Preface

Please note: The research, and findings presented in this document are based on data collected until January, 2021.

As the world continues to grapple with COVID-19, this booklet comes in handy to answer and reflect upon basic questions encompassing the word “pandemic”- the what, where, when and how of it. The genesis of the book began when we were approached by the Office of Principal Scientific Adviser to the Government of India to produce a document that was not meant to be: (i) a compendium for training individuals on pandemic science; (ii) an exhaustive compilation of do’s and don’ts with respect to a pandemic; and iii) a commentary on global best versus worst practices to combat the pandemic.

What this booklet does aim to provide is the following: (i) basic information about key concepts associated with and procedural understanding of the term “pandemic”; (ii) a synopsis of past and present pandemics with focus on lessons learnt- primarily from COVID-19 and preparedness for future; iii) a brief overview of mitigation policies adopted by countries across the globe to combat the pandemic (iv) an account of direct and indirect impacts of pandemic on various sectors of the society ranging from health, education, to economic, and v) a preliminary inference of its ramifications on progress towards Sustainable Development Goals (SDGs). Therefore, this booklet should be considered as a primer on pandemics with the main objective of familiarizing its readers with key concepts, measures, lessons and preparedness on pandemics.

The booklet took about 6 months till its completion. It was a herculean task as the goal posts kept changing, we were flooded with new information on a daily basis regarding a relatively new phenomena. However, as we sailed through uncharted waters and endured the hurdles, we believe we have a story to tell through this booklet and hope the readers find it useful primarily as an information note on pandemics in general. It also highlights some of the complexities we have to face when making decisions to combat the disease but at the same time oversee the welfare of the people across multiple domains and not just linked with the disease.

We acknowledge that an exhaustive evaluation of the current pandemic- COVID-19 and its aftermath might not be possible, given that it is still ongoing and we make no such claims. However, we do try to gauge the magnitude of its impact on the world we live in and derive preliminary inferences based on facts to enhance our understanding.

If there is one thing that the COVID-19 pandemic has revealed it is the power of oneness- power of global coordination, international scientific collaboration, and aligned action in fighting against the virus. We are all in this together. As we learn to live with the fact that COVID-19 is here to stay for a while, and continue to acclimatize to the “new normal”, our aim should be to trust scientific evidence and align our actions in a manner that maximizes “normal” living and minimizes inconveniences caused due to the pandemic. We hope this booklet will provide its audience with necessary information to help achieve this goal.
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COVID-19 pandemic is unprecedented in human history. It has brought to the forefront some unimaginable challenges and has highlighted the need for resilient and adaptable health, economic, and social systems. It is only through an unwavering commitment to COVID appropriate behaviour and adoption of an integrated approach towards vaccine development that we can mitigate and recover from damage caused by pandemics like COVID-19.

As the world continues to grapple with this pandemic, it is essential to understand the basic questions encompassing the word “pandemic” - the what, where, when and how of it. This is the motivation for the document.

The primary aim of this document is to provide basic information about key concepts associated with and procedural understanding of the term “pandemic”. It gives a synopsis of past and present pandemics with focus on lessons learnt primarily from COVID-19 and preparedness for future. It sheds light on the mitigation policies adopted by countries across the globe to combat the pandemic and gives an account of direct and indirect impacts of pandemic on various sectors of the society.

This document is a collation of facts and figures which are informational in nature. It highlights some of the complexities we have to face as a nation when making decisions to combat the disease but the same time oversee the welfare of the people across multiple domains and not just linked with the disease. I hope that this document will serve as a useful tool not only for policymakers who are at the forefront of devising plans to combat the spread of disease, but also for other stakeholders like educators, economists, health care personnel who are tasked with implementing the plans, and most importantly people by and large who are ultimately responsible for executing the plans, thereby deciding success or failure in curtailting the spread of the disease.

I would like to congratulate Prof Anantha Kumar Duraiappah, Director UNESCO MGIEP, his entire team and the eminent contributors in taking the initiative and bringing out this document.

Lastly, I thank my team consisting of Shri B.N. Satpathy and Shri Suneet Mohan for coordinating and contributing towards building of this document.

K. VIJAYRAGHAVAN
Principle Scientific Advisor to the Govt. of India
The pneumonia was attributed to a coronavirus. In India, the first case was reported on 30 January 2020. On 11 March 2020, the WHO declared the infectious disease a pandemic. The disease was called Coronavirus infectious disease 2019 (COVID-19), and the virus SARS coronavirus 2 (SARS-CoV-2).

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It is against this background that this document has been prepared. The objective of this document is to provide basic facts about pandemics, past, present and future. It is meant to be a primer on pandemics. It provides a brief overview of some of the key factors that might help understand and address pandemics, especially the ongoing COVID-19, and their impacts across society at the global scale. This document is not meant to provide an exhaustive explanation of pandemics. References to specific do not reflect the official views of the government.

The document is targeted primarily to policymakers tasked with handling pandemics but also to stakeholders in other sectors such as education and development who are affected by pandemics. The primary data used in this document are from recognized databases such those by the World Health Organization (WHO), John Hopkins University and the Centers for Disease Control and Prevention (CDC). Peer reviewed published literature as well as reports from the relevant international organizations are extensively used in this document. The dates on which the data is presented range from October to December as the numbers are constantly changing as the virus works its way through the world.

The document is organized around 17 questions beginning with what is a pandemic and the international legal-institutional process to declare a pandemic. These are then followed by questions on the COVID-19 mitigation policies that have been used to date and the lessons learnt. The next set of questions focus on the direct and indirect impacts of the COVID-19 pandemic across the health, education and economic sectors and extrapolating these on the progress towards achieving the Sustainable Development Goals (SDGs).

The document ends with some key lessons and recommendations on the way forward.

What is a pandemic?

At the time of finalizing this document (10 December 2020), there were 68,165,877 confirmed cases of the COVID-19 pandemic and 1,557,385 confirmed deaths across 220 countries, areas and territories. The majority of the cases as of October 1st 2020 have been in the United States of America (USA), India and Brazil and which are still not seeing a flattening of the curve as shown in Figure 1.

Although the WHO does not have a binding set of rules for declaring a pandemic, the organization uses the International Health Regulations (2005) (IHR) as the global legal instrument to help protect nations from international spread of disease including public health risks and public health emergencies. The IHR requires countries to report public health events and outlines criteria to determine whether or not a particular event constitutes a “public health emergency of international concern” (PHEIC).

The bottom line we can learn from COVID-19 is the need to strengthen the rules and legislation within the WHO for it to declare a pandemic that is universally accepted by all Member States and are obliged to act accordingly in a collaborative manner with support from the WHO.

The COVID-19 is not a ‘Black Swan’ event as many claim it to be. A report from the Global-Preparedness-Monitoring-Board...
COVID-19 mitigation policies

Countries across the world adopted a range of measures ranging from lockdowns, containment zones, mandatory masks, social distancing and personal sanitary measures. It seems that countries which followed a rigorous Test, Track, Quarantine, Treat (TTQT)—in conjunction with strict lockdowns in the early stages of infections followed by easing of lockdowns with containment zones established when necessary—and enforced non-pharmaceutical interventions (social distancing, masks and sanitary measures) have weathered the pandemic much better (see countries with flattened case load rates in Figure 3) than those which had ad-hoc or partial measures but without strategic planning.

The differences in the effectiveness of such measures applied in different countries reflect a fundamental property of epidemics—that the contact between susceptible and infected individuals which leads to transmission depends on the choices made by individuals. People’s contact choices reflect the relative costs of illness and its avoidance to them—the private cost. If the private cost of illness is low, or the private cost of illness avoidance is high, people have little incentive to avoid contact. The essentially economic nature of contact decisions, and the essential role of economics in epidemiological processes determines the total impact a pandemic has on societies. A key lesson emerging from this observation is for policymakers to have mechanisms that automatically kick in during times of disaster such as a pandemic to reduce the private costs of illness avoidance.

Impacts of the COVID-19 pandemic

COVID-19 has had profound impacts across all segments of society and across all countries. Nobody has been spared. Those countries with high levels of infection have seen high mortality rates while others have witnessed the indirect impacts through disruptions in the education and human development sectors. In this document, we have explored the impact the pandemic has on the economic, education, and health sectors. We have also used the 17 Sustainable Development Goals (SDGs) as a relevant benchmark to assess the impacts of COVID-19. Figure 2 provides a snapshot of this across the SDGs.

Poverty, health, hunger, education, gender, unemployment, and inequalities can be expected to worsen and might take a long time to recover if targeted policies are not enforced immediately and continued post COVID-19. Areas to focus include the green sustainable economy, digitalization, social-welfare programs and governance.

Short-term Impacts of COVID-19 on the Sustainable Development Goals

| SDG | Description | Impact
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<tr>
<td>SDG 1</td>
<td>No poverty</td>
<td>Highly negative impact on employment, income, and wealth.</td>
</tr>
<tr>
<td>SDG 2</td>
<td>Zero hunger</td>
<td>Mixed or moderately negative impact.</td>
</tr>
<tr>
<td>SDG 3</td>
<td>Good health &amp; well-being</td>
<td>Mixed or moderately negative impact.</td>
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<tr>
<td>SDG 4</td>
<td>Quality education</td>
<td>Mixed or moderately negative impact.</td>
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<td>Gender equality</td>
<td>Mixed or moderately negative impact.</td>
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<tr>
<td>SDG 6</td>
<td>Clean water &amp; sanitation</td>
<td>Highly negative impact.</td>
</tr>
<tr>
<td>SDG 7</td>
<td>Affordable &amp; clean energy</td>
<td>Highly negative impact.</td>
</tr>
<tr>
<td>SDG 8</td>
<td>Decent work &amp; economic growth</td>
<td>Mixed or moderately negative impact.</td>
</tr>
<tr>
<td>SDG 9</td>
<td>Industry, innovation &amp; infrastructure</td>
<td>Mixed or moderately negative impact.</td>
</tr>
<tr>
<td>SDG 10</td>
<td>Reduced inequalities</td>
<td>Highly negative impact.</td>
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Figure 2. Impacts of COVID-19 across the SDGs. Source: Sachs et al. (2020, pp. 4-5)
**Key Lessons and Future Challenges:**

- **Emerging Infectious Diseases (EID) causing pandemics** have been found to be distributed non-randomly across the globe with many dominated by pathogens emerging from land conversion, agricultural production methods, the trade in wildlife and wildlife products, and the ecological impacts of habitat depletion. Pandemics can be expected to occur more frequently in the future. Countries need to prepare themselves for this challenge.

- **Differences in the effectiveness of pandemic measures** applied in different countries reflect a fundamental property of pandemics—that the contact between susceptible and infected individuals, which leads to transmission, depends on the choices made by individuals. People’s contact choices reflect the relative costs of illness and illness avoidance to them—the private cost. If the private cost of illness is low, or the private cost of illness avoidance is high, people have little incentive to avoid contact. The challenge is to bring down the cost of avoidance.

- **Countries which were able to secure the participation of their citizens—either by reducing the private cost of illness avoidance or by strict regulatory enforcement with punitive actions—were successful in stemming the rapid rise in infection by adopting a Test, Track, Quarantine, Treat (TTQT) strategy.**

- **Existing mechanisms at all spatial and institutional levels are ill-equipped to address and counter the effects of pandemics.** Healthcare, education, and economic systems across the globe have struggled to cope with the direct and indirect effects of the pandemic, leading to many countries witnessing a reversal in their achievements towards the SDGs. The challenge is to meet the SDG goals with renewed efforts after the pandemic.

**Opportunities:**

- **Explore at the global level, establishing an international task force comprising of an interdisciplinary group of experts from across the world to identify ways and means to put in place monitoring and coordinating mechanisms for more efficient and effective mitigation and adaptation pathways.**

- **Leveraging digital technologies—such as artificial intelligence (AI), big data and cloud computing, and blockchain—to test, track, quarantine and treat COVID-19 can curb the spread of the disease across borders. These technologies should ideally be overseen by the national and global coordinating centers to ensure privacy of individuals while increasing efficiency.**

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**Challenges:**

- **Highly negative impact**
  - Disproportionate negative health and economic impacts on vulnerable groups (including refugees and migrants) especially in countries with low safety nets
  - Loss of jobs of lower skilled lower-wage labor

- **Mixed or moderately negative impact**
  - Rise in urban poverty and vulnerability
  - Shutdown of public transport
  - Lower access to public/green spaces
  - Movements of population that vary across countries
  - Short term reduction in pollution levels

- **Impact still unclear**
  - Short-term reduction in natural resource use due to reduced economic activity and consumption
  - Pressure to loosen up regulations on circular economy and postpone the adoption of new measures
  - Increased plastic pollution (eg, used to produce personal protective equipment)

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The ongoing COVID-19 pandemic has had far-reaching impacts across the world. The rapid spread of the virus has practically shut down modern society as we knew it. Most economic and social activities were curtailed to different degrees. People were requested or ordered to stay at home. Empty streets on once buzzing cities like New York, London, Milan, Delhi and Paris, to name a few, became the new norm.

The WHO announced on 11 February 2020 that the new coronavirus disease will be called COVID-19. By 8 March 2020, over 100 countries had reported COVID-19 cases with over 100,000 cases worldwide. On 11 March 2020, the WHO in spite of not having any formal process to define a pandemic, officially declared the COVID-19 as a pandemic—defined as the spread of a new disease worldwide for which most people do not have immunity.

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Q1. WHAT IS A PANDEMIC AND HOW IS A PANDEMIC DECLARED?
Also, as stated in A Dictionary of Epidemiology (John, 2001) “Pandemic is an epidemic occurring worldwide or over a wide area, crossing international boundaries, and usually affecting a large number of people”.

Although there is no universally binding definition of a pandemic, there is consensus on:

(i) its large-scale geographical outreach;
(ii) infecting people beyond national boundaries; and
(iii) causing significant health damage and social, economic and political disruptions compared to a local outbreak or epidemic of an infectious disease.

According to the World Health Organization (WHO) “A pandemic is the worldwide spread of a new disease”.

According to Centers for Disease Control and Prevention (CDC) of USA, “Pandemic refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people.”

The following seven key features that might be used to define a pandemic emerge from the literature:

**WIDE GEOGRAPHIC EXTENSION**
The term pandemic usually refers to diseases that extend over large geographic areas (Taubenberger & Morens, 2009). There were 178 countries involved during the H1N1 outbreak in 2009 (Rewar et al., 2015) while the COVID-19 has spread over 215 countries and territories.

**DISEASE MOVEMENT**
Disease movement includes widespread person-to-person spread of diseases caused by respiratory viruses, such as influenza and SARS. The out-of-season transmission is what characterizes an influenza pandemic.

**NOVELTY**
The term pandemic has been used most commonly to describe diseases that are new, or at least associated with novel variants of existing organisms.

**SEVERITY**
The term pandemic has been applied to severe or fatal diseases (e.g., the Black Death, HIV/AIDS and SARS) much more commonly than it has been applied to mild diseases. Severity is estimated by the case fatality ratio (Donaldson et al., 2009).

**HIGH ATTACK RATES AND EXPLOSIVENESS**
Pandemics are characterised by high rates of attack and explosive spread. However, if the transmission is non-explosive, even if it is widespread, it is not classified as a pandemic.

**INFECTIOUSNESS AND CONTAGIOUSNESS**
Pandemic diseases are infectious, so they are transmitted from one person to another person. This transmission can be direct (person to person) or indirect (person to vector to person) (Morens et al., 2010).

**MINIMAL POPULATION IMMUNITY**
Although pandemics often have been described in partly immune populations, pandemics are characterised by almost zero population immunity (Fangriya, 2015; WHO, 2013).
Question No. 2: What is the Procedure used to Declare a Pandemic?
In the context of COVID-19 there is “no mathematical formula, no algorithm,” for making a pandemic declaration. WHO declared COVID-19 as a pandemic on 11 March 2020, at which point it had already spread to over 110 countries. WHO’s hesitation in declaring a pandemic highlights the confusion surrounding the elusive definition of the term and brings forth the recurring debate on when it is apt to call a disease outbreak a pandemic (Green 2020).

Prior to COVID-19, the most recent pandemic was the 2009 H1N1 Influenza virus or ‘swine flu’. During the spread of swine flu, WHO followed a six-phase procedure (see Figure 3) that was applicable worldwide and provided a global framework to facilitate preparedness and response planning among countries.

Phase 1-3 focus on preparedness, that is indulging capacity development and response planning activities, while Phases 4-6 indicate the need for response and mitigation efforts. Furthermore, periods after the first pandemic wave are elaborated to facilitate post pandemic recovery activities (WHO 2009). This six-phase approach led to declaration of swine flu as a pandemic by the WHO in 2009. However, swine flu turned out to be less lethal than was anticipated. WHO faced a backlash for the declaration when the disease did not have the wide spread expected impact.

Currently, WHO in accordance with the International Health Regulations (2005) (IHR) determines whether an event can be designated as Public Health Emergency of International Concern (PHEIC) or not. The IHR-Annex 2 provides a “decision instrument” (see Figure 4) that guides States regarding which health events can potentially turn into PHEICs, thereby requiring reporting to WHO. The IHR also empowers the WHO Director-General to convene an Emergency Committee (EC), which provides advice on whether the current situation should be considered a PHEIC, and what provisional recommendations should be given to governments to support the response. The EC comprises international experts convened on an ad-hoc basis, and the WHO Director-General has ultimate and sole authority to declare a PHEIC (WHO 2016). The PHEIC is the highest level of alert under IHR that WHO is obliged to declare in order to warn the Member States about actions that need to be taken to curb the spread of disease and to mobilize resources to help low-and-middle-income countries. It also obligates countries to share information with WHO.

COVID-19 was declared a PHEIC by WHO on 30 January 2020 after the second Emergency Committee meeting, at which point 7,536 cases and 179 deaths had been confirmed in mainland China, with 107 cases confirmed in 21 other countries. Even after declaration as a PHEIC, the virus continued to spread globally and was ultimately declared as a pandemic by WHO on 11 March 2020, at which point more than 118,000 cases and 4,291 deaths were reported from 114 countries. It is suspected that WHO’s hesitance to characterize COVID-19 as pandemic earlier could be attributed to its loosely coined definition and to the fear and panic that the term induces. The literature offers limited clarity to the question of timing i.e. when it is apt to confirm a PHEIC as a pandemic and the relative effectiveness of each term in triggering combative actions by nation states.

ANNEX 2: DECISION INSTRUMENT FOR THE ASSESSMENT AND NOTIFICATION OF EVENTS THAT MAY CONSTITUTE A PUBLIC HEALTH EMERGENCY OF INTERNATIONAL IMPORTANCE

An event involving the following diseases shall always lead to utilization of the algorithm, because they have demonstrated the ability to cause serious public health impact and to spread rapidly internationally:

- Cholera
- Pneumonic Plague
- Yellow Fever
- Viral Haemorrhagic Fever (Ebola, Lassa, Marburg)
- Other diseases that are of special national or regional concern, eg. dengue fever, HIV, valley fever and meningococcal disease

A case of the following diseases is unusual or unexpected and may have serious public health impact, and this shall be notified:

- Smallpox
- Polio (Wild-type poliovirus)
- Human influenza caused by a new subtype
- Severe acute respiratory syndrome (SARS)
- Severe acute meningococcal disease (meningococcal disease)
- Meningitis caused by Neisseria meningitidis
- Monkeypox
- Marburg/Hanta viruses
- Avian influenza

Any event of potential international public health concern, including those of unknown causes or sources and those involving other events or diseases than those listed in the box on the left and the box on the utilization of the algorithm:

- Is the public health impact of the event serious?
- Is there a significant risk of international spread?
- Is there a significant risk of international travel or trade restriction?

Event shall be notified to WHO under the International Health Regulations
Q3.

IS IT LEGALLY BINDING FOR ALL COUNTRIES TO ADHERE TO PANDEMIC GUIDELINES?

CAN A COUNTRY DEFY A PANDEMIC DECLARATION?


Question No. 3: Is it Legally Binding for All Countries to Adhere to Pandemic Guidelines? Can a Country Defy a Pandemic Declaration?
**International Health Regulations (2005) (IHR) is the global legal instrument designed to help protect nations from international spread of disease including public health risks and public health emergencies.**

IHR came into force on 15 June 2007 as a result of increased international mobility and emergence of diseases with potential to transcend borders. The stated purpose and scope of the IHR is “to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade” (WHO, 2008).

IHR provides a comprehensive “legal framework that defines countries’ rights and obligations in handling public health events and emergencies that have the potential to cross borders.” The IHR is an instrument of international law that is legally-binding across 196 countries, including the 194 WHO member states. The IHR requires countries to report public health events and outlines criteria to determine whether or not a particular event constitutes a “public health emergency of international concern” (PHEIC). A Public Health Emergency of International Concern is defined in the IHR (2005) as, “an extraordinary event which is determined to constitute a public health risk to other States through the international spread of disease and to potentially require a coordinated international response.” The IHR also mandates countries to devise proper focal points of communication between the nation state and the WHO to aid surveillance, international travel and transport, safeguard the rights of travelers, and ensure non-discrimination in the application of health measures under the Regulations. WHO plays the coordinating role in IHR implementation in nation states and support countries to build capacities when a Public Health Emergency of International Concern (PHEIC) occurs.

The process of global governance of the disease and established channel of communication between nation states and WHO is described in Figure 3. The articles and Annexes refer to IHR (2005) articles and Annexes. The IHR necessitates countries ability to detect, assess and report, and respond to public health risks and emergencies. In the event that IHR determines that a particular event constitutes a public health emergency of international concern (PHEIC), WHO develops and recommends critical health measures for implementation by member states during such an emergency. Hence, once a PHEIC is declared by WHO, it is implicitly legally binding for member states to adhere to the IHR guidelines and for countries to implement containment measures to mitigate the spread of the disease. As acknowledged earlier, apart from the scope of spread there is little clarity on when a PHEIC is designated as a pandemic, but once WHO declares a pandemic, it is legally binding for countries to adhere to its guidelines.
Q4. How many Pandemics have we witnessed over the past 100 years?
Spanish Flu (1918-20):

In the spring of 1918, a mild respiratory disease started at an army camp in Kansas, USA, attributed to a soldier who had been cleaning pig pens (Crosby 1989). The disease spread in the camp, along the railway line to other military bases and US cities, and on troopships to Europe. Though highly contagious, the first wave caused few deaths and thus received little attention, partly also due to war-time censorship.

However, in Spain, a neutral country in the War, there was extensive media coverage and the disease was soon called “Spanish influenza”. The second wave started in late August, probably in Western France, from where it spread globally. It peaked during September to November 1918, at which time about 10,000 people were dying per week in some US cities (Frost 1920). A third wave of equal ferocity struck in late 1918 or early 1919. It was not until 1999 that the virus was identified to be a novel H1N1 virus (Reid 1999).

Death rates were estimated to be even higher in Africa and Asia. An estimated 12-18 million people perished in India – equivalent to 4% of its population (as per 1911 census). The infection was brought from Europe to the ports of Bombay and Karachi in May and June 1918. This was followed by a far more lethal second wave that swept across India from September to early December 1918, in which people in the 20-40 years age group were particularly susceptible. Most of the 12-18 million deaths in India took place in the three peak months during the second wave (Barry 2018).

Spanish Flu revealed inequalities due to colonial rule and the social divide. In Cape Town and several other South African cities, influenza killed about 4% of the entire population in a period of four weeks – 32% of white South Africans and 46% of blacks reportedly had disease – with about 0.8% and 3% mortality, respectively (Barry 2018). In Britain the mortality was 4.7 per 1,000 people. In India it was 8.3 per 1,000 for Europeans but 20.6 per 1,000 for Indians. Even among Indians, social divisions were apparent with mortality rates of 61 and 18.9 per 1,000 among low caste and high caste Hindus (Kapoor 2020). Besides poor healthcare infrastructure, there was also a drought in India in 1918, which led to a famine in large parts of the country that exacerbated the disease and associated mortality. However, food from India continued to supply Britain’s war efforts.

Asian Flu (1957):

This pandemic originated in the Guizhou province in southern China in February 1957, spreading to the Huan province, and to Hong Kong and Singapore by April. In May, the causative agent was isolated in Japan and found to be a new H2N2 influenza virus. The first wave struck USA and UK in October 1957, and was followed by a second wave in January 1958. The infection rate was highest in 5- to 19-year-olds, where it exceeded 50%. Both waves showed heightened mortality, with about 116,000 deaths in the US and over 1.1 million worldwide (Stuart-Harris 1985). The first cases in UK were in late June, and by early 1958 it was estimated that at least 9 million people in Great Britain had been infected with about 14,000 deaths. Five months after the Hong Kong outbreak the virus was reckoned to have traversed the globe. As an entirely new strain there was no immunity in the populace and the first vaccines were not distributed until August in the US and October in the UK, and that too on an extremely limited basis (Jackson 2009).

The Asian flu first reached India via Madras in May 1957 and spread across the country within the next 12 weeks. Between 19 May 1957 and 8 February 1958 there were 4.45 million reported cases, with 1098 deaths. As elsewhere, the disease in India generally had a mild course, although nausea and vomiting and symptoms related to the nervous system were relatively frequently seen. Bombay was the worst hit with over 1.3 million cases and 315 deaths, but Madras with over 580,000 cases showed only 78
Influenza virus of the H3N2 summer

The first signs of a new strain were recognized in the summer of 1968. By late April, the virus had spread enough for WHO to declare it a PHEIC, and in June it was declared a "pandemic". It began to taper off in November 2009 with a steep decline in cases by May 2010, and WHO declared the pandemic to be over on 10th August. During this period, there were 491,382 lab-confirmed cases and 18,449 deaths reported to WHO. Some studies estimated that the actual number of cases, including asymptomatic and mild cases, could be 700 million to 1.4 billion people, equivalent to 11-21% of the world population at that time, and about 284,000 deaths (range 150,000 to 575,000). In comparison, it was possibly no worse than seasonal flu, which according to WHO kills an estimated 250,000 to 500,000 people annually.

In India, the first cases were reported in Madras on 8 September 1968, having arrived on the ship S.S. Rajula from Singapore. During the period September-November, 84,511 patients were treated in the hospitals in Madras City, which had a population of 2 million. It is estimated that an equal number of persons were treated by the private practitioners in the city. The attack rate was therefore 8.4%. The main epidemic spread through the Indian subcontinent within 20 weeks. The spread was fastest through the most crowded cities and relatively slower across villages and towns. All age groups were involved, although the disease appeared to be more severe among children. Persons who had an attack of Asian influenza in 1957 generally escaped infection by the Hong Kong influenza virus. The data for how many people became infected or died across India in this pandemic are not available (N Veeraraghavan, Bull WHO 1969).

1https://www.who.int/emergencies/diseases/who-influenza/2019

Hong Kong Flu (1968):

The first confirmed case in India was on 30th January 2020 - a student from Wuhan University, who came home to Kerala.


The first clusters of the present pandemic were observed in the city of Wuhan in the Hubei region in China around December 2019. Researchers from the Chinese Academy of Sciences and the Chinese Center for Disease Control identified it as a new coronavirus.

However, due to delayed reporting at local levels and the traditional large volume of Chinese New Year travel caused the early spread of the disease beyond Wuhan to the other parts of China and the world.

On 11 March 2020 the Coronavirus Infections disease 2019 (COVID-19) pandemic was declared by the World Health Organization. The virus causing the disease was called SARS coronavirus 2 (SARS-CoV-2) in view of its genetic similarity and clinical presentation to the severe acute respiratory syndrome (SARS) coronavirus.

Since its emergence, COVID-19 has shut down the world and devastated the global economy unlike the 1958, 1968 and the more recent 2009 pandemic. A central question is why SARS-CoV2 moved so quickly compared to in a world that is much more technologically advanced in 2020 than it was in 2003. It appears that SARS-CoV2 is much better adapted to spread rapidly across the globe and infect a large number of people.
adapted for human-to-human transmission and has already shed (and transmitted) a few days before symptoms appear, unlike SARS-CoV that sheds only during the symptomatic phase. The world is also more connected in 2020 through travel and supply chains. But COVID-19 has also shown the power of technology and collaboration. The virus was identified and its genomic sequence became available within a week of notification. This allowed the development of diagnostic tests and real-time mapping of the growth of the pandemic. It also took only 42 days from availability of the viral genomic sequence to the first vaccine to be made and 63 days to which human clinical trials were initiated. There are over 200 vaccines currently in development with about 50 already being clinically tested. The first efficacy trial results have shown the vaccines to be highly effective.

Key partnerships among the private sector, governments and academic institutions have ensured a roll out of more than one vaccine in the first quarter of 2021. Scientists all over the world have collaborated and freely shared both materials and know-how. The knowledge base and freely shared both materials and know-how. The knowledge base

more severe

SARS affected older adults more severely than younger individuals, almost 50% of those infected over 65 years of age died, compared with just 1% under 24 years.

Caution: Pandemic near misses

The first two decades of the 21st century have already witnessed two pandemics – Swine Flu in 2009 and Covid-19 that started in December 2019 and is continuing. However, there have also been a few pandemic threats – SARS in 2003, Bird Flu in 2005-07, Ebola in 2014-16 and Zika in 2015-16. Why is the frequency of pandemics increasing?

Outbreaks happen in the world’s most vulnerable areas – countries with few resources to stem the tide of infection before becoming regional outbreaks. Public health emergencies or pandemics. With modern travel networks, a pathogen can travel from a remote village to major cities on all continents in 36 hours, which is often shorter than its incubation period, i.e. the time it takes from infection to disease. Many global challenges exist that increase the risk that outbreaks will occur and spread rapidly. With growing populations and demands on land for agriculture and housing, wild animal habitats are being destroyed, increasing the risk of infectious pathogens “spilling over” from animals to humans. There is

PANDEMICS: PAST, PRESENT AND LESSONS FOR THE FUTURE

Concern (PHEICs).

Health Emergencies of International

surge capacity to deal with Public

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dedicated health units at all

brought about the introduction of

new international rules on reporting

and handling disease threats. The

International Health Regulations

2005 make it mandatory to have

dedicated health units at all

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PANDEMICS: PAST, PRESENT AND LESSONS FOR THE FUTURE

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SARS (2002-03)

On 12th March 2003, WHO warned of “atypical pneumonia” cases from China, Hong Kong and Vietnam. When three days later there were suspected cases in Canada, Singapore, Thailand, Indonesia and the Philippines as well, WHO decided to call this first global health threat of the 21st century as Severe Acute Respiratory Syndrome or SARS. On 24th March the cause was identified as a new coronavirus – called SARS coronavirus or SARS-CoV. It was later discovered that SARS started in November 2002, the first identified case being a 45-year-old man in Foshan, a city in the Southern Chinese province of Guangdong. Studies also showed that the virus originated in bats, having infected humans most likely through animals – in this case, civet cats in China’s wet animal markets. A doctor from Guangzhou, the capital of Guangdong, took the virus to densely populated and internationally connected Hong Kong, from where SARS-CoV went global. After infecting 8039 people across 29 countries, of which 774 died, the outbreak was declared over by 5th July 2003. SARS affected older adults more severely than younger individuals, almost 50% of those infected over 65 years of age died, compared with just 1% under 24 years. There were only 3 lab-confirmed and 10 suspected cases of SARS, and no deaths reported from India.

It initially appeared that SARS would become a pandemic, sweep the globe and infect millions. But aggressive countermeasures by

There are over 200 vaccines currently in development with about 50 already being clinically tested.
What were the main pathogens causing the diseases and what treatments were used?
According to Jones (2008), emerging infectious disease (EID) events between 1940 and 2004 were dominated by pathogens that emerge in wild animals first and transfer to humans to cause disease (see Box 1 on pathogen discovery). Such events have been distributed non-randomly across the world and been increasing over time. The CDC estimates that animal spillovers account for two-thirds of all human infectious diseases and three-fourths of newly emerging diseases, with both wild and domesticated animals being able to pass disease to humans. Viruses comprise only 14% of known human pathogens but comprise 44% of new and emerging pathogens. Some of the biggest public health threats of the 20th century came from viruses such as influenza and HIV, both of which spilled from animals into humans. The pace of emergence of new viruses threatening human health has continuously increased over the past 25 years. Of the 20 diseases the WHO considers having the potential to develop into future pandemics, 16 have viruses as the causative agents. Understanding the biology of viruses, especially RNA viruses, is key to both preparedness and mitigation (see Box 1).

The identification of a novel sequence is only the first step in pathogen discovery. Implications in disease require proof of a causal relationship. This can be achieved through fulfillment of Koch’s postulates (isolation of a microbe, propagation in culture, and reproduction of disease with introduction into a naive host). However, realizing this ideal is not feasible if one cannot grow the agent in culture or there is no animal model for the disease. Furthermore, some effects, such as autoimmune disease, may not be manifest until after the reproduction of disease with introduction into a naive host. The CDC estimates that animal spillovers account for two-thirds of all human infectious diseases and three-fourths of newly emerging diseases, with both wild and domesticated animals being able to pass disease to humans. Viruses comprise only 14% of known human pathogens but comprise 44% of new and emerging pathogens. Some of the biggest public health threats of the 20th century came from viruses such as influenza and HIV, both of which spilled from animals into humans. The pace of emergence of new viruses threatening human health has continuously increased over the past 25 years. Of the 20 diseases the WHO considers having the potential to develop into future pandemics, 16 have viruses as the causative agents. Understanding the biology of viruses, especially RNA viruses, is key to both preparedness and mitigation (see Box 1).
Question No. 6: Which are the Main Pandemic Viruses and What are the Key Differences Across Them and the Type of Treatments Used?
Infectious disease is as old as humans, but it is only in the last two centuries that we have started understanding its microbial basis and diversity. Various plagues have inflicted humans through the ages, some of the major ones shown in Figure 6. Here we will focus on the 20th and 21st centuries, to seek out common features in our understanding of disease and our response to it. Pre 20th century pandemics are briefly described in Annex 1.

1. Influenza Viruses

Influenza viruses have been the cause of major morbidity and mortality worldwide, and large segments of the human population are affected every year. Additionally, these viruses also infect many animal species allowing the mixture of strains and the emergence of novel viruses, sometimes with pandemic potential. There are three genera (types) of influenza viruses—A, B and C, and viruses belonging to each of these types can undergo genetic reassortment and thus readily exchange genetic information, but reassortment between viruses belonging to different types has never been reported. We will focus on influenza A viruses since these are most frequently associated with human disease.

Influenza A virus has a complex structure with a lipid membrane derived from the cell in which it replicated. Embedded in this envelope are three viral proteins—haemagglutinin (HA), neuraminidase (NA), and M2. There are 17 different types of HA (H1 to H17) and 9 different types of NA (N1 to N9)—and this is how influenza viruses are named. The Spanish Flu (1918) and Swine Flu (2009) viruses were found to be H1N1, Asian Flu H2N2, Hong Kong Flu H3N2 and Bird Flu H5N1. Though 17 x 9, i.e. 153 combinations are possible, only a few combinations of H and N genes have caused disease in humans.

Viruses carrying novel HA and NA combinations can spread rapidly as most of the population is susceptible, and can lead to large outbreaks, epidemics or pandemics. Since influenza viruses circulate in many animal species, there is also an opportunity for animal and human influenza viruses to reassort their RNA segments, with the population having little or no immunity against the new virus. Usually avian and human influenza viruses circulate within these species. But pigs can get infected by both types of viruses, and act as “mixing vessels” to produce new influenza viruses. This is illustrated in Figure 7, which shows the emergence of the 2009 swine flu pandemic virus. Note that this virus that caused a human pandemic contains only one human and two avian flu virus genes; the rest of the genes were derived from swine flu viruses, including the HA and NA genes. This is why humans had no immunity and were highly susceptible.

Treatment. Two types of drugs have been used for influenza—both directed at the virus multiplication cycle. Amantadine such as Amantadine and Rimantadine are entry inhibitors that block the ion channel activity of the viral M2 protein; this is essential for the intracellular release of viral RNAs. These are off-patent and very inexpensive drugs. However, they have significant side effects and resistance to these drugs arises rapidly. The other class of drugs are virus egress inhibitors—these inhibit neuraminidase, which is required to release newly produced virions from the cell surface. These include Oseltamivir (Tamiflu), Zanamivir (Relenza), Peramivir (Rapivab) and Laninamivir.

Vaccines. Vaccination against seasonal influenza is carried out annually based on the major viral strains circulating that year. Though useful for everyone to prevent disease (not infection), these are especially recommended for children aged 6 months to 4 years and adults > 50 years as also in people with chronic ailments and immunosuppression. Universal influenza A vaccines that protect against all subtypes of the virus is a highly desirable goal, and an active area of research.

Other strategies. Influenza is a respiratory disease, which is spread by coughing, sneezing and aerosols. Barrier protection with masks is desirable in the flu season, especially for those vulnerable due to age or other ailments.
Respiratory Syndrome coronavirus emergence of the Middle East This was followed in 2012 by the SARS coronavirus (SARS-CoV). (SARS), which was found to be severe acute respiratory syndrome of viruses, until the emergence of considered a pretty harmless family of common colds. These were associated with about 20-30% to this family; two of these were respiratory viruses were also added liver and neurologic disease in gastroenteritis in pigs and severe bronchitis in chicken, transmissible distributed among humans, RNA viruses that are widely Coronaviruses are enveloped

2. Coronaviruses
Coronaviruses are enveloped RNA viruses that are widely distributed among humans, other mammals and birds. Members of this family of viruses were isolated in the 1930s as causative agents for infectious bronchitis in chickens, transmissible gastroenteritis in pigs and severe liver and neurologic disease in mice. In the 1960s, some human respiratory viruses were also added to this family; two of these were associated with about 20-30% of common colds. These were considered a pretty harmless family of viruses, until the emergence of severe acute respiratory syndrome (SARS), which was found to be caused by a new coronavirus, called SARS coronavirus (SARS-CoV). This was followed in 2012 by the emergence of the Middle East Respiratory Syndrome coronavirus (MERS-CoV), also associated with respiratory disease. And in late 2019, another novel coronavirus, SARS-CoV2, emerged to cause respiratory disease and the ongoing pandemic.

The origins of all respiratory disease-causing human coronaviruses have been traced to bats, having jumped into human via other animal species—SARS-CoV through civet cats, MERS-CoV through dromedary camels, and SARS-CoV2 either directly or through pangolin. Expectedly, the highest nucleotide identity of SARS-CoV2 is to bat coronaviruses (96%) isolated in eastern China in 2018 and to a pangolin virus (91%); it has far less genetic identity to SARS-CoV (80%), MERS-CoV (55%) and the common cold coronaviruses (50%).

Treatment. There are no specific antiviral drugs directed against human coronaviruses. During the SARS outbreak, many patients were treated with ribavirin, steroids, alpha interferon, and protease inhibitors licensed for HIV therapy. According to a large-scale review (Stockman et al. 2006), none of these treatments showed a beneficial effect in patients. At least 21 different treatments are being tried for COVID-19, of which about a dozen are used widely with promising or mixed results. Remdesivir, a RNA virus replication inhibitor initially developed for Ebola and hepatitis C has shown limited efficacy early in the disease, and so has steroid therapy late in the disease to control the ‘cytokine storm’. Plasma therapy using plasma from recovered patients was used during SARS and is being used widely in critical COVID-19 patients with mixed outcomes.

Vaccines. Till very recently there were no licensed vaccines against human coronaviruses. Various vaccines were developed against SARS-CoV, including inactivated whole virus, viral-vectorized single protein, recombinant proteins and DNA vaccines. However, the disease disappeared before any of these could be tested for efficacy. For COVID-19, however, there are over 200 different vaccines in development, of which about 50 are in clinical development and six have received emergency use approval. This is remarkable speed, with at least four COVID-19 vaccines reporting efficacy data from Phase 3 trials. The earliest approvals are expected by the end of 2020, with some vaccines becoming available in early 2021.

Other strategies. Coronaviruses cause upper and lower respiratory infection, which is spread by coughing, sneezing and aerosols. The virus was shown to be viable on surface from about 4 hours to 72 hours. Barrier protection with masks, physical distance of about 6 feet and frequent hand washing with soap is recommended.

3. HIV
HIV is a complex virus with a unique virophage morphology containing cylindrical or conical cores. The ~ 10 kilobase genome expresses genes found in all retroviruses—gag, pol and env that code for the viral core, polymerase and envelope proteins. Additionally, HIV also has a number of accessory genes—vif, vpr, vpu, tat, rev, and nef that are not required for virus multiplication in vitro but are essential for disease causation (Figure 7). The main targets for HIV are CD4+ T lymphocytes, CD4+ monocyte/macrophage lineage cells and some populations of dendritic cells (DCs). These are also the cells that are important for immune control of other infections; chronic HIV infections slowly lead to immunodeficiency.

HIV infects key cells of the adaptive immune response, explaining the clinical manifestations of immune suppression. The time from acute infection to AIDS (defined as CD4 cell count of < 200 cells per microliter) can be as rapid as 6 months or as long as 25 years, though most people progress in 5 to 10 years. This variable disease course depends upon early events at the time of acute infection, viral and host genetics. The establishment of latent viral reservoirs is key to the success of HIV as a pathogen. During the period of acute infection, a stable reservoir of HIV-infected rested memory CD4 cells is established. As proviruses in this reservoir are not transcriptionally active, no viral RNAs or proteins are produced and the virus stays hidden from the immune system as well as antiviral therapy.

Treatments. There are multiple drugs available to treat HIV-infected people, which has turned AIDS into a chronic disease with lifelong therapy. The various classes of anti-HIV drugs are (1) replication inhibitors, both nucleoside and non-nucleoside reverse transcriptase (RT) inhibitors; (2) protease inhibitors that inhibit viral protein processing; (3) integrase inhibitors that prevent provirus formation; and (4) fusion inhibitors that block virus entry into host cells. Since HIV undergoes rapid mutation, use of single drugs lead to resistance. The most successful regimen is to use a combination of 3 drugs that includes a cocktail of non-nucleoside RT and protease inhibitors.

Vaccines. Despite decades of research and several clinical trials, no vaccine has so far been developed.

Other strategies. There are three major modes of HIV transmission—sexual, parenteral (via blood) and mother-to-infant. The mitigation strategies rest on behaviour change such as limiting sexual partners, using condoms, and not sharing needles (either for injections or recreational drug use). Improving the blood supply by testing donors is an effective way to reduce infections in the community. Mother to infant transmission can be reduced drastically by treating mothers during pregnancy and breastfeeding.
Q7.

**WHAT ARE THE MAIN CAUSES OR DRIVERS BEHIND THE EMERGENCE OF PANDEMIC DISEASES?**


Question No. 7: What are the Main Causes or Drivers Behind the Emergence of Pandemic Diseases?

(Charles Perrings, Arizona State University)
It is helpful to distinguish between the emergence and spread of zoonoses. Currently while much effort is committed to the management of spread risk, very little effort is committed to emergence risk. Yet it has been frequently demonstrated that prevention is better than cure (Leung et al. 2002). A recent study of COVID-19 concludes that the cost of effort aimed at preventing the emergence of novel zoonoses would be significantly less than the cost of responding to novel zoonoses once they have emerged (Dobson et al. 2020).

Although emerging infectious disease outbreaks are most likely to occur in the large population centers of Europe, the USA, and Japan, there is a growing body of evidence that those outbreaks are most likely to have their origin in forested tropical areas. Specifically, the risk of disease emergence is highest in forested areas in the tropics characterized by high levels of mammalian biodiversity (panel a in Figure 8), human population, and the conversion of forest habitat to agricultural production (panel b in Figure 8).

The management of emergence involves intervention in the processes of forest conversion. Emergence risks are highest along the edges between forest habitats and agricultural land. The more fragmented is the pattern of conversion, the greater is the length of the forest edge, which is where transmission between infected wild animals and domesticated animals occurs.

While most studies of the problem have argued that the way to reduce emergence risk is to reduce the rate of deforestation (Dobson et al. 2020), it is also possible to focus on the edge directly. Risk can be reduced by focusing on the pattern of land conversion. A reduction in the length of the forest edge can be achieved by ensuring that the pattern of land conversion is more compact, and less fragmented.

Emergence risks are highest along the edges between forest habitats and agricultural land. The more fragmented is the pattern of conversion, the greater is the length of the forest edge, which is where transmission between infected wild animals and domesticated animals occurs.

China has been the source of many emerging zoonoses in recent decades, but as Figure 8 shows, countries in South and Southeast Asia, Central America, Central and West Africa are similarly a source of risk. In all cases emergence is associated with contact between humans or their domesticates and particular wild species at forest edges.

It follows that management of emergence risks has less to do with epidemiology than with the process of land conversion, agricultural production methods, the trade in wildlife and wildlife products, and the ecological impacts of habitat depletion. The approach increasingly being taken to mitigate emergence risk is styled the ‘One Health’ approach. From a disciplinary perspective, it integrates virology and parasitology, ecology, epidemiology, economics, political science, and anthropology. From a policy perspective it integrates public health, veterinary medicine, animal management, and biological conservation (Cunningham et al. 2017).
Q8.

What are the factors affecting the spread of pandemics?
In the last few decades, development of the travel network and growth in the volume of travel have been implicated in both the pattern and rate of spread of plague, cholera, HIV/AIDS, H5N1, West Nile virus, and SARS (Hufnagel et al. 2004, Tatem et al. 2006, Daszak 2012). Interventions in the trade and travel network—restrictions on the movement of both goods and people—are a common first response to the appearance of an emerging infectious disease.

In the case of COVID-19, the outbreak prompted immediate mobility restrictions around Wuhan. These were followed by the suspension of international flights to and from China. When it became clear that the virus had already spread internationally, individual countries (individual states in the U.S.) added internal mobility restrictions together with a range of social distancing measures.

Differences in the effectiveness of such measures applied in different countries reflect a fundamental property of epidemics—that the contact between susceptible and infected individuals which leads to transmission depends on the choices made by individuals.

The spread of newly emerged infectious diseases is very strongly tied to patterns of trade and travel. Studies of the role of the air transport network in the transmission of the 2003 SARS and 2009 H1N1 pandemics show that spread rates reflect the time and distance associated with distinct routes, together with the volume of traffic along those routes (Brockmann and Helbing 2013).
Q9.

What measures were adopted by countries to combat COVID-19 and how successful have they been?
In this section, we shall look at the efficacy of policies implemented to contain the spread of the virus. Policies relating to mitigating the economic, education and health impacts will be addressed in following sections focusing on the key impacts of the pandemic (Q10-Q16).

In Table 1, we present some of the practices adopted by 10 countries as of 10th October 2020. These countries were selected to highlight either the high case infection and death rates, type of measures undertaken, or regional contrasts. The intention here is not to imply that these are the best responses to the pandemic but to simply enlist various practices that were adopted by those countries to address the spread of the pandemic.

**Figures as of 10 October 2020, based on John Hopkins University, Coronavirus Research Center; World Economic Forum; International Monetary Fund.**

**Figures as of 10 October 2020, adopted from Hale et al. (2020). The index ranges from 0-100 (100= strictest) and measures level of strictness with which government policies were implemented.**

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>USA</th>
<th>INDIA</th>
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<tbody>
<tr>
<td><strong>SEVERITY IMPACT</strong></td>
<td>Cases = 7,663,293</td>
<td>Deaths = 213,752</td>
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<tr>
<td></td>
<td>Cases = 6,906,151</td>
<td>Deaths = 106,490</td>
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<tr>
<td><strong>ADOPTED MEASURES</strong></td>
<td>Declared “State of Emergency”</td>
<td>Nationwide Lockdown</td>
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<td></td>
<td>Promoting Work-From-Home</td>
<td>Localized Lockdowns in Containment Zones</td>
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<td>Extensive Testing</td>
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<td></td>
<td>Containment Measures Varied by State &amp; County</td>
<td>Travel Restrictions</td>
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<td>Travel Bans</td>
<td>Imposed 14-Day Quarantine_Past Travel</td>
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<td>Ban on Large Gatherings</td>
<td>School and College Closures</td>
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<td></td>
<td>School Closures [those that reopened adopted various instruction approaches-in-person instruction, virtual or hybrid]</td>
<td>Closure of Gyms, Museums, &amp; Theatres</td>
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<td></td>
<td>Entertainment, Theme Parks &amp; Convention Centers Remain Closed in Some States</td>
<td>Promoting Remote Work</td>
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<td>Phased Reopening by Most States</td>
<td>Ban On Mass Gatherings</td>
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<td>Nationwide Lockdown</td>
<td>Covid-19 Testing Centers Created</td>
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<td></td>
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<td>Nationwide Phased Reopening Plan in Place</td>
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| GOVERNMENT RESPONSE STRINGENCY INDEX** | 62.50 | 73.61 |

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<tr>
<th>CHINA</th>
<th>SOUTH AFRICA</th>
<th>KENYA</th>
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<tbody>
<tr>
<td><strong>SEVERITY IMPACT</strong></td>
<td>Cases = 85,557</td>
<td>Deaths = 6,634</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cases = 699,896</td>
<td>Deaths = 17,673</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cases = 41,158</td>
<td>Deaths = 760</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cases = 5,055,888</td>
<td>Deaths = 149,639</td>
<td></td>
</tr>
<tr>
<td><strong>ADOPTED MEASURES</strong></td>
<td>Lockdown of Wuhan, Hubei Province</td>
<td>Nationwide Curfew from 7pm to 5am</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adopted Stringent Enforcement Measures</td>
<td>Suspension of International Flights</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lee Test, Track, Isolate, Treat (TTIT) Covid-19</td>
<td>Social Distancing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TTIT was Implemented Through Elaborate Use of Digital Technologies</td>
<td>Heightened Restrictions in Non-Essential Social Spaces and Gatherings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>like Artificial Intelligence (AI), Big Data, Cloud Computing, Blockchain, and 5G</td>
<td>Encouragement of Teleworking Where Possible</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Large-Scale Mobility Restrictions at the National Level</td>
<td>School and College Closures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Distancing</td>
<td>Establishment of Isolation Facilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A 14-Day Quarantine Period For Returning Migrant Workers</td>
<td>Limitations on Public Transportation Passenger Capacity</td>
<td></td>
</tr>
</tbody>
</table>

| **GOVERNMENT RESPONSE STRINGENCY INDEX** | 52.31 | 39.81 | 64.81 | 63.43 |

Table 1. Severity impact, adopted measures and government response severity index (as of 10 October 2020).
In an attempt to measure a national government’s response to the pandemic, Hale et al. (2020) developed an Oxford COVID-19 Government Response Tracker (OxCGRT). Their team used data from over 150 countries on 18 indicators and aggregated it into a set of four common indices, reporting a number between 1 and 100 to reflect the level of government action on health, education and state of economy. The four indices are as follows:

1. **OVERALL GOVERNMENT RESPONSE INDEX:**
   This index measures the variation in overall government response across all indicators, suggesting whether government response has increased or decreased since the outbreak.

2. **CONTAINMENT AND HEALTH INDEX:**
   This index encapsulates school closures, mobility restriction due to lockdown and also contact tracing and testing policy to list a few.

3. **ECONOMIC SUPPORT INDEX:**
   This index includes information regarding economic stimulus received, debt relief.

4. **STRINGENCY INDEX:**
   This index measures how strictly the lockdown policies restricted human behavior.

### Adopted Measures

<table>
<thead>
<tr>
<th>Country</th>
<th>Adopted Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>Full Closure of Border</td>
</tr>
<tr>
<td>Norway</td>
<td>National Wide Lockdown Imposed</td>
</tr>
<tr>
<td>Sweden</td>
<td>Strict Quarantine</td>
</tr>
<tr>
<td>France</td>
<td>Travel Restrictions</td>
</tr>
<tr>
<td></td>
<td>Quarantine-After-Travel Requirement Imposed</td>
</tr>
<tr>
<td></td>
<td>Social Distancing Measures in Place</td>
</tr>
<tr>
<td></td>
<td>Closures Of Schools, Universities And Businesses</td>
</tr>
<tr>
<td></td>
<td>Implemented ‘Herd Immunity’ Strategies</td>
</tr>
<tr>
<td></td>
<td>Continuous Monitoring of Localised Clusters with Outbreaks</td>
</tr>
<tr>
<td></td>
<td>School Closures</td>
</tr>
<tr>
<td></td>
<td>Ban On All Non-Essential Activities Oughtings, Large Gatherings And Long-Distance Travel</td>
</tr>
<tr>
<td></td>
<td>Introduction Of Night-Time Curtews In Some Cities</td>
</tr>
<tr>
<td></td>
<td>Abandon The Customary “Bise” Greeting—Involving Kissing Each Other On The Cheek—to Promote Social Distancing</td>
</tr>
</tbody>
</table>

### Government Response Stringency Index

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Deaths</th>
<th>OXCGRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>15,388</td>
<td>275</td>
<td>82.87</td>
</tr>
<tr>
<td>Norway</td>
<td>15,388</td>
<td>275</td>
<td>28.7</td>
</tr>
<tr>
<td>Sweden</td>
<td>6,906,151</td>
<td>106,490</td>
<td>37.04</td>
</tr>
<tr>
<td>France</td>
<td>732,434</td>
<td>32,601</td>
<td>43.98</td>
</tr>
</tbody>
</table>

### Pandemics: Past, Present and Lessons for the Future

In an attempt to measure a national government’s response to the pandemic, Hale et al. (2020) developed an Oxford COVID-19 Government Response Tracker (OxCGRT). Their team used data from over 150 countries on 18 indicators and aggregated it into a set of four common indices, reporting a number between 1 and 100 to reflect the level of government action on health, education and state of economy. The four indices are as follows:

1. **OVERALL GOVERNMENT RESPONSE INDEX:**
   This index measures the variation in overall government response across all indicators, suggesting whether government response has increased or decreased since the outbreak.

2. **CONTAINMENT AND HEALTH INDEX:**
   This index encapsulates school closures, mobility restriction due to lockdown and also contact tracing and testing policy to list a few.

3. **ECONOMIC SUPPORT INDEX:**
   This index includes information regarding economic stimulus received, debt relief.

4. **STRINGENCY INDEX:**
   This index measures how strictly the lockdown policies restricted human behavior.
The findings from Hale et al. (2020) are graphically represented in Figure 9.

While Figure 9 represents country performance in terms of overall government response to the pandemic, it might be more insightful to evaluate the spread of the pandemic with respect to strictness in implementation of containment measures. Therefore, in Figure 10, we graphically represent the total number of COVID-19 cases (normalized per million) and the government response stringency index calculated by Hale et al. (2020) over time for select countries. The aim is to examine whether those countries with higher stringency index were able to contain the pandemic or not.

Figure 10 reveals that ceteris paribus a higher stringency index during initial months is instrumental in reducing the impact of the pandemic. However, a drop in the stringency index in later months, which pertains to lifting of lockdown and containment measures, seems to have contributed to the spikes experienced by those respective countries. The French graph indicates that a premature lifting of containment measures has contributed to the emergence of a second wave in France. In the case of India, the graphs show a low infection rate with a very high stringency index in the early days but as measures were relaxed, the infection rates increased exponentially. As the stringency index is composed on a range of measures that not only include the health measures but also economic support and government policy implementation, a more detailed analysis will be required to explore which particular measures were the primary reason for containment. The graphs also reveal that timing of implementation of stringent measures is critical, the quicker these measures were implemented, for example in China, the better chance a country has in curbing the pandemic.
Key Impacts of COVID-19

The impacts of COVID-19 go beyond just health. It affects nearly every segment of society causing disruptions in the economic, education and health sectors (See Figure 11). A pandemic has to be seen more than just a health issue but a societal problem that transcends sectoral boundaries with its impacts affecting people on multiple fronts.

In this document we shall focus on the health, economic and education impacts and through those attempt to trace how these might affect the progress towards achieving the Sustainable Development Goals (SDGs).

Figure 11. Impacts from COVID-19. Source: Adapted from Douglas et al. (2020)
Q10. What are the health impacts of COVID-19?
There are basically two direct health impacts—mortality and morbidity. The former refers to the number of deaths while the latter refers to the level of health during and post illness. As of 13th December 2020 there were approximately over 1.5 million deaths globally with USA, Brazil and India with the highest levels of 297,800, 181,123 and 143,019 respectively (See Figure 12).

As of 13th December 2020 India had mortality rate of 105 per million increasing from about 75 deaths per million as of 1 October 2020. The U.S. was experiencing 910 deaths as of 13th December increasing from 625 deaths per million as of 1st October with Brazil having a death rate of 864 from approximately 675 per million. The Case Fatality Rate (CFR)\(^1\) for India, USA and Brazil were approximately 1.5, 1.9 and 2.6 respectively as of December 13th 2020.

Depending on age, health and clinical condition of the patients (Wu et al. 2020) outcomes of COVID-19 have shown dramatic variation with more severe outcomes in the elderly patients with secondary health problems like diabetes, hypertension, lung and heart diseases and cancer. Dozens of studies have also reported that many of the sickest COVID-19 patients have been people with obesity. In a meta-analysis published in Obesity Reviews, which included 399,000 patients, it was found that people with obesity who contracted COVID-19 were 113% more likely than people of healthy weight to land in the hospital, 74% more likely to be admitted to an ICU, and 48% more likely to die (Simmsont et al. 2020, Hamer et al. 2020). Depending on severity of infection, existing health conditions and age, recovery from COVID-19 is variable with some persons recovering easily while others experiencing longer recuperation time.

The Case Fatality Rate (CFR) for India, USA and Brazil were approximately 1.5, 1.9 and 2.6 respectively as of December 13th 2020.

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\(^1\)The CFR is the ratio of deaths per number of cases.

As of December 2020, India was the third highest country with fatalities in absolute terms while it is ranked 83 of over 203 countries and territories when normalized for population.

Morbidity is overlooked if we focus only on death as a measure of the effect of the pandemic. While it is too early to evaluate morbidity, emerging studies report on children who developed a multisystem inflammatory syndrome after COVID-19, with potential cardiac damage (Whittaker et al. 2020). The severe pulmonary damage has been observed in some adults who recovered from severe COVID-19. It is too soon to tell whether this will have long-term respiratory implications, but the term “Long COVID” has been used to describe long-term sequelae of COVID-19. It is a situation that countries should continue to monitor as patients recover.
**Indirect Health Impacts**

Two indirect impacts from COVID-19 have emerged so far in the literature. The first relates to the effects of COVID-19 on the health system and its capacity to deliver health care. The second indirect impact pertains to the psychological implications arising from the disease itself but also from the confinement and lockdown policies implemented to contain the virus.

**BURDENING THE HEALTHCARE SYSTEM**

The COVID-19 pandemic stretched healthcare systems worldwide and rapidly revealed the fragility of healthcare infrastructure and services, forcing countries to make difficult choices on how to best meet the needs of people. The outbreak of the infection has necessitated the urgent increase in the number of beds and intensive care units that are localised in specifically equipped wards, with dedicated medical teams and separate routes and exits. The speed, extent and severity of the infection exposed the lack of preparedness of healthcare systems and made clear the urgent need for countries to develop guidelines for such pandemic disasters with the objective of enhancing the resilience of health systems and integrating disaster risk reduction into all levels of healthcare.

**ACCESS TO ESSENTIAL HEALTHCARE**

The second rather unfortunate outcome of COVID-19 and associated lockdowns was the negative impact on accessing essential health care. For instance, in India, public transport was barred for a long time, making it extremely difficult for individuals with pre-existing health problems to access any health care. As a consequence, there have been dramatic reductions in essential public health and clinical interventions. Data from India’s National Health Mission indicates that there was a close to 70% drop in children’s vaccination for measles, mumps, and rubella, a 50% fall in attendance to clinic for acute cardiac events, an over 30% decrease in inpatient care for pulmonary conditions, and an over 20% reduction in institutional deliveries in March 2020, compared with March 2019 (Cash and Patel 2020). Other disruptions observed in other countries include curtailed access to antimarial medicines and suspension of polio vaccination.

Many people who need treatment for cancer, cardiovascular disease and diabetes have not been receiving the health services and medicines they needed since the COVID-19 pandemic began.

**PSYCHOLOGICAL IMPACT OF COVID-19**

The highly infectious nature of the COVID 19 virus have demanded hard measures of physical distancing and the strict imposition of quarantine. For humans who are social beings, quarantine is a difficult and unpleasant experience. Uncertainty and anxiety about disease status, curtailed freedom, boredom and separation from family and friends can have dramatic consequences. Anger runs high, and increases in domestic violence, divorce rates and suicide have been reported following the imposition of quarantine in previous outbreaks (Brooks et al. 2020, NZFVC 2020). The massive negative effects of mandatory mass quarantine have called for serious introspection on the use of quarantine as a public health measure (Hawryluck et al. 2004, Reynolds et al. 2008, Brooks et al. 2020).

Along similar lines a study comparing post-traumatic stress symptoms in parents and children quarantined with those not quarantined found that the mean post-traumatic stress scores were much higher (quadrupled) in children who had been quarantined, compared to those who were not (Sprang and Silman 2013). While the length of the quarantine period (10 days or more) on social and emotional health is unclear, maintaining stable social and emotional health has emerged as a key factor of psychological health in quarantine conditions.

**SOCIAL STIGMA**

The fear of being infected with COVID-19 has given rise to stigma in local communities. Social stigma was defined as “an attribute which is deeply discrediting” that reduces a person “from a whole and usual person to a tainted, discounted one” (Goffman 1963, p.3; Dowdy et al. 2020). Media reports from around the globe have also narrated how frontline health care workers were assaulted, spit on, denied rides, hit with rocks, sprayed with bleach and made homeless because of fears that they would transmit COVID-19 to the people living around them (Sotgiu and Dobler 2020).
Factors affecting the magnitude of direct and indirect health impacts of COVID-19

A number of factors affect the mortality and morbidity levels of the disease. In addition, the degree to which the indirect impacts will affect individuals will also be influenced by a number of external factors. The key factors are presented below.

AGE

Similar to the 2003 SARS epidemic (Anderson et al. 2004), but unlike H1N1 Swine Flu of 2009, the risk and severity of COVID-19 increased with age (Dong et al. 2020; Zhao et al. 2020) with the most severe health impact seen for adults over the age of 60—with particularly fatal results for those 80 years and older. Potential reasons behind this increment in reported number of cases with age at the onset of COVID-19 (Liu, Xing, & Xue Za, 2020) with the most severe health impact seen for adults over the age of 60—with particularly fatal results for those 80 years and older. Potential reasons behind this increment in reported number of cases with age at the onset of COVID-19 (Liu, Xing, & Xue Za, 2020) with the most severe health impact seen for adults over the age of 60—with particularly fatal results for those 80 years and older. 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QII.

WHAT HEALTH SECTOR SPECIFIC POLICY RESPONSES CAN BE IMPLEMENTED?
The pandemic outbreak exposed many gaps and weaknesses in public health surveillance, preparedness and response systems of countries worldwide. An interesting feature that emerged was the existence of policies in a number of countries, following earlier epidemics and pandemics but with no follow-up action.

As a consequence, on ground medical infrastructure and trained manpower to respond to the pandemic were absent or inadequate, which left public health systems vulnerable. The impact of COVID-19 once again brought to fore the absence of public health focus on mental health and the urgent need for it. The impact on mental health as a consequence of quarantine and lockdown has reiterated once again the need for psychological support and counselling as an active component of the public health support.

Some key responses that have been observed include:

**Communication**

Providing scientifically accurate information to people is not only important but necessary during a pandemic. The purpose of the communication is to provide and exchange pertinent information with the general public and stakeholders so that they can make well-informed decisions and take appropriate measures to protect health and safety. Communications should be based on the five principles outlined in WHO’s influenza outbreak communications planning guide (World Health Organization 2008b), which are as follows:

- To maintain and build public trust in public health authorities before, during and after an influenza pandemic;
- To support coordination and the efficient use of limited resources among local, national, regional and international public health partners;
- To provide relevant public health information to the public; to support vulnerable populations having the information they need to make well-informed decisions;
- To take appropriate actions to protect their health and safety; and to minimize social and economic disruption.
- To minimize social and economic disruption.

**Supplies**

Insufficient supplies for daily needs was found to be one of the greatest concerns in lockdown and quarantine situations. Officials therefore need to ensure that enough supplies for daily needs which would be replenished at regular and rapid intervals and provide reassurance to the public to prevent hoarding of such supplies (Manuell et al. 2011).

**Length of the Quarantine or Lockdown**

Quarantine is a necessary preventive measure during pandemics. However, studies have suggested that length of quarantine can have impact on psychological health and economic growth. Two studies showed that longer quarantine is associated with poorer psychological outcomes. Research suggests that restricting the length of quarantine to what is scientifically reasonable given the known duration of incubation periods, and not adopting an overly precautionary approach to this, would minimize the effect on people (Hawryluck et al. 2004, Reynolds et al. 2008).

**Psychological Support**

Psychological crisis intervention should be part of the public health response to a pandemic outbreak. This is important enough to be organized at the city, municipal, and provincial levels. There is urgent need for an intervention workforce to provide psychological support and counselling. In India, psychiatric social workers quickly set up counselling support for psychological counselling. In addition, social network support was found to be a great resource in managing psychological outcomes (Maunder et al, 2003).

**Protecting Vulnerable Populations**

In order to ensure that vulnerable populations are protected during pandemic outbreaks, it is essential that their vulnerability be highlighted to policy makers. To do so, public health professionals, emergency managers, and other stakeholders need to include representatives from racial/ethnic minority/migrant communities to inform planning and response and where appropriate, to adapt strategies to the context of diverse minority communities. Mass health messages for the general population may need to be adapted to the cater to language, culture and health literacy. Both the private sector and community support can also provide active support in keeping themselves, their families, and others in the community protected. Co-ordinated public-private partnerships would have been very helpful and governments need to set up data banks of such organisations for future preparedness.
Q12.

How Has COVID-19 Impacted School Education?
There is a serious risk that the COVID-19 pandemic will undo progress made in terms of achieving the ‘Education for All’ agenda in recent decades as well as in the context of the current ‘Education 2030–SDG 4’ agenda—inclusive and equitable quality education and lifelong learning opportunities for all.

The disruptions brought on by the COVID-19 pandemic are disproportionately affecting the marginalized children and youth and exacerbating educational inequality both within and across countries as illustrated in Figure 13, leading to urgent calls for investment in and transformation of education and learning systems to prevent short-term setbacks from turning into long-lasting problems (International Commission for the Futures of Education 2020; UN 2020).

Prolonged school closures disrupt services such as school feeding, immunization, and mental health and psychosocial support. They can also cause stress and anxiety owing to disrupted routines and the loss of peer interaction.

Further, these disruptions have disproportionately negative impacts on marginalized children, such as those from poor households, those living in conflict-affected countries, migrants, the forcibly displaced, minorities, and children with disabilities and learning differences.

The longer disadvantaged children stay out of school, the more likely they are to drop out. Even in a non-crisis situation, children from the poorest households are five times more likely to be out of primary school than those from the wealthiest (UNESCO et al. 2020).

Moreover, the digital divide has made it impractical and unrealistic for many schools to transition to online classes. For example, while globally 59% of learners have computers at home and 57% have household internet connection, these figures drop to 11% and 18%, respectively, in sub-Saharan Africa (International Commission on the Futures of Education 2020). According to the most recently available data in the World Bank’s online data repository, 34.5% of population in India used the Internet in 2019. A high proportion of the world’s population, 46.4%, did not have access to the internet in 2019, with most of the offline populations residing in least-developed countries (LDCs) (See Figure 15).

Further, these disruptions have disproportionately negative impacts on marginalized children, such as those from poor households, those living in conflict-affected countries, migrants, the forcibly displaced, minorities, and children with disabilities and learning differences.
Key constraining factors include
(i) poor or uneven quality of existing digital resources, which can be neither linguistically accessible nor culturally responsive to learner needs especially in developing countries; and
(ii) the lack of training and capacity of teachers in remote instruction or distance teaching, which often hampers the realization of flexibility, adaptability, customizability, learner-centred approaches and other promises of digital or blended learning solutions (UNESCO 2020c, UNESCO MGIEP 2019).

**DISRUPTED ACCESS TO FOOD, NUTRITION AND VITAL SERVICES**

School closures due to COVID-19 have an impact on the health and nutrition of many learners. The World Food Programme (WFP) estimated that, due to school closures, globally over 365 million primary school children were missing out on school meals at the end of March 2020 and 346 million in mid-August 2020. The loss of school meals therefore puts these children at risk of hunger and being deprived of key vitamins and micronutrients, which in turn negatively affects immunity, brain development and learning (UNESCO 2020a).

Moreover, disruptions to health and immunization services expose children in the most economically deprived households and the poorest countries to increased risks of pneumonia, diarrheal diseases, malaria, HIV and so on, leading to more child deaths from pneumonia, which already takes the lives of 800,000 children under the age of five annually or 2,200 daily, apart from COVID-19 (UN CCSA 2020).

**STRESS, ANXIETY AND MENTAL HEALTH ISSUES**

Infectious disease outbreaks have observed increased levels of anxiety among the population and increased rates of diagnosable mental illnesses (Brooks et al. 2020, Rubbin and Weseley 2020, also see section on health impacts). For children and adolescents with mental health issues, social distancing measures mean a lack of access to the resources they usually have. School routines serve as important coping mechanisms for young people with mental health issues, and school closures can therefore add to the deterioration of their mental health.

According to Lee (2020), in a survey by the mental health charity YoungMinds, which included 2,111 participants up to age 25 years with a mental illness history in the UK, 83% responded that the pandemic had worsened their conditions, and more than a quarter reported that they were unable to access mental health support.

For children and adults living in an abusive home, social distancing measures can worsen the already difficult situation they find themselves in at home, with abuse likely aggravated at times of uncertainty, stress and anxiety. Whereas previous public health emergencies have witnessed increased reports of child abuse, we know little about the long-term mental health effects of pandemics on children and adolescents, which is an important gap for research (Lee 2020). As the COVID-19 pandemic continues, there is a need to monitor the mental health status of children and adolescents. Box 2 provides an example of a government initiative to monitor young people’s mental health issues.

**NON-CONDUICIVE HOME LEARNING ENVIRONMENT**

A number of challenges hamper efforts to create an environment conducive to home learning. For children from poor households, home learning is typically a challenge due to a general lack of resources, including digital devices and connectivity, crowded conditions and poor ability of parents or caregivers to facilitate formal learning at home.

Home learning can be a source of stress for learners as well as for families, as it puts extra pressure on caregivers, sometimes with limited capacity, time or resources. Parents who do not speak the language of instruction or whose children have special educational needs are likely to face aggravated challenges (UNESCO 2020a). Box 3 gives examples of government initiatives designed to support home-based learning.

### BOX 2: ‘MANODARPAN’ MENTAL HEALTH INITIATIVE IN INDIA

India’s Ministry of Human Resource Development (MHRD) launched a mental health initiative called ‘Manodarpan’ to promote student well-being during the coronavirus pandemic in response to suggestions made by a taskforce it convened. Manodarpan provides a dedicated website, advisory guidelines, skill handbook, a national toll-free helpline, interactive online chat platform, a database of counsellors and a holistic report card.

Under this programme, schools are asked to focus on prevention by creating a safe and calm environment, teaching students about mental well-being, and reinforcing it through school activities. The programme also addresses early detection of mental health issues among children, by making mental health an integral part of health and physical education and by making these components compulsory for teacher education courses. In addition, as part of the National Education Policy 2020, report cards of students will be redesigned to reflect the “uniqueness of each learner in the cognitive, affective, socio-emotional and psychomotor domains”.

### BOX 3: GOVERNMENT INITIATIVES TO SUPPORT HOME-BASED LEARNING

The French Ministry of Education, in March 2020, launched an initiative called Nation-apprenante (Learning Nation), to facilitate learning at home during lockdown. The Kyrgyz Ministry of Education and Sciences provided embedded daily instructions to parents to support their children’s homework that were broadcast through TV programmes. In addition to online learning, the use of TV and radio, supported by media campaigns and guidance for parents, constitutes an effective tool to reach families during school closures. To reach out to students without connectivity or devices, Mauritania and Jamaica have provided families with take-home packages that contain learning materials, play kits and practical guidance for parents (Alam and Tiwari, 2020).
The World Bank analysis using data from 157 countries estimated that the income shock of the COVID-19 pandemic alone will push out almost 7 million students from primary and secondary schools worldwide (Azevedo et al. 2020). Economic hardships due to the pandemic will have spillover effects on education as families take into account the monetary and opportunity costs of educating their children, especially in countries where schooling is a private good and there are limited social safety net and social protection measures.

With much uncertainty about how the current crisis unfolds, a major downturn of the global economy is inevitable, which will consequently affect government revenues of many countries and hence the resources available for education (UNESCO 2020d, UNESCO 2020b). The domestic budget for education as well as international aid to education tend to suffer at times of economic recession. These cuts will have an impact on:

- (i) teacher training, compensation and job security, leading to teacher absenteeism, attrition and low teaching quality;
- (ii) expenditure on digital infrastructure; and
- (iii) support services such as school meals.

The early 2020 estimate of the financing gap to achieve SDG 4 in low-income and lower-middle-income countries was $148 billion annually, and it is estimated that this gap will increase by more than 30% due to COVID-19 (UN 2020).

Increased Risks of Exploitation and Violence for Children and Youth

Another important consideration is increased risks of exploitation and violence for vulnerable children at the times of economic downturns. Lockdowns and other social distancing measures linked to COVID-19 have already increased reporting of violence at women and girls.6

Confinement measures can aggravate risks affecting already ‘at-risk’ teenagers, from persistent absence from school. The 2020 report released by the Children’s Commissioner for England warns that the 120,000 teenagers in England—out of 25 in all terms—already at risk before the COVID-19 lockdown could be joined by many more who have difficulty returning to ‘normal’ after six months out of school.23

The Commissioner’s report calls for re-engaging them in society so as not to let a whole generation of vulnerable teens remain at risk of educational failure and unemployment, or crime or exploitation. They are easy prey to criminal gangs and are at high risk of becoming so-called ‘NEET’ (Not in Education, Employment or Training). Given that the share of NEET youth in UK was 10.5% of youth population (2019), as compared to 30.4 percent in India (2018) and 30.5% in South Asia (2018),24 it is all the more important to take measures to mitigate youth disengagement from education in this region, especially during and after the confinement measures.

Indirect Impact of Confinement Measures on Education

Major epidemics have always been followed by economic crisis and often accompanied by a period of economic recession. In times of recession, government spending across the board is cut with huge implications for the education sector. These budget cuts will have serious implications for the well-being of children and youth from the vulnerable segments of society.

**Impact of Economic Recession on Education at Household Level and Public Expenditure Level**

The World Bank analysis using data from 157 countries estimated that

The Gender Dimension

The unprecedented disruption to education linked to COVID-19 has immediate and longer-term effects on gender equality. According to some estimates, nearly 10 million more secondary school age girls could be out of school after the COVID-19 crisis has passed (Malala Fund 2020). Public health outbreaks have distinct gendered impacts that deserve special attention here.

In considering the indirect impacts of pandemics on education, it is important to address:

1. The burden of unpaid care work,
2. Female vulnerability and gender-based violence, and
3. Gendered digital gaps, which can be exacerbated during the crisis and deepen gender inequality in and through education.

A recent literature review found increases in gender-based violence (GBV) during past epidemics, including domestic violence and sexual exploitation and abuse (Fraser 2020). School closures can put adolescent girls at increased risk of early marriage and pregnancy. When schools close, learners in disadvantaged households, such as children from migrant and forcibly displaced communities, can become isolated at home and in their communities with diminishing protection. This leads to increased risk of abuse, exploitation and gender-based and sexual violence. Research conducted by UNICEF on the impact of the Ebola epidemic in Sierra Leone found that teenage pregnancy increased by 65% in some communities during the crisis partly due to school closures.26

The gender divide in digital learning during this pandemic can be expected to worsen. According to the International Telecommunication Union (ITU), more men than women have access to and use the internet in all regions of the world (see Figure 16). In 2019, the proportion of women using the internet globally was 48%, compared to 58% of men. In the least developed countries (LDCs), only 13.9% of women use the internet. Moreover, the digital gender gap worldwide is widening in recent years, particularly in developing countries, although it decreased in developed countries.27
WHAT ARE SOME KEY POLICY RESPONSES IN EDUCATION?
1. Safe Reopening of Schools: Lessons from Europe and USA

While school children and adolescents can develop COVID-19, experiences in European countries and USA show that schools implementing appropriate transmission mitigation measures (e.g. physical distancing, ventilation, masking, hand hygiene, and staying home with minimal symptoms) have not significantly contributed to spread of the virus among local communities (Lordan et al. 2020). Based on scientific understanding of SARS-CoV-2, Lordan et al. (2020) highlight three mitigation strategies for reopening:

1. To minimize the import of infections into the school, restrict in-person learning when infection in the local community is controlled.
2. To minimize the likelihood of further transmission, implement appropriate mitigation measures such as limiting room occupancy, avoiding activities such as singing and sports, and improving ventilation.
3. To minimize outbreaks in school, limit secondary transmission to the smallest possible number of persons. Cohorts should remain isolated from each other and person-to-person contact should be kept minimal to facilitate contact tracing in case outbreaks occur.

2. A Framework for Reopening Schools: With the Most Marginalized Children in Mind

Around the world, decision makers are tackling difficult trade-offs as they consider re-opening schools. UNESCO, UNICEF, WFP, UNHCR, and the World Bank developed a framework to inform the decision-making process on when, where, which schools to reopen and how to ensure (1) safe operations, (2) learning, (3) wellbeing and protection of school staff, teachers, students and communities, and (4) inclusion of the most marginalized (UNESCO et al. 2020).

Some of the key questions to be asked in terms of addressing the challenges of school closures include the following:

- Is classroom instruction indispensable to attain the respective learning outcomes?
- Is high-quality remote learning (including but not limited to online learning) accessible to all students?
- Are school closures compromising student access to food, nutrition and other vital services?
- Is the current arrangement for remote learning sustainable in terms of student learning and socio-emotional well-being, given home learning environments, burdens on caregivers and other factors?
- Do school closures expose children to increased risks of exploitation, abuse and violence?
- There is also a need to consider school readiness for reopening, the level of exposure of the school population, and various community-related risk factors. Some key questions to ask are:
  - Does the school have necessary capacity to maintain safe school operations?
  - Does the school population have a high level of exposure with higher-risk groups?
  - How do students, teachers and other school staff travel to and from school?
  - Are there community-related risk factors, given epidemiological factors, the capacity of the health system, density of population, and observance of social distancing, personal hygiene and other measures to prevent COVID-19 transmission?

Source: Adapted from UNESCO et al. 2020. For more detailed guidance, consult the original document.
Strengthening the resilience, responsiveness and flexibility of the education system

The COVID-19 pandemic has highlighted the importance of building resilient and responsive education systems to anticipate and cope with future crises. This section synthesizes and highlights recommendations from the two main documents published in August 2020:

(1) policy recommendations based on research evidence which were detailed in an open letter by leading US education researchers (Harris et al. 2020); and


FOCUS ON EQUITY AND CAPACITY DEVELOPMENT

An inequitable education system is vulnerable to shocks. Pandemics and other disruptions exacerbate existing inequalities and push the most vulnerable learners out of school. Invest to build system resilience and responsiveness, focusing on equity and inclusion, as well as on reinforcing capacities for risk management and enhancing leadership, coordination, consultation and communication (see UN 2020).

STRONGER ARTICULATION BETWEEN DIFFERENT TYPES OF LEARNING

System resilience also depends greatly on its flexibility, which is partly determined by connections and linkages between levels and types of education and the capacity to mobilize alternative modes of delivery. Hybrid learning can provide quasi-individualized learning pathways for students, taking advantage of a plethora of digital learning resources. Stronger articulation between formal and non-formal education is needed to allow education systems to become better equipped to serve the needs of all learners, their communities and society at large.

DIGITAL LEARNING

It is important to capitalize on the momentum of using technology to innovate teaching and learning, assessment, and school-family relationships, and keep up with innovations after the crisis. Sustainable solutions should build upon lessons learnt from the extensive use of technology — both high tech and low tech — to ensure learning continuity during the pandemic, including for the most marginalized. This is however not a call for transitioning from face-to-face to fully online schools, which have so far a poor track record of supporting learning in prior research. Evidence from USA suggests that fully virtual schools generate much less learning than in-person schools (Harris et al. 2020).

Student experience can be severely limited in the absence of high-speed internet connectivity and computers at home. Although this cannot happen overnight, universalizing digital access for students and teachers is an essential step to make education systems prepared for, and responsive to, current and future health and other crises, including the looming climate change challenges. The United Nations (2020) has called for expanding the definition of ‘the right to education’ to include connectivity.

Free and open source technologies are important to ensure equity. Taking fully into account the issues of data privacy and implications of public education being dependent on digital platforms controlled by private companies, governments should support open educational resources (OERs) and open digital access (UNESCO MGIEP 2019; International Commission for the Futures of Education 2020; UN 2020).

Hybrid learning can provide quasi-individualized learning pathways for students, taking advantage of a plethora of digital learning resources. Although there is growing evidence that MOOCs and similar approaches to online learning tend to exacerbate inequalities in educational outcomes due to socioeconomic status (Hansen and Reich 2015; Kirzic et al. 2017; Reich and Ito 2017), there is no doubt that well-designed online learning can be effective and it will play an increasingly important role in schooling. For effective remote instruction, Harris et al. (2020) recommend frequent interaction combining synchronous and asynchronous instruction. It is important to build teachers’ capacities to harness pedagogical possibilities opened up by digital technology, such as ubiquitous learning, active knowledge making, recursive feedback, and collaboration (UNESCO MGIEP 2019). It is useful to explore innovative continuous assessments using technology, such as monitoring student progress through mobile phone surveys, utilizing learning platforms or apps which track student learning, and implementing rapid learning assessments to identify learning gaps (Alam and Tiwari 2020).
Q14.

WHAT HAVE BEEN THE ECONOMIC IMPACTS OF COVID-19?
The COVID-19 pandemic has caused huge economic disruptions. Most countries have seen their Gross Domestic Product (GDP) growth drastically fall over the first two quarters of 2020. The contraction has been higher in advanced economies than in emerging and developing economies. Growth forecasts are being continuously revised downwards as the economic impacts of COVID-19 and the corresponding policies addressing the COVID-19 materialize.

Global GDP was expected to expand by 4 percent in 2021 but these numbers have now been revised to be 5.3 percent below the pre-pandemic projections; this translates to about 4.7 trillion USD (World Bank 2020). Global Trade is projected to contract by 9.5 percent in 2020, a drop witnessed in the 2009 global recession.

The pandemic has also caused per capita incomes to fall in more than 90 percent of Emerging Market and Developing Economies (EMDEs) forcing millions back into poverty (World Bank 2020). This fall is expected to erase about 10 years of per capita income gains in these countries. The pandemic has no doubt erased much of the progress countries made in achieving SDG1-reducing poverty. Equally important the pandemic has no doubt played a key role in worsening the already increasing income and wealth inequality gap across most countries (Goldin and Muggah 2020). In the United States itself,

The economic impacts are twofold. The first coming directly from the disease itself and the second resulting from the various policies implemented to contain the virus. 1968 (see Box 4). The economic impacts are twofold. The first coming directly from the disease itself and the second resulting from the various policies implemented to contain the virus.

Box 4. PANDEMICS: ECONOMIC IMPACTS

1. The economic impact of the Spanish Flu driven by deflation was computed to be about 6% lower GDP growth (Barro et al. 2020). The most recent estimates for the COVID-19 lie in the range from about 3% to 10%

2. During the Spanish Flu, the real employment impact was the loss of a large portion of the working population. In the case of COVID-19, the unemployment impact seems to be similar to the Great depression (GDP fell by over 50% while unemployment rose from 3.2% to 24.9%) due to stoppage of supply chains and reduction in demand due to lockdown policies and worker layoffs.

3. The 1957 Asian Flu pandemics estimated to have cost one to two million lives globally. The 1968 Hong Kong Flu is estimated to have caused one to four million deaths. No major policies affecting economic activity were imposed.

4. The COVID-19 policy responses have for the first time shut down the economic system across the world. The final fatality count will tell us if the social and economic costs of these policies outweigh the benefits accrued in potentially saved lives and minimizing reduction in labour productivity caused by the health-related after-effects of the virus.

The high degree of uncertainty and the manner in which COVID-19 response policies have been implemented across the globe has also had an impact on individuals’ perceptions and subsequently behaviour (Baldwin and Mauro 2020).

Unlike the Spanish Flu which caused a major deflation, the COVID-19 is causing the greatest recession since the Great Depression of the 1930s. The economic dynamics of the COVID-19 pandemic is very different from the previous three pandemics of 1918, 1957 and 1968 (see Box 4). The economic impacts are twofold. The first coming directly from the disease itself and the second resulting from the various policies implemented to contain the virus.

The pandemics have also caused per capita incomes to fall in more than 90 percent of Emerging Market and Developing Economies (EMDEs) forcing millions back into poverty (World Bank 2020). The contraction of supply chains and reduction in demand due to lockdown policies have had impacts on the supply side effecting production and consumption respectively. These have subsequently had impacts on the demand side with declining consumer confidence and spending.

Figure 17. OECD forecasts of GDP growth as of March 2020.

Source: Adopted fromMSN.com Economics. Oakland, How in August March 2020: more pronounced impact of weaker domestic demand, lower commodity and equity prices and higher uncertainty. Base-case scenario with the virus achieved second in China, broad country scenario with the outbreak spreading significantly in other parts of the world (Europe, Asia and North America. See Box 4 for full details of the shocks applied. Economies with negative growth include Argentina, Brazil, China, Australia, South Africa and other non-OECD oil-producing economies. The high degree of uncertainty and the manner in which COVID-19 response policies have been implemented across the globe has also had an impact on individuals’ perceptions and subsequently behaviour (Baldwin and Mauro 2020).

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An early forecast by the OECD in March 2020 (see Figure 17) put the global change in GDP at approximately negative 1.4% in a broader contagion scenario. These figures we very quickly surpassed with outlooks now much bleaker as the second level impacts of the policies to contain the virus ripple through the economic systems across the globe. The more recent forecast by the OECD in June 2020 shown in Figure 18 puts GDP change ranging from negative 6 to negative 7.6% depending on if there is a second surge of infections in countries.

The virus has affected a total of 123 countries with some of the worst effected being also some of the most economically advanced countries. It is important to note that previous, post-war pandemics have generally affected much less economically important nations; this is not the case for COVID-19 (Baldwin and Tomura 2020). For example, the cluster of US, China, Japan, Germany, Britain, France and Italy—each having high infection and mortality levels account for approximately 60% of the world GDP, 68% of world manufacturing and 41% of manufacturing exports (Baldwin and Mauro 2020).

In a globalized and connected world of today, the impacts of policies in many of these major economies to minimize mortality (deaths) and morbidity (illness and inability to work) will have significant impacts on their own economies as well as the rest of the world.

The tools used to implement macroeconomic policies for addressing the downturn caused by the pandemic will differ across countries depending on the structure and maturity of the respective economies. (Hevia and Neumeyer 2020, Djankov and Panizza 2020). The most important amplifying factors include:

- Pre-existing high levels of poverty and inequality
- A relatively unstable political and governance structure
- Decline in remittances and relatively small public sectors and tax revenue bases
- Poor health infrastructure
- Limited fiscal and monetary options
- A large informal economy and labour market
- Precarious access to international financial markets
- A large share of the economy comes from the tourism sector
- A drop in commodity prices due to drop in demand
- Additional decline in double-hit scenario

We know that lockdowns and confinement policies can have substantial benefits by reducing the mortality rate. However, eradicating the virus through a “crush the curve” or “flattening the curve” policies can have considerable economic costs (Hsiang et al. 2020, Fang et al. 2020, Deh et al. 2020, Torrejon Perez et al. 2020). Therefore, the decision to implement any policy should ideally be guided by a Social Cost-Benefit Analysis (SCBA).

To undertake a social cost-benefit analysis, calculations imputing the cost of life lost is inevitable. Although steeped in controversy over the use of such estimates, some ball park figures are needed to guide policymakers on making decisions based on trade-offs between cost of lives lost versus the economic costs of saving lives. Estimates understandably range over a wide spectrum, each based on a set of different assumption; an average estimate is around US$10 million per person (Viscusi and Masterman 2017).

In addition to the statistical value of life, economists have attempted to calculate the impact of illness through the Disability Adjusted Life Years (DALY). The DALY measures the number of years lost to illnesses, disability or early death. The indicator therefore computes both mortality and morbidity into a single metric (Murray 1994).

The value added production chain of today’s global economic system will translate to distortions in the chain having a ripple effect across the whole production chain spread across the world.
Costs of Pandemic Policies

The total economic costs from the COVID-19 pandemic can be analysed from the supply and demand perspective. The extent of these costs will be very much dependent on the type of pandemic policy being adopted. These costs will come from:

(i) Supply side disruptions: Costs related to disruption in production caused by the disease;
(ii) Supply chain disruptions: Costs related to trade and supply chains disruption; and
(iii) Demand side disruptions: Costs of a drop in demand caused by a drop in disposable income and fear of uncertainty about future income stream caused by disruption in economic system. 

SUPPLY SIDE COSTS ARE PRIMARILY:

(i) Costs to the economy due to deaths. The supply of labour for economic production is disrupted and in fact a smaller pool of labour is available. However, in the case of COVID-19, the majority of mortalities were people in the 70 and above age group. Therefore, the impact on labour supply to the economy might not be as large as it might have been in the 1918 Spanish Flu when 50 odd million people were lost to the flu from a global population of 1.5 billion. Another factor that differentiates COVID-19 from the Spanish Flu is that most of the causalities in the latter were in their 30’s to 40’s.
(ii) Another supply side production cost that will be incurred in a pandemic is the drop in labour productivity due to days lost during illness and the after-effects of the illness. This cost will be inversely dependent on the rigidity of the policy implemented; the more stringent the policy of lockdown and confinement, the higher the cost of lost days. However, this cost will have a time dimension whereby the short-term costs will have to be weighed against the long-term gain of lower infections.
(iii) Third cost is overall reduction in output (supply shock) due to restricted flow of inputs across and within countries, supply chain disruptions caused by lockdown and confinement policies. Figure 19 tells it all. The three main supply centers are Germany, China and the U.S.A. The size of the node and the thickness of the arrows indicate the value and volume of trade respectively. Disruptions to these three centers will have adverse economic impacts across nearly all nations across the world.

DEMAND SIDE COSTS OF THE PANDEMIC WILL COME FROM:

(i) Lower purchases of goods and services by consumers because of absolute loss of people due to high mortality rates. This can be assumed to be negligible in the case of COVID-19 because of the relatively low mortality rates in nearly all countries. The total number of global deaths as of 10th December 2020 was approximately 1.5 million; about 0.02% of global population.
(ii) Reduced demand arising from loss in disposable income caused by unemployment, cut in wages and/or loss of income for many small business owners.
(iii) A drop in demand because of a wait and see behaviour by consumers and firms. Previous recessions and economic crisis such as the Great Trade Collapse in 2008-2009, saw both consumers and firms postponed or delayed purchases and investment till much later when confidence in both fiscal and monetary policies returned to the market.

PSYCHOLOGICAL AND MENTAL HEALTH COSTS

An often overlooked or ignored costs accruing from pandemics is the mental health and psychological trauma that emerge during a pandemic crisis. The direct impacts of the pandemic through the loss of family members and friends can have a huge psychological impact leading to depression and in some cases suicides. The economic valuation of these are usually computed through the DALY’s (Disability Adjusted Life Years).

Benefits

Lives Saved: The key benefit from any pandemic policy will be the lives saved. It is a philosophically difficult topic to address but at the end of any decision making, economists have always used cost-benefit analysis to understand if any additional measure will produce a net positive or negative benefit; in other words, the additional benefit experienced by society exceeds the costs incurred. On the other hand, it might also reduce to a moral question whereby policymakers’ objective is to minimize the lives lost at whatever cost. This will primarily then imply imposing stringent lockdowns with complete confinement for the time period that is necessary for the virus to be eradicated.

Environment: An interesting and unexpected benefit in the case of the COVID-19 lockdown policy has been the improvement of environmental conditions across the world. Pollution levels have dropped due to the shutdown of most economic activities. The actual benefits of improved environmental conditions has yet to be calculated but initial observations suggest significant improvements.

A Social Cost-Benefit Analysis

To gain a better understanding of the effectiveness of any policy response to the COVID-19 crisis will require us to identify the various costs and benefits associated with these policies. In this document we will look at the following four main policy strategies:

• No action taken: The Business As Usual (BAU).
• Voluntary measures of social distancing and face masks combined with some regulatory measures overseeing public gatherings and activities (VR);
• An aggressive Test, Trace, Quarantine, Treat policy (TTQT);
• A tightly enforced lockdown with confinement of population to their homes, shutdown of all economic and social activities (SR).

Turning the coin on its head, the success of pandemic policies put in place in turn will largely be influenced by the underlying economics. The reproduction number—R0—is in fact influenced by the confinement policy in place. We shall not present actual numbers in this document as we do not have the data or models to run these scenarios but what this document suggests is a SCBA framework for policymakers to consider when designing policies.

Under a BAU scenario, the RO factor can be assumed to be high; present estimates suggest a R0 of 4 under a BAU. This implies higher mortality and morbidity rates. Using the statistical value of life, we can compute the cost of lives lost, and the cost of productivity drop from the illness caused. The costs of production and demand changes will be minimized in this scenario as production chains would have not been affected due to no lockdowns and confinement policy. The life span of the pandemic might
continue till a vaccine is found or herd immunity sets in across all countries in the globe. Countries that might be considered following a BAU could be Sweden, USA, and Brazil.

A highly regulated policy will ideally produce a R0 of below 1 for the COVID-19 virus. This would yield high benefits from the lives saved and also the benefits from an improved environment. However, the costs of a highly regulated policy would imply high production and demand costs incurred from the lockdown and confinement policies put in place. Countries in this category could be China, Germany, India, Norway, and South Korea.

Ideally, the lockdown intensity or degree of confinement should be determined by the compromise between the short-term benefits of easing the lockdown and the long-term costs of a longer duration of the pandemic or seen in another way, the compromise between the short term costs of increasing the confinement and the long term benefit of reducing the duration of the confinement (Gollier 2020).

The Impact of Behaviour, Perceptions and Attitudes

A study by Gomez and colleagues using data from the International Coronavirus Survey show distinctly three key findings with respect to individual’s behaviours and perceptions towards COVID-19 (Gomez e al 2020). First, there is less compliance with containment measures by citizens in low\middle income countries. Second, individuals from these countries feel that their governments were untrustworthy and unreliable. Third, individuals from these low\middle income countries demonstrated higher levels of anxiety and depression with females being affected the most.

These attitudes, behaviour and perceptions will influence the success of the policy implemented and in particular policies which will rely on trust and responsibility on the part of individuals. A strict enforcement of a full lockdown and confinement as in the case of China worked well in curbing the spread of the disease. However, similar lockdowns and confinement policies have had less success. What were the main factors contributing to this difference is an area of future research.

What We Measure is What We Manage

The economic impacts of the pandemic have primarily revolved using the Gross Domestic Product (GDP)32 as the key benchmark. It is important to keep in mind what the GDP indicator tells us about the economy and more importantly what it does not. The GDP is therefore a useful indicator for measuring the productivity and efficiency of any economy.

However, it is not an indicator to be used as a welfare indicator.

Many alternate indicators have been suggested to be used if the objective of the exercise is to monitor the overall welfare of citizens (Stiglitz, Sen and Fitoussi 2007, Rogers and Duraiappah et.al 2012). These range from the Gross National Happiness indicator, the Human Development Index, the Gini coefficient for inequality, the sustainability Index to the Inclusive Wealth Index. Each of these have their strengths and weaknesses. The final choice therefore might require a suite of indicators used together synergistically to provide an overall indication of the welfare of citizens and how this these have changed over time as well as changes from a stress factor such as the pandemic.

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32 GDP is defined as the monetary market value of all final products and services produced in a country over any specified time period. It was developed by Simon Kuznets in 1934 and he warned against using it as an welfare statistic.
Q15. What have been the Economic Policies in Response to COVID-19?
The key role of economic intervention policies would be to maximize the net benefit or minimize the total costs accruing from policies being implemented to address the pandemic. Therefore, using the cost-benefit framework we had discussed earlier, the following policies have emerged from the literature on the economic impacts of the pandemic.

1. Increase Public Expenditure on Health Care. Emergency hospital space, ventilators, protective medical equipment, medical personnel and other health related budget items with the sole purpose of reducing mortality. This will contribute to maximizing the benefits accruing from saving lives or minimizing the net costs by reducing the mortality and morbidity rates as much as possible.

2. Provide Income Support to People. The provisioning of safety nets in times of crisis is one of the most effective fiscal policy tools in the hands of the government. The type of support will vary by the target group within each country. Workers in the formal economy can be supported by providing extensions of existing unemployment and leave benefits. These can be distributed through the formal tax and revenue systems. In addition, loan holidays especially house mortgages might be an option that could be negotiated with banks.

For workers in the informal and undocumented economy, distribution becomes complex and non-trivial; but this is the population group that will really need support. Options include direct cash transfers, food coupons, access to health facilities, and loan holidays for mortgages, among other measures, when necessary.

3. Support Small Business. Small business and enterprises form the backbone of economies of many countries. Financial support in the form of wage subsidies, tax cuts, moratoriums on debt repayments, extending credit lines are some of the key fiscal policy measures governments can implement to diminish financial burdens caused by the pandemic and the associated pandemic policies.

4. Reduce Stress on Financial System. In parallel with fiscal measures, governments also have at their disposal monetary policies such as cutting interest rate, reducing reserve requirements by banks to support investments, and adjusting the money supply to meet the needs of the economy in the short term. The release of government backed bonds and securities to support fiscal policies would need support from financial institutions and in particular authorities overseeing the country’s monetary policies.

- First and foremost, additional fiscal support for health services is required, including sufficient resources to ensure adequate staffing and testing facilities, and all necessary prevention containment and mitigation measures.

- Measures can also be taken to cushion adverse effects of the outbreak on vulnerable social groups. Short time working schemes, where available, can be utilized to enhance the flexibility of working hours while preserving jobs and take home pay, although such schemes do not protect temporary or migrant workers from lay-offs. Governments can also help households by providing temporary assistance, such as cash transfers or unemployment insurance, for workers placed on unpaid leave, and by guaranteeing to cover virus-related health costs for all, retrospectively if needed.

- In the very short term, the provision of adequate liquidity in the financial system is also a key policy, allowing banks to provide help to companies with cash-flow problems, particularly small and medium-sized enterprises, and ensuring that otherwise solvent firms do not go bankrupt whilst containment measures are in force. Measures that reduce or delay tax or debt payments, or lower the costs of inputs such as energy, for firms in the most affected regions and sectors should be considered. Temporary reductions in the level of reserves banks are required to hold at the central bank could also be implemented if required. Swap lines between major central banks may also need to be utilized, particularly if widespread disruption to trade or a flight to safety by portfolio investors enhances the demand for US dollars.

- In addition to allowing the automatic fiscal stabilisers to work fully, and expanding spending on health services, targeted and temporary fiscal measures could also be implemented to support businesses in sectors particularly exposed to a sharp downturn in travel and tourism. Funds established to reintegrate workers who he lost their jobs due to globalisation could also be utilised. In the European Union, other potential options are to adapt temporarily the state aid framework, as was done at the height of the financial crisis in 2008–09, or to allow more leeway within the EU fiscal rules to affected economies, in recognition of the exceptional circumstances.

- More broadly, lower policy interest rates and stronger government spending can help boost confidence and assist with the recovery of demand once the outbreak eases and travel restrictions are removed. However, such measures are less effective in dealing with the immediate supply-side disruptions that result from enforced shutdowns and travel restrictions.
Q16. **What have been the overall effects of COVID-19 on the SDGs?**
I t is estimated that more than 1 billion people could be living in extreme poverty primarily caused by the COVID-19 pandemic by 2030. This number represents the upper limit scenario if no dedicated and integrated solutions are implemented to counter the effects of the pandemic. This implies that even if the pandemic is contained with the next year or so, the after-effects will persist for many years post pandemic. Estimates from the World Bank in its Global Economic Prospects show when compared with pre-crisis forecasts that COVID-19 could push about 100 million people into extreme poverty in 2020. A study by Sumner et al. (2020) expects poverty levels to increase by 25 to 35% with about half of these in South Asia. The same bleak prospects hold for SDGs 2, 3, 4, 5, 8, 9, 10 and 11. These estimates show the high degree of variability in projections which are understandable due to the complexity of issues and more importantly the inter-dependencies that lie across these SDGs.

At the global level, a recent study provided a snapshot of the impacts COVID-19 can be expected to have on the progress of achieving the SDG’s (UNDESA 2020). As shown in Figure 21, most of the impacts can be expected to range from mixed or moderate to highly negative impact. There are a number of SDGs where there is no data available yet to make any comment on the impact COVID-19 might have on them.

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The Sustainable Development Goals Report (2020) states that even before the pandemic, progress towards SDGs was slow and uneven with some visible gains. The probability of achieving the targets by 2030 were grim. COVID-19 aggravated the challenges and made the SDGs even more difficult to achieve. While the SDGs are intertwined and their achievement is inter-dependent on one another, in this report we focus on the SDGs that are closely linked to health, education, and economics (the three major domains of this report).

We intend to understand the impact of COVID-19 on these SDGs and shed light on targeted interventions that could be useful in mitigating the damage caused by COVID-19.

Targeted interventions refer to “SDG push” measures which include focused investments in social welfare programs, green sustainable economy, interventions to strengthen governance and digitalization to recover from the impacts caused by COVID-19 and to get back on-track with achieving the SDGs. Pardee Center and UNDP (2020) study assets that “SDG push” interventions, if implemented, could uplift 146 million people out of extreme poverty, and could reduce gender poverty gap after accounting for damage caused by COVID-19.

A key point to take away from this analysis is the cross-overs effects of impacts across the various sectors in society. For example, curtailed economic activities have dire impacts on employment leading to poverty and access to food, health and education. Depending on the socioeconomic strata, individuals will be differently affected with the most vulnerable suffering the most leading to growing inequalities. This is further exacerbated for women leading to greater gender inequality.

Another ripple effect occurs from confinement and mental health. Individuals confined in closed spaces for extended periods of time can suffer from depression, anxiety and stress. It has been reported that household violence has increased in particular against children and women. Many communities and countries are reporting higher levels of suicides stemming from the confinement policies implemented by authorities across countries.

The good news is that these projections can be minimized if a focused set of SDG investments in social protection-welfare programs, governance, digitalization and a sustainable green economy are implemented. The report further goes on to stress the importance of global collaboration if the optimistic scenario whereby the immediate impacts of the pandemic are reversed and the trajectory to achieve the SDGs are back on track (Hughes et.al 2020). For example, we can predict that SDG 12, 14 and 15 to actually see improvements and the trajectory to achieve the SDGs are back on track (Hughes et.al 2020). For example, we can predict that SDG 12, 14 and 15 to actually see improvements if a sustainable green economy strategy is implemented and the trajectory to achieve the SDGs are back on track (Hughes et.al 2020). For example, we can predict that SDG 12, 14 and 15 to actually see improvements if a sustainable green economy strategy is implemented which mirrors the reduced environmental impact we had observed when traditional economic activities were curtailed. Another key take away is that the countries must take a system approach as opposed to a sector approach in implementing the “SDG push” measures because the SDGs are inter-linked and their achievement is inter-dependent on one another. Hence, only an integrated approach would ensure recovery from damage caused by COVID-19 and accelerate pace towards achieving SDGs.
Q17.

What are the key lessons we can learn from the COVID-19 pandemic and opportunities to be explored in preparation for future pandemics?
Key lessons emerging from the ongoing COVID-19 pandemic include:

- Emerging Infectious Diseases (EID) causing pandemics have been found to be distributed non-randomly across the globe with many dominated by pathogens emerging from land conversion, agricultural production methods, the trade in wildlife and wildlife products, and the ecological impacts of habitat depletion. Pandemics can be expected to occur at more frequent rates in the future.

- Differences in the effectiveness of pandemic measures applied in different countries reflect a fundamental property of pandemics—that the contact between susceptible and infected individuals which leads to transmission depends on the choices made by individuals. People’s contact choices reflect the relative costs of illness and illness avoidance to them—the private cost. If the private cost of illness is low, or the private cost of illness avoidance is high, people have little incentive to avoid contact.

- Countries that were able to secure the participation of their citizens—either by reducing the private cost of illness avoidance or by strict regulatory enforcement with punitive punishments—had successfully stemmed the rapid rise in infection by adopting a Test, Track, Quarantine, Treat (TTQT) strategy.

- Existing mechanisms at all spatial and institutional levels are ill-equipped to address and counter the effects of pandemics. Healthcare systems, education, and economics systems across the globe have struggled to cope with the direct and indirect effects of the pandemic leading to many countries witnessing a reversal in their achievements towards the Sustainable Development Goals (SDGs).

- Transparency, effective leadership, effective communication, building trust and solidarity, timely action, enhanced use of digital technologies, and internationally coordinated containment efforts are essential to counter pandemics in an efficient and equitable manner.

- Stringency in implementation of containment measures such as lockdowns, school and college closures could prove to be instrumental in reducing the spread of the pandemic. Timing at which these measures are implemented is also crucial—the quicker the better.

- International coordination and cooperation may yet prevent the worst effects of the COVID-19 pandemic.
Opportunities to be Explored

**EDUCATION**

Explore the transformation of education systems to a hybrid model combining face-to-face and digital learning systems, to be prepared for, and responsive to, future pandemics and other crises. This means investment in digital infrastructure, teacher training and making access to digital learning available to all learners.

Access to internet should be seen as a necessity like electricity rather than a luxury.

Explore developing global, multilingual and AI-powered open repositories of publicly-funded or public-held digital education resources, Open Education Resources (OERs), and other digital content made available by diverse entities for free for educational purposes. Such repositories can build on inspiring examples such as Éduthèque37 by the French Government and the Horizon 2020 project X5GON38 (Cross Modal, Cross Cultural, Cross Lingual, Cross Domain, and Cross Site Global OER Network) funded by the European Union.

**HEALTH**

- Explore at the global level, establishing an international task force comprising of an interdisciplinary group of experts from across the world to identify ways and means to put in place monitoring and coordinating mechanisms for more efficient and effective mitigation and adaptation pathways. This mechanism under the leadership of the WHO but in collaboration with other UN agencies such as UNESCO, UNICEF, WFP and others will strengthen the global coordination and sharing of information to declare, contain and eradicate future pandemics in an efficient and equitable manner. An international collaborative mechanism that might provide:
  - A systematic approach to confinement and lockdowns
  - Standardized operating protocols for Testing, Tracing, Quarantine and Treatment (TTQT)
  - Scientific research and data to be shared openly to develop treatment protocols, drugs and vaccines more effectively, efficiently and equitably.
- Explore at the national level, establishing a central disease control mechanism that oversees the management of a pandemic. This body should be overseen again by a multidisciplinary group of experts that include not only health experts but also experts from all relevant economic, education and social sectors.
- Explore leveraging digital technologies such as artificial intelligence (AI), big data and cloud computing, and blockchain to test, track, quarantine and treat COVID-19 to support curbing the spread of the disease across borders. These technologies should ideally be overseen by the national and global coordinating centers to ensure privacy of individuals while increasing efficiency.

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37 Éduthèque [https://www.edutheque.fr/accueil.html] is a web portal created by the French Ministry of Education, free for all teachers and their students, at primary and secondary school level. It is a platform with more than 100 cultural and research partners in the fields of science and education. Éduthèque gathers the partner’s resources of high scientific quality, which have the right digital educational resources available for the portal, such as videos, maps, 3D models, animations and books, with their rights being cleared for educational purposes by the government, and their use considered a transformative use with established and special rules.

38 X5GON [https://www.x5gon.org/] is developing Artificial Intelligence methods to enable both learners and teachers to identify resources that match their learning goals. For example, a teacher in Africa might be able to find MOOCs or lectures that present a topic based on local and indigenous knowledge that is appropriate for the specific local context. A learner from France interested in understanding specific African challenges might be directed to relevant African content translated from local language into French.
ECONOMICS

Explore the design of automatic macroeconomic fiscal and monetary stabilizers to enable a faster reaction to disasters such as pandemics to reduce transaction loss accruing from political and bureaucratic processes of approvals and implementation.

Explore using or establishing a new international mechanism to coordinate transport protocols to minimize travel and supply chain disruptions across countries.

Explore advances in digital technology in the financial sector which could be leveraged to offer more efficient and transparent access to finance especially in the poorest countries.

Explore the establishment of unemployment benefit guarantee reserves. This process would involve a partnership between government and private sector to identify how a negotiated amount of the employment cost can be put aside as reserves in the case of a pandemic or any other unseen catastrophic event to avoid staff layoffs.

Conclusion

Limiting the spread of the virus, providing relief to the population in particular to vulnerable and marginalized populations and the provisioning of a safe vaccine in the most efficient, effective and equitable manner will always be the key priorities for every government.

Short term solutions that are necessary and which require significant immediate financial resources might have to be accommodated. However, distribution of these resources will need to be equitable and efficient to ensure that the inequality gap is not further widened and transaction costs minimized respectively. This will require major institutional revisions in many countries.

In addition, as the crisis abates, efforts must be directed towards ensuring that fiscal and monetary policies are designed in a manner that goes towards supporting the achievement of the SDGs. In addition, the lessons from this pandemic suggest building resiliency within the various institutions overseeing the economic, education, health and development sectors. The pandemic also shows us how important digital technology will be for building this resiliency.

Last but not least, global cooperation will be key in addressing many of the challenges thrown at humanity when events such as pandemics and other catastrophes like climate change which transcend national borders happen. The COVID-19 Pandemic has reminded humanity once again the essential role multilateralism can and must play in finding solutions to global problems.
Acronyms

**AI** - Artificial Intelligence

**AIDS** - Acquired Immune Deficiency Syndrome

**BAU** - Business As Usual

**CCSA** - Canadian Centre on Substance Abuse

**CD4** - Cluster Of Differentiation 4

**CDC** - Centers for Disease Control and Prevention

**CFR** - Case Fatality Rate

**CI** - Confidence Interval

**COVID-19** - Coronavirus Infections Disease 2019

**DALY** - Disability Adjusted Life Years

**DNA** - Deoxyribonucleic Acid

**EID** - Emerging Infectious Diseases

**EU** - European Union

**GBV** - Gender-based Violence

**GDP** - Gross Domestic Product

**H1N1/Swine flu** - Hemagglutinin Type 1 and Neuraminidase Type 1

**H5N1/Avian flu** - Hemagglutinin Type 5 And Neuraminidase Type 1

**HA** - Hemagglutinin

**HIV** - Human Immunodeficiency Virus infection

**IHR** - International Health Regulations (2005)

**ILO** - International Labour Organization

**ITU** - International Telecommunications Union

**LDC** - Least Developed Countries

**MERS** - Middle East Respiratory Syndrome

**MERS-CoV** - Middle East Respiratory Syndrome coronavirus

**MHPSS** - Mental Health And Psychosocial Support

**MHRD** - Ministry of Human Resource Development

**NA** - Neuraminidase

**NEET** - Not in Education, Employment or Training

**NZFVC** - New Zealand Family Violence Clearinghouse

**OERs** - Open Educational Resources

**OxCGRT** - Oxford COVID-19 Government Response Tracker

**PHEIC** - Public Health Emergency of International Concern

**RNA** - Ribonucleic Acid

**SARS** - Severe Acute Respiratory Syndrome

**SARS-CoV-2** - SARS Coronavirus 2

**SCBA** - Social Cost-Benefit Analysis

**SDGs** - Sustainable Development Goals

**TTQT** - Test, Track, Quarantine, Treat

**TVET** - Technical and Vocational Education and Training

**UN** - United Nations

**UN DESA** - United Nations Department of Economic and Social Affairs

**UNDP** - United Nations Development Programme

**UNESCO** - United Nations Education, Scientific and Cultural Organization

**UNESCO MGIEP** - UNESCO Mahatma Gandhi Institute of Education for Peace and Sustainable Development

**UNICEF** - United Nations Children’s Fund

**WFP** - World Food Programme

**WHO** - World Health Organization
1. Inter-Pandemic period (low risk of pandemic): Phase 1: No new influenza virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection may be present in animals. If present in animals, the risk of human infection or disease is considered to be low. Phase 2: No new influenza virus subtypes have been detected in humans. However, a circulating animal influenza virus subtype poses a substantial risk of human disease.

2. Pandemic Alert Period (medium to high risk of pandemic): Phase 3: Human infection(s) with a new subtype but no human-to-human spread, or at most rare instances of spread to a close contact. Phase 4: Small cluster(s) with limited human-to-human transmission but spread is highly localized, suggesting that the virus is not well adapted to humans. Phase 5: Larger cluster(s) but human-to-human spread still localized, suggesting that the virus is becoming increasingly better adapted to humans but may not yet be fully transmissible (substantial pandemic risk).


### Table 3: WHO Pandemic Phase Description and Main Actions by Phase (2009)

<table>
<thead>
<tr>
<th>PHASE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHASE 1</td>
<td>No animal influenza virus circulating among animals have been reported to cause infection in humans.</td>
</tr>
<tr>
<td>PHASE 2</td>
<td>An animal influenza virus circulating in domesticated or wild animals is known to have caused infection in humans and is therefore considered a specific potential pandemic threat.</td>
</tr>
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<td>PHASE 3</td>
<td>An animal or human-animal influenza reassortment virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks.</td>
</tr>
<tr>
<td>PHASE 4</td>
<td>Human to human transmission of an animal or human-animal influenza reassortment virus able to sustain community-level outbreaks has been verified.</td>
</tr>
<tr>
<td>PHASE 5</td>
<td>The same identified virus has caused sustained community level outbreaks in two or more countries in one WHO region.</td>
</tr>
<tr>
<td>PHASE 6</td>
<td>In addition to the criteria defined in Phase 5, the same virus has caused sustained community level outbreaks in at least one other country in another WHO region.</td>
</tr>
<tr>
<td>POST PEAK PERIOD</td>
<td>Levels of pandemic influenza in most countries with adequate surveillance have dropped peak levels.</td>
</tr>
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<td>Levels of influenza activity have returned to the levels seen for seasonal influenza in most countries with adequate surveillance.</td>
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### Annex 1: WHO Pandemic Phase Descriptions & Main Actions by Phase

#### PHASE DESCRIPTION

**PHASE 1**

*No animal influenza virus circulating among animals have been reported to cause infection in humans.*

**PHASE 2**

*An animal influenza virus circulating in domesticated or wild animals is known to have caused infection in humans and is therefore considered a specific potential pandemic threat.*

**PHASE 3**

*An animal or human-animal influenza reassortment virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks.*

**PHASE 4**

*Human to human transmission of an animal or human-animal influenza reassortment virus able to sustain community-level outbreaks has been verified.*

**PHASE 5**

*The same identified virus has caused sustained community level outbreaks in two or more countries in one WHO region.*

**PHASE 6**

*In addition to the criteria defined in Phase 5, the same virus has caused sustained community level outbreaks in at least one other country in another WHO region.*

**POST PEAK PERIOD**

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**POST PANDEMIC PERIOD**

*Levels of influenza activity have returned to the levels seen for seasonal influenza in most countries with adequate surveillance.*

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<td><strong>PHASE 1</strong></td>
<td><strong>PHASE 2</strong></td>
</tr>
<tr>
<td>Develop, exercise and periodically revise national influenza pandemic preparedness and response plans.</td>
<td>Develop robust national surveillance systems in collaboration with national animal health authorities, and other relevant sectors.</td>
</tr>
<tr>
<td><strong>PHASE 3</strong></td>
<td><strong>PHASE 4</strong></td>
</tr>
<tr>
<td>Provide leadership and coordination to multisectoral resources to mitigate the societal and economic impacts</td>
<td>Actively monitor and assess evolving pandemic and its impacts and mitigation measures.</td>
</tr>
<tr>
<td><strong>PHASE 5</strong></td>
<td><strong>PHASE 6</strong></td>
</tr>
<tr>
<td>Plan and coordinate additional resources and capacities during possible future waves</td>
<td>Regularly update the public and other stakeholders on any changes to the status of the pandemic.</td>
</tr>
<tr>
<td><strong>POST PEAK PERIOD</strong></td>
<td><strong>POST PANDEMIC PERIOD</strong></td>
</tr>
<tr>
<td>Evaluate the effectiveness of the measures used to update guidelines, protocols and algorithms.</td>
<td>Conduct a thorough evaluation of all interventions implemented.</td>
</tr>
</tbody>
</table>
As the world continues to grapple with COVID-19, this booklet comes in handy to answer and reflect upon basic questions encompassing the word “pandemic”—the what, where, when and how of it. If there is one thing that the COVID-19 pandemic has revealed it is the power of oneness—power of global coordination, international scientific collaboration, and aligned action in fighting against the virus. We are all in this together. As we learn to live with the fact that coronavirus is here to stay for a while, and continue to acclimatize to the “new normal”, our aim should be to trust scientific evidence and align our actions in a manner that maximizes “normal” living and minimizes inconveniences caused due to the pandemic. We hope this booklet will provide its audience with necessary information to help achieve this goal.