April 2011. (Internal report.)

personal activities for some period of time. Therefore, it should be considered an ethical duty to explain the rationale for such measures and how they may change over time.¹²⁹

Public education campaigns should be grounded in a risk communications approach (see [CPIP Communications and Stakeholder Liaison Annex](#)) to support compliance with public health measures. Clear communication of public health messages is crucial, and information must be consistent, accurate, reassuring and trustworthy.¹³⁰

The strategies, interventions and products developed for seasonal influenza campaigns can be the building blocks for pandemic-related education campaigns. The contacts established by public health programs that already target schools, large businesses, governments and municipalities could facilitate pandemic-related public education implementation.

The entire population will need general information, while specific groups (see [Section 2.4.1](#)) will require more targeted information that may need to be delivered in less conventional ways.

Public health planners should consider:

- Preparing educational materials for the public during the interpandemic period and modifying them as needed, including:
 - Providing instruction on proper techniques for hand hygiene, respiratory etiquette, environmental cleaning, as well as symptoms of influenza, prompt self-diagnosis, self-care, and how to obtain further medical care while minimizing exposure.
 - Giving advice on preparing for public health measures, such as isolation protocol, restriction and cancellation of mass gatherings, closure of schools and child care facilities, closure of public facilities and other places of assembly.
 - Emphasizing that those at high risk for serious illness or complications from influenza should:
 - Consult with their health care provider to plan what they can do to protect themselves;
 - Know what to do if they become ill;
 - Avoid large gatherings when ILI is circulating in their community; and
 - Plan ahead for the possibility of getting sick and ensuring an in-house supply of groceries and other necessities (e.g., medication) should they be self-isolated at home for several days.¹³¹
- Tailoring public health awareness campaigns for remote and isolated communities during the interpandemic period:
 - Engage key community members (e.g., cultural interpreters, translators, elders, healers, Indigenous physicians) in developing and delivering public health measures to the community, tailored to their language, health literacy level and culture.
 - Identify communities where circumstances, such as lack of clean running water and supplies or limited access to telecommunications (e.g., telephone, internet) require tailored messages.

129 Government of British Columbia. British Columbia's H1N1 Pandemic Influenza Response Plan. Public health measures summary document. Oct. 2009, https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/public_health_measures_-_summary.pdf. Accessed on 17 December 2018.

130 Leung GM, Nicoll A. Reflections on Pandemic (H1N1) 2009 and the international response. *PLoS Med.* 2010, 7(10):e1000346.

131 Public Health Agency of Canada. Guidance for remote and isolated communities in the context of the pandemic (H1N1) 2009 outbreak. Nov. 2009. https://web.archive.org/web/20100129052023/http://www.phac-aspc.gc.ca/alert-alerte/h1n1/guidance_lignesdirectrices/ric-cei/index-eng.php. Accessed 14 December 2018.

- Develop communication strategies (e.g., mail outs, community radio, working with neighbouring communities to obtain necessary information, posters, door-to-door messaging, community meetings) to address local circumstances.
- Anticipating additional resource needs:
 - Encourage organizations to undertake business continuity planning (e.g., potential staff absences due to self-isolation).
 - Advise school boards to strategize about ways of maintaining education should schools close (e.g., internet or other ways for students to receive and submit assignments).
 - Encourage the use of a “flu buddy” system whereby neighbours check on one another, particularly those at high risk of complications of influenza, elderly or single people, and single parent families, to help ensure that assistance is available, if required. It is important that precautions be taken to avoid exposing the flu buddy to infection.
- Reviewing and updating educational materials for health professionals that reinforce existing recommendations for management of individuals presenting with ILI (e.g., provide surgical masks for people with coughs).

KEY MESSAGES ON PUBLIC HEALTH MEASURES

- Use appropriate hand hygiene and respiratory etiquette at all times;
- Avoid touching your eyes, nose and mouth;
- Avoid sharing drinks, eating utensils, cigarettes;
- Avoid contact with people who are sick with ILI and, if unable to do so, maintain a two-metre separation from them as much as possible;
- Be aware of signs and symptoms of ILI;
- Stay home if ILI develops;
- When ill, stay away from others as much as possible to help avoid infecting them;
- If ILI develops, plan ahead on how to return home as soon as possible by a means that will minimize exposure to others (e.g., avoid mass transit);
- Make a plan with a friend or neighbour to help ensure that assistance is available (e.g., to pick up medication, run errands) in case ILI develops;
- Wear a mask to prevent viral spread to household members or others in the community if you must leave the house; and,
- Avoid contact with animals while you have ILI (to prevent possible transmission).

Adapted from: Individual and community based measures to help prevent transmission of influenza-like-illness (ILI), including the pandemic influenza (H1N1) 2009 virus, in the community. Sept. 2009, https://web.archive.org/web/20100129051725/http://www.phac-aspc.gc.ca/alert-alerte/h1n1/hp-ps-info_health-sante-eng.php. Accessed on 14 December 2018.

3.6 Risk Management Approach

3.6.1 OVERVIEW

Risk management is a systematic approach to setting the best course of action in an uncertain environment by identifying, assessing, acting on and communicating risks. This framework for pandemic planning and response supports the CPIP planning principles and approaches of evidence-informed decision-making, proportionality, flexibility and a precautionary and protective approach.

Planning assumptions for using the public health measures strategy as a risk management planning tool are identified in [Section 3.3](#); planning scenarios are described in the next section.

3.6.2 RISK MANAGEMENT CONSIDERATIONS FOR THE PUBLIC HEALTH MEASURES STRATEGY

The public health measures strategy is subject to numerous risks, including the possibility of unintended secondary consequences of measures and uncertainty of adequate public uptake of such measures. It is expected that communication on public health measures will need to be adjusted based on the implications of each scenario.

Table 2 describes potential implications for the public health measures strategy for pandemics of varying impact, using the four planning scenarios described in greater detail in the CPIP main body ([Section 3.7](#)).

TABLE 2: IMPLICATIONS AND POTENTIAL ADJUSTMENTS TO THE PUBLIC HEALTH MEASURES STRATEGY FOR PANDEMICS OF VARYING IMPACT

TRANSMISSION	CLINICAL SEVERITY	
	LOW	HIGH
HIGH	<p>Scenario B</p> <ul style="list-style-type: none"> • Due to high case volume, public perception of risk may increase and drive demand for school and event closures. • Expect media attention. • Consider release of travel health advice (especially re: high risk groups). • Intensify voluntary individual measures, with rationale. • Communicate and reinforce voluntary community-based measures, with rationale (social distancing and caring for the ill). 	<p>Scenario D</p> <ul style="list-style-type: none"> • Expect high public perception of risk and high media attention due to differing applications of public health measures within and outside of Canada. • Consider school and daycare closures and cancellation of mass events. • Consider self-isolation, use of masks for all cases; likely need to activate plans for additional supply of PPE and human resources. • Consider ongoing home quarantine of exposed household contacts. • Update travel health notices and recommendations (especially re: high risk groups). • Intensify measures and communicate rationale (voluntary and mandatory, individual and community-based social distancing and caring for the ill).

TRANSMISSION	CLINICAL SEVERITY	
	LOW	HIGH
LOW	<p>Scenario A</p> <ul style="list-style-type: none"> • Public complacency (low perception of risk). • Public perception of risk may shift quickly, as ongoing surveillance may identify settings and vulnerable populations at higher risk, or if individual deaths receive media coverage. • Communicate and reinforce voluntary individual measures. • Before widespread transmission of virus is observed, conduct comprehensive case and contact investigation on first few hundred cases. 	<p>Scenario C</p> <ul style="list-style-type: none"> • Public perception of risk may increase and cause absenteeism from school and work. • Target communications to high-risk groups. • Consider ongoing self-isolation and use of masks for all cases. • Consider ongoing quarantine of exposed household contacts. • Communicate and reinforce voluntary community-based measures, with rationale (social distancing and caring for the ill). • Expect media attention.

It is important to note that pandemic impact will not be uniform across Canada and may be higher in some settings (e.g., remote and isolated communities) and in vulnerable populations. For additional detail on applying measures based on severity to specific settings, see [Appendix A: Recommended Public Health Measures, by Settings and Severity](#).

Table 3 provides a more detailed outline of the risks and events that could affect the public health measures strategy, their implications and potential mitigation/response, should the risk or event occur. Timely and transparent risk communications to the public and health care providers should be an integral part of the response to each event.

TABLE 3: RISKS AFFECTING THE PANDEMIC PUBLIC HEALTH MEASURES STRATEGY, THEIR IMPLICATIONS AND POTENTIAL MITIGATION OR RESPONSE

FACTOR / EVENT	IMPLICATIONS	POTENTIAL MITIGATION / RESPONSE
PUBLIC OPINION AND RISK PERCEPTION		
<p>Media report severe illness or a large number of cases.</p>	<ul style="list-style-type: none"> • Sudden increase in demand for information about public health measure efficacy. • Need for implementation of more public health measures (or perhaps more targeted measures). 	<ul style="list-style-type: none"> • Communicate and reinforce public education: i.e., individual public health measures and their rationales (e.g., hand hygiene, respiratory etiquette, voluntary self-isolation when ill, environmental cleaning, caring for the ill, seeking medical assessment). Use tailored approaches to communicate with vulnerable populations. • Explain to the public how each additional measure used will increase personal and group protection and prevention. • Advise the public that measures may change as new information becomes available.
<p>Public fear associated with perception of severe pandemic.</p>	<ul style="list-style-type: none"> • Increased demand on health care services (such as emergency departments), associated with individuals who perceive great risk but could be managed more appropriately in the community. 	<ul style="list-style-type: none"> • Proactively communicate messages about illness prevention, self-care, when and how to seek medical advice. • Increase accessibility to websites and telephone advice lines.
<p>Differences in implementation of public health measures between jurisdictions and internationally.</p>	<ul style="list-style-type: none"> • Selection and implementation of public health measures will differ depending on local or regional situations. • Public perception that another jurisdiction’s approach is better. • Public concern if there is perception of inequitable distribution of public health resources. 	<ul style="list-style-type: none"> • Acknowledge differences in, and provide rationale for, differing local or regional approaches. • Ensure that public health measures benefit all groups within a community or region and that burdens are equitably distributed.

FACTOR / EVENT	IMPLICATIONS	POTENTIAL MITIGATION / RESPONSE
POPULATION RISK FACTORS		
<p>Some settings or parts of the country are affected more severely than others.</p>	<ul style="list-style-type: none"> Communities with limited capacity (e.g., remote and isolated communities) may be challenged with implementation of some public health measures. 	<ul style="list-style-type: none"> Consider resources required to implement the measures (e.g., at early stage, contact tracing is labour-intensive and likely will not be effective once the virus is widespread in the community).
<p>New risk factors identified for severe or complicated disease.</p>	<ul style="list-style-type: none"> Public perception that public health measures are ineffective or no longer important. 	<ul style="list-style-type: none"> Communicate the rationale for implementing, not implementing or de-escalating any given measure. Evaluate public health measures throughout the pandemic. Remind the public that influenza is a community-based infection, and therefore focussing on a single setting (e.g., school, workplace, airport) is ineffective.
<p>Rates of severe outcomes are greater than for seasonal influenza.</p>	<ul style="list-style-type: none"> Groups at risk of severe illness are changing. Groups at risk of severe illness may involve those with access and functional issues. Need for communication to health care providers and the public. 	<ul style="list-style-type: none"> Communicate change in risk factors and rationale for new focus or type of public health measure(s). Identify strategies for implementing public health measures with groups assessed to be at risk of severe illness or complications based on epidemiology. Identify strategies for implementing public health measures with persons who are culturally or geographically isolated, have physical disabilities, have low income or those in remote communities. Continue to monitor over time to assess further changes in the virus as it adapts.
INTERNATIONAL CONSIDERATIONS		
<p>Other countries use different public health measures or at different times.</p>	<ul style="list-style-type: none"> Perception that another country's approach is better. International results may not be comparable. 	<ul style="list-style-type: none"> Acknowledge differences and provide rationale for Canadian approach. Share public health measures information internationally.

3.7 Triggers for Action and Key Decisions and Activities

Key decisions needed to implement the public health measures strategy and their associated triggers are shown in Table 4. Note that communications to the public and health care providers about the public health measures strategy and implementation should occur at all stages. PTs may experience different trigger timelines; hence, key decisions and activities may vary among PTs at any given time.

TABLE 4: TRIGGERS AND KEY DECISIONS FOR THE PUBLIC HEALTH MEASURES STRATEGY

TRIGGERS / TIMELINES	KEY DECISIONS / ACTIVITY	CONSIDERATIONS
<p>Novel virus causing human cases detected somewhere in the world, outside of Canada (no or limited transmission).</p>	<ul style="list-style-type: none"> • Gather intelligence from affected areas (e.g., via WHO, Global Public Health Intelligence Network (GPHIN)). • Disseminate relevant communications to public and health sector. • Consider border and travel advisories and applicable measures. • Ensure that an evaluation framework is in place for the public health measures that will be taken. • Release public education on individual, family and community-based public health measures to prevent influenza. 	<ul style="list-style-type: none"> • Likely will have limited information. • Promote seasonal influenza prevention and control measures. • Tailored communications to health sector and general public.
<p>Novel virus with sustained human transmission detected somewhere in the world, outside of Canada.</p>	<ul style="list-style-type: none"> • Gather intelligence from affected areas (e.g., via WHO, GPHIN). • Tailor considerations of public health measures based on epidemiology. • Consider public messaging about Canada’s pandemic strategy. • Keep public informed about what is currently known/unknown. • Consider border and travel measures (e.g., traveller education, assessment of ill travellers and appropriate referral to local public health authorities). • Monitor for novel influenza virus occurring in Canada. • Identify and investigate clusters of ILI cases. 	<ul style="list-style-type: none"> • If clinical severity is high, there may be public fear, anxiety, demand or anger.

TRIGGERS / TIMELINES	KEY DECISIONS / ACTIVITY	CONSIDERATIONS
<p>Novel virus with sustained human transmission first detected in Canada (early stage).</p>	<ul style="list-style-type: none"> • Keep public informed about what is currently known/unknown. • Recommend use of public health measures implemented during seasonal influenza (e.g., hand hygiene, voluntary self-isolation). • Develop and tailor public health measure recommendations as knowledge about transmissibility and clinical severity become available; update as information evolves. • Conduct comprehensive case and contact investigations of first few hundred cases occurring in Canada. 	<ul style="list-style-type: none"> • It is unknown whether cases will be distributed across the country or be more localized within a jurisdiction(s). • Epidemiology will be evolving. • Public messaging about Canada's pandemic strategy will evolve as new knowledge is gained. • It is important to signal that changes should be expected based on new knowledge and to explain the rationale for changing recommendations. • Sharing new knowledge and rationale for decisions with international partners is important.
<p>Novel/pandemic virus detected in PT or local jurisdiction.</p>	<ul style="list-style-type: none"> • Keep public informed about what is currently known/unknown. • Recommend use of public health measures based on evolving epidemiology and on those implemented during seasonal influenza (e.g., hand hygiene, voluntary self-isolation). • Depending on clinical severity and transmissibility, local or regional closures or social distancing measures may be considered. 	<ul style="list-style-type: none"> • Actions may be dependent on reported clinical severity and extent of transmission.
<p>Localized or widespread activity in Canadian population: first pandemic wave under way (peak stage).</p>	<ul style="list-style-type: none"> • Keep public informed about what is currently known/unknown. • Recommend use of personal public health measures based on epidemiology of circulating virus (e.g., voluntary self-isolation, quarantine, hand hygiene, respiratory etiquette). • Consider instituting community-based measures. 	<ul style="list-style-type: none"> • Actions may be dependent on reported clinical severity and extent of transmission.

TRIGGERS / TIMELINES	KEY DECISIONS / ACTIVITY	CONSIDERATIONS
Pandemic wave wanes.	<ul style="list-style-type: none"> • Keep public informed about what is currently known and unknown. • Recommend continuation of public health measures used during seasonal influenza (e.g., hand hygiene, respiratory etiquette, voluntary self-isolation). • Based on the epidemiology of the first wave, plan for public health measure recommendations for second wave. • Begin evaluation of public health measures response based on evaluation framework designed in interpandemic period. • Monitor stock of hand sanitizer and personal protective equipment recommended for use by the public. 	<ul style="list-style-type: none"> • Public fatigue after the first wave may factor into maintaining vigilance in the interim period.
Second (and subsequent) pandemic wave (late stage).	<ul style="list-style-type: none"> • Keep public informed about what is currently known/unknown. • Adapt recommendations of public health measures used during previous wave (e.g., hand hygiene, respiratory etiquette, voluntary self-isolation and quarantine) based on updated epidemiology. • Consider school closures and cancellation of mass gatherings based on clinical severity, transmissibility and effectiveness of these measures if already used during the first wave. 	<ul style="list-style-type: none"> • Public fatigue from restrictions during first wave may impact compliance with some measures including facility closures.
Pandemic ceases.	<ul style="list-style-type: none"> • Complete evaluation of public health measures response. • Undertake after-action review to assess what worked and what did not work. 	<ul style="list-style-type: none"> • Depending on pandemic severity, significant staff turnover and fatigue may impact completion of this activity.



4.0 INTEGRATION WITH OTHER RESPONSE COMPONENTS

This section demonstrates the way in which certain response elements (Surveillance and Communications) are essential to the effective implementation of public health measures in a pandemic. Other response components, such as Vaccines and Antivirals, play a complementary role, as indicated where relevant in this Annex.

4.1 Surveillance

Timely surveillance information is needed for public health measures decision-making. PHAC collates and analyzes surveillance information from across Canada and other countries to produce risk assessments and provide decision-makers with timely and relevant surveillance data.

Surveillance information required for public health measures decision-making includes the following:

- indicators of transmissibility and severity of clinical disease;
- rates of illness, severe disease and death by age and risk groups and risk of severe disease in those affected;
- risk factors for severe illness, hospitalization and death (including settings with increased risk); and
- proportion of severe disease in persons with and without underlying health conditions.

For further details on surveillance during a pandemic, see the [CPIP Surveillance Annex](#).

4.2 Communications and Stakeholder Liaison

The imperative for effective communications and the strategic engagement of key stakeholders is an integral element of all CPIP annexes and the planning guidance they provide. Communications must build and maintain the trust and confidence of the public and other stakeholders by providing clear, concise, consistent, realistic and timely information.

Key goals of public health measure communication include:

- Informing the public of the disease (symptoms and signs, how it is transmitted);
- Providing guidance on appropriate responses, including:
 - hand hygiene and respiratory etiquette;
 - what to do should people become ill (e.g., when to present to health care providers); and
 - when to defer travel if unwell.
- Addressing public concerns (giving an accurate assessment of risk while acknowledging uncertainty and reassuring the public).

The planners of public health measures response strategies should consult the [CPIP Communications and Stakeholder Liaison Annex](#) in conjunction with this Annex, especially for the public education aspects of public health measures. It provides planning guidance on how to address the information needs of the public; describes factors that support public acceptability and compliance; and contains information about educating key stakeholders and intermediaries whose perceptions of the pandemic response may influence public opinion. Of special note is the guidance provided on communicating to the public about risks, the evolving nature of the pandemic and the subsequent need for public health measures to change over the course of the event.



5.0 RESEARCH NEEDS

Research plays a key role in pandemic preparedness and response. Although additional research has been undertaken since the 2009 pandemic to build an evidence base for a public health measures response to pandemic influenza, more research is needed on the effectiveness of public health measures, the choice and timing of implementation and the potential for unintended secondary consequences. While some research questions can be carried out during the interpandemic period, others will need to be conducted during a pandemic; therefore, it is important to plan in advance for a rapid research response. Putting in place and sustaining an infrastructure during the interpandemic period is the best way to ensure that timely research can be conducted during a pandemic.

As research resources are limited across jurisdictions, it is critical that research topics related to pandemic public health measures be periodically reviewed and prioritized. In addition, periodic review has the potential to reduce duplication of research efforts and to find means to collaborate on a given initiative. If possible, consideration should be given to sharing pre-publication research results of importance with other jurisdictions (i.e., results that may impact the efficacy of public health measures). The research needs outlined below have been identified as interpandemic (I) or pandemic (P), depending on when the research is required. They include:

5.1 Individual Measures

- How do increased frequency and quality of hand hygiene affect influenza virus transmission in the community setting? (I) (P)
 - Are hand sanitizers as effective as hand washing with soap and water?
 - What is the effect of the combined use of respiratory etiquette and hand hygiene?
- What educational activities are most effective for changing behaviours and improving compliance for hand hygiene and respiratory etiquette across population groups? (I) (P)
- What social media tools are most effective for disseminating public education messages about individual and community-based measures to prevent influenza transmission? (I)
- What situations call for increased surface cleaning in various settings (e.g., households or schools with confirmed influenza cases)? (I)
- What is the effectiveness of individual measures (e.g., hand hygiene, respiratory etiquette, use of masks) in preventing transmission of the pandemic influenza virus? (P)

5.2 Community-Based Measures

- How do school policies for hand hygiene and availability of soap and water influence hand-washing behaviours in school-aged children? (I)
- How do various types of face masks, weather conditions (e.g., humidity and temperature) and social or behavioural factors influence the effectiveness of face masks in preventing influenza transmission? (I)
- What are the optimal triggers (e.g., number of cases, transmissibility of the virus, severity of influenza) for recommending mask use among ill individuals and well individuals in community settings? (I) (P)
- What are the effectiveness, timing and optimal implementation of school closures, other social distancing measures and environmental control methods in specific settings? (P)
- What are the secondary consequences (e.g., missed work) of community-level measures (e.g., school closures, cancellation of mass gathering events) that have direct economic effects for families and communities? What is the magnitude of the impact, and does it make these measures unfeasible? What is the impact of these secondary consequences on community living settings (e.g., group homes and retirement homes)? (P)
- How can the transmission be slowed in circumstances that need to be continued during waves, such as public transportation and other essential services? (I) (P)
- What factors influence the public acceptability of, and adherence to, community-based measures? (P)
- What is the level of compliance with public health measures in a pandemic and the impact of intervention fatigue? (P) What is the effectiveness of public health measures in mitigating pandemic impact (e.g., effect on virus transmission, hospitalizations, deaths)? (P)

5.3 Special Considerations

- How is viral transmission affected by social structures and behaviours (e.g., population density, living conditions, social interactions)? (P)
- What are the transmission dynamics among populations whose circumstances (e.g., low income, homelessness, remote and isolated communities) may increase their susceptibility to infection and/or complications of pandemic influenza? (P)
- Are there additional factors besides universal susceptibility that allow the rapid spread of the virus in the first wave? (P)



6.0 ASSESSMENT AND EVALUATION OF PUBLIC HEALTH MEASURES PREPAREDNESS AND RESPONSE

An evolving pandemic can be volatile as, for example, disease characteristics shift or resulting social disruptions complicate efforts to implement and manage public health measures. Planners need to design an evaluation program that is flexible enough to work under conditions of considerably greater uncertainty than other contexts that require evaluation.

This task poses considerable challenges. Public health measures planners must develop an agile strategy for evaluating such measures, both during and after a pandemic response. There is a duty to collect data that can be used to conduct an evaluation for purposes of identifying optimal public health measure implementation, maintenance and discontinuation. Therefore, PTs and local public health authorities need to work together to identify upfront what data to collect during a pandemic.

Forward planning for evaluation will establish the protocols and priorities that can facilitate any needed changes in direction during the pandemic, as well as facilitate an overall after-action evaluation of the response in order to identify lessons learned and best practices. In addition, evaluation activities should be identified for different pandemic scenarios.

Evaluation activities may be more successful if they are co-ordinated to ensure that selected sites examine specific issues, thus potentially reducing duplication of effort and the need for all sites to participate. This approach may improve the acceptability of evaluation activities among health authorities in jurisdictions that are still recovering from the pandemic.

Areas to evaluate include:

- Type and degree of public health measures implementation;
- Differences in approaches to implementation of public health measures within and between PTs;
- Resource availability (e.g., personnel, masks);
- Impact of pandemic on provision of other public health services;
- Secondary or unintended consequences of public health measures and the effectiveness of strategies to mitigate them, including impact on community living settings, such as group homes and retirement homes;
- Accuracy and timeliness of guidance provided; and
- Information gaps.

APPENDIX A: RECOMMENDED PUBLIC HEALTH MEASURES, BY SETTINGS AND SEVERITY

	SCENARIOS A AND B: LOW CLINICAL SEVERITY AND LOW-TO-MODERATE TRANSMISSIBILITY	SCENARIO C: HIGH CLINICAL SEVERITY AND LOW TRANSMISSIBILITY	SCENARIO D: HIGH CLINICAL SEVERITY AND HIGH TRANSMISSIBILITY
All settings (including community living settings, such as group homes, retirement homes, shelters, correctional facilities)	Recommend hand hygiene and respiratory etiquette, self-monitoring, voluntary self-isolation when ill, routine environmental cleaning of surfaces. Use of masks by well individuals is not recommended.	Recommend hand hygiene and respiratory etiquette, self-monitoring, voluntary self-isolation when ill, routine environmental cleaning of surfaces, use of masks by ill individuals when interacting. Use of masks by well individuals is not recommended unless they are caring for an ill individual.	Recommend hand hygiene and respiratory etiquette, self-monitoring, voluntary self-isolation when ill, routine environmental cleaning of surfaces, use of masks by ill individuals when interacting. Use of masks by well individuals is not recommended unless they are caring for an ill individual.
Workplaces	Social distancing measures are generally not recommended.	Social distancing measures are generally recommended (e.g., teleworking, staggered start hours, flexible sick leave policies to support workers to stay home if ill).	Social distancing measures are recommended (e.g., teleworking, staggered start hours, flexible sick leave policies to support workers to stay home if ill).
Child care facilities, schools	Proactive school and daycare closures are not recommended.	Proactive school and daycare closures should be considered if increased virulence in children and school-aged populations. Social distancing measures (e.g., students spaced further apart) should be considered.	Proactive school and daycare closures should be considered. If schools remain open, recommend social distancing measures (e.g., students spaced further apart).
Residences	Voluntary home quarantine of exposed household members is not generally recommended. Use of masks by ill persons is recommended when contact with household members or crowded community settings cannot be avoided.	Voluntary home quarantine of exposed household members is recommended. Use of masks by ill persons is especially recommended when contact with household members or crowded community settings cannot be avoided.	Voluntary home quarantine of exposed household members is recommended. Use of masks by ill persons is especially recommended when contact with household members or crowded community settings cannot be avoided.
Mass gatherings	Cancellations are not recommended.	Cancellations are not recommended.	Cancellations may be considered.

<p>Camps (e.g., day, residential, special needs, work)</p>	<p>Cancellations are not recommended.</p> <p>Establish a dedicated area to isolate residential campers with ILI.</p> <p>Send day campers with ILI home.</p>	<p>Cancellations may be considered for special needs camps.</p> <p>If there is increased virulence in children and school-aged populations, consider cancellations for day and residential camps.</p> <p>Send campers with ILI home.</p> <p>If camps remain open, recommend social distancing measures (e.g., campers spaced further apart).</p>	<p>Cancellations are recommended for all camps.</p> <p>If camps remain open, recommend social distancing measures (e.g., maximize distance between campers' beds as well as during activities or meal times).</p> <p>Quarantine campers exposed to cases of ILI.</p> <p>Send campers with ILI home.¹³²</p>
<p>Remote and isolated communities</p>	<p>Deliver education regarding public health measures that is appropriate to the language, culture and circumstances of the community. Consider alternate means to deliver messages (e.g., radio, flyers, door-to-door visits, elders).</p> <p>Consider stockpiling alternative means for effective hand hygiene (e.g., hand sanitizer) in homes and community settings where there is a lack of access to clean running water.</p> <p>Consider stockpiling face masks because of overcrowded housing and delivery delays.</p> <p>Consider early outbreak investigation and case and contact management.</p>	<p>Conduct early outbreak investigation and case and contact management.</p> <p>Consider the impact of overcrowded housing and lack of alternative caregivers or spaces in decisions about school closures.</p>	<p>Conduct early outbreak investigation and case and contact management.</p> <p>Consider the impact of overcrowded housing and lack of alternative caregivers or spaces in decisions about school closures.¹³³</p>

Adapted from: Qualls N, Levitt A, Kanade N, et al. Community mitigation guidelines to prevent pandemic influenza—United States, 2017. *MMWR Recomm Rep* 2017;66(No. RR-1):1–34. TABLE 10. Recommended non-pharmaceutical interventions for influenza pandemics, by setting and pandemic severity.

132 Public Health Agency of Canada. Prevention and management of cases of influenza-like-illness (ILI) suspected to be due to the pandemic (H1N1) 2009 influenza virus in summer camps. Aug. 2009, <https://web.archive.org/web/20100129051436/http://www.phac-aspc.gc.ca/alert-alerter/h1n1/guidance-orientation-06-30-eng.php>. Accessed 14 December 2018.

133 Public Health Agency of Canada. Guidance for remote and isolated (RI) communities in the context of the pandemic (H1N1) 2009 outbreak. Nov. 2009, https://web.archive.org/web/20100129052023/http://www.phac-aspc.gc.ca/alert-alerter/h1n1/guidance_lignesdirectrices/ric-cei/index-eng.php. Accessed 14 December 2018.

APPENDIX B: GUIDANCE FOR REMOTE AND ISOLATED (RI) COMMUNITIES¹³⁴

Considerations for people living in RI communities

The overall health of Canadians living in remote and isolated communities can be affected by social, environmental and economic factors, including housing, water, food security, personal health, education and income. These factors, in addition to limited access to health care, are important to take into account when planning for, and responding to, pandemic influenza in remote and isolated communities.

The social circumstances and needs of people living in RI communities may differ when compared to the general Canadian population in the following ways:

- **Housing:** There are typically higher rates of overcrowding, and housing standards are often below adequacy and suitability standards. This is of concern because overcrowded and inadequate housing conditions contribute to increased likelihood of transmission of communicable diseases (e.g., influenza, TB).
- **Water:** There is frequently a lack of adequate quantity and quality of water. This is of concern because of the importance of effective hand washing for infection prevention and control.
- **Food Security:** Access to affordable, nutritious food is often a challenge, especially because of the increased costs associated with the logistics of transporting fresh produce. This is of concern because food insecurity compromises the overall health and resiliency of affected people.
- **Personal Health:** The proportion of people with pre-existing chronic health conditions, such as asthma and diabetes, is significantly higher. This is of concern because of the evidence of increased severity of influenza in groups with chronic medical conditions.
- **Education:** The proportion of people with high school or post-secondary education tends to be significantly lower. This is of concern in designing public communications/education campaigns (e.g., literacy, use of pictorial or visual messaging) that people will understand.
- **Income:** The overall unemployment rate is significantly higher, and the annual income is significantly lower. This is of concern because health, morbidity and mortality follow a social and economic gradient, and availability of income is a practical consideration with respect to stockpiling food and supplies, access to transportation options, etc.
- **Access to health care:** Communities may have challenges in accessing health care due to a lack of health care workers and extreme weather conditions. This is of concern because prompt access to health care will be essential in a pandemic.
- **Culture:** Cultural practices include a community and family-centred approach to health (e.g., multiple family members attending medical appointments or providing care for sick household members, high respect for elders). These practices will need to be considered when planning health care services for communities.

134 Public Health Agency of Canada. Hand hygiene recommendations for remote and isolated community settings. Oct. 2009, <https://web.archive.org/web/20100129051514/http://www.phac-aspc.gc.ca/alert-alerte/h1n1/public/handhygiene-eng.php>. Accessed on 14 December 2018.

Public Health Measures in RI Communities

RI communities are at risk of influenza outbreaks due to multiple predisposing factors for transmission. In these settings, it is important to minimize the impact of possible rapid spread. It is recommended that early outbreak investigation and management be considered in consultation with the local public health unit.

Challenges and potential strategies for implementing community-based public health measures are listed below:

RI Challenge: Lack of availability of non-medical supplies

Delivery and transportation of non-medical supplies (e.g., soap, food, household items) in RI communities can be challenging due to limited transportation, possible illness in the household and other factors, such as inclement weather.

Strategies for public health planners to consider:

- Encourage and increase the awareness of individuals, families and communities of the need to have a surge of essential supplies (e.g., soap, household cleaning products, non-perishable food and fluids, tissues) in order to meet their needs.

RI Challenge: Limited access to running water

Some RI communities have limited access to running water or clean running water for hand hygiene.

Strategies for public health planners to consider:

- Increase the awareness of individuals and families in RI communities vis-à-vis alternative means for effective hand hygiene if they lack clean running water. Consider treating available water (e.g., boiling for one minute with chemicals, such as chlorine bleach), using two separate containers for their water (e.g., pail, bowl) and moving hands around to mimic running water. Alternatively, alcohol-based hand sanitizer may be used for hand hygiene. However, if hands are visibly soiled, hand wipes should be used to remove any such soil or organic material; this should then be followed by the use of hand sanitizer.

RI Challenge: Public gatherings

The potential for spread of infection during public gatherings may put undue strain on already limited resources in RI communities.

Strategies for public health planners to consider:

- Consider the presence of ILI activity as well as the availability of health care providers, basic medical supplies, medications, isolation beds or rooms, etc. when considering the postponement of public gatherings.

RI Challenge: Impact of school closures

School closures in RI areas may have a significant impact on a community. Given limited qualified substitute staff in the community, the school may not be able to implement a business continuity cycle if there is a high attack rate. Hence, the school closure may be longer than in urban communities.

Strategies for public health planners to consider:

- Communities considering school closures should consult with local public health authorities and follow various school guidelines.
- Actively involve schools in surveillance to identify cases before an outbreak occurs.
- Communities develop a business continuity plan for each school which would include a list of human resources.

RI Challenge: Potential lack of tailored public health awareness campaigns

RI communities may be less exposed to public health awareness campaigns than urban communities. In addition, the messaging that RI communities receive is often not suited or tailored to the circumstances (e.g., limited water, limited accessibility to supplies) in these communities, or consideration may not be given to health literacy, language barriers and limited access to telecommunications, including basic phone and internet).

Strategies for public health planners to consider:

- Identify communities where tailored communication strategies are required given the local circumstances. Tailored strategies could include: mail-outs, community radio, posters, door-to-door messaging and community meetings. Tailoring may also include messaging from people who are familiar or trusted (e.g., Indigenous elders or physicians).
- Develop and communicate campaigns that are specifically tailored to the circumstances of RI communities.