International Horizon Scanning and Learning to Inform Wales' COVID-19 Public Health Response and Recovery

Report 10, 25/06/2020

GIG CYMRU NHS WALES
Iechyd Cyhoeddus Cymru
Public Health Wales

World Health Organization
Collaborating Centre on
Investment for Health and Well-being

Overview

The International Horizon Scanning and Learning work stream was initiated following and informing the evolving coronavirus (COVID-19) public health response and recovery plans in Wales. It focuses on COVID-19 international evidence, experience, measures, transition and recovery approaches, to understand and explore solutions for addressing the on-going and emerging health, wellbeing, social and economic impacts (potential harms and benefits).

The learning and intelligence is summarised in weekly reports to inform decision-making. These may vary in focus and scope, depending on the evolving COVID-19 situation and public health / policy needs.

This work is aligned with and feeding into the Welsh Government Office for Science and into Public Health Wales Gold Command. It is part of a wider Public Health Wales' systematic approach to intelligence gathering to inform comprehensive, coherent, inclusive and evidence-informed policy action, which supports the Wellbeing of Future Generations (Wales) Act and the Prosperity for All national strategy towards a healthier, more equal, resilient, prosperous and globally responsible Wales.

Disclaimer: The reports provide high-level summary of emerging evidence from country experience and epidemiology; research papers (published/not); and key organisations' guidance / reports, including sources of information to allow further exploration. The reports don't provide detailed or in-depth data/evidence analysis. Due to the novelty of COVID-19 virus/disease, and dynamic change in situation, studies and evidence can be conflicting, inconclusive or depending on country/other context.

In focus this week

- **Outbreak hot-spots**
- **Long-term consequences of lockdown**
- **Impact of climate on COVID-19 incidence rates**
- **Homelessness**
- **Country insight: Argentina**

Contents

At a glance: summary of international learning on COVID-19 3
Outbreak hot-spots 5
Long-term consequences of lockdown 8
Impact of the climate on COVID-19 incidence rates 12
Homelessness 15
Country insight: Argentina 17

At a glance: summary of international learning on COVID-19

"The world is learning the hard way that health is not a luxury item; It is the cornerstone of security, stability and prosperity."
Dr Tedros Adhanom Ghebreyesus, WHO Director-General

Outbreak hot-spots

- Outbreak hot-spots are locations/settings with **high concentration** of COVID-19 cases
- Significant transmission 'hot-spots' have been linked with increased **particulate matter, volatile organic compounds and contamination** (such as meat packing factories)
- **Meat processing plants** have specific characteristics, which can increase COVID-10 virus survival or transmission, such as: cold temperatures, aggressive ventilation systems, close proximity and prolonged duration of co-workers' contact, fast-paced environment, shared spaces and transportation
- COVID-19 virus can potentially spread via bio-aerosols and if ventilation systems are not correctly used, they may contribute to an **airborne disease transmission**
- **Mitigation measures** in hot-spot settings, such as factories, include: enforcing and reinforcing social distancing at all times and in all places; staggering breaks, arrival and departure times; temporary break areas, etc.

More information is summarised on pp.5-7

Long-term consequences of lockdown

- The COVID-19 pandemic is **affecting communities, societies and economies** at their core and can be associated with **increasing poverty and inequalities** on a global scale
- **Multiple direct and indirect harms**, including morbidity and mortality from **non-COVID-19 related physical and mental illnesses**, arise through different mechanisms, such as:
  - ✓ Reduced/unequal access to health services and facilities
  - ✓ Education closures
  - ✓ Transport restrictions
  - ✓ Restriction to non-essential sectors and increase in unemployment rates
  - ✓ Economic downturn
  - ✓ Behavioural changes
  - ✓ Home isolation
  - ✓ Exacerbating vulnerability, including physical, social and economic
- Measures that have strong impact on the economy and society, such as lockdown, isolation, infection prevention and others, require a **health impact assessment**
- The European Region has reported **massive disruption to routine health care services**, such as non-communicable disease (NCD) prevention and control, cancer screening and treatment, immunisation disruption, and others
- Specific prevention and control measures are recommended for **NCDs**
- **Young people** (teenagers and at their 20s) are at increased risk of depression and anxiety, online harassment, physical and sexual violence and unintended pregnancies
- Especially **vulnerable sectors** include: hospitality, entertainment, transport, leisure, sport
- People on **low incomes** are most vulnerable to the adverse effects
- **Mitigation measures** are needed in the short and long term. They need to consider people in **precarious work** and **long term support** for vulnerable workers / families

More information is summarised on pp.8-11

Impact of the climate on incidence rates

- There is currently **no conclusive evidence that weather** (short term variations in meteorological conditions), **climate** (long-term averages) **or temperature have a strong influence** on COVID-19 transmission and spread
- **Cold weather and snow, or warmer temperatures** (>25°C) cannot kill COVID-19 virus
- Key arguments supporting the **hypothesis that weather can play a role in the aggravated spread of COVID-19 disease during winter** include:
  - ✓ Seasonal patterns of similar viruses (e.g. common cold, influenza) show they spread more during cold months, but people can still become ill during other months
  - ✓ Particulate matter, such as droplets, can last longer in cold and less humid environments
  - ✓ Population behaviour show that people tend to gather more in closed spaces during colder months**,** which facilitates transmission and spread of the virus
  - ✓ Low winter temperatures can make human body more vulnerable to viral infections
  - ✓ Circulation of other viruses can negatively affect people's immunity; however, individuals recently recovered from a viral infection show strengthened immune systems, which might help to prevent subsequent infections
- It is too early to determine if meteorological parameters play a role in causing continuous or increasing incidence of COVID-19 in **Latin American countries**

More information is summarised on pp.12-14

Homelessness

- People experiencing homelessness are a vulnerable group, often with chronic physical or mental problems, and exposure to COVID-19 can negatively affect their health
- Homeless people can be even more overlooked once healthcare services are allocated almost exclusively to fighting COVID-19 pandemic outbreak
- Detection of cases and prevention of disease in a transient population are more difficult
- Many people experiencing homelessness live in congregate settings, such as shelters or halfway houses, or encampments or abandoned buildings, which increases the risk of transmission
- COVID-19 outbreak can impact housing security, with loss of income, causing rent or mortgage arrears or even homelessness

More information is summarised on pp.15-16

Outbreak hot-spots

Overview

- Outbreak hot-spots are geographic locations or specific settings where there is high concentration of COVID-19 cases
- Significant transmission 'hot-spots' have been linked with increased particulate matter, volatile organic compounds and contamination, e.g. meat packing factories in the USA[1][2]
- Expert assessment of evidence indicates that COVID-19 virus can potentially spread via bio-aerosols and if ventilation systems are not correctly used, this may contribute to airborne diseases transmission and spread, as previously proposed for SARS[3]
- It is believed, that low temperatures allow the COVID-19 virus to stay viable outside the body for longer, increasing the survival of the virus in the air[4]
- It is hypothesised, that burning of incense in enclosed spaces (linked to creating particulate matter), in addition to low room temperatures from air conditioning, can potentially create conditions for increased COVID-19 virus transmission[5]

Meat industry outbreaks

- Meat industry outbreaks have been reported in multiple countries *(table 1)*
- Three large food factories have closed **in England and Wales** after ~250 workers tested positive for COVID-19; suspected outbreaks have been identified at five other sites[6]
- Meat processing plants have specific characteristics, which can increase COVID-10 virus survival or transmission, such as[7][8]:
  - ✓ Prolonged duration and close proximity of co-workers' contact, e.g. 10-12 hours shifts
  - ✓ Fast-paced environment, related to heavy breathing and difficulty keeping masks properly positioned
  - ✓ Cold temperatures and aggressive ventilation systems
  - ✓ Shared spaces, such as break rooms, locker rooms and entrances/exits to the facility; and living together in over-crowed housing
  - ✓ Common practice of sharing transport, such as ride-share vans, shuttle vehicles, car-pools and using public transportation

Mitigation approaches, recommended by the CDC[7]

- Single-file movement with six-foot distance between each worker where possible
- Workers should maintain at least six feet distance from others at all times, including breaks
- Designating workers to monitor and facilitate distancing on processing floor lines
- Visual cues (e.g. floor markings/signs) as a reminder to maintain social distancing
- Staggering break times or temporary break areas / restrooms; staggering arrival and departure times to avoid congregations in parking areas, locker rooms, etc.

[1] *Guardian (15/5/20) - https://www.theguardian.com/world/2020/may/15/us-coronavirus-meat-packing-plants-food*
[2] *US National Library of Medicine - https://toxtown.nlm.nih.gov/sources-of-exposure/meat-processing*
[3] *Fineberg (2020) - https://www.ncbi.nlm.nih.gov/books/NBK556967/*
[4] *https://www.wired.com/story/why-meatpacking-plants-have-become-covid-19-hot-spots/*
[5] *Amoatey et al (2020) - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7215150/*
[6] *https://www.theguardian.com/business/2020/jun/19/three-meat-factories-in-england-and-wales-closed-over-coronavirus*
[7] *https://www.cdc.gov/coronavirus/2019-ncov/community/organizations/meat-poultry-processing-workers-employers.html*
[8] *https://www.wired.com/story/why-meatpacking-plants-have-become-covid-19-hot-spots/*

Table 1. Overview of regional, community, and setting-based COVID-19 outbreaks

Country	Regional clusters	Meat Industry outbreaks	Reliance on Migrant workers	Other significant clusters / factors
UK[9][10][11][12]	**England**: London, Midlands, North West **Wales**: Anglesey **Scotland**: Glasgow	✓	×	Significant number of confirmed cases also in care/nursing home and prison settings
Ireland[13][14]	Dublin	✓	×	1,069 clusters notified (20th June 2020)
Germany[15][16]	Bavaria, North Rhine – Westphalia	✓	✓	A total of 3,737 positive cases reported from meat processing plants or kitchens in the catering trade
France[17][18][19]	Île-de-France, Grand Est	✓	×	Over 1/3 of all cumulative deaths were in nursing homes and other medico-social establishments
Spain[20][21][22][23]	Aragon, Madrid, Catalonia	✓	✓	These territories have consistently reported most cases, influenced by having the highest population levels
Italy[24]	Lombardy, Piedmont	×	Not known	Lombardy has been one of the main hot-spots since the start of the outbreak
Denmark[25][26][27]	Copenhagen and surrounding	✓	✓	Greater number of positive cases within health and social care, and trade settings
Belgium[28][29]	Flanders	×	✓	Stricter rules for slaughterhouses, and the housing of migrant workers, have enabled them to remain open
Portugal[30][31]	Lisbon, Sintra	×	Not known	Outbreaks localised and traceable to particular work spaces and crowded neighbourhoods
Iceland[32][33]	Greater Reykjavik, South Iceland	×	×	Early signs of transmission within the community can be traced back to the UK
New Zealand[34][35]	Southern, Waitematá	×	✓	The most prevalent type of transmission is from imported cases, with the highest % of cases reported in Europeans or persons of other ethnic origin
Singapore[36]	Not defined	×	✓	Latest additional cases linked to a vast majority of Work Permit holders residing in foreign worker dormitories

[9] https://public.tableau.com/profile/public.health.wales.health.protection#!/vizhome/RapidCOVID-19virology-Public/Headlinesummary
[10] https://coronavirus.data.gov.uk/
[11] https://www.gov.scot/publications/coronavirus-covid-19-daily-data-for-scotland/
[12] https://www.foodmanufacture.co.uk/Article/2020/06/22/Coronavirus-More-meat-factory-clusters-expected
[13] https://www.gov.ie/en/news/7e0924-latest-updates-on-covid-19-coronavirus/
[14] https://www.euronews.com/2020/05/12/covid-19-outbreaks-in-german-slaughterhouses-expose-grim-working-conditions-in-meat-indust
[15] https://www.euronews.com/2020/05/12/covid-19-outbreaks-in-german-slaughterhouses-expose-grim-working-conditions-in-meat-indust
[16] https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Situationsberichte/2020-06-22-en.pdf?__blob=publicationFile
[17] https://www.france24.com/en/20200524-covid-19-how-the-meat-industry-became-a-global-health-liability
[18] https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=COVID-19%20clusters%20identified%20in%20French%20slaughterhouse%20workers_Paris_France_05-18-2020
[19] https://dashboard.covid19.data.gouv.fr/vue-d-ensemble?location=FRA
[20] https://cnecovid.isciii.es/covid19/
[21] https://www.euronews.com/2020/05/12/covid-19-outbreaks-in-german-slaughterhouses-expose-grim-working-conditions-in-meat-indust
[22] https://www.theguardian.com/global-development/2020/may/01/no-food-water-masks-or-gloves-migrant-farm-workers-in-spain-at-crisis-point
[23] https://english.elpais.com/society/2020-06-21/coronavirus-infection-rates-rise-in-spain-due-to-outbreaks-in-aragon-madrid-canaries-and-catalonia.html
[24] http://opendatadpc.maps.arcgis.com/apps/opsdashboard/index.html#/b0c68bce2cce478eaac82fe38d4138b1
[25] https://www.ssi.dk/sygdomme-beredskab-og-forskning/sygdomsovervaagning/c/covid19-overvaagning
[26] https://files.ssi.dk/COVID-19-ansatte-alle-brancher-19-inddeling-uge25-yg64
[27] https://www.globalmeatnews.com/Article/2020/05/18/Danish-Crown-closes-Southern-Jutland-slaughterhouse
[28] https://covid-19.sciensano.be/sites/default/files/Covid19/Dernière%20mise%20à%20jour%20de%20la%20situation%20épidémiologique.pdf
[29] https://www.brusselstimes.com/all-news/belgium-all-news/113544/strict-measures-prevent-coronavirus-outbreaks-in-belgian-abattoirs/
[30] https://covid19.min-saude.pt/ponto-de-situacao-atual-em-portugal/
[31] https://www.telegraph.co.uk/news/2020/06/22/portugal-restores-curfew-tackle-coronavirus-spike-lisbon/
[32] https://www.covid.is/data
[33] https://www.sciencemuseumgroup.org.uk/blog/hunting-down-covid-19/
[34] https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-current-situation/covid-19-current-cases
[35] https://www.globalmeatnews.com/Article/2020/04/15/New-Zealand-farmers-warned-of-further-processing-delays
[36] https://www.moh.gov.sg/news-highlights/details/218-new-cases-of-covid-19-infection-(22-june-2020)

Country examples

Germany[37]

As lockdown measures have eased across Germany, a high 7-day incidence rate was observed in multiple districts, primarily due to localised outbreaks *(table 2).*

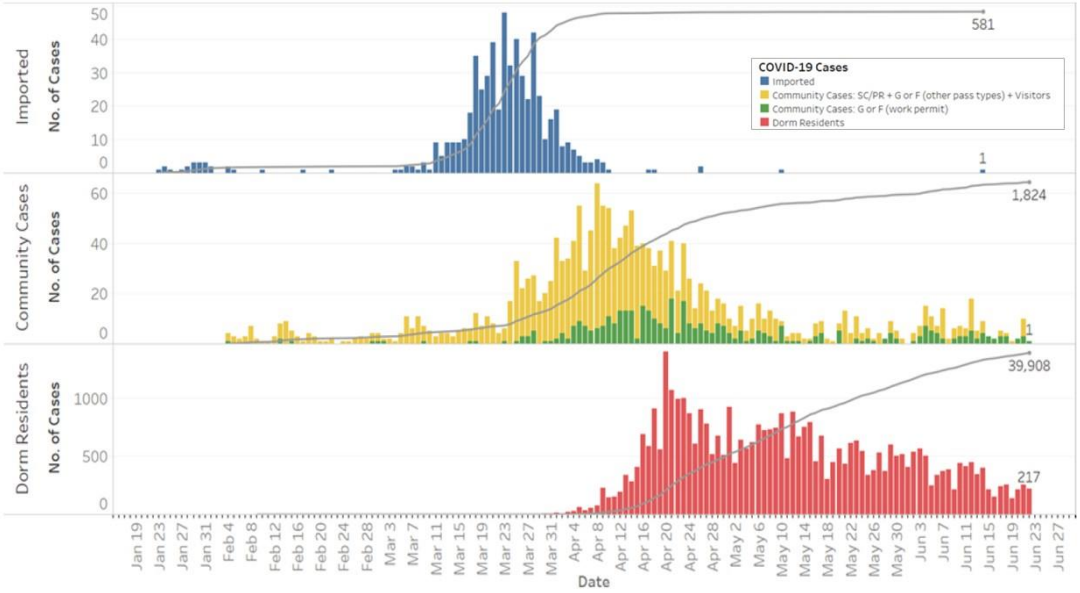
Table 2. An overview of recent outbreak settings in Germany

Current outbreak cluster/ hotspot location (German district)	Setting / source of outbreak	Cumulative number of cases in similar settings
Guetersloh	Meat processing plant	3,737
Goettingen,	Family gatherings	-
Neukölln, Berlin, Hesse, Mecklenburg-Western Pomerania.	Religious community gatherings	-
Verden	Retirement- and nursing homes	17,567 (residents) 9,765 (staff)
Other settings with high incidence	Hospitals, outpatient clinics and practices, dialysis clinics or outpatient nursing services	3,268 (patients) 13,677 (staff)
	Day care facilities, kindergartens, facilities for after school care, schools or other educational facilities, children's homes, holiday camps	2, 900 (residents) 2,668 (staff)

Singapore[38]

- After an initially well-contained outbreak, there is a resurgence in infection rates, particularly in the migrant worker population (*Figure 1*)[39][40]
- A key factor for this is considered to be the living conditions of migrant workers, including dormitories sleeping up to 20 people in bunk beds, making social distancing and other preventative measures extremely difficult or impossible[41]
- Singapore has adopted an aggressive test, track & trace approach, allowing to determine the origins of most cases. For example, 98% of the new cases are linked to known clusters

Figure 1. Epidemic Curve of the COVID-19 Outbreak by Press Release Date[42]



Total cases

42313

No. of cases in migrant worker population

39908

[37] https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Situationsberichte/2020-06-22-en.pdf?__blob=publicationFile
[38] https://www.moh.gov.sg/news-highlights/details/648-more-cases-discharged-218-new-cases-of-covid-19-infection-confirmed
[39] https://covidsitrep.moh.gov.sg/
[40] https://www.moh.gov.sg/docs/librariesprovider5/pressroom/press-releases/moh-press-release---annex-a-(22-jun-2020).pdf
[41] https://www.ft.com/content/0fdb770a-a57a-11ea-92e2-cbd9b7e28ee6
[42] https://www.moh.gov.sg/docs/librariesprovider5/local-situation-report/situation-report---22-june-2020.pdf

Long-term consequences of lockdown

Overview and summary of emerging evidence

- COVID-19 pandemic is far more than a health crisis - it is **affecting communities, societies and economies at their core**[43]
- COVID-19 will most **likely increase poverty and inequalities at a global scale**, making achievement of the Sustainable Development Goals (SDGs) even more urgent[43]
- **Prolonged or more restrictive social distancing** measures could increase health inequalities in the short and long term
- **Individuals in their teens and 20s** are at increased risk of depression and anxiety, online harassment, physical and sexual violence and unintended pregnancies[44].
- During COVID-19 lockdown, many **services have been scaled back** and repurposed to support the increased COVID-19 response[45]
- **Especially vulnerable sectors** include: hospitality, entertainment, transport, leisure, sport
- Overall, **economic downturns** have been associated with **deteriorating mental health**, including increases in homicide and suicide, as well as with **improvement in some health outcomes, such as traffic injuries**[46]
- People on **low incomes** are most vulnerable to the adverse effects
- Substantial **mitigation measures** are needed in the short and long term[47]
- Governments, such as the UK, have taken measures to reduce harms to businesses. People in **precarious work** (not covered by these measures) need to be considered; as well as **long term support** for vulnerable workers / families once the measures expire
- **Long term effects** may be substantial due to increasing unemployment rates; those losing their jobs in middle age may never return to the workforce in countries facing recession
- **Direct and indirect impacts** on health, such as morbidity and mortality from non-COVID-19 related conditions, arise through **numerous mechanisms and pathways**, including social, economic, behavioural, disruption to services, education and transport *(Figure 2)*
- Measures that have strong impact on the economy and society, such as lockdown, isolation, infection prevention measures, require a **health impact assessment (HIA)**
- HIA can identify **potential positive or negative factors and effects** on health, including: macro- and micro-economic conditions, unemployment, job insecurity, income loss, residential and environmental conditions, social and communal environment, sustainability factors, access to and quality of services, access to education, and others

[43] https://unsdg.un.org/sites/default/files/2020-04/UN-framework-for-the-immediate-socio-economic-response-to-COVID-19.pdf
[44] https://news.un.org/en/story/2020/06/1066252
[45] https://www.sciencedirect.com/science/article/pii/S0959804920301805?via%3Dihub
[46] https://www.bmj.com/content/369/bmj.m1557.full
[47] https://www.bmj.com/content/bmj/369/bmj.m1557.full.pdf ***Note: Authors state the assessment is based on rapid scoping of potential impacts and a non-systematic review of diverse publications, so there is a high degree of uncertainty about the extent of some impacts.***

Health services disruption

The European Region has reported **massive disruption to routine health care**[48], including:

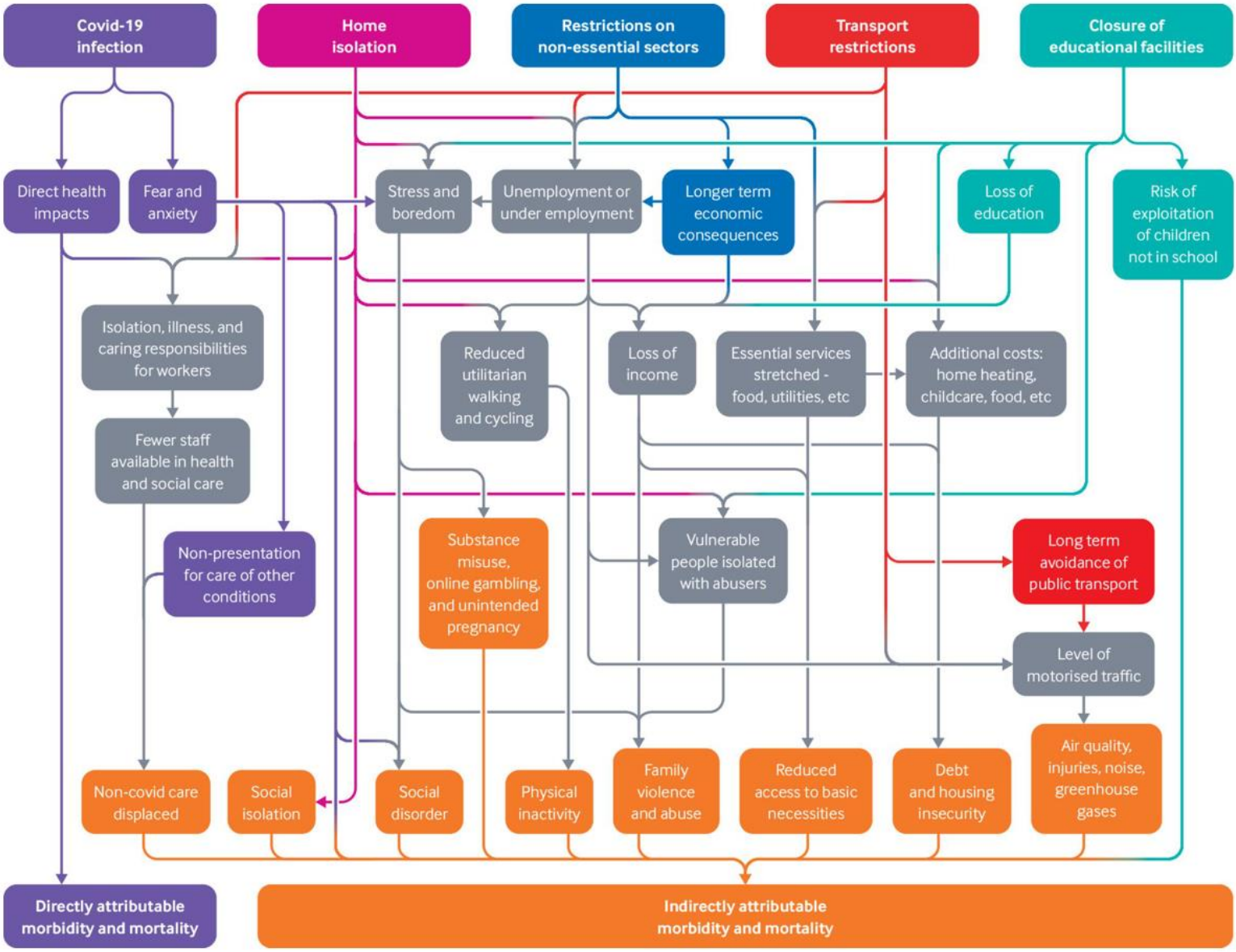
- Screening services and non-urgent surgery postponed (put on hold) or cancelled, in addition to treatments for acute and chronic conditions, such as chemotherapy[49]
- National immunization services disrupted in some countries, with others experiencing a significant drop in coverage
- Cancer screening programmes suspended in several countries
- 68% of countries have reported disruption to services to manage NCDs
- 66% of services for hypertension management have been disrupted
- 58% of services to manage diabetes and its complications have been disrupted
- New cancer diagnoses dropped by 25% in the Netherlands
- Cases of heart attack (myocardial infarction) treated by cardiology services dropped by 40%, compared to the weeks before the epidemic, in Spain
- Up to a 60% reduction in tuberculosis (TB) detection, leading to late start of treatment and increase in mortality
- Specific **NCD prevention/control** measures are presented in *Table 3*[50]

Country example – the United Kingdom[51]

- The impact, directly caused by the lockdown, could be profound, affecting people's income, job security and social contacts
- Unprecedented economic shock, with the Office for Budget Responsibility forecasting a 35% reduction in the Gross Domestic Product (GDP) in the second quarter of 2020
- Initial research on the impact of the lockdown on economic activity has found higher job and earnings losses for lower earners, younger workers and women
- Surveys suggest food insecurity has increased, driven by income loss and disruptions in the food supply.
- While the government has intervened to mitigate the shock, there are still gaps in provision, likely to cause hardship, as well as slow uptake of small business loans
- Prolonged spells of financial hardship and unemployment can affect health directly, as well as affecting future economic prospects
- The social consequences of a prolonged lockdown and period of social distancing:
  - ✓ Increased anxiety
  - ✓ People seeking help for domestic abuse
  - ✓ School closures may have negative / unequal consequences for pupils' development

[48] https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/statements/statement-preparing-for-the-autumn-is-a-priority-now-at-the-who-regional-office-for-europe
[49] https://www.kcl.ac.uk/news/researchers-highlight-impact-covid-19-pandemic-patients-with-cancer
[50] https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31067-9/fulltext
[51] https://www.health.org.uk/news-and-comment/blogs/covid-19-five-dimensions-of-impact

Figure 2. COVID-19 direct and indirect effects on health[52]



[52] https://www.bmj.com/content/369/bmj.m1557.full

Table 3. Responses, risks and mitigation related to NCD prevention and control during the COVID-19 pandemic[50]

	NCD-specific responses	Associated risks	Mitigation[47]
Community transmission with containment measures such as physical distancing and public service and institution closures or restrictions			
Lengthened time spent indoors	Use technology to provide knowledge & support to manage NCDs; online information on exercise & mental health self-management classes; healthy recipes for home preparation, and online delivery of healthy foods	Reduced physical activity Increased strain on mental health Greater consumption of unhealthy foods Harmful use of tobacco and/or alcohol	• Encourage and support other forms of social contact • Provide supplies • Provide clear communication • Restrict duration of isolation
Family members at home	Provide special arrangements for families with NCD patients to self-isolate	Risk of increased contact with younger family members at home	• Support to vulnerable families • Realistic expectations for home working / home schooling • Safety advice and support services for women at risk of domestic abuse • Support for young people in critical transitions; low income; at-risk children; and young people who lack IT and good home study environment
Inadequate access to medicines	Use telemedicine more Allow local or community doctors and pharmacists to renew or extend drug prescriptions Deliver essential drugs to home	Shortage of essential medicines such as insulin and other NCD-specific medication	• Robust business continuity planning • Attention to supply chains for non-COVID medicines
Transport and other services restricted	Prioritise and ensure continued community level services in a safe way to cater for NCD patients' needs	Restricted transport facilities and family support for continued NCD care	• Discourage unnecessary car journeys • Support active travel • Safe access to green spaces • Post-pandemic support for public transport
Test, Trace and Protect			
Early detection and extensive testing	Prioritise NCD patients and immunocompromised for COVID-19 testing at triage where possible Promote the need for testing	NCD patients who visit health facilities have greater risk of exposure to COVID-19; they might be less motivated or able to actively seek testing in a safe manner	Avoid stigmatising ill people or linking the pandemic to specific conditions
Contact tracing	Focus on NCD patients and those with risk factors (e.g. obesity); alert and follow up closely	NCD patients might be unaware of the additional risks posed on them	Avoid stigmatising ill people or linking the pandemic to specific conditions
Health-care settings (infection control)	Provide NCD patients and health-care staff working in NCD services with special training and personal protective equipment, as well as health-care professionals at increased risk of NCDs	NCD patients with comorbidities are at increased risk of infection Health-care staff working in NCD clinics are at increased risk of infection	• Robust business continuity planning • Prioritise essential services including health & social care, emergency services, utilities, and the food chain • Guidance, online consultations and outreach, for conditions other than COVID-19

Impact of the climate on COVID-19 incidence rates

Overview

- COVID-19 virus has been transmitted in all regions of the world, from cold and dry, to hot and humid climates
- There is currently no conclusive evidence that weather (short term variations in meteorological conditions), climate (long-term averages) or temperature have a strong influence on COVID-19 transmission and spread[53][54]
- Cold weather and snow, or warmer temperatures (>25°C) cannot kill COVID-19 virus[55]
- Key arguments supporting the **hypothesis that weather can play a role in the aggravated spread of COVID-19 disease during winter** include:
  - ✓ Seasonal patterns of similar viruses (e.g. common cold, influenza) show they spread more during cold months[56], but people can still become ill during other months
  - ✓ Particulate matter, such as droplets, can last longer in cold and less humid environments[56]
  - ✓ Population behaviour show that people tend to gather more in closed spaces during colder months**,** which facilitates transmission and spread of the virus[57]
  - ✓ Low winter temperatures can make human body more vulnerable to viral infections[58]
  - ✓ Circulation of other viruses can negatively affect people's immunity; however, individuals recently recovered from a viral infection show strengthened immune systems, which might help to prevent subsequent infections[59]
- There is still much to learn about the transmissibility, severity and other features associated with COVID-19 and investigations are ongoing
- It is too early to determine if meteorological parameters play a role in causing continuous or increasing incidence of COVID-19 in Latin American countries, especially as some countries like Ecuador, Paraguay and Uruguay, have seen a decline of cases and deaths

Evidence on viral transmission and meteorological parameters

Learning from influenza and other corona viruses studies

- Epidemics usually occur during winter in temperate countries; and during the rainy season in tropical countries, suggesting climate impact on the spread of Influenza viruses[60]
- At an epidemic scale, no impact of climate factors was highlighted[60]
- At an intra-annual scale, six climate variables appear to have a significant impact[60]
  1. Average temperature (5.54 ± 1.09%),
  2. Absolute humidity (5.94 ± 1.08%),
  3. Daily variation of absolute humidity (3.02 ± 1.17%),
  4. Sunshine duration (3.46 ± 1.06%)
  5. Relative humidity (4.92 ± 1.20%)
  6. Daily variation of relative humidity (4.46 ± 1.24%)
- Among these six factors, only two could have a real effect on influenza spread, although it is not possible to determine which ones, based only on statistical analysis[60]

[53] https://www.who.int/news-room/q-a-detail/q-a-on-climate-change-and-covid-19
[54] https://www.cdc.gov/coronavirus/2019-ncov/faq.html
[55] https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters
[56] https://www.bbc.com/mundo/noticias-51705064
[57] https://www.clima.com/noticias/como-afectara-el-invierno-en-argentina-al-coronavirus
[58] https://www.mdpi.com/1660-4601/17/5/1633/htm?luicode=10000011&lfid=231522type%3D1%26t%3D10%26q%3D%23%E4%B8%96%E5%8D%AB%E7%BB%84%E7%BB%87%E5%B7%A5%E4%BD%9C%E4%BA%BA%E5%91%98%E5%9C%A8%E4%BC%8A%E6%9C%97%E6%84%9F%E6%9F%93%E6%96%B0%E5%86%A0%E7%97%85%E6%AF%92%23&featurecode=newtitle%E7%9C%8B%E8%B5%B7&u=https%3A%2F%2Fwww.mdpi.com%2F1660-4601%2F17%2F5%2F1633%2Fhtm
[59] https://www.theguardian.com/world/2020/mar/17/what-effect-will-winter-have-on-coronavirus-in-australia
[60] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4881007/

- In temperate countries, influenza outbreaks are well correlated to seasonal changes in temperature and absolute humidity[61]
- Tropical countries have much weaker annual climate cycles, outbreaks show less seasonality and are more difficult to explain with environmental correlations[61]
- It is possible to show that despite the apparent differences in outbreak patterns between temperate and tropical countries, absolute humidity and, to a lesser extent, temperature, drive influenza outbreaks globally[61]
- A hypothesized U-shaped relationship between absolute humidity and Influenza is predicted by theory and experiment, but has not been documented at the population level[61]
- The balance between positive and negative effects of absolute humidity appears to be mediated by temperature, and the analysis reveals a key threshold around 75°F[61]

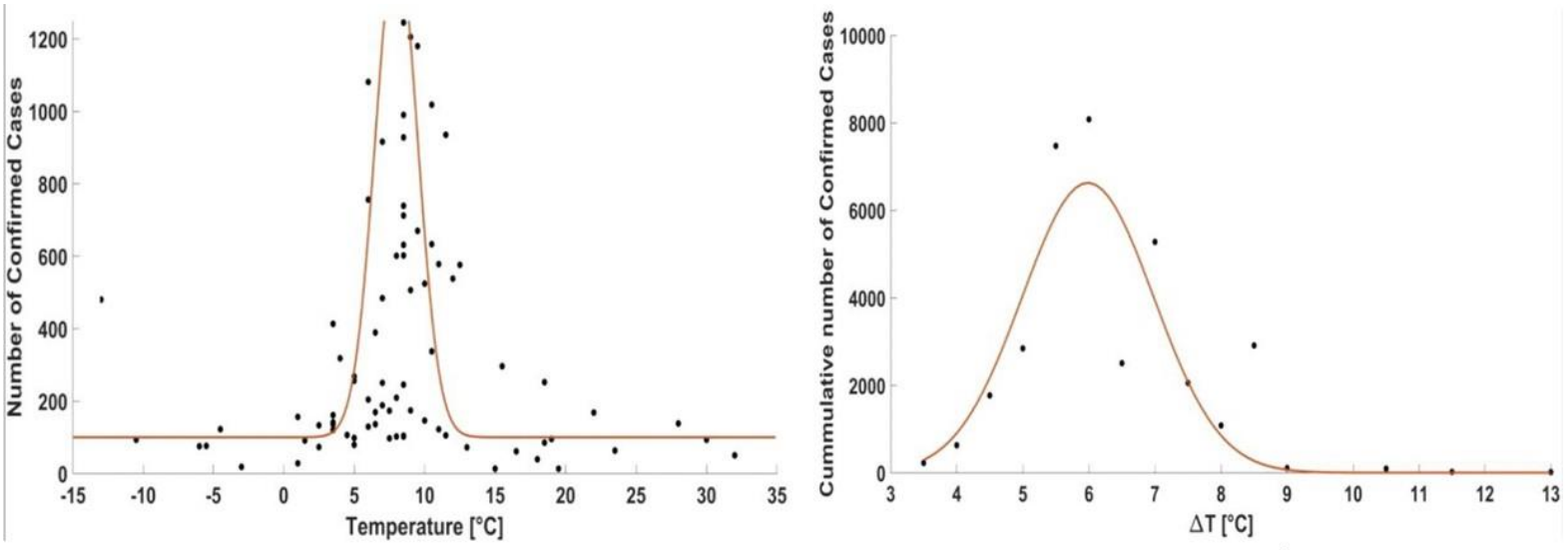
Learning from a COVID-19 study[62]

- Analysis of the region-/city-specific global data and corresponding meteorological factors show that there is an optimum range of temperature and UV index[63] affecting the spread and survival of the virus (*Figure 3*)
- Precipitation, relative humidity, cloud cover were found to have no effect on the virus
- This study lacks supporting physiological evidence and cannot be used in isolation

COVID-19 and climate in South America

- South America has been severely affected by the COVID-19 pandemic, notably Brazil, Peru and Chile *(Figure 4)*
- South America is currently in its winter period (20 June-22 September), which, with the exception of the very south of Argentina and Chile and mountain areas, is milder and less humid than the UK *(Figure 5)*
- The forecast has predicted higher temperatures than usual for the months of May, June and July 2020[6465]

Figure 3. Scatter plot of temperature and total number of confirmed cases (to March 2020)



a Scatter plot between average daily temperature and number of confirmed cases. The line shows the log normal fit to the data ($N = 85$; $R^2 = 0.35$). **b** Scatter plot of the difference between the maximum and minimum daily temperatures and accumulated number of confirmed cases. The orange line shows the log normal fit to the data ($N = 14$; $R^2 = 0.74$). All the fits are statistically significant

[61] https://www.pnas.org/content/113/46/13081.short
[62] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7180684/
[63] https://www.who.int/news-room/q-a-detail/ultraviolet-(uv)-index
[64] https://www.clima.com/noticias/como-afectara-el-invierno-en-argentina-al-coronavirus
[65] https://www.timeanddate.com/weather/argentina/buenos-aires/historic

Figure 4. Distribution of cases and deaths (%) by country in South America[66][67]

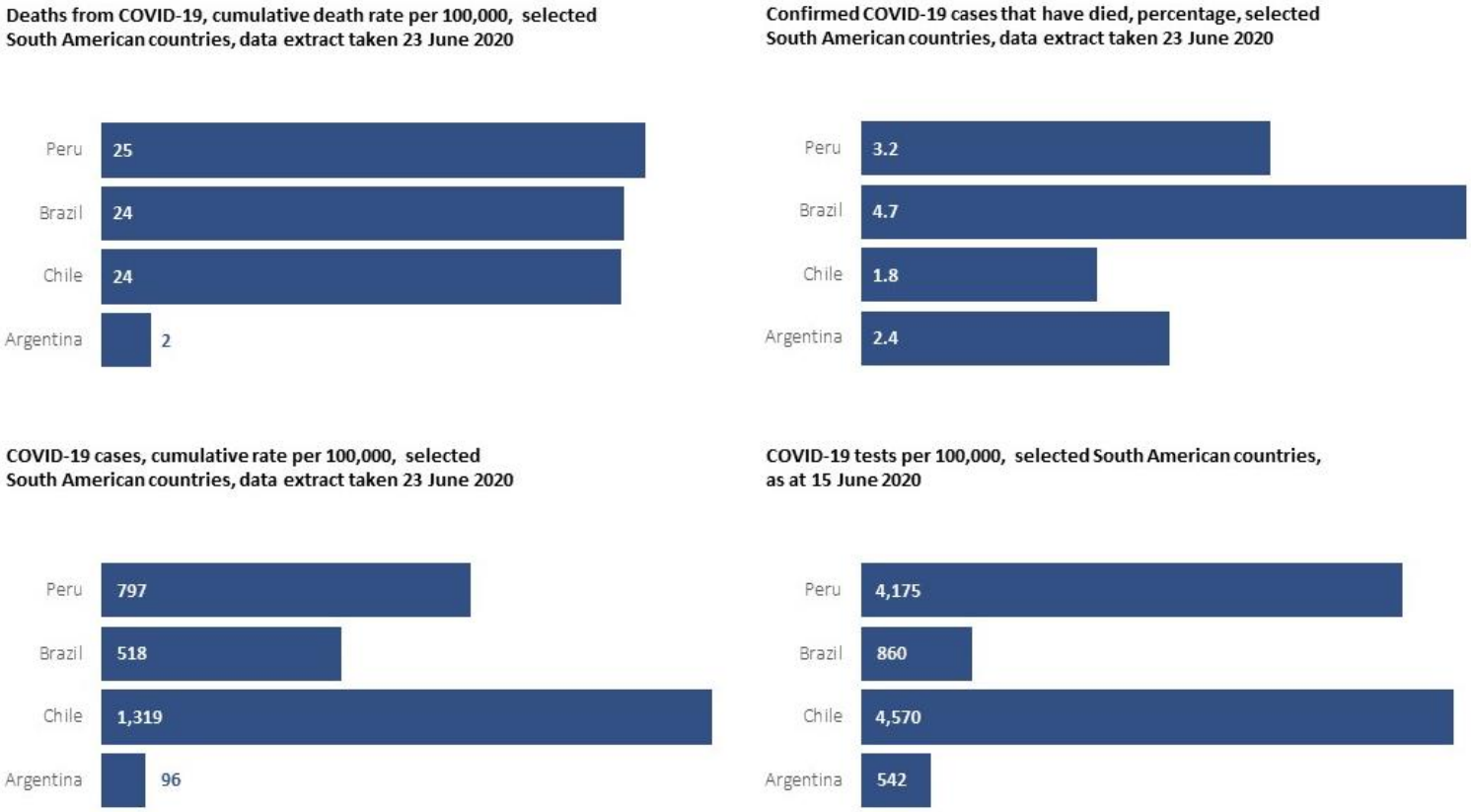
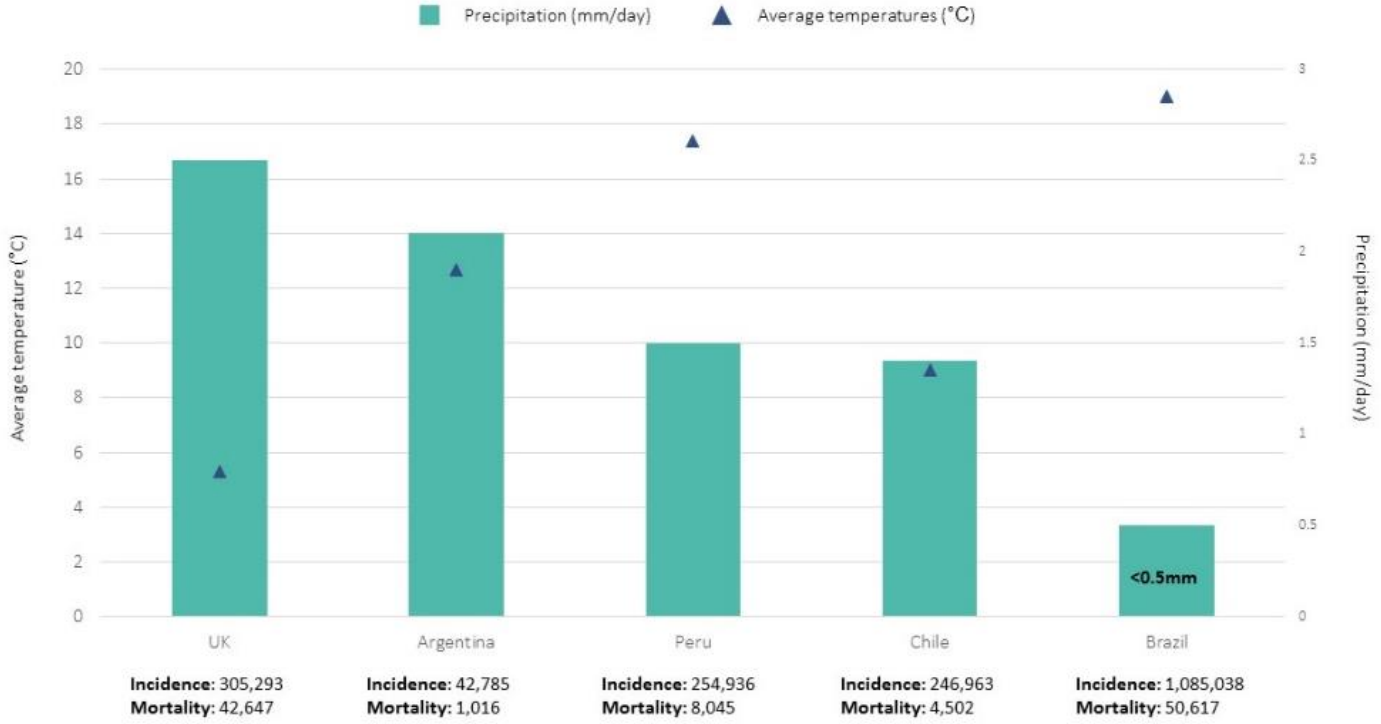


Figure 5. COVID-19 incidence and mortality, 23 June 2020 and average winter temperatures[68][69]



*UK average temperature refers to the months December – February. All other countries cover the months June – August.
^Climate data for Argentina, Peru, Childe and Brazil is based on data for the capital cities.

[66] https://paho-covid19-response-who.hub.arcgis.com/pages/paho-south-america-covid-19-response
[67] Country population data from The World Bank: https://data.worldbank.org/indicator/SP.POP.TOTL
COVID-19 cases and deaths data from WHO Dashboard: https://covid19.who.int/
Testing data from the Americas Society Council Of The Americas: https://www.as-coa.org/articles/chart-covid-19-testing-recovery-and-mortality-rates-latin-america
[68] https://www.weather-atlas.com/en/brazil/brasilia-climate#rainfall_days, https://meteobox.com/brazil/brasilia/statistics/
[69] https://covid19.who.int/

Homelessness

Overview

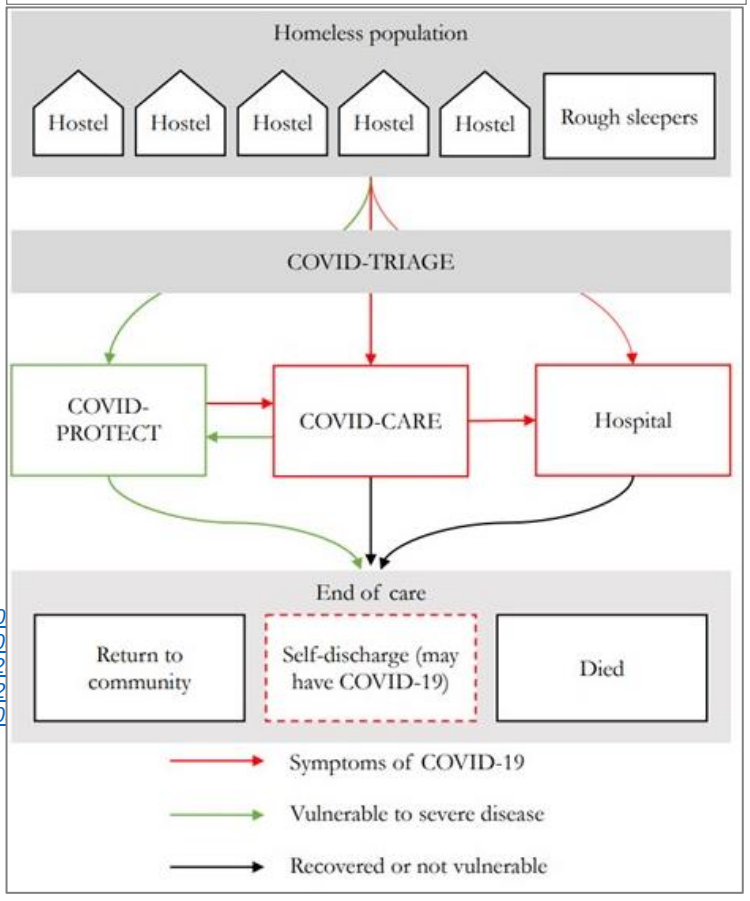
- People experiencing homelessness are a vulnerable group and exposure to COVID-19 can negatively affect their mental and physical health[70]
- People experiencing homelessness, aged younger than 65 years, have all-cause mortality that is 5 to 10 times higher than that of the general population[71]
- A high proportion of homeless people have chronic physical or mental disorders[72]
- Homeless people can be even more overlooked once healthcare services are allocated almost exclusively to fighting COVID-19 pandemic[72]
- Detection of cases and prevention of disease in a transient population are more difficult[73]
- Many people experiencing homelessness live in congregate settings, such as shelters or halfway houses, or encampments or abandoned buildings, which increases the risk of transmission[74]
- COVID-19 outbreak can impact housing security, with loss of income, causing rent or mortgage arrears or even homelessness[75]

Emerging evidence

COVID-19 and homelessness in England: a modelling study[76]

- A residential intervention developed to isolate those vulnerable to severe disease (COVID-PROTECT) and care for people with symptoms (COVID-CARE) *(Figure 6)*
- In a 'do nothing' scenario, 34% of the homeless population could get COVID-19 (March-August 2020) with 364 deaths, 4,074 hospital admissions and 572 critical care admissions
- In 'Base Intervention' scenario, demand for COVID-PROTECT peaks at 9,934 beds; and demand for COVID-CARE peaks at 1,366 beds. This could lead to a reduction of 164 deaths, 2,624 hospital admissions, and 248 critical care admissions over this period
- In conclusion: supportive accommodation can Homeless population in England, and reduce the burden on acute hospitals

Figure 6. Residential intervention to support homeless people in England



Country examples

Measures have been taken across multiple countries to prevent the spread of COVID-19 in the homeless population *(Table 4)*.

[70] https://www.sciencedirect.com/science/article/pii/S2468266720300
[71] https://www.sciencedirect.com/science/article/pii/S2468266720300
[72] https://www.sciencedirect.com/science/article/pii/S0378512220302
[73] https://www.sciencedirect.com/science/article/pii/S0378512220302
[74] https://www.sciencedirect.com/science/article/pii/S2468266720300
[75] https://www.bmj.com/content/369/bmj.m1557.full
[76] https://www.medrxiv.org/content/10.1101/2020.05.04.20079301v1

Table 4. An overview of preventative measures taken in homeless populations in response to the COVID-19 outbreak

Country	Measures taken
Ireland	COVID Community Assessment Hub established in Dublin to support, test and care for people from vulnerable groups, including homeless, Traveller and Roma populations. The service offers: • A helpline for hostel staff with concerns about residents • A mobile health and screening unit • Open access clinics • In-reach and outreach services; and • A Step Up Step Down service to help relieve pressure on hospital beds • Introduction of a three month rent freeze and ban on evictions to prevent families becoming homeless • Homes found for more than 100 families living in sheltered accommodation in Dublin • Hotel rooms for people living in hostels and shared accommodation
France[77][78][79][80]	• Testing and self-isolation centres set up in Paris for homeless people who test positive, but do not require hospitalisation • Extension of winter truce accommodation for around 14,000 rough sleepers • Temporary halt on residential evictions until July • Allocation of an extra 50 million euros for housing
Germany	• Provision of hotel accommodation for rough sleepers • Temporary ban on residential evictions
Portugal	Lisbon City Council: • Opened four spaces to accommodate up to 140 homeless people • Two new quarantine spaces • Reinforced hygiene measures in the existing centres, with the creation of isolation spaces for suspected cases • The Central Mosque of Lisbon opened up to homeless people with COVID-19 who are asymptomatic or showing mild symptoms
Spain	Social service authorities have set up points where homeless people can: • Receive kits with food and hygiene products • Get their temperature checked; and receive guidance on preventative measures Homeless centres are supported by health personnel who provide them with: • Protective equipment • Health monitoring • Identifying possible infections and isolation guidance • Preventative measures • Reinforced cleaning and disinfection procedures for facilities and residents' clothing and belongings Provision of large spaces to house, feed and care for homeless people, equipped with isolation areas to help minimise the risk of contagion in current homeless shelters Madrid City Council repurposed a hotel to accommodate homeless people with mild symptoms, with capacity for 120 convalescents and gave a two-month extension of the Cold Weather Campaign for homeless people, with 479 places
New Zealand[81][82][83]	• Priority testing for people in communities with high deprivation, crowded housing, and barriers to access to healthcare • $100m to keep 1,200 motel rooms available for the homeless for a year • Promise to build 8,000 more social housing places
Singapore[84]	The cross-agency homelessness network in Singapore (PEERS) is helping to: • Provide safe sleeping places for around 700 rough sleepers • Distribute care packs with hygiene kits and surgical masks to temporary shelter residents and rough sleepers • Identify people living on the streets through a network of Safe Distancing Ambassadors and social workers

[77] http://www.insee.fr/fr/themes/document.asp?ref_id=ip1455
[78] https://www.neweurope.eu/article/france-opens-self-isolation-centres-to-shelter-homeless-with-covid-19/
[79] https://news.cgtn.com/news/2020-03-25/Europe-scrambles-to-get-shelter-care-for-homeless-amid-COVID-19-P9vvAdAiyc/index.html
[80] https://www.insidehousing.co.uk/insight/how-europes-housing-sector-has-responded-to-the-covid-19-crisis-66450
[81] https://www.health.govt.nz/system/files/documents/pages/testing_approach_to_eliminate_covid-19-28april2020.pdf
[82] https://www.theguardian.com/world/2020/may/27/new-zealand-sheltered-its-homeless-during-covid-19-but-can-it-last
[83] https://www.otago.ac.nz/news/news/otago613529.html
[84] https://www.channelnewsasia.com/news/singapore/covid-19-homeless-seek-shelter-assistance-msf-desmond-lee-12699938

Country insight: Argentina[858687]

Overview

- Social distancing measures escalated and strict mandatory lockdown from 19th March
- COVID-19 incidence is still on the rise
- Approximately 88% of all cases in Greater Buenos Aires (highest population in the country)
- Greater Buenos Aires accounts for half of total poverty in the country with nearly 5 million people under the poverty line (second ½ of 2019) of which 1.4 million people live in extreme poverty (68% of the country's total)
- Special concern: a group of 33 districts surrounding Buenos Aires city hit harder, with a population of about 10 million, characterised by high unemployment and poverty; poor health; poor living conditions with overcrowded houses and limited access to safe water

Economic impact

- Argentina already in fragile economic and social situation before COVID-19 pandemic (two years of recession, inflation above 50% and poverty affecting 35.5% of the population
- Expected that economic downturn would deteriorate further
- 63.8% of export concentrated in agricultural commodities/products, vulnerable to price drop
- Services-producing sectors (52.4% of real GDP 2018) can also suffer a severe hit
- Sectors that might be worst hit include retail, hospitality (hotels, restaurants), real estate, business, cultural and sports activities, accounted for 27.6% of the GDP
- "Economy vs health" complex challenge, given important fiscal imbalances and high public debt burden, which could turn into a more disruptive economic and political crisis

Mitigation measures

Tax payments: government postponed or significantly reduced the payment of payroll taxes for companies in non-essential activities for a two-month period.

Wage payments: government to subsidize wage payments for affected companies; first to pay part of workers' wages, with coverage varying according to the companies' size; later decided to pay half of private workers' wages in companies with up to 800 workers, with a cap of two minimum salaries. 1.6 m workers of 158,731 companies would receive the benefit.

Bank loans: government announced subsidized loan programs to finance companies' capital; and independent workers, seeking to prevent a break-up in the supply chain (already tight). Small and medium businesses faced challenges in complying with banks' credit requirements.

To **prevent a major deterioration of social conditions**, the following measures announced:

- ✓ **A rise in the unemployment insurance benefits**
- ✓ **An emergency subsidy** for those who are unemployed, for informal workers and for independent workers with the lowest incomes

Delay in implementation and **severity of the situation** for many households and companies suggest that the above measures might be insufficient, taking into account that social distancing measures are expected to remain in place for a long time.

[85] https://covid19.who.int/region/amro/country/ar
[86] https://www.aljazeera.com/news/2020/06/argentina-covid-19-cases-spike-pandemic-grips-poor-villas-200619162334234.html
[87] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjX8rCU2JfqAhXeRBUIHTizBFEQFjAJegQIBBAB&url=https%3A%2F%2Fwww.undp.org%2Fcontent%2Fdam%2Frblac%2FPolicy%2520Papers%2520COVID%252019%2FUNDP-RBLAC-CD19-PDS-Number6-EN-Arg.pdf&usg=AOvVaw14_G9Iqp0dBuFPc5OKJ6kc

The International Horizon Scanning and Learning reports are developed by the International Health
Team (the International Health Coordination Centre, IHCC) at the WHO Collaborating Centre on Investment for Health and Well-being (WHO CC), Public Health Wales.
Executive lead and Director of the WHO CC: Professor Mark A Bellis
International health lead: Dr Mariana Dyakova (mariana.dyakova@wales.nhs.uk)
Senior programme manager: Lauren Couzens (lauren.couzens@wales.nhs.uk)