The Economic Consequences of Pandemics

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15 July 2021

PIDE Working Papers
No. 2021:5

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PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS
ISLAMABAD
2021

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Designed, composed, and finished at the Publications Division, PIDE.

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ABSTRACT

The recorded history of human civilisation is replete with instances of recessions that have brought financial despair upon the people. Pandemic-induced recessions are different because the adverse shock to the workings of the economy is purely biological rather than economic or financial. But they are no less destructive in their tendency to deflate economies and put all economic activity in peril. A study of the past episodes offers us a window into the lessons learned that could be valuable in managing today's as well as future challenges caused by adverse shocks to the system.

INTRODUCTION—A HISTORY OF PANDEMICS

Economic recessions have a very long history. The causes are different, but the repercussions are the same: from the curtailment of economic output to exacerbated poverty and inequality, their effects could be long-lasting, and the economic toll momentous. The Great Recession of 2008, set into motion by the collapse of a few investment firms, caused losses worth trillions of dollars to the global economy.

The present recession is no different. However, what is of interest is that the negative economic repercussions are not driven by a financial or economic phenomenon (like a stock market crash or banks' default), but by a purely biological phenomenon in the form of a virus-induced Pandemic that has already cost the global economy a fortune.[1]

From a historical perspective, this is not the first pandemic that has affected the economic workings of individual countries and the global economic order. The bubonic plague, commonly referred to as the 'Black Death', brought unparalleled misery upon Europe and fundamentally changed its economic order.

For our research purposes, it helps that the recorded history of human civilisation contains many examples of biological outbreaks that led to devastating consequences. From a scattered record of pandemics till the early phases of the industrial revolution, more concise record began to be tabulated later on. The 20th century saw not only accumulation and centralisation of earlier records, but also credible research into the effects of pandemics (including economic effects), a trend that continues to this day. These include estimations and statements of how economic life was affected by pandemics, which could help us in gauging whether they offer us any lessons in the current scenario?

Table 1 contains a list of pandemics throughout human history. This is by no means an exhaustive list, as some entries (like the Japanese smallpox pandemic of 735 to 737 AD) have been left out.[2]

LITERATURE REVIEW

Given the vast potential of pandemics in perpetuating adverse economic outcomes, it is no surprise that they have been the subject of studies over time. The majority of the research is devoted to the rough estimates of the economic toll of the pandemics that struck at various times and different places, but research over the last few decades has additionally relied upon modelling techniques to estimate the potential damage of future pandemics. The following lines briefly highlight the relevant literature.

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[1]Reputed publication, the Economist, has estimated the global cost to be $10.3 trillion in terms of forgone GDP for the years 2020 and 2021.

[2]A more detailed list, with timeline and casualty figures, is attached at Annexure-A.

Table 1

Historical Incidences of Pandemics, with a Brief Account

Serial No.	Name	Time	Brief Description
1	Unknown	5000 BC[3]	In 2015, archaeologists discovered a small pre-historic house in North China where 97 bodies were stuffed together. It became known as the 'Hamin Mangha'. The remains were similar to remains found at another pre-historic site (Miaozigou). The research concluded that the entire region (at least the north China region) was devastated by an unknown epidemic. The numbers and repercussions remain unknown.
2	Plague of Athens	430 BC	Around 430 B.C, for five years, an epidemic ravaged the city of Athens. This was documented by the Greek historian Thucydides, who narrated how people of good health were suddenly attacked by an unknown illness, causing violent throbbing in the head, redness and inflammation, inward parts (like throat and tongue) becoming bloody, and people experiencing putrid breath. The plague's death toll is estimated to be 100,000 souls, leading to a decline of major economic activities. This, in turn, devastated Athens' finances, leading to its capitulation to Sparta in 'Peloponnesian Wars'. Research suggests that it was probably Ebola or Typhoid that was the cause.
3	Antonine Plague	165-180 AD	Smallpox was the main cause of this devastation, estimated to have caused around 5 million deaths in the Roman empire. It was brought by returning soldiers after their campaigns at the edges of the empire. So devastating were its effects that it ended 'Pax Romana', which saw the Roman Empire reach its zenith. After the plague, the Roman Empire experienced an unending wave of civil wars, internal instability, and barbarian invasions that weakened its grip.
4	Plague of Cyprian	250-271 AD	It originated in Egypt, which at that time was under the Roman Empire. At its height, it is thought to have killed 5,000 people in Rome in a single day. Special kilns were built to burn the victims. Saint Cyprian, after whom the plague is named, wrote about its symptoms and circumstances, but experts are not sure what exactly caused the pandemic.
5	Plague of Justinian	541-542 AD	In contrast to the common belief that the destructive bubonic plague made its first appearance in medieval Europe, 'Plague of Justinian' was the first time that the world realised its calamitous effects. Occurring during the zenith of the Byzantine empire, it is estimated to have wiped out 10 percent of the world's population at that time.
6	Black Death	1346-1353 AD	Thought to have originated in a port city of Egypt from where grains travelled to Europe, the devastation wrought by the black death (caused by a specific strain of bacterium known as 'Yersinia Pestis') was so palpable that Europe lost almost half of its population. Mass graves became a common sight, and the whole of Europe was plagued by labour shortages. It's a well-researched subject, with researchers concluding that it led to fundamental shifts in the economy and society.
7	Cocolitzli Epidemic	1545-1548	Perpetuated by a particular strain of *Salmonella* bacterium, the *S. Paratyphi C*, this pandemic struck the Aztec empire's inhabitants in Central America and Mexico. Victims experienced gastrointestinal problems, high fever, and dehydration. Approximately 15 million inhabitants. were killed. Alongside a debilitating drought, it led to the end of Aztec rule.

Continued—

[3]This episode is not that well-known, and neither that well-documented. But the reason for including this in the list is to demonstrate that pandemics are as old as human civilisation.

Table 1—(*Continued*)

8	American plagues	16th century	Before the arrival of the European conquerors from Spain and Portugal, South America was ruled by the Inca and the Aztec empire. The European exploratory force, led by Hernan Cortes and Francisco Pizzaro, brought with them smallpox, which the natives could not withstand and which led to millions of deaths. Such was the scale of devastation that Mexico is estimated to have gone from 11 million to 1 million people only, with estimates also suggesting that almost half of the indigenous population was wiped out. The devastation weakened both the empires, thus making the job of European conquerors easier.
9	Great plague of London	1665-1666	This was the last time that the bubonic plague struck Europe, after the devastation it had wrought in the form of the Black Death. Not only London lost 15 percent of its total population, but an estimated 100,000 people were killed in total.
10	Great Plague of Marseilles	1720-1723	The plague spread from a ship carrying cargo from the Mediterranean to the port of Marseilles. It wiped out 30 percent of the city's population and killed over 100,000 people. The exact bacterium or virus causing the outbreak remains unknown.
11	Cholera Pandemics	1846-1860	This was a series of pandemics that probably started in the mid-1830s, and gradually spread to different continents, and lasted till 1863. The pandemic that began in 1846, known as the 'third cholera pandemic', was the most devastating of these. It originated in India and spread to other parts of the globe. In Russia, more than a million people died of Cholera. In 1846, 15,000 souls in Mecca lost their lives. Between 1853-54, Britain lost 23,000 individuals to this disease. 10 million were thought to have perished in India, while the US also suffered as thousands lost their lives. Countries like Japan, China, and South Korea were also not spared. As per the researchers, the pandemic was caused by two viral strains: bubonic and pneumonic strain.
12	Flu Pandemic	1889-1890	This pandemic resulted in about a million deaths around the globe. Caused by the influenza virus, it reached its peak mortality just within 5 weeks, the main reason being the newer (and faster) modes of transportation, making it easier to transport it from its origin (thought to be Russia). The speed of transmission made it different from earlier pandemics.
13	Spanish Flu	1918-1920	At its peak, 500 million people were affected by this flu, with an estimated 50 million losing their lives. Poor sanitary conditions, cramped camps and bunkers, and poor nutrition due to WWI are thought to have made it even more lethal than it was. Considered the deadliest pandemic in history, it was caused by a strain of influenza. People of all ages were affected. Although it's called the Spanish flu, experts believe that it did not originate in Spain, but in China, carried to Europe by Chinese labour. In the cramped, dirty trenches of WWI, soldiers first contracted it in 1918. As they returned to their homes at the end of the war, they carried the virus with them. Returning Indian soldiers, for example, were the main source of the spread of Spanish flu in Colonial India, where mortality rates reached a staggering 50 deaths per 1000 people. A similar strain of flu caused an epidemic in the form of 'Swine flu' (2009-2010, also known as H1N1 influenza).
14	Asian Flu	1957-1958	This flu was also a form of influenza, ending up taking the lives of more than 1.1 million people around the globe. It was a blend of avian flu viruses.
15	Ebola	2014-2016	Originated in West Africa, with the first reported cases appearing in Guinea. Up till now, it has caused more than 11,000 deaths.

The earliest writings on the socio-economic effects of pandemics go back to the time of Greek historian Thucydides, who described the Plague of Athens (430 BC) in his writings. Similar writings on pandemics, coupled with other aspects of statecraft, can be found during other periods when plagues struck various parts of the globe. The 'Alexiad' (1100 AD) of Anna Komnenus, the daughter of Byzantine emperor Alexus Comnenus, contains an account of the 'Justinian Plague' that put the whole Byzantine Empire at peril, almost 500 years after its occurrence, reflecting upon its terrible toll that lived on in the memories of Byzantine rulers and people. Similarly, the chronicles of the cathedral priory of Rochester (1314-1350 AD) contain a detailed account of the ravages unleashed by the bubonic plague that struck England in 1348.

In present times, Herlihy (1997) wrote about the tremendous transformation that took place in Europe in the aftermath of the 'Black Death', narrating the economic as well as the social consequences of the pandemic. Martin, Cox, and Fukuda (1999) undertook a study to gauge the aggregate economic effects of an event similar to the Spanish Influenza of 1918 on the US economy (if it were to occur). They base their estimates on the probable number of deaths and what needed to done in terms of vaccinating people to limit the economic fallout? Their calculations put potential economic losses at an estimated $116.5 billion and suggested timely vaccination of at least 60 percent of the population to ensure the highest economic returns. Brainerd and Seigler (2003) studied the devastating effects of the Spanish Influenza of 1918, concluding that it had a large and robust effect on per capita income across states in the US. Summers, Jamison, and Fan (2018) used a simulation to estimate the probable loss of an influenza-like pandemic. Their estimations, which included lost income and elevated costs due to mortality and illness, suggested total losses worth $500 billion annually at a global scale in case a pandemic struck.

A similar, earlier study by the World Bank (WB, 2005) estimated potential losses of up to $800 billion. Summers and Cutler (2020) make monetary estimates of losses due to the recent pandemic under various scenarios and conclude that accumulated total losses to the global economy in a decade would stand in the vicinity of $ 16 trillion, half of them due to Covid induced recession and a half due to short and unhealthy lives of Covid affectees. Levy and Fillipini (2021) assessed the long-term socio-economic impacts of pandemics. They opined that it is the developing nations that are likely to suffer the most lasting damage, further concluding that the COVID-19 pandemic exposed the differential capacity of nations around the world to handle a pandemic-like situation.

Jorda, Singh, and Taylor (2020) differentiate between a traditional recession and the one induced by a pandemic to gauge the long-term consequences of the pandemic taking real returns on assets as an indicator. They estimate that pandemics have long-term consequences for asset returns, with real rates depressed for decades, which is in contrast to what happens after other events (like wars). Further, they conclude that unlike wars, when capital is destroyed, pandemics do not destroy capital but might induce events like precautionary savings.

THE ECONOMIC CONSEQUENCES

What pandemics tend to do in terms of a working economic system is that it induces significant uncertainty, leads to outright recessions (even depressions, as in

Europe's bubonic plague), creates unemployment, induces credit crunch, and stalls business activities, etc. Briefly put, their economic costs tend to be huge, and these linger on for some time rather than ending in the short-run (IMF, 2018). Economies suffer devastating losses due to pandemics, with the losses morphing through various channels. The following lines describe some common forms of economic costs that have been historically borne as a result of pandemics. Some consequences surprisingly, it should be noted, turn out to be positive in the long run, something that stands in stark contrast to what purely financial or economic factor-induced recessions do.

We start with the recognition of the role of human capital in economic growth. A significant input in quality human capital, as well as economic growth, is good health. A healthier workforce, in turn, has been shown to positively affect GDP growth (Georgieva, 2019), while poor health has been estimated to reduce global GDP growth by 15 percent per year (Remes, Dewhurst, and Woetzel, 2020).

Pandemics affect this input considerably, especially when the affected include a relatively younger population. They put a tremendous cost burden upon society in terms of morbidity and mortalities. Major episodes of pandemics that affect entire continents (like the Black Death and Spanish Influenza) have wiped out a substantial portion of the population, thus also wiping out human capital. Life is no easier for those who survive since individuals either develop chronic disabilities or fail to recover completely, thus imposing a substantial burden upon their future income prospects. There should be no doubt that COVID-19 would result in similar outcomes, with heavy costs (financial and otherwise) imposed upon the economy and the society, as suggested by Summers (cited above). The extent of its aggregate financial and economic cost is not known up till now, but the quantum is expected to grow with time as countries put the requisite infrastructure and countermeasures in place. The result is the channelling of resources, both personal and public, from other uses towards combating the pandemic.

The factors discussed above—human capital loss due to various factors (disability, loss of employment, deaths, etc.) were taken into account by Levy and Fillipini (2021) who took a detailed assessment of the long-term consequences of the Covid-19 pandemic. Their calculations, using the criterion of the statistical value of lives, suggest that the global deaths due to Covid-19 so far are equivalent to 16.9 percent of global GDP. They also take into account 'education losses', closely related to human capital, and base the calculated losses on effective hours of schooling and retention ratios as an estimated 1.6 billion children around the globe have been affected by school closures. The lifetime loss in labour earnings came to $10 trillion.

Levy and Fillipini's estimates take into account the earlier estimates made by Summers and Cutler (2020, Table 2), with estimated aggregate losses to the tune of $16 trillion.

The effects on labour supply could be catastrophic, as in the case of the Justinian plague and the bubonic plague (Black Death) that struck medieval Europe. The drastic loss of population during the Justinian plague, for example, considerably weakened the Byzantine Empire since the imperial finances dried up in face of a much smaller population, resulting in a smaller taxation base. Fertile lands, once harvested fully by abundantly available cheap labour, remained fallow as the bubonic plague struck Europe,

Table 2

Estimated Economic Cost of the COVID-19 Crisis

Category	Cost (Billions), US$
Lost GDP	7592
Health Loss	
Premature Death	4375
Long-term Health Impairment	2572
Mental Health Impairment	1581
Total	16121
Total for a Family of 4	196475
% of Annual GDP	90

Abbreviation: GDP, Gross Domestic Product.

whereby the availability of labour became a challenge (Routte, 2008). This led to further misery as grain production suffered. The mortality rates due to the Spanish Flu were high among 15-40 age cohorts, leading to a dearth of working-age labour. This, in turn, led to an increase in poverty rates as breadwinners of families lost their lives[4]. In Sweden, for example, each death in this age cohort led to the addition of 4 individuals in poverty numbers (Eggeman, 2020). These labour shortages, in turn, led to some unforeseen consequences. For example, a large number of historians of the Industrial revolution posit that a primary factor in the invention of machines that wrought the industrial revolution was the scarcity of labour, making it expensive in many parts of Europe. They date these kinds of labour scarcity of the Black Death. Since then, they contend, there were increasing efforts in mainland Europe to substitute labour with mechanical devices (Allen, 2003).

These labour shortages resulted in a substantial rise in wages of labour at a time when GDP was falling, leading to a higher cost of doing business. During the Spanish Influenza, for example, the real wages of labour rose in US cities where the mortality rate was the highest (Garret, 2009). Similarly, the real wages of construction labourers in London rose by 34 percent as Spanish influenza struck in 1918-19. This continued what had been recorded and observed long before during times of pandemics. For example, the wages of rural/agrarian labour in England during the bubonic plague saw a surge between 30 to 40 percent between the late 1340s and 1360 (Farmer, 1991), while at the same time witnessing a reduction in the wealth of bourgeoisie and landlords all around mainland Europe and England. Thus, what we observe historically is the redistribution of wealth from the wealthy to the poor without the need for any government intervention.

This drastic redistribution of wealth is a lesser discussed, but equally profound, outcome of the pandemics. Of late, Walter Scheidel's work (Scheidel, 2017) plus that of Thomas Piketty (2013) lend meaningful credence to this observation. Both of these leading scholars have contended that historically, entrenched income inequalities have only been lessened through extreme events like plagues, pandemics, violent uprisings, and wars, with the direction of wealth re-distribution from top to the bottom. Schiedel's research, for example, posits that large wealth inequalities in Rome were corrected (to

[4]In Europe and the western world of that time, men were still the major bread earners. Female labour participation was low.

some extent, if not fully) by plagues and wars. These events also changed the balance of power and wealth within the society. During Roman Empire's most debilitating plague (the Cyprian Plague), wealth and power changed course from Mediterranean-based aristocracy to military officers and businessmen (Harper, 2015). During the Black Death, as labour shortages became severe, the surviving labour class enjoyed an unprecedented bounty as they saw a tremendous spike in their nominal wages, an aspect discussed above.

The adverse fallouts lead to a sharp drop in Aggregate Demand (AD). The substantial decline of AD, sometimes even a complete crash (as in Black Death), is common to such episodes of upheaval. For economies with consumption as the major component (like Pakistan), such a fall in AD could spell tough times ahead. A fall in AD, in turn, leads to recession and even drastic reductions in GDP. The English GDP, for example, fell by 29 percent during the bubonic plague (Milas, 2020). If mainland Europe is also included in the calculation, the estimations reflect an even bigger fall. This has been the known historical pattern. For example, although Europe was the epicentre of the Spanish Influenza pandemic, even the US suffered a severe contraction in aggregate demand that led to business closures and job losses. Cities like Philadelphia and Washington were completely shut down, leading to a crash in demand that severely exacerbated economic difficulties.

In almost all major pandemic outbreaks, one particular area of industry and services sees a tremendous upsurge in demand: medical services and medical equipment. For anyone following the developments related to COVID-19, this should not come as a surprise. Its common sense economics; an unexpected surge in demand at a specific point in time leads to supply difficulties. The result is a substantial surge in prices of medical equipment, medicines, and medical services, and an expansion of the black market in goods (like in-demand medicines suffering shortages). The demand for labour that can help in medical chores follows this trajectory.[5] The governments of their time, on more than one occasion, tried to fix the prices of products suffering supply shortages, which usually leads to expansion of the black market in these products. We have already witnessed something similar panning out at the moment in terms of products like masks, ventilators, medicines, and medical services, etc. India's recent oxygen availability crisis in the context of Covid-19 ravaging its entire geographical contours provides us a vivid example of how huge difference between supply and demand leads to black-market activities.[6]

One of the most common themes following such shocks to the international economic order has been the increase in the level of government spending (to provide 'stimulus' to the economy) and an uptick in public loans, complemented by the international flow of capital between countries around the world. Temin (2012) alludes to the economic crisis of AD 33 in the Roman empire, which compelled the then Roman emperor Tiberius to come up with a fiscal package amounting to 100 million cistasious

[5]The KP government appointed 1,299 medical officers on emergency basis in 2020.

[6]In normal circumstances, the price of oxygen cylinders rarely comes close to the price of gold. But as COVID-19s recent wave pillaged India's nook and corner, it is not uncommon to hear of families exchanging their gold belongings for merely a single oxygen cylinder in the black market. See 'Sold his SUV to buy oxygen for people', for example.

(Roman currency), helping stem the panic by providing direct fiscal support for credit markets and other aspects of economic activity. Public-led support in times such as pandemic propelled recessions started to become a permanent feature of the landscape in the post-industrial revolution world when central banks became a permanent feature of economic landscapes. Horn, Trebesh, and Reinhart (2020) analysed major turbulences to the global financial order between 1790 and 2015, estimating that there were 230,000 official commitments related to loans, grants, and guarantees whose valuation amounted to $15 trillion (in constant 2015 terms). Only the instruments used to effect these transfers have undergone an evolution over time. For example, central bank swap lines are now one of the more favoured methods during times of crisis.

A primary reason that the state's role in economic activities in these uncertain times increases is the 'flight to safety' phenomenon which constitutes another common theme during pandemics. Individuals, even those who could be characterised as 'risk-takers, become more risk-averse and there is a preference for liquid assets. The most liquid of these have proven to be cash, whose demand surges in times of uncertainty ('liquidity premium' in technical lingo). One reflection of this, for example, can be seen in the sudden declines in stock markets as stock investors dump their stocks and look for liquidity in times of uncertainty. Over time, only the form and nature of liquid assets have changed. For example, during the bubonic plague, the most sought-after (and liquid) asset was gold.

Lockdowns and social distancing have been a common practice since the Black Death, being also witnessed during the Spanish Influenza (1918), Ebola (2013-2016), and now COVID-19 (2019). Such lockdowns impair economic mobility and lead to a dearth of mutually beneficial market transactions, both being fundamental components of an efficient economic system. To put it in different words, mutually beneficial economic transactions suffer a considerable decline, which ultimately translate into lower business and economic activity and noticeable decline in GDP.

LESSONS FOR THE PRESENT

One of the primary motives for studying history is that it can offer us valuable clues about the present. The case of pandemics and their economic effects are no different, and we have some good lessons from history at hand to guide us in the present uncertain times.

One of the major lessons for the present is that the most effective remedy in cases such as pandemics is a well-functioning and quality healthcare system that can immediately respond to emergencies like Covid-19. This has to be complemented by efficient governance that ensures marshalling of state resources quickly and productively. A good healthcare system and an efficient governance structure are what ensured China's exceptional response to COVID-19. The cholera outbreak in London serves as a historic example in this regard. When John Snow, a British Doctor, finally traced the outbreak to contamination (a water pump in Broad Street), it led to regulation and investment in the provision of clean drinking water that ensured no such outbreaks in the future. In contrast, cholera is still a killer in developing countries with poor sanitation and provision of contaminated water, with the obvious lesson from the past being that unless proper regulation and investment in healthcare are made, substantial improvement in health outcomes would remain elusive.

For countries like Pakistan, whose less-than-satisfactory healthcare system is complemented by poor governance, the breakout of pandemics could be a debilitating experience. Not only do such instances expose the weak underbelly of the state's abilities (especially in terms of providing quality services), but can lead to furthering the political and ethnic fissures within a weak state. We already witnessed the Federal and Sindh governments at loggerheads over the policies needed to stem the spread of the corona virus. In short, countries with weak governance arrangements need to make drastic changes to the way they govern, especially in terms of utilising available resources productively, and where they are needed the most.

In this regard, the role of the pharmaceutical industry is highly critical. Were it not for a well-functioning pharmaceutical industry, there would not have been Covid-19 vaccines in record time. In Pakistan, unfortunately, there is not a single home-produced vaccine (not just the Covid vaccine, but any vaccine!) despite having more than 700 pharmaceutical firms.[7] Suffice to state that adverse regulations have put the domestic pharmaceutical industry at the back foot (Mehmood, 2017)[8]. This, in aggregate, implies that Pakistan cannot combat this pandemic without imported vaccines that are in short supply. Therefore, it is time that the government must review its regulations towards the pharmaceutical industry, especially its pricing and research-related policies.

It's an acceptable practice now for the governments to take on an added role in economic affairs during times of uncertainty such as the pandemic, primarily through fiscal measures ('stimulus' packages). But these do not constitute free lunch! Poor fiscal management could create future troubles rather than ameliorate economic difficulties. Approximately 2 millennia before the Spanish Flu ravaged the globe, the Cyprian pandemic put Rome's imperial finances under so much strain that the long-held trimetallic system was pushed to extinction. As imperial finances dried up and money supply curtailed (leading to the decline in economic activity and GDP), the attempts at increasing money supply through decreasing the coin's silver content led to debasement, inflation, large-scale hoarding of real silver coinage, and even more misery. Businesses lost confidence in imperial money, which ultimately had to be replaced by a new standard. But in between, tremendous damage was inflicted upon the Roman economy (Harper, 2015).

For countries like Pakistan, good fiscal management is imperative given the fiscal mischiefs that have led to a precarious position. At the end of 2020, Pakistan's total debt and liabilities stood at Rs 45 trillion (98.5 percent of GDP), of which approximately Rs 38 trillion (82 percent of GDP) was public debt (Table 3). Given that the government's fiscal stimulus effort would likely imply taking on extra debt, sound fiscal management is imperative to avert fiscal problems spilling over to real sectors of the economy.

The fall in Aggregate Demand, and the general contraction in economic activities, should come as no surprise as it is consistent with historical patterns during the time of pandemics. To prevent large-scale mortalities and human catastrophes, whole cities have been shut down and quarantined during Covid-19. Wuhan in China, which was completely cordoned off, is a continuation of this theme. But such declines in aggregate

[7]Only now has National Institute of Health (NIH) started assembling (not manufacturing) a Chinese vaccine under license.

[8]Since the outbreak of Covid-19, PIDE has held three webinars on the pharmaceutical industry.

Table 3

Pakistan's Debt and Liabilities

Category	Debt and Liabilities (Rs billion)
Government Domestic Debt	24,310
Government External Debt	11,952
Debt from IMF	1,194
External Liabilities	1,306
Private Sector External Debt	2,497
PSEs External Debt	878
PSEs Domestic Debt	1,461
Commodity Operations	734
Intercompany External Debt	646
Total debt and Liabilities	44,978

demand have also brought with them financial misery and an uptick in poverty rates, especially for the lower classes (like daily wagers). There should be no doubt that this time would be no different in this respect, and thus a concerted effort is needed if this predicament is to be avoided. This effort, like always, will have to be led by the government. Only a successful, effective effort can curtail the spread of poverty and its severity. And this will have to be a long-term effort rather than a short-term push, which will only be possible if it is backed by sound financial management.

Recently, Kremer and Miguel (2021) pointed out another valuable lesson from the past- the concentration on a viral pandemic should not blind governments to the possibility of other life-threatening diseases. They feared that the hard-fought victories against other diseases were in danger of being undone due to budgetary difficulties and exclusive concentration on the Covid-19 pandemic. For a world that is witnessing rising levels of poverty and inequality post-Covid-19, especially in developing countries like Pakistan, this could spell trouble given the traditionally higher burden of diseases and a poor healthcare system. For example, Pakistan is one of the last places on Earth where polio is still to be found. A recent report suggested that the efforts to combat it have suffered given the flow of funds towards combating the corona virus. Thus, governments need to be aware of this aspect and should ensure that their efforts to combat a particular disease are not at the cost of ignoring others.

EPILOGUE—IS THE PRESENT AGE ANY DIFFERENT?

The history of pandemics throws up a substantial amount of similarities in terms of their socio-economic consequences. However, the present age does offer some aspects that make it different from the world in which previous episodes occurred.

Perhaps no other facet of the modern world describes its difference from the time gone by than its inter-connectedness, reflected aptly by the term 'globalisation. The gains of this inter-connectedness have been stupendous, giving vent to the engine of the global economy. But this connected world also ensures that any contagion (financial or biological) would not be limited to its host region or country. This has been known since at least the flu pandemic (1889-1890) when new modes of travel (especially Railways) made it easier to travel to foreign destinations, and thus carry the disease from its

destination to other parts of the globe. What the world has witnessed in terms of Covid-19 is something similar, as an outbreak in Wuhan (China) afflicted other parts of the world within no time. To boot, means of travel are only going to get faster, bringing with them the possibility of an even faster spread of future outbreaks.

The present world faces another major challenge in the form of climate change, a phenomenon that can exacerbate the effects of any disease outbreak. This was most aptly demonstrated a couple of years back during the Zika virus episode. Climate change helped expand the effective area of the *Aedes egypti* mosquito (source of zika virus), once confined to only specific areas of Brazil. This particular form of mosquitos, besides zika virus, can also spread dengue, yellow fever, and chikungunya. Thus, changing patterns of climate led to further spread of these mosquitos, and hence elevated the probability of being affected by them substantially. Climate change, of course, is not limited to Brazil but every continent and every country is affected by it. There is every possibility that climate change-induced outbreaks of diseases would gradually become more frequent in the future.

We live in a world that is more urban and densely populated than ever. The present density per square km is unparalleled in history. While this is mostly good news given that dense settlements and clusters (like cities) are the engines of economic growth, such density also carries with it the risk of exponential spread of contagion in a very short time. Even if viewed from a historic angle, it was dense settlements where pandemics proved to be the most destructive, whether it was Athens of 430 BC or London of the 16th century. The question, however, should not revolve around undoing densifyification, but rather on the provision of a health infrastructure that can act fast and decisively against such an outbreak. The other way of saying this is that we need more (and effective) investment in health, especially in the developing nations where dense and informal settlements lack a viable health infrastructure.

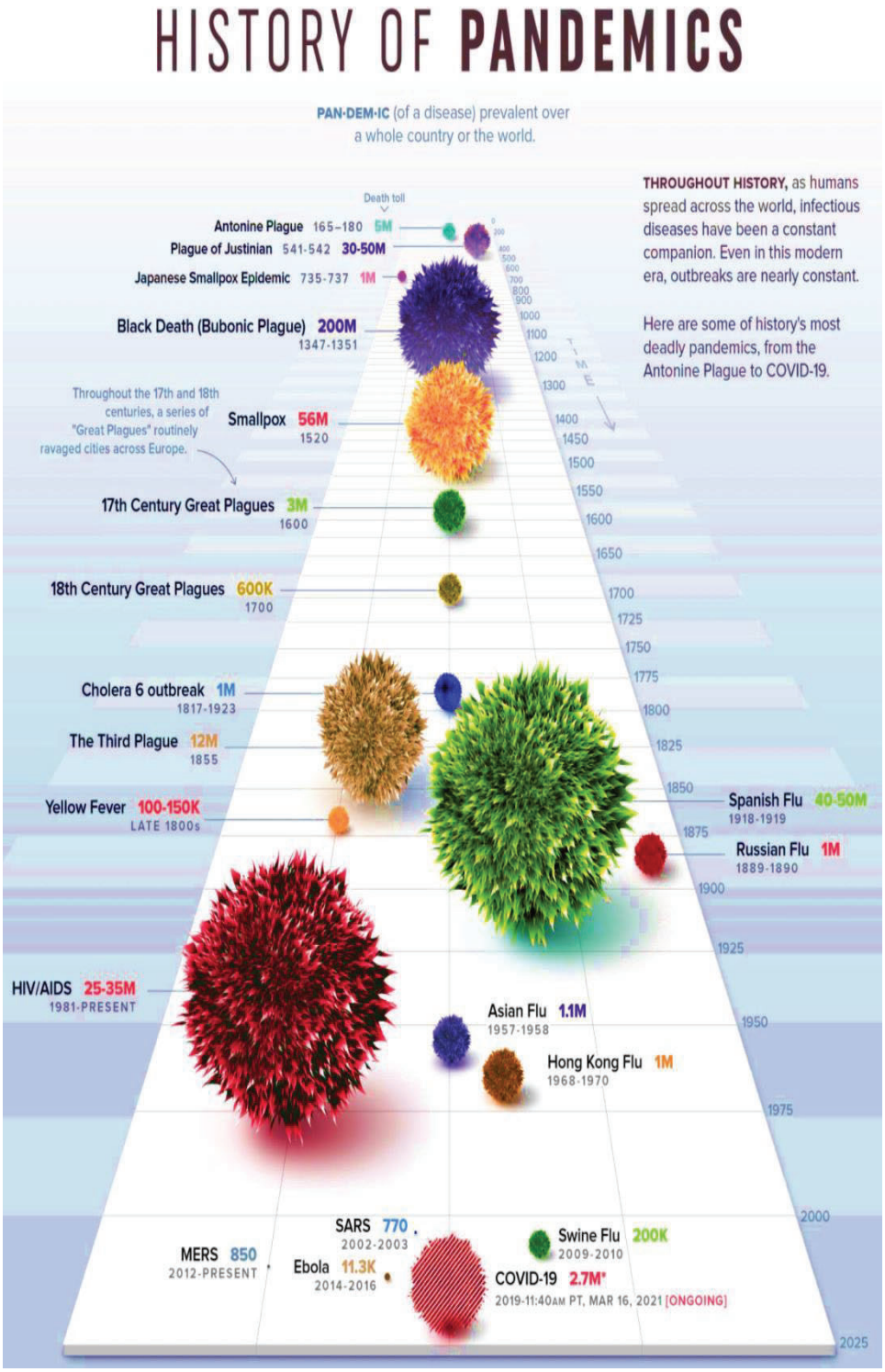
One of the things pointed above was the inherent danger of the spread of diseases in an ever-connected world. But it's also heartening to realise a more coordinated world than before, with bodies like World Health Organisation (WHO) representing a global rather than individual effort. Joint efforts are now more common than before, either under the guise of the UN or bilaterally. China, which has suffered tremendous damage, is already sending aid to all parts of the world in the form of vaccines, masks, ventilators, medicines, and kits. Similarly, detailed information is available at the fingertips, thanks to technological advancement and the ease of access to information through the internet and smartphones. The advances in technology have enabled humanity to continue their work from homes rather than completely shut shop, something unprecedented in terms of scale and occasion, and which has never been done before.

Technology, and its breath-taking advances, have also been adopted by the pharmaceutical industry, with the result that the detection of a new pathogen elicits an immediate, fast response from the industry. The response fits Smith's observation about self-interest leading to overall gains for the society very well, whereby the industry benefits from sales and consumers realise a potentially lifesaving drug. An illustration of how technological advances and discovery saved millions of lives came during the time of 1957 flu pandemic. When the virus was identified in Hong Kong as a new form by Maurice Hilleman, an American microbiologist who developed over 40 vaccines in his lifetime, the information was passed on to vaccine makers. By the time the virus reached

North America, 40 million vaccine doses had already been produced and provided, thus preventing catastrophe. It is this technological advance that helped produce Covid-19 vaccines in record time, something that has never happened before.

Finally, and perhaps worryingly, is the observation that unlike the previous major pandemic episodes (like the Spanish Influenza), the redistribution of wealth favouring the lower stratum of the society has not taken place. Covid-19 seems to have exacerbated inequalities as the rich have seen their wealth grow further (Mehmood, 2020). In a world where inequality becomes more entrenched and poverty is rising, this is unwelcome news and puts added pressure upon the governments to expand safety nets.

ANNEXURE-A


HISTORY OF PANDEMICS
PAN·DEM·IC (of a disease) prevalent over a whole country or the world.
THROUGHOUT HISTORY, as humans spread across the world, infectious diseases have been a constant companion. Even in this modern era, outbreaks are nearly constant.
Here are some of history's most deadly pandemics, from the Antonine Plague to COVID-19.
Death toll
TIME
Antonine Plague 165–180 5M
Plague of Justinian 541-542 30-50M
Japanese Smallpox Epidemic 735-737 1M
Black Death (Bubonic Plague) 200M 1347-1351
Throughout the 17th and 18th centuries, a series of "Great Plagues" routinely ravaged cities across Europe.
Smallpox 56M 1520
17th Century Great Plagues 3M 1600
18th Century Great Plagues 600K 1700
Cholera 6 outbreak 1M 1817-1923
The Third Plague 12M 1855
Yellow Fever 100-150K LATE 1800s
Spanish Flu 40-50M 1918-1919
Russian Flu 1M 1889-1890
HIV/AIDS 25-35M 1981-PRESENT
Asian Flu 1.1M 1957-1958
Hong Kong Flu 1M 1968-1970
SARS 770 2002-2003
MERS 850 2012-PRESENT
Ebola 11.3K 2014-2016
Swine Flu 200K 2009-2010
COVID-19 2.7M* 2019-11:40AM PT, MAR 16, 2021 [ONGOING]
1700
1725
1750
1775
1800
1825
1850
1875
1900
1925
1950
1975
2000
2025

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