EVIDENCE SYNTHESIS BRIEFING NOTE

TOPIC: **COVID-19 OUTCOMES FOR PRIORITY POPULATIONS AND SETTINGS**

Information finalized as of February 22, 2021.[a]
This Briefing Note was completed by the Evidence Synthesis Unit (Research, Analysis and Evaluation Branch, Ministry of Health); please refer to the [Methods] section for further information.

Purpose: This note summarizes the available evidence on COVID-19 outcomes including outbreaks and severe illness among priority populations and across various health care and non-health care settings.

Key Findings:
- **Vulnerable populations:** International studies report that vulnerable populations are at much greater risk of COVID-19 infection and experiencing adverse outcomes of the disease due to socioeconomic status, social conditions, structural racism, and structural inequalities. Groups that were identified included 1) People who experience homelessness; 2) Racialized communities including racialized rural communities; 3) Low income, immigrant or refugee groups; 4) People who use drugs; and 5) People living with a mental illness. Studies of all of these individual groups found both increased risk of COVID-19, and/or adverse effects (e.g., hospital admission/intensive care treatment) and death.
- **Essential workers**: Research from across US, Europe, and UK, concluded that individuals in health care occupations were at highest risk of acquiring SARS-CoV-2, more specifically those in the dental health field (i.e., dental hygienists, oral and maxillofacial surgeons, dental assistants, dentists) and EMS personnel. For non-health care workers, the highest predicted risk was observed among municipal firefighters; ambulance drivers and attendants; and correctional officers and jailers.
- **Congregate living settings**: (excluding seniors in long-term care): Studies from Canada, US, Europe, and UK reported increased risk of outbreaks among various congregate settings (correctional facilities; homeless shelters; residential care for people with intellectual and developmental disabilities [IDD]; mental health facilities; group home facilities; refugee shelters; living facilities for migrants). Studies reported risk of COVID-19 ranging from 21/1,000 to 159/1,000 cases compared to the general population. At-risk settings included penitentiaries in Quebec, Ontario, and British Columbia; homeless shelters in Hamilton; children living in Ontario group homes and foster care; a dedicated refugee shelter in Toronto; and agricultural migrant workers in Windsor-Essex County.
- **Indigenous populations**: Indigenous populations in Canada, the US, and New Zealand, have higher case rates and fatalities. For example, the Navajo Nation has a higher per capita rate of infection than any US state, and the incidence of COVID-19 among American Indian/Alaska Native persons was 3.5 times higher than among non-Hispanic (NH) White persons in 23 states. Researchers in New Zealand also outline the priority needed for Indigenous populations due to potential rates of increased transmission due to socioeconomic inequities and social determinants of health, severity of potential health impact due to underlying health conditions, and existing inequities in health care access and quality that will likely increase if services become overloaded.

Analysis for Ontario: Research suggests that to mitigate the spread of COVID-19 in Ontario, it is necessary to develop interventions that prioritize specific populations who have been found to be at higher risk for the disease and related adverse outcomes. This may include early implementation of testing, even of asymptomatic individuals, isolation, adequate social supports, addressing systemic barriers, and early prioritization for other interventions that may include vaccinations. These priority populations and settings also require further attention to address the risk factors that place them at higher risk of outbreaks and their associated outcomes.

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[a] This briefing note includes current available evidence as of the noted date. It is not intended to be an exhaustive analysis, and other relevant findings may have been reported since completion.

Supporting Evidence

Table 1 lists and describes scientific evidence on COVID-19 outcomes among priority populations and settings, as well as recommendations from national and international health authorities, grey literature, and news articles.

Table 1: COVID-19 Outcomes for Priority Populations and Settings

Scientific Evidence	**Essential workers**
	<u>Health care occupations</u> • Health care occupations at highest risk include those in the dental health field (i.e., dental hygienists, oral and maxillofacial surgeons, dental assistants, dentists). The second highest risk category includes workers in the general health care field: general practitioners, orderlies, registered nurses and radiation therapists.[1] • EMS personnel are at a higher risk of dying from COVID-19 than other health care or emergency services professionals (registered nurses, fire fighters). COVID-19 related death among EMS personnel is about three times higher than that of nurses, and about five times higher than that of physicians.[2] <u>Non-health care occupations</u> • Among non-health care occupations, workers at highest risk include: municipal firefighters, correctional officers and jailers, ambulance drivers and attendants (excluding emergency medical technicians), and first-line supervisors of correctional facilities.[3] **Congregate Living Settings** <u>Correctional facilities</u> • A Canadian study reported that fewer COVID-19 tests were being used in federal penitentiaries compared to use in the general population; between March 30 and April 21, 2020, there were outbreaks in five penitentiaries, with a COVID-19 prevalence of 30-40%.[4] • In Canada, Indigenous women represent over 41% of federally incarcerated women and are more likely to have higher rates of chronic conditions, including respiratory illnesses, substantially increasing vulnerability to COVID-19 complications.[5] • A US study (2020) found that 34 prison systems have case rates per 1,000 that are higher than the general population with the highest being in New Jersey at 159 cases per 1,000 incarcerated people.[6] <u>Homeless shelters</u> • A pilot study in Hamilton, Ontario reported that one of 104 residents (1.0%) and seven of 141 staff (5.0%) were diagnosed with COVID-19 infection during the study period (March 19 to April 30, 2020). In comparison, the city of Hamilton reported 422 patients with COVID-19 and a positivity rate of approximately 5-7%. Researchers suggest these findings demonstrate that accessible shelter housing that provides rapid testing, isolation, and physical distancing is imperative to outbreak prevention in shelter settings.[7] • Multiple US studies identified high proportions of test positivity in shelters with identified clusters and evidence for pre-symptomatic and asymptomatic transmission of SARS-CoV-2 across the shelters, indicating increased risk in this setting.[8] 44.8% of persons who were positive for SARS-CoV-2 were more frequently 60 years of age or older than those without SARS-CoV-2 (15.9%).[9] Findings indicate that COVID-19 can spread quickly in homeless shelters; rapid interventions are necessary, including testing to identify cases and isolation to minimize transmission.[10] • A study in England determined that SARS-CoV-2 outbreaks in homeless settings can lead to a high attack rate among people experiencing homelessness, even if incidence remains low in the general population. Avoiding deaths depends on transmission prevention within homeless settings, including hostels and night shelters.[11] <u>Residential care for people with intellectual and development disabilities (IDD)</u> • Multiple US studies suggest that compared to the general population, people with IDD living in residential group homes are at greater risk of severe COVID-19 outcomes, including fatality.[51,54,56] Researchers found that among COVID-19-positive individuals with IDD, a greater likelihood of hospitalization was associated with a higher number of chronic medical conditions and male gender.[12] <u>Mental health and group home facilities</u> • A US study identified that adolescents (11-17 years) in psychiatric inpatient settings may be especially vulnerable to COVID-19 infection.[13]

- A study from China found that psychiatric inpatients may be more susceptible to severe viral outbreaks due to the crowded living conditions and patients' potential disordered mental state, poor self-control and self-care, and inadequate insight; such patients may be incapable of practicing infection control measures to protect themselves.[14]

Refugee shelters and living facilities for migrants

- An Ontario study reported that of the 60 adult residents who agreed to be tested, 41.7% were positive for COVID-19. Of those tested positive, 20% reported fever, cough or shortness of breath at the time of testing. This demonstrates the high risk of SARS-CoV-2 transmission in congregate living settings and the importance of mobilizing timely testing and management of symptomatic and asymptomatic residents in shelters.[15]

Vulnerable Populations

Low-income and immigrant communities

- Local health unit data in Ontario suggests that vulnerable populations, including low income and immigrant communities, are more adversely affected by COVID-19 and have higher case rates, and hospitalizations.[16]
- A 2021 Ontario based study found that certain characteristics signal higher case fatality for certain populations. For community-dwelling individuals, increased age, male sex, history of prior hospital admissions in the past three years, certain chronic medical conditions, and residing in lower-income neighbourhoods were associated with increased risk of death following COVID-19 infection.[17]

Racialized communities

- International data from the US suggest that racialized communities, including Black and Hispanic communities, are more adversely affected by COVID-19 and may experience higher case rates and higher mortality rates.[18,19,20] Studies attribute this to social conditions, structural racism, and structural inequalities.[21]
- A US study found that systemic social inequities have resulted in the overrepresentation of Hispanic and non-White workers in frontline occupations where exposure to SARS-CoV-2 might be higher. Findings indicated that 73% of workplace outbreak-associated COVID-19 cases were among persons who identified as Hispanic or non-White.[22]
- A US based study on racial disparities in COVID-19 disease reported that the 20% of US counties that are disproportionately Black account for 52% of COVID-19 diagnoses and 58% of COVID-19 deaths nationally. The study attributes this to social conditions, structural racism, and structural inequalities.[23]
- A 2020 US study on COVID-19 mortality and occupational differences across racial/ethnic groups and US states reported that mortality was higher among non-Hispanic (NH) Black persons compared with NH White persons, due to more NH Black persons holding essential worker positions.[24]
- Among US rural counties, the average daily increase in COVID-19 mortality rates has been significantly higher in counties with the largest shares of Black and Hispanic residents.[25]
- A US-based study that examined COVID-19 disparities reported that Black adults at high risk for severe illness were 1.6 times as likely as White adults to live in households that contain health-sector workers. Among Hispanic adults at high risk for severe illness, 64.5% lived in households with at least one worker who was unable to work from home, versus 56.5% among Black adults and only 46.6% among White adults.[26]

People living with mental illness

- A 2020 US study indicated that individuals with a recent diagnosis of a mental disorder are at increased risk for COVID-19 infection, which is further exacerbated among African Americans and women; in addition, they have a higher frequency of adverse outcomes.[27]

People who use drugs or have substance use disorders

- Individuals with substance use disorders, especially individuals with opioid use disorders and African American users, were found to have increased risk for COVID-19 infection and its adverse outcomes.[28]

People who experience homelessness

- An Ontario study reported that people with a recent history of homelessness were over 20 times more likely to be admitted to hospital for COVID-19, over 10 times more likely to require intensive care for COVID-19, and over five times more likely to die within 21 days of their first positive test result.[29]

Indigenous Populations

- Data from the US indicate that in 23 states with adequate race/ethnicity data, the incidence of COVID-19 among NH American Indian and Alaska Native populations was 3.5 times that of NH White persons.[30]
- The Indian Health Service of the US has found that the Navajo Nation is amongst the hardest hit reservations in the US, with a higher per capita rate of infection than any US state, including New York, and even greater than that of Wuhan at the peak of the outbreak in China.[31]

International Scan	**Essential workers** Health care occupations • A 2020 European Centre for Disease Prevention and Control (ECDC) report suggests that most clusters and outbreaks in European countries were from the health and social care settings (i.e., acute care hospitals) in which the size of cluster ranged from two to 571 confirmed cases. Among these clusters, a total of 3,298 health care professionals were reported to have been affected, including 82 deaths.[32] Non-health care occupations • Among non-health care workers, clusters and outbreaks were observed in the following occupational categories: office settings; educational facilities; food production, including agriculture; factory/manufacture sector; building and construction sites; packaging/mail distribution centres; bars and restaurants; and transportation sectors. In 13 European countries and the US, the food production sector (i.e., agriculture, meat and poultry processing facilities) had the highest number of COVID-19 clusters and cases.[33,34] **Congregate Living Settings** Correctional facilities • A 2020 ECDC technical report stated that, as of April 2020, there had been a number of cases in European prison settings: Italy (131 staff, 21 inmates), Spain (69 staff, six inmates), France (114 staff, 48 inmates), Belgium, Germany, and Portugal. In England and Wales, as of May 31, 2020, 466 inmates across 79 prisons and 949 staff members across 105 prisons had been confirmed COVID-19 positive, with 23 deaths among inmates and 11 among staff.[35] **Vulnerable Populations** Racialized communities • A UK analysis of news articles reported that of the 12,593 patients who died in hospital prior to April 19, 2020, 19% were Black, Asian and minority ethnic (BAME); these groups comprise 15% of England's general population. Three London boroughs with high BAME populations were among the five local authorities with the highest death rates in hospitals and the community.[36] **Indigenous Populations** • A New Zealand academic paper produced by the Department of Public Health at the University of Otago on mitigating the risk of COVID-19 among Māori citizens reported the necessity of ensuring health equity in all levels of decision-making and in all strategies. Themes include: 1) socioeconomic inequities and social determinants of health leading to increased transmission; 2) severity of potential health impact due to underlying health conditions; and 3) existing inequities in health care access and quality that will likely increase if services become overloaded.[37]
Canadian Scan	**Vulnerable Populations** • Toronto Public Health data suggest the COVID-19 pandemic is more adversely affecting people with lower incomes, alongside new immigrant populations. Low income populations • When analyzed by income group, low income populations had 113 cases per 100,000 people, compared to 73 cases per 100,000 people in the highest-income group. There were 20 hospitalizations per 100,000 people among those living in the lowest income areas, compared to nine per 100,000 in the highest income areas. New immigrants • When analyzed by new immigrant data, the group with the highest percentage of recent immigrants also had the highest rate of COVID-19 cases, with 104 per 100,000 people. The group with the lowest percentage of recent immigrants had the lowest rate, with 69 cases per 100,000 people.[38]
Ontario Scan	**Congregate Living Settings** Correctional facilities • A 2020 Public Health Ontario rapid review found that, as of May 6, 2020, Correctional Services Canada reported 294 confirmed COVID-19 cases in federal correctional institutions, including 166 in Quebec, eight in Ontario, and 120 in British Columbia. As of April 21, 2020, the US CDC reported 4,893 cases and 88 deaths among incarcerated and detained persons, and 2,778 cases and 15 deaths among staff members.[39] Refugee shelters and living facilities for migrants • A 2020 CBC news article reported 1,276 positive cases of COVID-19 among farm workers as of November 25, 2020 in Windsor-Essex County and two deaths. As of November, there were 147 cases among farm workers in the municipality of Chatham-Kent, most of which were attributed to an outbreak at a single greenhouse facility. Most of the farm workers infected were migrant workers living in congregate settings.[40]

	Mental health and group home facilities
	• According to data from the Ontario's Ministry of Children, Community and Social Services, four children living in group homes and foster care, and eight staff members working at group homes and youth detention facilities, tested positive for COVID-19 as of May 2020.[41]

Methods

The COVID-19 Evidence Synthesis Network is comprised of groups specializing in evidence synthesis and knowledge translation. The group has committed to provide their expertise to provide high-quality, relevant, and timely synthesized research evidence about COVID-19 to inform decision makers as the pandemic continues.

For more information, please contact the Research, Analysis and Evaluation Branch (Ministry of Health).

APPENDIX

Table 2: Summary of Evidence on COVID-19 Outcomes for High Risk Populations and Settings

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
Essential Workers: Health Care	Washington State, United States (US)	• Differential predicted risk ratios of COVID-19 by occupation	• **Study**: This study identifies workers in individual occupations at highest risk of COVID-19 infection using predictors from the Occupational Information Network (O*NET) database and correlating them with case counts published by the Washington State Department of Health (up to June 16, 2020).[42] • **Results**: Overall, the 15 occupations that have the highest predicted risk are health care professions, with four of the top five in the dental health field (i.e., dental hygienists [2.71], oral and maxillofacial surgeons [2.67], dental assistants [2.64], and dentists, general [2.62].[43] ○ Health Care Occupations at Highest Risk: Predicted prevalence ratios calculated for other health care workers include: orderlies (2.61); radiation therapists (2.6); obstetricians and gynecologists (2.57); respiratory therapists (2.54); family and general practitioners (2.53); registered nurses (2.61); radiologic technicians (2.52); nurse midwives (2.51); emergency medical technicians and paramedics (2.51); and occupational therapists (2.51).[44]
Essential Workers: Health Care	New York City, New York (US)	• Case counts and relative risk for Emergency Medical Service (EMS) clinicians	• **Study**: This article examines available EMS COVID-19 mortality data in order to describe the extent of EMS losses, and to compare the risks for EMS clinicians to related professions. ○ Cases, Deaths and Relative Risks: At the end of March 2020, 573 of 4,408 NYC Fire Department (FDNY) Bureau of Emergency Medical Services clinicians had confirmed cases of COVID-19 (rate: 130 per 1,000 persons), compared to 1,198 cases among the 11,230 firefighters (rate: 107). This means the relative risk was 20% higher for EMS clinicians than for firefighters.[45] ○ By July 6, 2020, four FDNY emergency medical technicians (EMTs), one FDNY EMS mechanic, and one NYC hospital-ambulance-based 911 paramedic had died from the virus. By September 8, 2020, eight EMS personnel in New York State had died from COVID-19.[46] • **Conclusion**: EMS personnel are at a higher risk of dying from COVID-19 than other health care or emergency services professionals. Data suggest that EMS personnel COVID-19 related death is about three times higher than that of nurses, and about five times higher than physicians.[47]

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
Essential Workers: Health Care	Europe Union (EU), European Economic Area (EEA), and the United Kingdom (UK)	• Number and size of case clusters	• **Study**: A 2020 European Centre for Disease Prevention and Control (ECDC) report described COVID-19 clusters and outbreaks between March and early July 2020 in the EU/EEA and the UK that were linked to occupational settings, including health care settings, and identified possible factors contributing to transmission in these settings.[48] • **Results**: A total of 1,377 clusters in occupational settings, including 18,198 COVID-19 cases, were reported from 17 countries from European Union (EU) (Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Ireland, Liechtenstein, Latvia, Lithuania, Malta, the Netherlands, Romania, Spain, Sweden) and the UK (England). The COVID-19 clusters reported by EU countries and the UK fall into several broad occupational categories including: o <u>Health and Social Care</u>: Most clusters and outbreaks reported by countries were from the health and social care setting. More than two hundred (n=241) individual clusters in acute care hospitals were reported by 10 countries (Bulgaria, Cyprus, Czechia, France, Ireland, Latvia, Lithuania, Malta, Romania and Spain). Sizes of clusters in acute-care hospitals varied from two confirmed cases to 571 (median=14). Among these clusters, a total of 3,298 health care professionals were reported to have been affected, including 82 deaths. A small number of individual clusters in primary care settings (n=4) were reported by three countries (Czechia, Latvia and Lithuania), involving 14 health care professionals.[49]

Essential Workers: Non-Health Care	EU, EEA, and the UK	• Number and size of case clusters	• **Study**: The above-mentioned 2020 ECDC report also described COVID-19 clusters and outbreaks that were linked to non-health care occupational settings, and identified possible factors contributing to transmission in these settings.[50]
			• **Results**: The COVID-19 clusters reported by EU countries and the UK fall into several broad occupational categories including:
			  o <u>Office settings</u>: 65 clusters of COVID-19 in various office settings were reported by 10 countries (Bulgaria, Cyprus, Czechia, France, Ireland, Latvia, Lithuania, Malta, Romania and Spain). Specific settings included banks, company headquarters, government buildings and call centres. Croatia reported only aggregate data, with offices accounting for 10.5% of the confirmed COVID-19 cases in the country. Sizes of clusters reported by the 10 countries varied from two confirmed cases to 23 (median: seven cases). A total of 410 persons were affected, including four deaths.
			  o <u>Educational facilities</u>: Five countries (Bulgaria, Czechia, France, Latvia, and Romania) reported 22 clusters in educational facilities, in the form of 143 confirmed cases and one death. Countries did not consistently report whether the confirmed cases were among teachers/staff or among children/students, making it difficult to assess the occupational risk for the teachers/staff. The cluster sizes in kindergartens were smaller than clusters in schools with older children: the number of cases in these clusters ranged from two to six and two to 35, respectively.[51]
			  o <u>Food production, including agriculture</u>: Two main categories were identified: 1) food processing (e.g., meat and fish processing and packaging; dairy production; bread and pastry production) indoors, and 2) agricultural food production (e.g., fruit picking and other mainly outdoor processes). Thirteen countries reported a total of 153 clusters and 3,820 cases. In addition, one country reported 36 cases without specifying the number of outbreaks, bringing the total number of cases to 3,856. Of the 153 clusters, 114 were in the food processing

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
			category (2,529 cases), while 26 were linked to agriculture, where a total of 1,016 cases were reported. In July 2020, media reported several outbreaks linked to seasonal migrant farm workers employed in fruit picking in Spain. In the region of Catalonia, 12 outbreaks leading to 900 cases were reported, while in the region of Murcia an outbreak with 38 cases was reported.[52] o Factory/manufacturing sector: Fifty-eight individual clusters in a factory or manufacturing setting were reported, with clusters of between two and 96 confirmed cases (median: seven cases) in Bulgaria, Latvia, Lithuania, Romania and Spain. A total of 661 persons were affected, including four deaths. In addition, Bulgaria reported 19 clusters in various factories in aggregate form, involving 371 persons. An analysis by the UK Office of National Statistics (ONS) of deaths from COVID-19 between March 9 and May 25, 2020 in England and Wales among male factory workers aged 20 to 64 years involved in the cleaning of industrial machines and the packing of goods, found that this category of workers had statistically significantly higher mortality rates from COVID-19 than the general population (73.3 deaths vs 39.7 per 100,000 men).[53] o Building and construction sites: Nine countries (Bulgaria, Czechia, Finland, Ireland, Latvia, Lithuania, Malta, Romania and Spain) reported between one and eight outbreaks or clusters, with a total of 27 cases, occurring both indoors and outdoors. The total number of COVID-19 cases in each outbreak ranged from two to 69, with an overall total of 402 cases. No deaths were associated with these clusters.[54] o Packaging/mail distribution centres: Eight clusters of COVID-19 were reported from the country-based data collected on packaging or mail distribution centres, with a range of three to 27 cases. Furthermore, media sources identified a cluster of 40 cases in workers at a distribution centre in Bologna, Italy and two clusters in Austria and Germany.[55] o Bars and restaurants: Five clusters of COVID-19 were reported among employees in bars or restaurants, four from Spain and one from Ireland, involving a total of 32 individuals and no deaths. Media reports of a restaurant-based outbreak of COVID19 in British Colombia, Canada, detailed four or five workers testing positive, but no onward transmission to restaurant patrons was reported.[56] o Transportation sector: Three clusters of COVID-19 were reported from country-based data collected among employees in the transportation sector, including a taxi/private car service and two long-distance transportation companies (bus and rail). These clusters consisted of three, four and eight individuals, respectively.[57] • **Risk factors for outbreaks**: Confined spaces and shared workplaces, both associated with a lack of physical distance, have also been reported by countries as being probable risk factors for the outbreaks observed in certain occupational settings. In addition, the duration of contact (work shifts) provides prolonged exposure to a potentially infectious co-worker and facilitates transmission. Moreover, workers may also have close contact in canteens, during breaks, in changing rooms or when clocking in and out.[58]
Essential Workers: Non-Health Care	Washington State (US)	• Differential predicted risk ratios of COVID-19 by occupation	• **Study**: This study assesses the differential risk of COVID-19 by occupation using predictors from the Occupational Information Network (O*NET) database and correlating them with case counts published by the Washington State Department of Health (up to June 16, 2020) to identify workers in individual occupations at highest risk of COVID-19 infection.[59]

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
			• Non-Health Care Occupations at Highest Risk: Predicted prevalence ratio estimates include: municipal firefighters (2.21); ambulance drivers and attendants (2.17) [excluding emergency medical technicians]; correctional officers and jailers (2.0); first-line supervisors of correctional officers (1.96); municipal firefighting and prevention supervisors (1.88); and transportation security screeners (1.88).[60]
Essential Workers: Non-Health Care	US	• Prevalence and rate of COVID-19 infection and deaths	• **Study**: Reported COVID-19 cases among workers in meat and poultry processing facilities. ○ Reported outbreaks: The report found that 115 meat or poultry processing facilities in 19 states reported aggregate data on COVID-19 cases to the Centers for Disease Control and Prevention (CDC) during April 9-27, 2020.[61] ○ Prevalence of COVID-19 infection and death in meat processing plants: In these facilities, COVID-19 was diagnosed among 4,913 workers (approximately 3%), and 20 COVID-19-related deaths were reported.[62]
Congregate Living Settings: Correctional Facilities	Canada	• Number of outbreaks and fatalities	• **Study**: This study examined the following COVID-19 outcomes within federal penitentiaries in Canada (from March 30 to April 21, 2020) and contrasted them with estimates for the overall population in the penitentiaries' respective provincial jurisdictions: testing, prevalence, the proportion recovered, and fatality.[63] • **Results**: Data on 50 of 51 penitentiaries (98%) were available. ○ Testing: Of the 50 federal penitentiaries, 72% of them reported fewer tests per 1,000 population than the Canadian general population average of 16 tests/1,000 population, and 24% of penitentiaries reported zero tests. Penitentiaries with high levels of testing were those that already had elevated COVID-19 prevalence.[64,2] ○ Outbreaks: Five penitentiaries reported outbreaks (i.e., at least one case). Hardest hit penitentiaries were those in Quebec, Ontario, and British Columbia, with some prisons reporting COVID-19 prevalence of 30% to 40%. Of these, two were women's prisons. Females in prison were over-represented among cases (31% of cases overall, despite representing 5% of the total prison population).[65] ○ Illness: The proportion of cases that had recovered inside federal penitentiaries ranged from 0% to 33%. In both Ontario and British Columbia, the proportion of individuals who had recovered within prisons was half that of the proportion of cases recovered in the community.[66] ○ Fatalities: At the time of data collection, one of the 189 laboratory-confirmed cases across all federal penitentiaries had died (0.5%), a 67% higher proportion of cases than that observed in the general prison population (0.3%, 1,966 of 614,340 cases).[67] • **Conclusion**: Increased sentinel or universal testing may be appropriate given the confined nature of prison populations. This, along with rigorous infection prevention control practices and the potential release of prisoners, will be needed to curb current outbreaks and those likely to come.[68]
Congregate Living Settings:	Canada and US	• Case counts and mortality	• **Synopsis**: A 2020 Public Health Ontario rapid review draws on international and Canadian findings to document the associations between social determinants of health and COVID-19. ○ Canada: As of May 6, 2020, Correctional Services Canada reported 294 confirmed COVID-19 cases in federal

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[2] The overall average rate for Canadian prisons was 34 tests/1,000 population; this is a result of a small number of institutions having disproportionately high rates (e.g., 502 tests/1,000 population at Grand Valley Institution for Women in Ontario), resulting in a positively skewed distribution (Blair et al., 2020).

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
Correctional Facilities			correctional institutions, including 166 in Quebec, eight in Ontario and 120 in British Columbia.[69] o US: As of April 21, 2020, the CDC reported 4,893 cases and 88 deaths among incarcerated and detained persons, and 2,778 cases and 15 deaths among staff members. Cases were reported in 86% (32/37) of the 54 jurisdictions that reported to the study, across 420 correctional and detention facilities.[70]
Congregate Living Settings: Correctional Facilities	Canada	• Percentage of Indigenous women in federal institutions	• **Commentary**: Indigenous women represent over 41% of federally incarcerated women. Indigenous women are more likely to have higher rates of numerous chronic conditions, including respiratory illnesses, substantially increasing vulnerability to COVID-19 complications. This can be exacerbated in prisons as access to health care may be limited. Outbreaks within the prison setting can not only overwhelm an already over-stretched health care system but also spread to the community and disproportionately impact marginalized communities and populations.[71] • **Conclusion**: There are public health and human rights implications of COVID-19 in prisons that call for attention to the unique needs and circumstances of incarcerated Indigenous women that are based on international best practice-based guidance to preventive and responsive measures to COVID-19.[72]
Congregate Living Settings: Correctional Facilities	US	• Test positivity, number of cases, and fatalities	• **Study**: This study presents data (as of July 15, 2020) on 53 prison systems COVID-19 testing, test positivity, case, and case fatality by state and compare these data with each state's general population. Results include:[3] o Testing positivity: Test positivity is, on average, higher in prison systems than the general population, but some prison systems have lower test positivity than their general population. This includes states with recent outbreaks in their general population (e.g., Arizona, Florida), those testing very few people who are incarcerated (e.g., Nebraska), and those conducting mass testing (e.g., Minnesota). o Case rates as compared with the general population: Thirty-four of the prison systems have case rates per 1,000 that are higher than the general population. New Jersey has the highest cases per 1,000 incarcerated people at 159/1000. Among those detecting more than 100 cases per 1,000 incarcerated people (Arkansas, Michigan, New Jersey, Ohio, Tennessee), all have tested a high proportion of their population. By comparison, the highest case rate in the general population is in New York with 21 per 1,000 testing positive. Six states (Arkansas, Connecticut, Michigan, New Jersey, Ohio, and Tennessee) have detected over 100 cases per 1,000 greater than their state's general population. • Case fatality rates: Thirty-seven states are reporting case fatality data. Fatalities per 1,000 cases range from zero in Hawaii, North Dakota, Rhode Island, South Dakota, and Utah to 11 deaths per 1,000 cases in the Federal Bureau of Prisons.
Congregate Living Settings: Correctional Facilities	International	• Number of outbreaks	• **Systematic Review**: A systematic review identified 28 studies, published between January 1, 2000 and July 28, 2020, that provide quantitative data on outbreaks of highly contagious diseases in prison including COVID-19.[73] • **Results**: One non-governmental organization estimated that in early June 2020, across 79 countries, 73,254 people in prisons (PIP) had tested positive for COVID-19, of which more than 1,100 had died from complications. Overall,

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[3] The authors of this study note that many states are not reporting full information on COVID-19 testing with some states also not reporting on case fatality (Lenmasters et al., 2020).

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
			infection rates in custodial facilities both among PIP and staff appear to be higher than in the general population, including in the US, and England and Wales, although it is unknown whether these are due to differences in testing. Some clusters have also been reported, including in one prison in Michigan, US, where COVID-19 rates were over 10% in PIP and 20% in staff. Nevertheless, with prison populations worldwide amounting to around 10.7 million, and more than 30 million people circulating through prison every year, some jurisdictions have included prisons as part of the public health approach to dealing with this pandemic.[74] • Outbreaks: One article (of 28) reported a COVID-19 outbreak (April-May 2020) in Louisiana, US, where a staff member had reported symptoms and later tested positive for COVID-19. This single case led to a total of 110 confirmed cases at the facility.[75]
Congregate Living Settings: Correctional Facilities	Europe and UK	• Number of cases and mortalities	• **Study**: A 2020 ECDC technical report identified the following outcomes in correctional facilities: ○ Europe: At the beginning of April 2020, a number of cases were reported in prison settings in Italy (131 staff and 21 inmates), Spain (69 staff and six inmates), France (114 staff and 48 inmates), Belgium, Germany, and Portugal.[76] ○ UK: as of 31 May 2020, 466 inmates across 79 prisons and 949 staff members across 105 prisons have been confirmed with COVID-19 in England and Wales; 23 inmates and 11 staff people have died.[77]
Congregate Living Settings: Refugee shelter	Ontario	• Number of cases	• **Study**: This study describes a COVID-19 outbreak and corresponding reported symptomatology at a dedicated refugee shelter in Toronto.[78] ○ Cases: Of the 63 adult residents on site at the shelter, 60 agreed to be tested. Among those tested, 41.7% (n = 25) were positive for SARS-CoV-2 infection. Of those who tested positive (n = 25), 20.0% (n = 5) reported fever, cough or shortness of breath at the time of testing. On more detailed assessment one day later, 70.8% (17/24) reported a broader range of symptoms. During the 14 days after testing, 87.5% (21/24) reported symptoms of infection.[79] • **Conclusion**: The study found a high rate of SARS-CoV-2 infection in this shelter population, which underscores the high risk of SARS-CoV-2 transmission in congregate living settings and the importance of mobilizing timely testing and management of symptomatic and asymptomatic residents in shelters.[80]
Congregate Living Settings: People with intellectual and developmental disabilities (IDD)	New York State (US)	• COVID-19 case rates and case-fatality	• **Study**: Describes COVID-19 outcomes among people with IDD living in residential groups homes in the State of New York as compared with the general population.[81] • **Results**: People with IDD living in residential group homes were at greater risk of severe COVID-19 outcomes: case rates - 7,841 per 100,000 for people with IDD compared to 1,910 for New York State; case-fatality - 15.0% for people with IDD compared to 7.9% for New York State; and mortality rate - 1,175 per 100,000 for people with IDD compared to 151 per 100,000 for New York State. Differences in cases and mortality rate were confirmed across regions of the state, but case-fatality rate was only higher for people with IDD in and around the New York City region.[82] • **Conclusion**: COVID-19 appears to present a greater risk to people with IDD, especially those living in congregate settings.[83]

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)

Congregate Living Settings: People with IDD	US	• Case counts, mortality	• **Study**: This study described how individuals with IDD have been affected in the first 100 days (January 20 to April 30, 2020) of the COVID-19 pandemic. Researchers used software applications to track patient, client and employee cases and exposures using a database of individuals with IDD who access their services (N=11,540) across 2,400 homes.
			  o Cases: One hundred and twenty-two individuals with IDD were placed in quarantine for exhibiting symptoms and signs of acute infection such as fever or cough. Of those, 66 individuals tested positive for SARS-CoV-2, and their average age was 50. The positive individuals were in 30 different homes (1.3% of total) across 14 states. Fifteen homes had single cases, and 15 have had more than one case.[84]
			  o Outcomes: Fifteen COVID-19-positive individuals were hospitalized. As of April 30, 2020, seven of the individuals hospitalized had been discharged and are recovering. Five remained hospitalized, with three improving and two remained in intensive care and on mechanical ventilation. There had been three deaths. Researchers found that among COVID-19-positive individuals with IDD, a higher number of chronic medical conditions and male sex were characteristics associated with a greater likelihood of hospitalization.
			• **Conclusion**: Findings indicate that people with IDD living in congregate care settings can benefit from a coordinated approach to infection control, case identification and cohorting, as evidenced by the low relative case rate reported.[85]

Congregate Living Settings: People with IDD	US	• Case rate and fatality rate	• **Study**: This study determined the impact of residential setting and level of skilled nursing care on COVID-19 outcomes for people receiving IDD services, compared to those not receiving IDD services. Researchers utilized publicly available California data on COVID-19 outcomes for people receiving IDD services (early May through October 2, 2020), and reported outcomes based on seven types of residence, differentiated by number of residents and level of skilled nursing care provided. This was compared to the larger California published outcomes. • **Results**: In general, Californians receiving IDD services had a 60% lower case rate, but 2.8 times higher case-fatality rate, compared with Californians not receiving IDD services. o Differences in residence type: COVID-19 outcomes varied significantly among Californians receiving IDD services by type of residence and skilled nursing care needs: higher rates of diagnosis in settings with larger number of residents, higher case-fatality and mortality rates in settings that provided 24-hour skilled nursing care. • **Conclusion**: Diagnosis with COVID-19 among Californians receiving IDD services appears to be related to the number of individuals within the residence, while adverse COVID-19 outcomes were associated with level of skilled nursing care.[86]
Congregate Living Settings: Homeless Shelters	Hamilton, Ontario	• None provided	• **Study**: In this pilot study on mitigating the risk of COVID-19 in congregate settings, researchers provided COVID-19 tests to 104 residents and 141 staff who had failed daily symptom screening in homeless shelters in Hamilton, Canada. Between March 19 and April 30, 2020, a total of 245 tests were conducted of 141 staff and 104 residents. o Cases: Of the 88 total PCR tests (59 residents and 29 staff) completed prior to April 17, 2020, 12 (13.6%) were positive for a viral pathogen. Ten of 59 residents (16.9%) were diagnosed with nasal infection and two of 29 staff (6.8%) were diagnosed with COVID-19. A total of 157 (44 residents and 113 staff) tests performed after April 17, 2020 were tested exclusively for COVID-19; of which one resident (2.3%) and five staff (4.4%) tested positive. Overall, during the study period, one of 104 residents (1.0%) and seven of 141 staff (5.0%) were diagnosed with COVID-19 infection.

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
			• **Conclusion**: For comparison, during the study time period, the City of Hamilton reported 422 patients with COVID-19 and a positivity rate of approximately 5-7%. Researchers suggest that their findings demonstrate that accessible shelter housing that allows for rapid testing, isolation and physical distance is imperative to outbreak prevention in the shelter setting.[87]

Congregate Living Settings: Homeless Shelters	England	• Estimated deaths, hospital and ICU admissions without interventions	• **Study**: This modelling study estimated the avoided deaths and health care use among people experiencing homelessness (i.e., 35,817 living in 1,065 hostels; 3,616 sleeping in 143 night shelters; and 7,132 sleeping outside) during the first wave of COVID-19 in England (i.e., February to May 2020).[88] Results include:
			  ○ Wave 1 (February 1-May 31, 2020): The authors estimated that preventive measures imposed might have avoided 21,092 infections, 266 deaths, 1,164 hospital admissions, and 338 ICU admissions among the homeless population.[89]
			  ○ Wave 2 (June 1-January 31, 2021): If preventive measures are continued, projections are as follows: a small number of additional cases between June 1, 2020, and January 31, 2021, with 1,754 infections (95% confidence interval [CI]; 1,543-1,960), 31 deaths (95% CI: 21-45), 122 hospital admissions (95% CI: 100-148), and 35 ICU admissions (95% CI: 23-47) with a second wave in the general population. However, if preventive measures had been lifted, outbreaks in homeless settings might have led to larger numbers of infections and deaths, even with low incidence in the general population. In a scenario with no second wave and relaxed measures in homeless settings in England, researchers projected 12,151 infections (95% CI: 10,718-13,349), 184 deaths (95% CI: 151-217), 733 hospital admissions (95% CI: 635-822), and 213 ICU admissions (95% CI: 178-251) between June 1, 2020, and Jan 31, 2021.[90]
			• **Conclusion**: Outbreaks of SARS-CoV-2 in homeless settings can lead to a high attack rate among people experiencing homelessness, even if incidence remains low in the general population. Avoidance of deaths depends on prevention of transmission within settings such as hostels and night shelters.[91]

Congregate Living Settings: Homeless Shelters	US	• Cluster outbreaks, prevalence	• **Study**: This report documents public health responses to COVID-19 cases in residents and staff members from five homeless shelters in Boston, Massachusetts (one shelter); San Francisco, California (one); and Seattle, Washington (three) in late March and early April 2020. Investigations included PCR testing for SARS-CoV-2, over approximately one to two weeks for residents and staff members at the five shelters. Overall, 1,192 residents and 313 staff members were tested in 19 homeless shelters. ○ Prevalence: When testing followed identification of a cluster, high proportions of residents and staff members had positive test results for SARS-CoV-2 in Seattle (17% of residents; 17% of staff members), Boston (36%; 30%), and San Francisco (66%; 16%). Testing in Seattle shelters where only one previous case had been identified in each shelter found a low prevalence of infection (5% of residents; 1% of staff members). Among shelters in Atlanta where no cases had been reported, a low prevalence of infection was also identified (4% of residents; 2% of staff members). Community incidence in the four cities (the average number of reported cases in the county per 100,000 persons per day during the testing period) varied, with the highest (14.4) in Boston and the lowest (5.7) in San Francisco.[92]

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
			Conclusion: There was a high proportion of positive tests in the shelters with identified clusters and evidence for pre-symptomatic and asymptomatic transmission of SARS-CoV-2 across the shelters, indicating increased risk in this setting.

Congregate Living Settings: Homeless Shelters	San Francisco, California (US)	• Case count, prevalence	• **Study**: This report describes the San Francisco Department of Public Health's response to a COVID-19 outbreak in the largest homeless shelter in San Francisco in April 2020. Descriptive statistics were used to characterize the study population; percentage of positive PCR tests; and symptoms, emergency department visits, hospitalizations, and deaths of confirmed cases.
			  o Cases: In total, 150 out of the 255 residents were tested, of which 101 (67%) were positive.
			  o Outcomes: Fifty-two (52%) were asymptomatic at time of testing. Of those residents who tested positive, 12 (12%) had treat and release emergency department visits, eight (8%) required hospitalization, and one died.
			  o Demographics: One-fifth (21%) were age 60 or older, and 27% had underlying medical conditions. The most common comorbidities were hypertension, diabetes, and congestive heart failure.
			  o Staff: Of the 60 staff tested, 10 (17%) were positive.
			Conclusion: The outbreak occurred during a period of low community incidence of disease (5.7 cases per 100,000 persons per day), which illustrates that superspreading events in shelters can occur despite low community incidence.[93]

Congregate Living Settings: Homeless Shelters	Atlanta, Georgia (US)	• Prevalence of Sars-CoV-2	• **Study**: This study conducted multiple, proactive, facility-wide testing events (April 7 – May 6, 2020) for people experiencing homelessness (PEH) who were living sheltered and unsheltered, and homelessness service staff in Atlanta, Georgia.[94] • **Results**: Overall, 2,875 individuals at 24 shelters and nine unsheltered outreach events underwent SARS-CoV-2 testing and 2,860 (99.5%) had conclusive test results. o SARS-CoV-2 prevalence: 2.1% (36/1,684) among PEH living sheltered, 0.5% (3/628) among PEH living unsheltered, and 1.3% (7/548) among staff. Reporting fever, cough, or shortness of breath in the last week during symptom screening was 14% sensitive and 89% specific for identifying COVID-19 cases compared with RT-PCR. Prevalence by shelter ranged 0%-27.6%. Repeat testing three to four weeks later at four shelters documented decreased SARS-CoV-2 prevalence (0%-3.9%). Nine of 24 shelters completed shelter assessments and implemented IPC measures as part of the COVID-19 response.[95] • **Conclusion**: PEH living in shelters experienced higher SARS-CoV-2 prevalence compared with PEH living unsheltered. Facility-wide testing in congregate settings allowed for identification and isolation of COVID-19 cases and is an important strategy to interrupt SARS-CoV-2 transmission.[96]
Congregate Living Settings: Homeless Shelters	Washington State (US)	• Case counts, prevalence	• **Study**: This study reports on SARS-CoV-2 testing offered to residents and staff members following a confirmed case of COVID-19 at a homeless shelter in King County. Testing was done on residents and staff at the shelter, and two other shelters that use the same services during March 30-April 1, 2020. o Cases: Among the 181 persons tested, 19 (10.5%) had positive test results (15 residents and four staff members). Among the 181 persons tested in the second round of testing, 18 (15.3%) had positive test results (16 residents and two staff members). In addition to the 31 residents and six staff members identified through testing at the shelters, two additional cases in residents were identified during separate symptom screening

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
			events, and four were identified after two residents and two staff members independently sought health care. In total, COVID-19 was diagnosed in 35 of 195 (18%) residents and eight of 38 (21%) staff members who received testing at the shelter or were evaluated elsewhere. • **Conclusion**: Findings indicate that COVID-19 can spread quickly in homeless shelters; rapid interventions including testing and isolation to identify cases and minimize transmission are necessary.[97]

Congregate Living Settings: Homeless Shelters	King County, Washington State (US)	• Positivity rate	• **Study**: This study investigated SARS-CoV-2 case counts across several adult and family homeless shelters in a major metropolitan area. A total of 14 homeless shelters in King County, Washington were studied with 1,434 study encounters conducted in shelter residents and staff. The primary outcome measure was test positivity rate of SARS-CoV-2 infection at shelters. Sociodemographic, clinical, and virologic variables were assessed as correlates of viral positivity.
			  ○ Positivity rates: Among the 1,434 encounters, 29 (2%) cases of SARS-CoV-2 infection were detected across five shelters. Most (n = 21 [72.4%]) were detected during surge testing events rather than routine surveillance, and most (n = 21 [72.4%]) were asymptomatic at the time of sample collection (January 1-March 31, 2020).
			  ○ Age: Persons who were positive for SARS-CoV-2 were more frequently aged 60 years or older than those without SARS-CoV-2 (44.8% vs. 15.9%).
			  ○ Room Type: 86% of persons with positive test results slept in a communal space rather than in a private or shared room.[98]

Congregate Living Settings: Homeless Shelters	Boston, Massachusetts (US)	• Case counts	• **Study**: Between March 28 and April 1, 2020, an increasing number of COVID-19 cases were identified from a single homeless shelter in Boston, MA prompting SARS-CoV-2 testing of all remaining shelter residents. As part of the subsequent investigation adults aged at least 18 years residing in a large homeless shelter in Boston on April 2 and April 3, 2020 underwent polymerase chain reaction (PCR) testing. Descriptive statistics were used to characterize the study sample, the percentage of positive PCR test results, and the symptom profile of individuals with PCR-confirmed infections.
			  ○ Cases: A total of 147 participants (36.0%) had PCR test results positive for SARS-CoV-2.[99]
			  ○ Outcomes: Among individuals with PCR test results positive for SARS-CoV-2, cough (7.5%), shortness of breath (1.4%), and fever (0.7%) were all uncommon, and 87.8% were asymptomatic.
			• **Conclusion**: The majority of individuals with newly identified infections had no symptoms and no fever at the time of diagnosis, suggesting that symptom screening in homeless shelters may not adequately capture the extent of disease transmission in this high-risk setting.[100]

Congregate Living Settings: Homeless Shelters	Rhode Island (US)	• Case counts	• **Study**: This study identified shelter characteristics that may be associated with higher transmission of SARS-CoV-2 by conducting a cross-sectional assessment of five congregate shelters in Rhode Island. Shelter residents 18 years old and older were tested for SARS-CoV-2 from April 19-April 24, 2020. At the time of testing, participant characteristics, symptomatology, and vital signs were collected. A total of 299 shelter residents (99%) participated.
			  ○ Results: A total of 35 (11.7%) residents tested positive for SARS-CoV-2. Shelter-level prevalence ranged from zero to 35%. Symptom prevalence did not vary by test result. There were no differences in age, gender, or race between people testing positive and negative for SARS-CoV-2.
			  ○ Symptoms: Only 20% of people testing positive (7/35) reported any symptoms; none had fever or hypoxia.

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
			○ Time at shelter: Among participants with negative tests, 70.1% (185/264) had spent more than two weeks at their shelter, compared to 42.9% (15/35) of participants with positive tests. • **Shelter Characteristics**: Shelters with positive cases of SARS-CoV-2 were in more densely populated areas, had more transient resident populations, and instituted fewer physical distancing practices compared to shelters with no cases.[101]
Congregate Living Settings: Migrant Workers	Ontario	• Prevalence of COVID-19 infection and death.	• **News Article**: According to a November 2020 CBC news article, there had been 1,276 positive cases of COVID-19 among farm workers as of November 25, 2020 in Windsor-Essex County and two deaths. As of the article's publication date, there were 147 cases among farm workers in Chatham-Kent County, most of which were attributed to an outbreak at a single greenhouse facility. Most of the farm workers infected in the two counties were migrant workers living in congregate settings.[102]
Congregate Living Settings: Mental Health Facilities	US	• Case counts	• **Study**: This study reports on a COVID-19 outbreak among adolescents at an inpatient behavioural health facility that was identified within five weeks of known viral transmission in the surrounding community. Clinical records were reviewed for all inpatients aged <18 years with laboratory-confirmed COVID-19 between March 23 and April 21, 2020. • **Results**: A total of 19 COVID-19-positive patients aged 11-17 years were identified. Patients most presented with sore throat (37%) and nausea/vomiting (32%). Only 26% of patients presented with cough, shortness of breath, or fever. The most common medical comorbidity was asthma (32%), and the most common psychiatric comorbidity was posttraumatic stress disorder (63%). One patient required intravenous fluids. No patients required transfer to a medical facility. • **Conclusion**: The findings of the authors suggest that adolescents in psychiatric inpatient settings may be especially vulnerable to COVID-19 infection.[103]

Congregate Living Settings: Mental Health Facilities	China	• Reported outbreaks	• **Article**: On February 8, 2020, a report in the China News Weekly stated that at least 50 inpatients with psychiatric disorders and 30 mental health professionals in a major psychiatric hospital in Wuhan, Hubei province, China had been diagnosed with COVID-19.
			   ○ Outbreaks: On February 18, 2020, the National Health Commission of China reported that 323 patients with severe psychiatric disorders were diagnosed with COVID-19.[104]
			   ○ Susceptibility of patients in mental health facilities: The report indicates that psychiatric inpatients in China may be more susceptible to severe viral outbreaks compared to patients in other health facilities. This is due to patients in psychiatric hospitals often being confined to crowded living conditions in hospitals where they share common dining and bathroom spaces. Due to their potential disordered mental state, poor self-control and self-care, and inadequate insight, they may be incapable of practicing infection control measures to protect themselves. Further, side effects of psychotropic medications, the suboptimal health status of hospitalized patients with major psychiatric disorders may render them more vulnerable to COVID-19 pneumonia and its complications. Another challenge to dealing with COVID-19 outbreaks in psychiatric hospitals, is that in China most psychiatrists do not receive adequate training in the prevention and treatment of infectious diseases.[105]

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)

Congregate Living Settings: Mental Health Facilities	UK	• Prevalence in older in-patient psychiatric population and people with young-onset dementia	• **Study**: This retrospective observational study describes the period prevalence, demographics, symptoms, management, and survival outcomes of COVID-19 in the older inpatient psychiatric population and people with young-onset dementia in five National Health Service Trusts in London, UK, from March 1 to April 30, 2020. Researchers collected data of inpatients aged 65 years or older or with dementia who were already inpatients or admitted.
			  ○ Cases: Of 344 inpatients, 131 (38%) were diagnosed with COVID-19 during the study period (period prevalence 38%). The mean age of patients who had COVID-19 was 75.3 years; 68 (52%) were women and 47 (36%) from ethnic minority groups; 16 (12%) of 131 patients were asymptomatic and 121 (92%) had one or more disease-related comorbidity. 74 (56%) patients had dementia, of whom 13 (18%) had young-onset dementia.
			  ○ Fatalities: Nineteen (15%) patients diagnosed with COVID-19 died during the study period, and their deaths were determined to be COVID-19 related.
			• **Conclusion**: Findings indicate that patients in psychiatric inpatient settings who were admitted without known SARS-CoV-2 infection had a high risk of infection with SARS-CoV-2 compared with those in the community and had a higher proportion of deaths from COVID-19 than in the community.[106]

Congregate Living Settings: Group Homes/ Youth Homes	Ontario	• Case counts	• **Article**: This article describes the incidence of COVID-19 in Ontario group homes and foster care as of May 2020. ○ Cases: Four children living in Ontario group homes and foster care had tested positive for the novel coronavirus, as had eight staff members who work at group homes and youth detention facilities, according to data from the province's Ministry of Children, Community and Social Services. At the time of publication, two of those four children were reported to have recovered from the virus, while five of those eight staff members were reported to have recovered.[107]
Vulnerable Populations: People experiencing homelessness, not in a shelter	Ontario	• Health outcomes of people with a recent history of homelessness including mortality as compared with the general population	• **Study**: A population-based retrospective cohort study in Ontario, Canada, between January 23 and July 31, 2020 used linked health administrative data among people who either had a recent history of homelessness (n = 29,407) or were dwelling in the community (n = 14,494,301).[108] • **Results**: In the peak period, people with a recent history of homelessness were over 20 times more likely to be admitted to hospital for COVID-19, over 10 times more likely to require intensive care for COVID-19, and over five times more likely to die within 21 days of their first positive test result.[109] • **Conclusion**: In Ontario, people with a recent history of homelessness were significantly more likely to be tested for SARS-CoV-2, to have a positive test result, to be admitted to hospital for COVID-19, to receive intensive care for COVID-19, and to die of COVID-19 compared with community-dwelling people. People with a recent history of homelessness should continue to be considered particularly vulnerable to SARS-CoV-2 infection and its complications.[110]
Vulnerable Populations: Low income and immigrant communities	Toronto, Ontario	• Prevalence of COVID-19 infection and	• Data from Toronto Public Health suggest the COVID-19 pandemic is more adversely affecting people with lower incomes in Toronto, alongside new immigrant populations. ○ Low income populations: As of April 27, 2020, low income populations had 113 cases per 100,000 people, compared to 73 cases per 100,000 people in the highest-income group. There were 20 hospitalizations per 100,000 people among those living in the lowest income areas, compared to nine per 100,000 in the highest

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
		hospitalizatio n	income areas. ○ New immigrants: The group with the highest percentage of recent immigrants had the highest rate of COVID-19 cases and hospitalizations, with 104 per 100,000 people and 18 per 100,000 people respectively. • The city's figures are similar to provincial data collected by non-profit research institute ICES, which analyzed COVID-19 testing data in Ontario up to April 30, 2020.[111]
Vulnerable Populations: Racialized Worker populations	Utah (US)	• Number of outbreaks per workplace sector and percentage of workers infected by ethnicity	• **Study**: The Utah Department of Health (UDOH) analyzed COVID-19 surveillance data to describe workplace outbreaks by industry sectors. In this report, workplaces refer to non–health care, non-congregate–living, and non-educational settings.[112] • **Results**: As of June 5, 2020, UDOH reported 277 COVID-19 outbreaks, 210 (76%) of which occurred in workplaces. ○ Number of workplace outbreaks: Approximately 12% (1,389 of 11,448) of confirmed COVID-19 cases in Utah were associated with workplace outbreaks. The 210 workplace outbreaks occurred in 15 of 20 industry sectors; nearly one half of all workplace outbreaks occurred in three sectors: Manufacturing (43; 20%), Construction (32; 15%) and Wholesale Trade (29; 14%); 58% (806 of 1,389) of workplace outbreak-associated cases occurred in these three sectors.[113] ○ Percentage of workers infected by ethnicity: Although 24% of Utah's workforce in all 15 affected sectors identified as Hispanic or Latino (Hispanic) or a race other than NH White (non-White), 73% (970 of 1,335) of workplace outbreak-associated COVID-19 cases were in persons who identified as Hispanic or non-White.[114] • **Conclusion**: Systemic social inequities have resulted in the overrepresentation of Hispanic and non-White workers in frontline occupations where exposure to SARS-CoV-2 might be higher; extra vigilance in these sectors is needed to ensure prevention and mitigation strategies are applied equitably and effectively to workers of racial and ethnic groups disproportionately affected by COVID-19.[115]
Vulnerable Populations: Racialized/ refugee worker populations	US	• Estimated health, employment and household risks	• **Study**: Using survey data collected in May 2020, this study examines the COVID-19–related risk factors among Bhutanese and Burmese refugees in the US. Data analysis compared respondents with and without recent COVID-19 to identify risk factors for infection.[116] ○ Risks for racialized essential workers: Of 218 refugees in 23 states who completed the survey, 15 (6.9%) reported infection with COVID-19. The following were risk factors for infection: being an essential worker during the pandemic (odds ratio[4] [OR] = 5.25), having an infected family member (OR = 26.92), and being female (OR = 5.63). Among 33 infected family members, 23 (69.7%) were essential workers.[117] • **Conclusion**: Working in essential industries was associated with an increased risk of COVID-19 infection among Bhutanese and Burmese refugees.[118]
Vulnerable Populations:	US	• Number of cases and deaths	• **Study**: Data (accessed April 13, 2020) on COVID-19 cases and deaths in US counties was used to describe racial disparities in COVID-19 disease and death and associated determinants.[119]

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[4] An odds ratio (OR) is a measure of association between an exposure and an outcome. The OR represents the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure (Szumilas, M., 2010).

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
Black communities			• **Results**: Nearly 90% (656/677) of disproportionately Black counties (i.e., ≥ 13%) reported a case and 49% (330/677) reported a death versus 81% (1,987/2,465) and 28% (684/2,465), respectively, for all other counties. Counties with higher proportions of Black residents have higher prevalence of comorbidities and greater air pollution. Counties with higher proportions of Black residents had more COVID-19 diagnoses (Rate Ratio (RR): 1.24) and deaths (RR: 1.18), after adjusting for county-level characteristics such as age, poverty, comorbidities, and epidemic duration. COVID-19 deaths were higher in disproportionally Black rural and small metro counties. The population attributable fraction of COVID-19 diagnosis due to lack of health insurance was 3.3% for counties with less than 13% Black residents and 4.2% for counties with greater than or equal to 13% Black residents.[120] • **Conclusion**: Nearly 20% of US counties are disproportionately Black, and they accounted for 52% of COVID-19 diagnoses and 58% of COVID-19 deaths nationally. County-level comparisons can both inform COVID-19 responses and identify epidemic hot spots. Social conditions, structural racism, and other factors elevate risk for COVID-19 diagnoses and deaths in Black communities.[121]

Vulnerable Populations: Black communities	US	• Mortality and occupational difference across ethnic groups	• **Study**: Data from the American Community Survey and Current Population Survey was used to examine the correlation between the prevalence of COVID-19 deaths and occupational differences across racial/ethnic groups and states.[122]
			  o Occupational differences by race/ethnicity: Among all 35 states and the District of Columbia (DC), the five occupations with the highest disparities in the proportion of NH White and NH Black workers were transportation and material moving, health care support, food preparation and serving, building and grounds cleaning and maintenance, and personal care and service. For example, 10.58% of NH Blacks worked in transportation and material moving, compared with 5.33% of NH Whites; 5.46% of NH Blacks worked in health-care support, compared with 1.76% of NH Whites.[123]
			  o Mortality rates of essential workers: COVID-19 mortality was higher among NH Black persons compared with NH Whites, due to more NH Blacks holding essential worker positions. Vulnerability to coronavirus exposure was increased among NH Blacks, who disproportionately occupied the top nine essential occupations.[124]
			• **Conclusion**: As COVID-19 death rates continue to rise, existing structural inequalities continue to shape racial disparities in this pandemic. Policies mandating the disaggregation of state-level data by race/ethnicity are vital to ensure equitable and evidence-based response and recovery efforts.[125]

Vulnerable Populations: Black, Hispanic, Asian populations	US	• Estimated health, employment and household risks	• **Study**: The study analyzed data (2014-2017) from the Medical Expenditure Panel Survey (MEPS)[5] to explore potential explanations for racial/ethnic disparities in COVID-19 hospitalizations and mortality. • **Results**: o Overall risk level: Black adults in every age group were more likely than White adults to have health risks associated with severe COVID-19 illness. However, White adults were older, on average, than Black adults. Thus, when all factors were considered, White adults tended to be at higher overall risk compared with Black,

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[5] MEPS is a nationally representative survey of the civilian non-institutionalized population, sponsored by the Agency for Healthcare Research and Quality (Selden et al., 2020).

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
			with Asian and Hispanic adults having much lower overall levels of risk compared with either White or Black adults.[126] ○ Socioeconomic factors: The authors explored additional explanations for COVID-19 disparities—namely, differences in job characteristics and how they interact with household composition. Black adults at high risk for severe illness were 1.6 times as likely as White adults to live in households containing health-sector workers. Among Hispanic adults at high risk for severe illness, 64.5% lived in households with at least one worker who was unable to work from home, versus 56.5% among Black adults and only 46.6% among White adults.[127]
Vulnerable Populations: Black, Hispanic, Asian populations	UK	• Prevalence and rate of COVID-19 infection	• **Background**: A news article analysis found that ethnic minorities in England are dying in disproportionately high numbers compared with White people. • **Results**: Of 12,593 patients who died in hospital up to April 19, 19% were Black, Asian and minority ethnic (BAME) even though these groups make up only 15% of the general population in England.[128] ○ Prevalence of COVID-19 infection and death among ethnic minorities: Three London boroughs with high BAME populations were among the five local authorities with the highest death rates in hospitals and the community. According to the NHS England data on 5,186 coronavirus deaths by ethnic minorities as of April 3, 2020, two of the three boroughs had the highest death rates of about 37 and 32 deaths per 100,000 residents respectively. In Harrow 58% of residents are from ethnic minority backgrounds, while in Brent the figure is 64%. Because deaths by ethnicity are not compared to the local population, further research is required to identify to what degree minority deaths are over-represented.[129]
Vulnerable Populations: Racialized rural communities	US	• Mortality rates by county and race/ethnicity	• **Study**: This study compared the average daily increase in COVID-19 mortality rates by county racial/ethnic composition (percent NH Black and percent Hispanic) among US rural counties for the period March 2-July 26, 2020.[130] • **Results**: Since early March, the average daily increase in the COVID-19 mortality rate has been significantly higher in rural counties with the highest percentages of Black and Hispanic populations. Compared to counties in the bottom quartile, counties in the top quartile of Black residents have an average daily increase that is 70% higher (incident rate radio [IRR] = 1.70), and counties in the top quartile of Hispanic residents have an average daily increase that is 50% higher (IRR = 1.50).[131] • **Conclusion**: Among US rural counties, the average daily increase in COVID-19 mortality rates has been significantly higher in counties with the largest shares of Black and Hispanic residents.[132]
Vulnerable Populations: People who use drugs or have substance use disorders (SUD)	US	• Risk of COVID-19 and related mortality and hospitalization rates	• **Study**: This is a retrospective case-control study of electronic health records (EHRs) data of 73,099,850 unique patients, of whom 12,030 had a diagnosis of COVID-19.[133] ○ Patients with a recent diagnosis of SUD (i.e., within past year) were at significantly increased risk for COVID-19 (adjusted odds ratio or AOR = 8.699), an effect that was strongest for individuals with opioid use disorder (OUD) (AOR = 10), followed by individuals with tobacco use disorder (TUD) (AOR = 8.222).[134] ○ Compared to patients without SUD, patients with SUD had significantly higher prevalence of chronic kidney, liver, lung diseases, cardiovascular diseases, type 2 diabetes, obesity and cancer. Among patients with recent diagnosis of SUD, African Americans had significantly higher risk of COVID-19 than Caucasians (AOR = 2.173), with strongest effect for OUD (AOR = 4.162).[135]

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
			o **COVID-19 patients with SUD** had significantly worse outcomes (death: 9.6%, hospitalization: 41.0%) than general COVID-19 patients (death: 6.6%, hospitalization: 30.1%) and African Americans with COVID-19 and SUD had worse outcomes (death: 13.0%, hospitalization: 50.7%) than White patients (death: 8.6%, hospitalization: 35.2%).[136] • **Conclusion**: These findings identify individuals with SUD, especially individuals with OUD and African Americans, as having increased risk for COVID-19 and its adverse outcomes, highlighting the need to screen and treat individuals with SUD as part of the strategy to control the pandemic while ensuring no disparities in access to health care support.[137]
Vulnerable Populations: People living with a mental illness	US	• Risk for COVID-19 infection and related mortality and hospitalization rates	• **Study**: This study assessed the impact of a recent (within past year) diagnosis of a mental disorder – including attention-deficit/hyperactivity disorder (ADHD), bipolar disorder, depression and schizophrenia – on the risk for COVID-19 infection and related mortality and hospitalization rates. Researchers analyzed electronic health records of 61 million adult patients from 360 hospitals and 317,000 providers, across 50 states in the US, up to July 29, 2020.[138] o Patients with a recent diagnosis of a mental disorder had a significantly increased risk for COVID-19 infection, an effect strongest for depression (adjusted odds ratio [AOR]=7.64) and schizophrenia (AOR=7.34).[139] o African Americans: Among patients with a recent diagnosis of a mental disorder, African Americans patients had higher odds of COVID-19 infection than White patients, with the strongest ethnic disparity for depression (AOR=3.78).[140] o Gender disparity: Women with mental disorders had higher odds of COVID-19 infection than males, with the strongest gender disparity for ADHD (AOR=2.03).[141] o Mortality: Patients with both a recent diagnosis of a mental disorder and COVID-19 infection had a death rate of 8.5% (vs. 4.7% among COVID-19 patients with no mental disorder) and a hospitalization rate of 27.4% (vs. 18.6% among COVID-19 patients with no mental disorder).[142] • **Conclusion**: Individuals with a recent diagnosis of a mental disorder are at increased risk for COVID-19 infection, which is further exacerbated among African Americans and women, and as having a higher frequency of some adverse outcomes of the infection.[143]
Vulnerable Populations: People with risk factors of COVID-19		• Case Fatality	• **Study:** This study identified Ontario residents, aged 20 years or older, who had tested positive for CVODI-19 between March 1 and December 31, 2020. Using multivariate logistic regression adjusted odds ratios for the associations between case fatality and individual-level and area-level characteristics. • **Results:** Among 143,077 community-dwelling individuals who tested positive for COVID-19, there were 2,232 deaths. Increasing age, male sex, prior hospital admissions, COPD, hypertension, CHF, diabetes, dementia or high frailty score, cancer, CKD, and immunosuppression were associated with increased case fatality, with age effect estimates having the largest magnitude for increased risk. Residence in high-income neighbourhoods was associated with decreased case fatality.[144] • **Conclusion:** These findings signal higher case fatality for certain populations. For community-dwelling individuals, increased age, male sex, history of prior hospital admissions in the past 3 years, certain chronic medical conditions,

Priority Group & Setting	Jurisdiction	Type of Data	Description of Outcomes (e.g., outbreaks, severe illness, deaths)
			and residing in lower-income neighbourhoods were associated with increased risk of death following COVID-19 infection.
Indigenous Populations	New Zealand	• No data	• **Commentary**: In this paper the authors discuss risk to Māori and the need to consider Māori health equity in all levels of decision-making and in all strategies aimed at mitigating the impact of an overwhelming COVID-19 outbreak. Themes include: 1) potential rates of increased transmission due to socioeconomic inequities and social determinants of health (e.g., living conditions, quality of housing, poverty); 2) severity of potential health impact due to underlying health conditions (i.e., cardiovascular, cancer, pulmonary, renal and endocrine comorbidity); and 3) existing inequities in health care access and quality that will likely increase if services become overloaded.[145]
Indigenous Populations: Non-Hispanic American Indian (AI) and Alaska Native (AN)	US	• Cumulative incidence of laboratory-confirmed cases of covid-19	• **Study**: To assess the impact of COVID-19 among the NH American Indian (AI) and Alaska Native (AN) populations, reports of laboratory-confirmed COVID-19 cases as reported by state and local health jurisdictions during January 22–July 3, 2020 were analyzed.[146] • **Results**: In 23 states with adequate race/ethnicity data, the cumulative incidence of laboratory confirmed COVID-19 among AI/AN persons was 3.5 times that among NH White persons.[147] • **Conclusion**: Adequate health care and public health infrastructure resources are needed to support a culturally responsive public health effort that sustains the strengths of AI/AN communities. These resources would facilitate the collection and reporting of more complete case report data to support evidence-based public health efforts.[148]
Indigenous Populations: Native American	US	• Case count and fatalities	• **Report**: As of June 28, 2020, the Indian Health Service, an agency within the Department of Health and Human Services, has reported more than 19,378 positive tests for coronavirus among its service population. In particular, the Navajo Nation is among the hardest hit reservations in the US, with a higher per capita rate of infection than any US state, including New York, and even greater than that of Wuhan at the peak of the outbreak in China. As of June 30, 2020, the Navajo Department of Health reports 7,532 positive cases of COVID-19 and 363 confirmed deaths.[149] • In states where there are large Native American populations, Native Americans comprise a significantly higher proportion of the case count as compared to the general population. Native Americans made up 18% of the deaths and 11% of the cases compared to 4% of the total population in Arizona; 57% of the cases compared to 9% of the total population in New Mexico; and 30% of the cases compared to 2% of the total population in Wyoming.[150,6]

[6] The IHS COVID-19 Pandemic Vaccine Plan, November 2020 is available here. Information about COVID1-9 cases by IHS area (i.e., seven-day rolling average positivity updated three days per week) can be found on the IHS website (IHS.gov/coronavirus, 2021).

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