FROM BLACK DEATH TO COVID-19, PANDEMICS, AGENTS OF DESTRUCTION OR CATALYST FOR CHANGE?

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I want to dedicate this thesis to my mother, who was always with me through all of my academic achievements, but she got sick and died last year. I also want to thank the Lord for giving me the strength to work, study, and complete this research. I also want to thank my supervisor for diligent supervision during the writing process.

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Abstract

The word pandemic conjures up all types of negative images in the minds of people who hear the word. All they can think of are severe illnesses, lots of deaths and funerals, bodies rotting in the street with no one to bury them, hospitals with no beds to put patients in, people being isolated, families fleeing from their homes because their loved ones are infected and they are unwilling to care for them. With the current pandemic, people associate it with things like wearing masks, being unable to work physically, having no employment, having no in-person school, lockdowns, and quarantines. Very seldom do people look at the positive side of pandemics. This research will compare and contrast the negative and the positive side of pandemics. Sure, it will describe the negative impacts that all the pandemics had on the human race. Still, it will also show human ingenuity in the face of adversity and the various initiatives humans came up with to cope during the multiple pandemics. It will also look at the social changes after each pandemic and the many new inventions and medicines that may have never seen the light of day had it not been for pandemics. It will also discuss the misinformation about COVID-19, the social media Blitz, and all the daily conspiracy theories people are bombarded with. This made persons more afraid and, in some cases, refused treatment and died in the process. But in the end, it will show that although pandemics take a toll on the human population, the survivors are usually better off after the pandemic than before.

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Abbreviations

CDC: Centers for Disease Control and Prevention

GDP: Gross domestic product

YOLO: You Only Live Once

TB: Tuberculosis

AIDS: Acquired Immune Deficiency Syndrome

GI: Gastrointestinal

CFR: Case Fatality Rate

PCR: Polymerase Chain Reaction

FDA: Food and Drug Administration

ICU: Intensive Care Unit

RNA: Ribonucleic acid

WHO: World Health Organisation

SIDS: Small Island Developing States

LDC: Least Developed Countries

SAID: Specific Adaptation to Imposed Demands.

LED: Light Emitting Diode

NASA: National Aeronautics and Space Administration.

TSM: Towards Sustainable Mining

WBE: Wastewater-based epidemiology

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Chapter 1 Pandemics Friend or Foe (Introduction and Aim)

1.1 Problem Statement - the Essence of the Research

As humans moved away from agrarian life to one where they are concentrated in cities, the potential for contagious diseases to spread was multiplied (Lindahl and Grace, 2015). Throughout human history, many of these diseases have achieved a pandemic status. We had the Plague of Justinian 541–543, the Black Death 1347–1351, the Spanish Flu 918–1919 and the current pandemic COVID-19 2019 and ongoing. (Piret J and Boivin G 2021).In most cases, we see these pandemics as disasters to the human population. This research aims to show that throughout history and even the present pandemic, the human race has benefited from some new processes and innovations. These benefits include religion, work and economics, social interaction, and technological advancements. This research will look at both the negative and the positive developments during and after the pandemic. It aims to show that the Human race advanced more rapidly after the pandemic than if it had not occurred.

1.2 Introduction and Aim of the Research

The years 2019 and 2020 were unlike any other years Earth's current population had seen in over a hundred years. These years saw the arrival of the COVID-19 virus. Almost all of the world has not experienced a pandemic in their lifetime; many are filled with fear and dread since they do not know what to expect. All over the world, they heard terrible news: the number of persons dying, businesses closing, travel suspended, hospitals overwhelmed with patients, families unable to

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attend the funeral of their loved ones, and persons living in isolation. Depression was on the increase, and domestic abuse was on the rise as people were confined to their homes for long periods with nothing much to do. There was a substantial increase in unemployment as many countries imposed lockdowns, stay-at-home and quarantine measures. For many, it seemed like the end of the world, and those with religious persuasions were talking about the coming of Jesus and the pandemic as a sign of the end of the world. There was only bad news in every media, whether social or mainstream. Some of the news that was carried on these various platforms was, most of the time, inaccurate and caused even more fear in the world's population. However, while this was happening, the human population was learning to cope, innovate, and find means of survival during the pandemic. Many of these things should have been promoted or reported. If they only looked at history, they would realise that the human race always found a way to cope during pandemics and sometimes even became stronger after the pandemics subsided. So, the question that can be asked is whether pandemics are our friend or foe. This research will seek to answer that question.

Over the years, diseases and pandemics have devastated the human race and inspired social change and many innovations. Even though these pandemics sometimes ravish the populations, they have also inspired some good things, like better sanitation systems and medical innovations that reduce the spread of the disease and increase the methods available to treat people. Some of these innovations are discussed in the following sections of this chapter, but they will be expanded on throughout the thesis.

The Black Death wiped out much of the population of Europe, meaning the feudal system collapsed. Thus, after the pandemic, the population was depleted, and there was a shortage of labour, which destroyed the system of serfdom. The persons who worked in agriculture could

demand better payment from the Lords and Ladies. Some of these poor people were able to acquire land which was left idle because the pandemic had taken most of the owners, and in the cities, authorities paid more attention to better sanitation and implemented a system of quarantining (McDonald 2020)

After the Spanish flu in 1918, 20 and 50 million people worldwide died. This caused the various governments to look at their policies. Many governments began to look at preventive medicine and medical attention for the whole community. They began to centralise their health systems and use employer-based insurance plans for the workers, which expanded health care to more of the general population. The medical personnel started focusing on the conditions that cause illness instead of trying to find only the cure, and the practice of studying disease epidemiology emerged (McDonald 2020)

The government also realised that the fact housing in the cities contributed to the spread of diseases, so some governments instituted the policy that there should be separate bathrooms for each apartment and that they should have fire escapes in every building (McDonald 2020)

After the 1918 pandemic, there was no longer a reason to blame the person who caught the disease and isolate them. Governments began to look at the concept of social medicine. Healthcare for all was free at the point of delivery, and all nations took steps to consolidate their health care and expand the number of persons who had free access to it. Many countries also revamped the Ministries of health, and there was a need to coordinate health at a global level (Spinney 2020)

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With the current pandemic, many innovations and changes have been implemented due to the global scope of COVID-19. Many companies, schools and other public organisations worldwide had to ask their employees to work from home or telecommute. Before COVID-19, not many people worked from home, but because of the contagious nature of the virus and because of the social distancing required, many organisations allowed the employees to work from home, and this has now become a norm as some companies did not need their workers to return to the office and this was a saving for the company on electricity, air conditioning and other things that in-office work would entail (Bolisani et al. 2020)

We also had the advent of telehealth doctors, where interviews were done online, and they could diagnose your problem so that you did not have to come physically to the office to avoid contact, therefore adding to the spread of COVID-19. This is very advantageous as, after the pandemic, this can be expanded to help people who live in remote areas and cannot get to see a doctor. (Politico 2021)

The pandemic also introduced new types of vaccines that could be develop rapidly using the mRNA method, and because of this method, the scientists were able to produce a vaccine very quickly that was able to stem the flow of the virus and slow it down (Politico 2021)

Another innovation was having robots deliver things to people so that there would be no physical contact. Even though this technology was around for a while, I did not get going until the pandemic hit because it allowed people to avoid contact with other humans as the robots delivered the things they needed (Politico 2021)

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The pandemic also led to governments giving cash to the citizens along with other financial aid like food baskets because of the large number of persons who were out of work (Politico 2021)

We also had to study online, education at all levels, from Kindergarten to University level, before people felt that the online structure was inferior to face-to-face, but when the COVID-19 hit, and there was no face-to-face interaction, everyone had to move to online learning and even though some have resume face-to-face classes the online component remains as an option and will continue after the pandemic has subsided (Politico 2021)

Another innovation that happened was the speed at which this government invested in infrastructure, manufacturing and other developments (Politico 2021)

Another good thing from the pandemic was that in some countries, all the students got free school meals because of the depressed job market. Some students did not have anything to eat at home, so the government implemented the free school meals programme so that they could have something to eat when they came to school because children do not learn when they are hungry (Politico 2021)

Another consequence or innovation of the pandemic is that companies and organisations that were reluctant to put their services online had no choice but to do so. Because of the lockdowns, quarantine, and social distancing, people could not visit their businesses, so most of those services had to go online, which dragged most of them into the 21st century. This is an excellent thing. They can no longer go back to the old paper face-to-face visit, and that is better for the customer (Politico 2021)

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Another thing that came out of the pandemic was the ability to vote by mail, resulting in people being afraid to be together at any polling station. This, too, shall remain long after the pandemic has gone (Politico 2021)

Another significant innovation was Zoom and other virtual meetings, as we could no longer have meetings in boardrooms or attend conferences or workplaces face to face. So video calls became the thing of the day, and Zoom became a success overnight. It became a household word almost everyone was using. It was the communicator for school, work and church. Zoom will continue long after the pandemic. We also had restaurants and supermarkets delivering your groceries to your door. Even though this was done before the pandemic, it was small but became significant. You could order groceries online and have them delivered to your door without leaving your house (Politico 2021).

These are some of the innovations that came out of this pandemic. The entire thesis will go into detail about these innovations, the ones that were successful and those that were not. This research will inform the current human population that when we are put to the test by a health crisis, unlike before, we rise to the occasion and devise ways to cope. For those in the future, it will show that humans are resilient and that we overcame a deadly pandemic, so they do not need to be fearful and panic if another one should occur in their lifetime.

The problem of looking at the positive side of pandemics has yet to be fully addressed. This is because the world was not so interconnected and interdependent when the former pandemics

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happened. Therefore, they did not suffer the same social and economic devastation the current pandemic has unleashed. Neither before in history did we as humans have to be so innovative that we could survive during the pandemic.

The remaining chapters examine the history of pandemics, their destructive power, and how humans adapt to cope with them. They also discuss the current pandemic and compare and contrast the devastation with the benefits and innovations that resulted from it. These chapters also discuss what lessons we have learned from COVID-19 and other pandemics and whether we are ready for the next pandemic.

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Chapter 2 History of Pandemics and Other Epidemics. (Literature review)

2.1 How Pandemics are Determined

Since time and history, humans have always been plagued with one or more types of diseases. Some diseases are hereditary or passed down through our parents. Some diseases affect us based on age, even though we try to practise healthy living: we may exercise, eat healthy, have an excellent social balance, have good nutrition, and have healthcare, but that does not stop us from falling sick. Sometimes, our environment contributes to our illness. It is stress, family relationships, discrimination, pollution, and all the other exterior things that lead us to fall ill.

When one falls sick, he attends his local health provider to get treated to become well. Still, when this disease affects a group of people, epidemiologists will be employed to investigate and try to contain the disease. The epidemiologist will also educate the public on healthy living and keeping their surroundings clean to reduce animal vectors that can carry diseases. (CDC 2023)

While many of the diseases are chronic and non-infectious, others are infectious because they can be easily transmitted from one person to another by contact or through air. Contagious illnesses include measles, mumps, the common cold, and chicken pox.

These infectious diseases are usually caused by agents such as parasites, bacteria, fungi, and viruses. The agents build up and multiply in the body until the individual falls sick. It is then possible for that person to transfer the infective agent to another person. When the body recognises

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the agent, the immune system immediately gets to work to clear the agent from the body, but when the agent is new, the body does not have any defence against it. In those cases, when it is a virus, this tends to spread rapidly amongst the population and, at times, across countries. (CDC 2023)

It is the epidemiologist's job to detect and control the outbreak of diseases in their communities and countries. They monitor the levels of the disease by counting the number of cases over a period of time (CDC 2023)

Some diseases only occur within a particular geographic location. In this case, the disease is said to be endemic because the infections of that specific disease are constant in that area. For instance, malaria is endemic to the region of Nigeria and its surrounding territories. (CDC 2023)

Sometimes, a particular disease may develop in a given community where the persons concerned show similar symptoms. First, the epidemiologist needs to know what the problem is caused by and how contagious it is. If the disease is contained in a community or a geographical area, it is called a cluster. Within that cluster, if the number of cases is taken to be more than that prescribed, then it will be an outbreak. In this outbreak, the epidemiologists advise the population to observe good sanitary practices, avoid sharing things such as food and socially isolate themselves (CDC 2023)

A rise in outbreak cases across a wider geographic area has made the outbreak an epidemic. The authorities could contain the outbreak through travel restrictions, improved sanitary conditions through frequent handwashing, and complete avoidance of social contact. This is only sometimes

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effective as people travel to other areas. They may be infected but asymptomatic, so the disease spreads to other countries. When that happens in many countries, we have a global pandemic. This affects the health systems of many nations; it sometimes takes them to the brink, and some are overwhelmed by the number of cases. In a severe pandemic, there is usually a significant loss of life and a large percentage of the infected persons are hospitalised. (CDC 2023).

2.2 Why do we Have Pandemics?

Throughout history, pandemics have shaped our culture and society in a way no other phenomenon has, yet we pay little attention to them. This lack of attention is very intriguing, even though we have had a long succession of pandemics throughout history that have decimated and terrorised populations and destroyed societies. Nevertheless, not all bad things came out of pandemics. They cleared the way for improvements in medicine, economics and political systems (Huremović 2019).

Diseases have affected human civilisation since time immemorial. There was some form of civilisation before records were kept. Since there was no form of writing to keep records, one cannot tell the number of diseases that occurred and their impacts before history was recorded. Even in the Bible, there was a Plague around 1500 BC, killing all the firstborns of the pharaoh and all the animals (Cartwrigh and Biddiss 2020).

We have coexisted with diseases since life began: Centuries back, long before the rise of science, they were blamed on sin in the Christian world and others. It was blamed on the gods or bad air. Crazy, ineffective treatments were applied to these diseases, yet curiously, humans still exist today.

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Just as pandemics were part of our past, they shall be part of our future, so each time we get over one, another is waiting in the wings to come upon us. We get the word pandemic from two Greek words: pan, which means all and demos, which means the population or people. (Preston 2020).

Occasionally, there have been pandemics and epidemics: plague, cholera, Spanish flu, and most recently, Covid-19. These are increasing as humans interact more and more with animals and as hunting is a worldwide trade. Before affecting only animals, viruses and bacteria can now cross over and affect humans. In old times, our protection lay in isolation and borders, helping control disease. With globalisation and the ease of travel, the potentiality for spread increases and diseases can be transferred from country to country (Piret and Boivin 2021)

Before the rise of cities, humans were hunter-gatherers. However, once humans began living in larger groups and became more agrarian, infectious diseases began to spread more widely within the human population. Once trade routes developed between different groups of people, diseases and disease vectors could move from one region to another. With the growth of cities and increased population, people lived closer to one another. Besides this, the cities had poor sanitation, such as raw sewage, animal excrement, and even dead animals in the street. Increasing human population and encroachment into the areas previously occupied by animals also increased the risk of crossing over bacteria and viruses that were previously only common to animals
(Piret and Boivin 2021).

Another reason we have pandemics is the dramatic change in the climate caused by global warming. This climate change allows for pathogens to spread more quickly. Another factor is the

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overuse of antibiotics, which have made some microbes immune to vaccines and other medications (Sampath et al. 2021).

Another reason for the wild spread of a pandemic is that most countries have health systems that are unprepared for the large numbers of persons getting ill, thus unable to contain the spread of a pandemic.

We have been so used to living almost 100 years without a pandemic that complacency has taken over, and we do not use correct hygiene practices. For example, it can be washing our hands after using the bathroom or after touching any surface.

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2.3 Pandemics in History

Pandemic	Timeline	Area of emergence	Pathogen	Vector	Death toll
Athenian Plague	430-26 B.C.	Ethiopia	Unknown	Unknown	Unknown
Antonine Plague	165-180	Iraq	Variola virus	Humans	5 million
Justinian Plague	541-543	Egypt	Yersinia pestis	Rodents' associated fleas	30-50 million
Black Death	1347-1351	Central Asia	Yersinia pestis	Rodents' associated fleas	200 million
The Seven Cholera Pandemics	1817-present	India	Vibrio cholerae	Contaminated water	40 million
Spanish Flu	1918-1919	USA	Influenza A (H1N1)		50 million
Asian Flu	1957-1958	China	Influenza A (H2N2)		>1 million
Hong Kong Flu	1968	China	Influenza A (H3N2)		1-4 million
HIV/AIDS	1981-present	Central Africa	HIV		36 million
Severe acute respiratory syndrome coronavirus	2002-2003	China	Severe acute respiratory syndrome coronavirus	Bats	774
Swine Flu	2009-2010	Mexico	Influenza A (H1N1)		148000-249000
Ebola	2014-2016	Central Africa	Ebola virus	Unknown	11000
COVID-19	2019- July 2021 (ongoing)	China	SARS-Cov-2	Unknown	>4 million (ongoing)

Figure 1 1 shows some of the Pandemics that occurred throughout history (Sampath et al. 2021)

2.3.1 The Athenian Plague of 430 B.C.

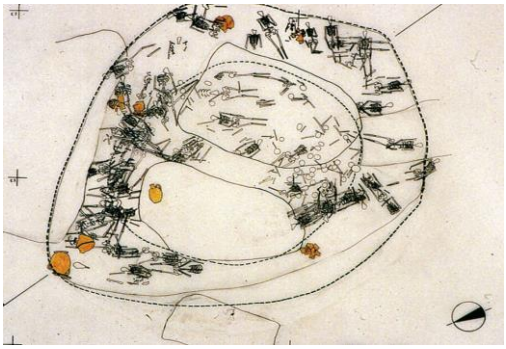

Figure 2 Mass grave from the plague

The Athenian plague took place from 430 BC to 426 BC. The States of Athens and Sparta were at war during these periods. The plague originated in Ethiopia, where it extended to Greece and

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Egypt. The initial symptoms included a rash covering the whole body, fever, headaches, and conjunctivitis. Eventually, the victim would have excruciating cramps in the stomach, followed by terrible vomiting. Some victims developed hemorrhagic fever. Those who did not die sometimes remained partially paralysed or even blind for the rest of their lives. (Huremović 2019).

It killed about 25% of the citizens of Athens and the surrounding regions. Contributing to the plague was that war was going on, and soldiers were moving to and from the war front. There was also overcrowding in the cities. The vector that caused this plague was unknown; historians have come up with many theories about which type of disease it could have been. Some said it was the bubonic plague; others said it was typhoid fever, while others thought it was an Ebola-like virus, which was the cause of hemorrhagic fever in some victims (Sampath et al. 2021).

2.3.2 The Antonine Plague 165 AD.

Figure 3 Map of The Antonine Plague in Ancient Rome. Source Study.com

The Antonine Plague struck the Roman Empire during the reign of Marcus Aurelius as Emperor, and the pathologic taught was smallpox. Soldiers returning from Celucia brought it home to the

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empire. Before it finally ended, it had affected the territories of Asia Minor, Grease Egypt, and Italy. However, unlike the plague of Athens, which was confined to a small geographical area, it was widespread over the length and breadth of the whole Roman Empire. This was because the Empire was politically and economically integrated, and as people moved about the Empire, they gave impetus to its spread. The plague killed about one-third of the population in most of the areas and decimated the Roman army. The plague also killed the emperor, Marcus Aurelius (Huremović 2019).

The manifestations of the plague were skin rashes, hemorrhagic pustules, bloody stool, fever, and, at times, hemoptysis. In its initial stages, it made the victim appear to have the heavy flu. This was followed by fever, cough, tiredness, and general feelings of unwellness. Unlike the flu, however, the symptoms did not get better but worse as the days passed.

On day four, boils appeared on the body and were very painful and itchy. If the person survived, the boils would dry up, and scabs would come off, leaving spots, thus leaving historians to think that it was smallpox. (Sampath et al 2021).

Though the Romans did try to explain its cause, given the high level of misunderstanding of medicine then, they used the best things available and legends. One of those legends was that Lucius Verus, the Roman army's leading general, opened a tomb along the River Tigris.

By doing this, he infuriated the gods, and the gods, in return, let loose the plague to show their anger towards the Romans for the desecration of the tomb. The Romans also blamed the plague of

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the time on the Christians who were among them. At that time, the world was very superstitious and little or no science was known about diseases

(Anversa 2020).

2.3.3 The Justinian Plague 541 AD

Figure 4 Map showing how the plague spread Source (Mulhern 2020)

It was a natural plague caused by the bacterium Yersinia pestis. It began in Nepal and then moved to Egypt, Palestine, Turkey, and Greece. The pandemic moved along the route whereby caravans moved from Asia to the west, and just like most of the pandemics of the day, they moved along the trade routes between countries. The movement of troops also contributed to the spread of the disease from Asia to Africa, Italy, and even Western Europe (Huremović 2019).

The ones who developed the plague often suffered from some sort of hallucination pre-outbreak and then the first symptoms soon after that. For example, in the case of the plague, victims would develop big-sized buboes in the groin area, the armpit, or behind the ears.

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After this, the course of the disease was amazingly rapid, as it generally came to a close by death in three or four days from the commencement of the symptoms. Those infected turned mad, and people would not eat or drink. Some of them attacked others in their fit of madness, which bothered all who should look after them. Most of them died with much pain.

When the buboes developed big and burst in a victim and formed pus, the patient would get well but would have to survive with shrivelled tongues for the rest of their lives
(Huremović 2019).

Whatever one was doing, or wherever, the symptoms came on suddenly. This was a puzzle to the doctors of the day as the body showed no outward changes in colour or inflammation. Therefore, the doctors were afraid even to touch them, so most persons who contracted the disease were expected to die. (Frith 2012).

The plague was transmitted by fleas that moved from infested rats to humans through bites. Human-to-human transmission also spread the disease. The plague killed roughly 60% of the people in the Mediterranean world (Anversa 2020).

Moreover, since most of the trade was by sea, the plague reached many cities such as Constantinople, and unknown to the sailors, they were transporting rats infested with fleas that carried the bacteria into the populations of the cities. Hence, the disease moved from city to city along with the cargo and goods exported and imported by the population (Anversa 2020).

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2.3.4 The Black Death 1346 1353

Figure 5 Map showing how the Black Death spread in Europe source (Mulhern 2020

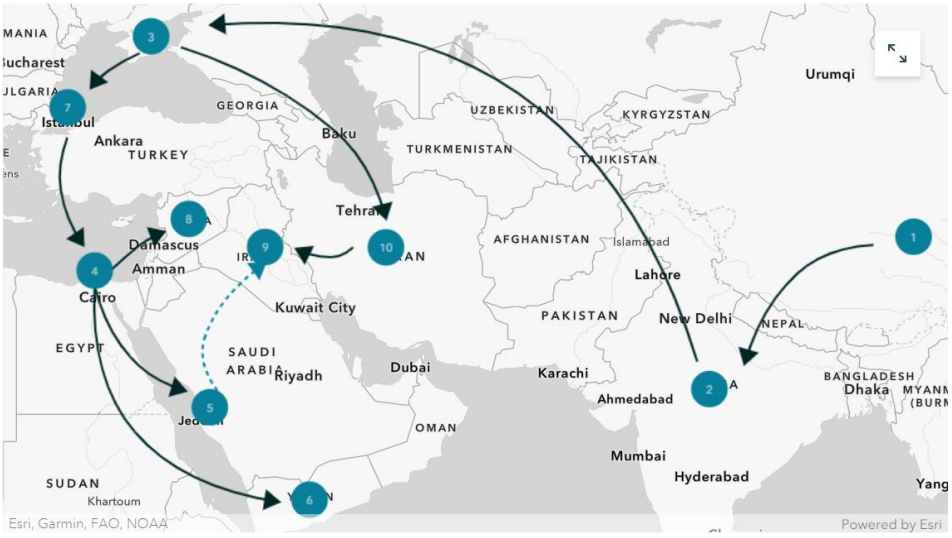

Figure 6 Map showing how the Black Death spread in the Middle East source (Mulhern 2020)

One of the most devastating plagues to hit the earth was the Black Death. A rod-shaped gram-negative bacteria called Yersinia pestis caused this plague (Huremović 2019).

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Historians thought it was because of bacteria emanating from a lake in China, but when the lake became disturbed in 1338, it infected the fleas in that area. These fleas infected the black rats by biting them, transporting the bacteria into their bloodstream. The rats would eventually bite humans, thus causing the plague outbreak (Anversa 2020).

Mongolians were among the first carriers of the plague and used it as a bio-weapon. They used to take all the soldiers who died from the plague and catapult them over the walls into the city when they wanted to attack a city that was too well-defended. The people of the town would get sick and weaken, and then the Mongols could conquer the city. (Anversa 2020).

This plague originated in China in 1338 and reached Europe in 1347. It followed the trade routes from the East, and within five years, the population of the affected areas declined from 450 million to 350 million. Estimates have been made that the Black Death took about 60% of the lives of persons who lived in Europe at that time (Huremović 2019).

The plague swept across Asia, Africa, and Europe from 1346 to 1353. It is considered the worst recorded pandemic in history, with a mortality rate of over 200 million, about 60 percent of the population of Europe and its environs. In this period, physicians did not know the aetiology of the disease; hence, they attributed it to bad air (Huremović 2019).

The symptoms at first were relatively benign. It was like a bad case of the flu; fevers, chills, and vomiting ensued, rendering many weak and incapacitated. Later, boils and buboes would appear in

the armpit and groin. Some of these were large, the size of an egg or sometimes much bigger, and were exceptionally painful as they continued to grow larger and larger. Then the buboes would burst, ooze blood and pus, and one would get this terrible odour from them. Anybody who came in contact with any of these bodily fluids became infected, and so many priests and doctors refused to go near them. The mortality rate was nearly 70%, and most people were dead within five to ten days. The scientific community members did not know the cause of this infection, and they blamed it on the alignment of the three planets that caused great pestilence in the air. The plague was being spread not only through the flea vectors but also now an airborne vector in that as persons coughed, the vector would be blown into the air, and when inhaled by other persons, they too would become infected. The plague wiped out entire families, but despite the disease, people nevertheless survived and overcame it, too. (Anversa 2020).

The bubonic plague is characterized by the sudden development of high fever. On the other hand, septicaemic plague is characterized by overwhelming septicemia, with gangrene of the nose, ears, and extremities due to disseminated intravascular coagulation. The third clinical type, pneumonic plague, is caused by the aerosol spread of the organism, causing hemoptysis and death.

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2.3.5 Cholera Pandemics 1817-1992

Figure 7 Map showing the first phase of the pandemic. Source (Mulhern 2020)

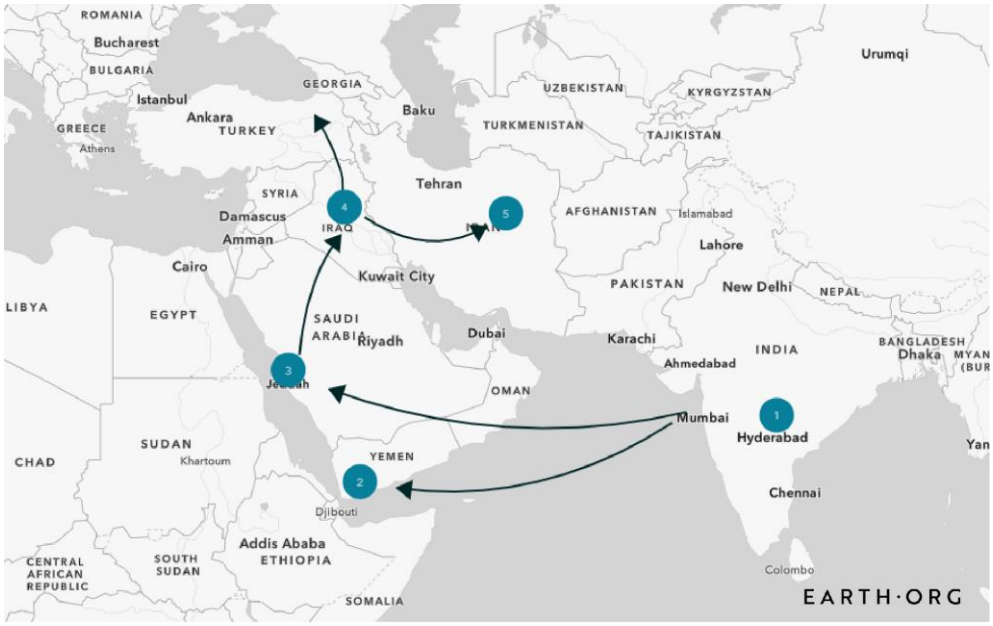

Figure 8 8 Map showing the Second phase of the pandemic. Source (Mulhern 2020)

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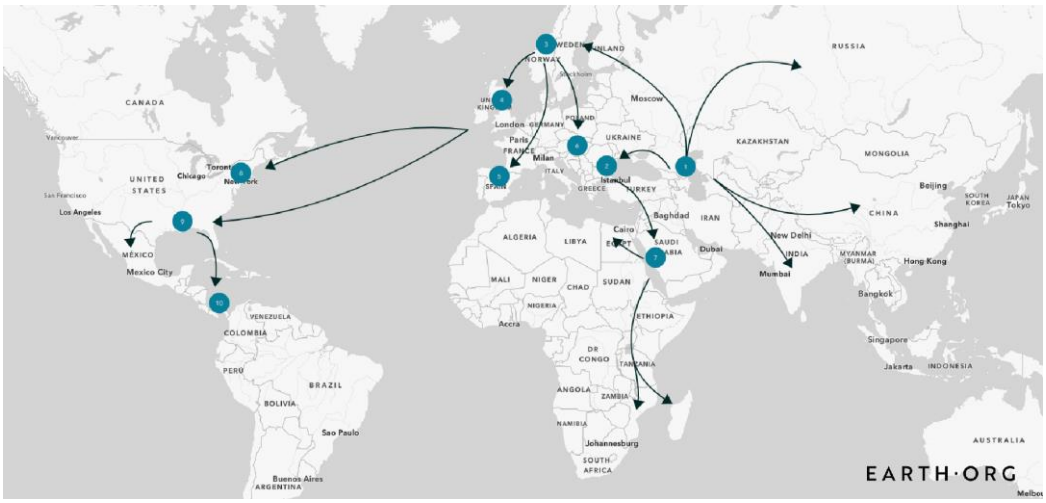

Figure 9 Map showing the Third phase of the pandemic. Source (Mulhern 2020)

Cholera disease was endemic in China, but starting in 1817, it began to spread to India and other parts of the world. When the steamships came on the scene, people travelled more for leisure. These ships were not utilised just for carrying goods and products. Hence, persons suffering from cholera could move from place to place. The people in those days tried to contain the disease by keeping such persons in the lazarettos. They blocked or stopped the ships coming into the harbours from the particular regions. They then quarantined all the persons who visited the areas where cholera prevailed. From 1817 to 1992, there were seven outbreaks. (Piret Boivin 2021).

Even the British colonies in the Caribbean and India were affected. It even reached Europe. It was the British, who were the first to utilise epidemiology to track down the outbreak's origin; they realised that the people consuming water from public pumps and water wells were the only ones getting the infection. Therefore, they concluded that the water contained cholera bacteria. Hygiene practices of the time also helped spread the cholera bacteria since human faeces usually found their way into the drinking water, increasing the spread of the cholera bacteria. Even in 1992, they were

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still fighting cholera outbreaks in some countries, and there was even a fear that it would be a pandemic, but it was contained. We still have cholera in certain countries nowadays, but because of higher or better standards of hygiene, a pandemic from cholera is less likely to happen (Piret Boivin 2021).

The incubation period may be from 12 hours to five days before symptoms appear after the person has been infected with contaminated food or water. The bacteria affect the walls of the intestine, forcing them to produce more water than usual and causing severe diarrhoea. Some infected persons show no symptoms, and some only have mild symptoms. (Preston 2020).

In those instances, the infection cleared up without further complication. Still, during the severe case, there is uncontrollable diarrhoea and vomiting that makes the legs cramp as the person gets very weak. During this time, the bacteria multiplies. This makes the disease very communicable for anyone who touches or is in contact with the stool, does not wash his or her hands, and continues eating or drinking. One can die of dehydration and loss of electrolytes within hours, or he/ she can enter a state of septic shock.
(Preston 2020).

Suppose the treatment is proper and the health system of the victim is exemplary. In that case, there are chances of survival that are excellent in number because the mortality rate is only 1% if the treatment is provided. This means that with no treatment, the death rate can be as high as 60%, which is the reason why cholera should be prevented and not treated. To avoid cholera, the best ways are through good sanitation, good hygiene, and clean water. Of importance, in the event of

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cholera in a person, their rehydration should not be delayed since one can die of dehydration, (Preston 2020).

2.3.6 The Spanish Flu 1918

Figure 10 Map shows the Spanish flu's first wave in early 1918. Source (Mulhern 2020)

Figure 11 Map showing the second wave of the Spanish flu in late 1918. Source (Mulhern 2020)

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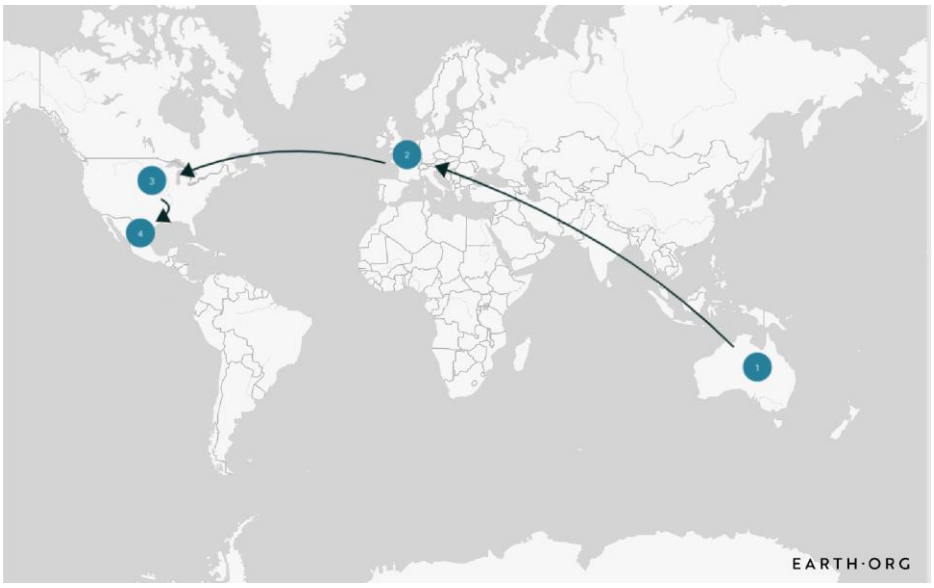

Figure 12 Map showing the Third wave of the Spanish flu in late 1919. Source (Mulhern 2020)

The world was barely out of the disastrous after-effects of the Second World War. Most of Europe was reduced to dust, and the economy faced a crisis of breakdown by 1918. It had been almost a hundred years since a pandemic had been seen. There had been other flu pandemics, for instance, that which began in Russia in 1889 and raged through Europe onto the United States, killing approximately one million persons within a year. (Preston 2020).

Contrary to its designation, it was not the normal flu, nor did the Spanish Flu take root in Spain. Thus, it came in waves. The first wave was not so bad; the people suffered mild symptoms but recovered after a few days. However, when the second wave came, it was different and devastating. Victims started to develop symptoms within hours or a few days, and they started suffocating. (Preston 2020)

-

Usually, you would expect the disease to affect the weak, the old and the young, but this flu was killing healthy persons of working age, many of them under 30. (Preston 2020). One Theory was that the flu caused the immune system in younger people to overreact, and the person's immune system became a liability. Persons who had survived the Russian flu seemed to have had some immunity also (Preston 2020)

It was caused by an influenza virus, the H1N1 variant. Despite all the advances in epidemiology and increased attention to public health, even nowadays, it is not clear what the true origin of the Spanish flu was. Historians claim that the Spanish flu began in America, China, Spain, France, and Austria; anyway, after several months, it overspread globally.

Since the soldiers who fought the World War in the army of the British Empire, were made up of men from many other countries, when they returned home, they returned the flu to their country 'unknowingly' (Huremović 2019).

The mortality rates for the Spanish flu ranged between 10 and 20%, while over a quarter of the world's population got the flu, leading to the death of 50 to 60 million people. The flu symptoms include sore throat, fever, and cough. This was what characterised the first wave of the illness. In the second wave of the illness, persons would have acute respiratory distress and pulmonary oedema, which in most cases leads to death (Preston 2020).

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2.3.7 HIV AIDS

One of those pandemics that we do not talk about is the HIV pandemic. It started in the 70s, and by the nature of the pandemic, it was pretty slow in the way it moved, the mode of transmission, and the stigma that came with it made it not to be seen as a severe health threat. It was initially thought that the disease only occurred among the gay male population, which made that community a target and left them isolated and stigmatised (Preston 2020)

HIV originated in the Congo region in Africa in the 1920s when it crossed over from chimpanzees to humans. Humans were killing the animals by hunting them and thus came into contact with their blood, thus contracting the virus (Anversa 2020).

In the mid-70s, there was a report of rare cancers and pneumonia amongst gay men in cities like New York and Los Angeles, but nobody appeared to pay attention to it at that time. It began to get more attention in the 80s because the men were healthy and getting cancers that would usually be associated with older people. It was not until the 80s that more and more cases were found, and they realised it wasn't only homosexuals contracting the disease but also heterosexual persons (Preston 2020).

By 1985, nearly every country in the world had at least one case of HIV, and it was not until 1987 that the medical community took it seriously. It was not until that year, 1987 that the FDA approved anti-viral drugs that treat it and blood tests to see if a person was infected with HIV were approved and tested (Preston 2020).

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It is the stigma and moral judgment that was cast upon people for getting HIV, just like the plague that hit in the 1300s where people would not even help their family members or coexist in the same house for fear of the disease.

This means that it would be hard to eradicate the disease since people fear coming forward to be tested, which will make them marginalised and social outcasts
(Preston 2020).

It has taken approximately 40 million lives since 1981 and still takes around 1 million lives every year. Currently, it has affected approximately 40 million of the world's population.

The rate of infection and deaths caused by this disease has considerably fallen because of the high awareness of the disease in developing countries. However, the prevalence of the disease is high, as high as 25% in some cases in the least developed African countries (Huremović 2019).

The virus is passed into a person's body through contact with blood, milk, and semen from an infected person. When the virus enters the body, it attacks the body's immune system, especially the T cells. Since these T cells act as the commanders of the immune system, the victim loses his/her fighting power against diseases. The disease has three stages. It consists of the acute stage when a person can develop symptoms of flu that occur between two to four weeks following contact. The virus in this stage is latent. It is active but not replicating. Today, many medications are used to keep the virus in a non-replicating stage; hence, a person cannot transmit the virus to another person.

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The third phase of the disease is called AIDS. This is when the immune system has completely broken down. In the more severe cases, even with treatment, the person dies within the space of two years because they become susceptible to all types of diseases, from cancers to contagious diseases that an average person can fight. In some cases, even the common cold can be deadly (Preston 2020).

2.3.8 Other Minor Epidemics

Severe Acute Respiratory Syndrome was the first disease of that type to gain public attention in the 21st century. A coronavirus causes it. It originated in China and was restricted merely to China and Hong Kong, and in all, it affected about 10,000 persons in that general area and a few cases in other parts of the world. The virus SARS killed about 10% of its victims. However, due to several public health vigilances in most countries, the disaster was averted, and the virus outbreak was controlled in 2003, containing the epidemic (Huremović 2019).

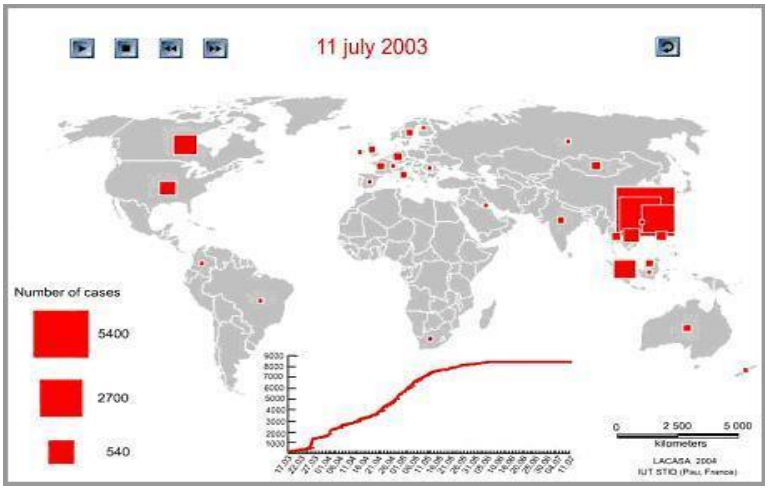

Figure 13 Map showing the spread of SARS. Source (Banos 2007)

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The Swine flu, or H1N1, began in 2009 and was the cousin to the flu responsible for the 1918 pandemic; it was not quite as destructive. It began in Mexico in April of 2009, and in a few weeks, it had reached pandemic proportions. By May 2010, the pandemic was declared to be over. This pandemic infected about 10 % of the world's population, and the death toll from this disease ranged from between 20,000 to 500,000. Just like the Spanish flu of 1918, the swine flu mostly affected younger people than older persons.

(Huremović 2019).

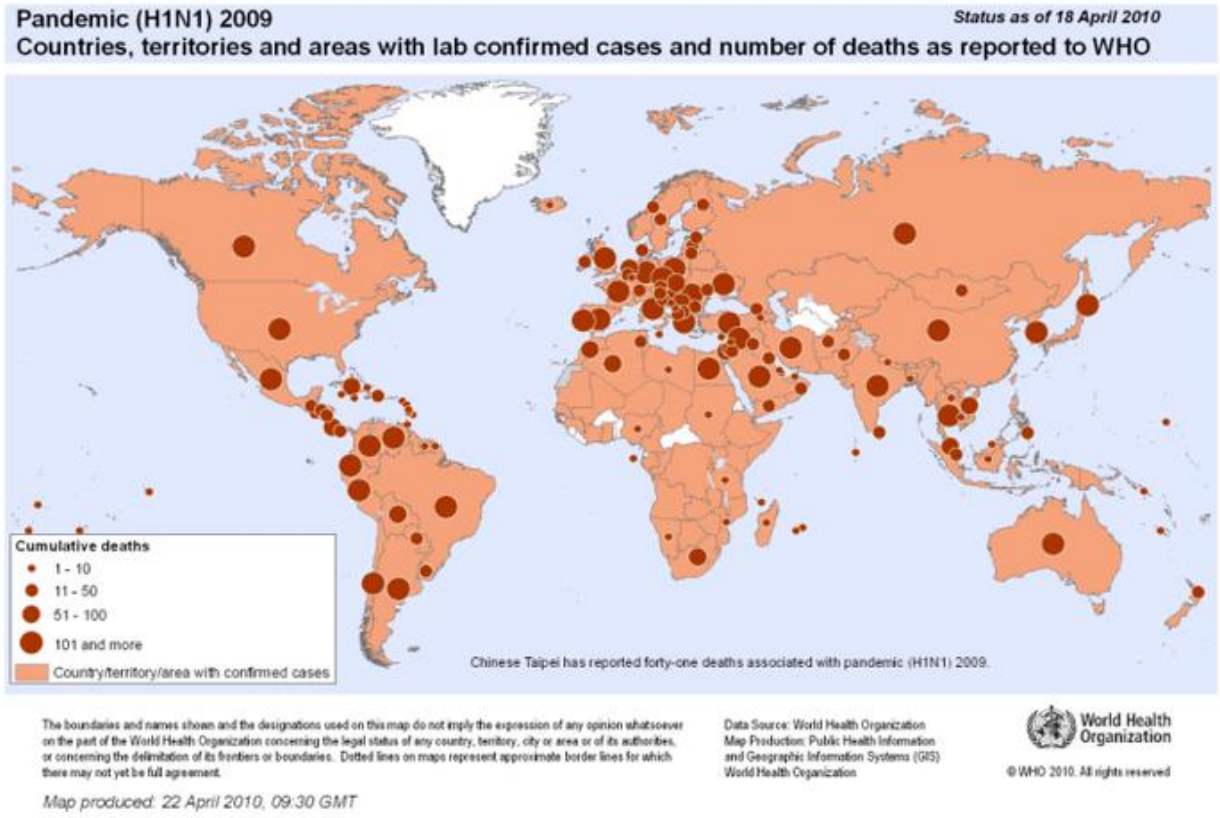

Figure 14 Map showing the Spread of the H1N1 Flu 2009. Source: World Health Organization

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The Zika virus in the Uganda rhesus monkeys did not usually infect humans. In 2015, an outbreak occurred in Brazil, wherein the victims developed signs of a rash on the skin, which further led to joint pain and headaches. These signs are like that of Dengue fever. This disease is spread through the Aides Egypti mosquito but is sexually transmittable, too. It was reported to cause birth defects in children if their mothers were pregnant at the time when they contracted the disease. This was one of the first diseases to get significant attention on social media. The disease spread from Brazil to South America, Central America, the Caribbean, and many other states within the United States. Without a vaccine against Zika, disease avoidance is possible only if one does not travel to the countries that have seen the disease outbreak. (Huremović 2019).

Figure 15 Map showing the spread of Zika. Source (Noorbakhsh et al. et al. 2019)

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2.3.9 COVID-19: 2019 and Ongoing

The COVID-19 virus was said to be found in bats, but it has crossed over to humans. It was first found in the city of Wuhan, China. Several other people believe there was an accident in China's high-security lab, and that is a reason for the virus to get out and start the pandemic. This is a disease caused by a completely new virus; therefore, it took a long time before the Chinese authorities realised the severity of the disease. The Chinese reported their outbreak in December 2019, and the World Health Organization declared a public health emergency in January 2020. As of March 11th, 2020, the disease was at pandemic status. One issue concerning a new virus is that it is constantly changing and mutating, creating new strains and developing a vaccine or any other medication to fight it is not easy. (Høiby. et al. 2020.

At the beginning of the pandemic, many Chinese were still travelling out of their country to other places, such as North America. Children were on winter break in Europe, and many of them, plus their parents, travelled to different cities and countries, thus giving the COVID-19 virus further proliferation. By October 2020, this virus had spread to 189 countries. At that time, 67.9 million cases were reported, and over one and a half-million people died.

The problem with the coronavirus is that so many people do not show symptoms yet transmit the virus to others. Many countries shut their borders first to China and then to other countries to stem the spread of the virus. During that time, many countries instituted lockdowns, work-from-home, school online, and stay-home orders to try and contain the virus (Høiby . et al., 2020).

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The COVID-19 virus burdened many countries' health systems due to the high level of hospitalisations and people needing intubation. Quarantine and the use of masks, combined with social distancing, were implemented in many countries to impede the spread of this disease. Coronavirus symptoms are similar to influenza symptoms. However, the virus attacks the upper respiratory tract and settles in the lungs if not treated. This means that when that happens, a person has to be taken to the Intensive Care Unit and placed on a ventilator so he/she can breathe. If not, he/she would die. The COVID-19 virus also affects those who have compromised immune systems or preconditions like high blood pressure, diabetes, cancer, kidney failure, or any underlying illness. It also affected and killed persons who are elderly more so than younger persons, and children seem to be able to fight it off quickly and did not have the symptoms as long as the adults.

Although the drop in cases occurred, the virus is still somewhat threatening. As much as it happened in the era of social media, there are so many myths and fake facts concerning the virus. That made so many persons either not take the vaccine or undergo any form of medical intervention, therefore accounting for the higher mortality rate than expected.

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Chapter 3 The Destructive Power of Pandemics (Literature Review)

3.1 Introduction

Until the onset of the COVID-19 pandemic, most persons alive never experienced the devastation that pandemics can cause. This chapter covers the destructive powers of pandemics. It will look at the physical, mental, social, spiritual and economic devastation that a global pandemic caused before the present pandemic. These pandemics killed millions of people. The chapter will examine the two significant pandemics in history: the Black Death in the 14th century and the Spanish flu in the early 20th century. It will show all of the carnage and heartache suffered by the human population. It will discuss the social isolation the human race sustained during these pandemics. It will show how families responded to the pandemic and how they treated their loved ones who caught the disease. It will also look at all the religious dogma that surrounded the plague of the 14th century. Even though all areas of life are affected by the onset of a pandemic, the toll on human life trumps all the others. The charts below show the mortality figures for some of the worst pandemics in history.

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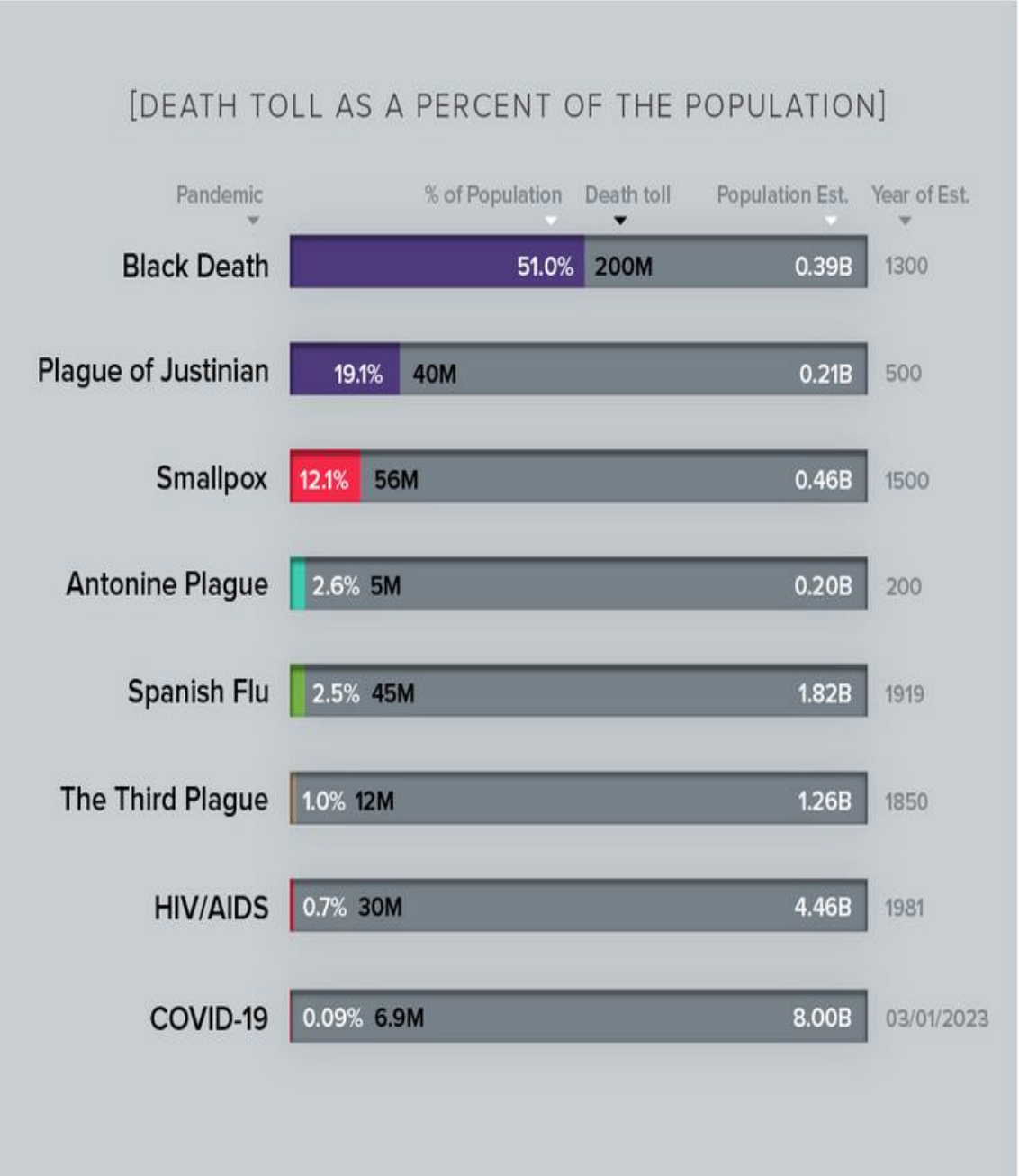

Figure 16 Chart showing the death toll as a percentage of the population. Source (LePan 2020)

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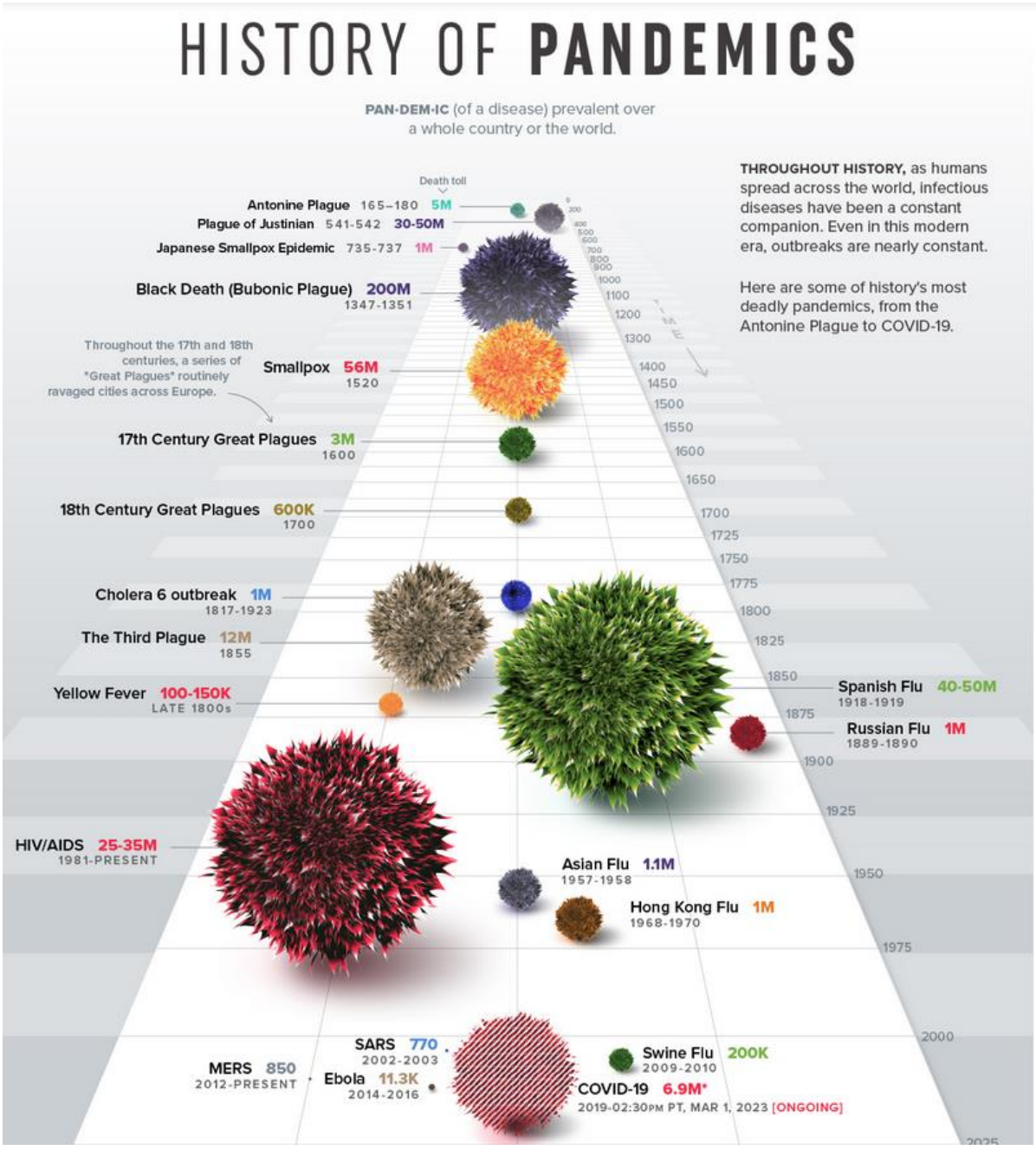

Figure 17 Death toll from various pandemics throughout history. Source (LePan 2020)

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3.2 Physical Impacts of Pandemics

Health impacts from pandemics are disastrous, and it was particularly so in the 14th century when between 30 and 50% of the population of Europe was killed. Another reason pandemics are so devastating is because they primarily affect the younger population, the people who make up the workforce. This was especially true during the Spanish flu from 1918 to 1921, when most fatalities were between 20 and 45. Over the years, pandemics have killed millions of people spanning extensive areas. In some places, the percentage of the population that died was more than 50 %((Qui et al. 2016.).

Such a pandemic that wiped out the population of Europe and Asia was the Black Death. It was viewed by most people to be one plague. There are three forms of this plague. The first was known as the Bubonic plague, the most notorious strain. This form of the plague got its name because once a person was infected, they had swollen lymph nodes in their necks, under the arms and groin. These swellings were referred to as buboes. The second strain was called the Septicemic plague. This was a dangerous strain as the bacteria would travel through the blood and affect all the organs more rapidly. The third strain was the Mnemonic plague, an air-borne one which attacked the infected person's lungs. It was difficult to detect in the early stages since it manifested through symptoms of more common respiratory illnesses like the common cold or the flu. This form easily spread in the air as the infected persons exhaled the pathogens. Persons near them would inhale the pathogens and then fall sick (Captivating History 2019).

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With all the strains of the plague, the first symptoms the person would develop would include chills and a very high fever; the sufferer also tends to be itchy and has constant headaches, which start at the initial stages of the incubation period. After this, the swelling of the lymph nodes would follow, which was an excruciating period in the lives of sufferers. If these infected nodes were left untreated, they would break open into open sores and pus with ooze coming from them. Persons who caught the septicemic form of the plague experienced visible bleeding under the skin or through the open orifices of the body. For instance, the nose, mouth, and extremities turned black. This was also accompanied by diarrhoea and vomiting. Of the three, pneumonic plague was the most contagious and the one for which people waited the longest to seek treatment because its symptoms were similar to viral respiratory infections such as influenza. However, then the individual would start to experience shortness of breath, and then they would start coughing up blood. They also started to experience abdominal issues. If left untreated, the Bubonic plague always developed into both the Mnemonic and the Septicemic plagues. (Captivating History 2019).

One of the many reasons the plague was also known as the Black Death was that the blood in the bodies of many people who suffered from the septicemic form of the plague began to turn black while they were still alive (Captivating History 2019).

First, the plague was transmitted by fleas, which rats and most animals carried. However, with its mutation, the plague took different forms. People developed all types of the plague since one day after exposure to a person with the disease, a person could become infected, especially if the person had the mnemonic form of the plague. They would become ill in a short time, and it is due to this

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reason that the disease spread with tremendous velocity to the majority of the population and why the number of deaths experienced in Europe was high. (Captivating History 2019).

The number of deaths resulting from the plague brought a problem to the remaining population as nobody wanted to bury the dead because of the fear of catching the disease. Persons who picked up bodies for burial were well paid as it was a hazardous job. So many people died that they eventually came up with the notion of distinct cemeteries for plague victims. Furthermore, the bodies were flung into the mass graves dug rather shallow to start with, and then some limited quantity of dirt was placed over them. The fact that the bodies were buried in a rush made the cemeteries become places where the rats and other mammals that might have been infected with the virus could feed on and infect the people of the town (Captivating History 2019).

The figures below show the death rates in various cities during the Black Death in Europe.

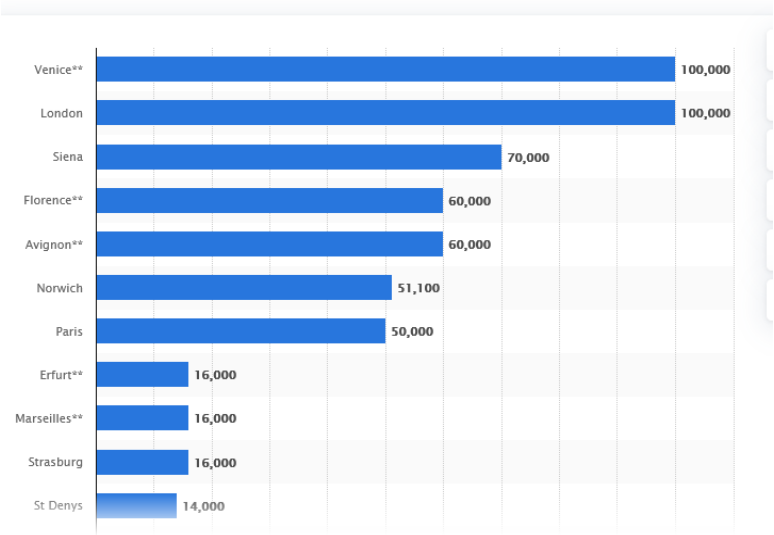

Figure 18 Chart showing the death toll by cities in Europe Source (O'Neill 2024)

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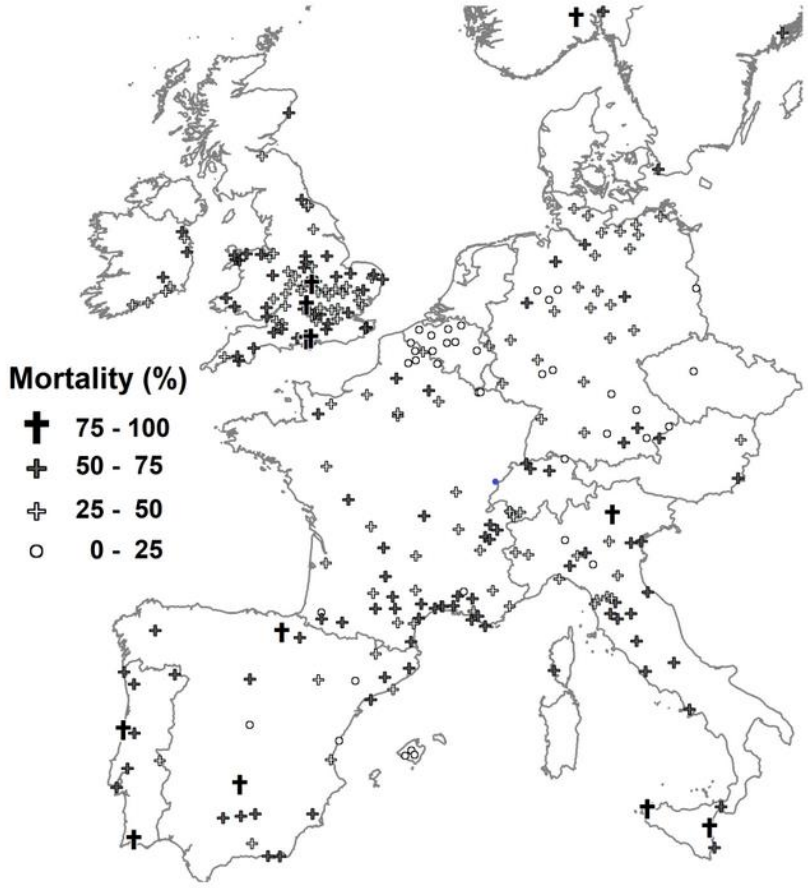

Figure 19 Geographic map showing the death toll in European Cities Source (Remi et al. 2022)

Spanish flu, on the other hand, was a viral disease that had unexpected results and outcomes. You would think that normally, when there is a pandemic, it is supposed to kill the weak, old, and the very young, yet this flu pandemic was killing healthy people who were at the pinnacle of their life span (Altman 2017). See the figure below.

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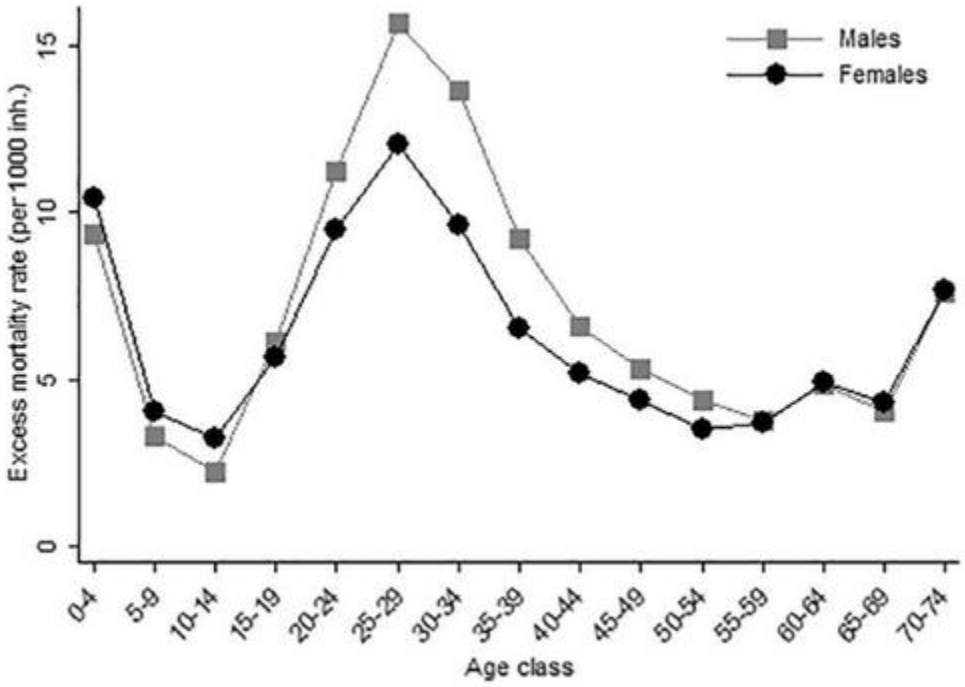

Figure 20 Graph showing the age demographics of death during the Spanish flu Source (Aassve et al. 2021)|

In the book "The Year of the Flu", Dr Nixon said one of his patients died after 48 hours of catching the disease. That was very surprising because his patient was in excellent health. The doctor surmised that it was his youth and his good physical condition that helped the virus kill him that fast. The Spanish flu was of the H1N1 type. It follows that healthy people with robust immune systems became more susceptible to the disease since the immune system mounted a very vigorous attack against the invaders, known as cytokine storm immune overreaction (Altman 2017).

This response caused the lungs to fill with fluid and other debris and blocked the oxygen exchange in the blood that humans needed to live. Children and older people did not have the same immune

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response to the virus; more often than not, they did not become sick, and if they did, it was only a mild form of the disease. (Altman 2017).

The influenza took or killed people in their 20s and 30s, with as many as 10% of the young adults being killed. The Spanish flu was contagious since the incubation period was about three to five days. Since it was so infectious, before a person had any symptoms develop, they would have infected many other people, therefore enhancing the disease's spread.
(Altman 2017).

This flu was very different from the other kinds of flu because it suddenly attacked its victims and even caused people to collapse without any warnings. These were very alarming symptoms but followed a familiar pattern. First, you would have extreme fatigue followed by a headache so bad that people thought that their heads were going to split open. This was followed by the aching of the joints, heavy nosebleeds, and then, at the last stage, the person would bleed from every open orifice in the body. Some persons would suffer from severe earaches and would be gasping for breath. They would cough uncontrollably because the disease attacked the respiratory system. When the virus got deep into the lungs, it became dire. The lungs hardened and solidified and could not transfer oxygen into the blood; hence, the patient's lips turned blue, and as they got sicker and sicker, their bodies used to get dark. Unlike today, during the COVID-19 pandemic, the doctors back then did not have the technology for intubation; therefore, they could only stand and watch the people die (Altman 2017).

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A further complication of the Spanish flu is that almost every pregnant mother who contracted the disease had a miscarriage or delivered a premature baby. This caused a problem for the doctors of the day because they did not know what to do with the premature babies due to the lack of equipment that we have today. They treated the mother, and also, incredibly, some of these premature babies did survive (Altman 2017).

The death rate from the Spanish Flu in some countries is shown in the figure below.

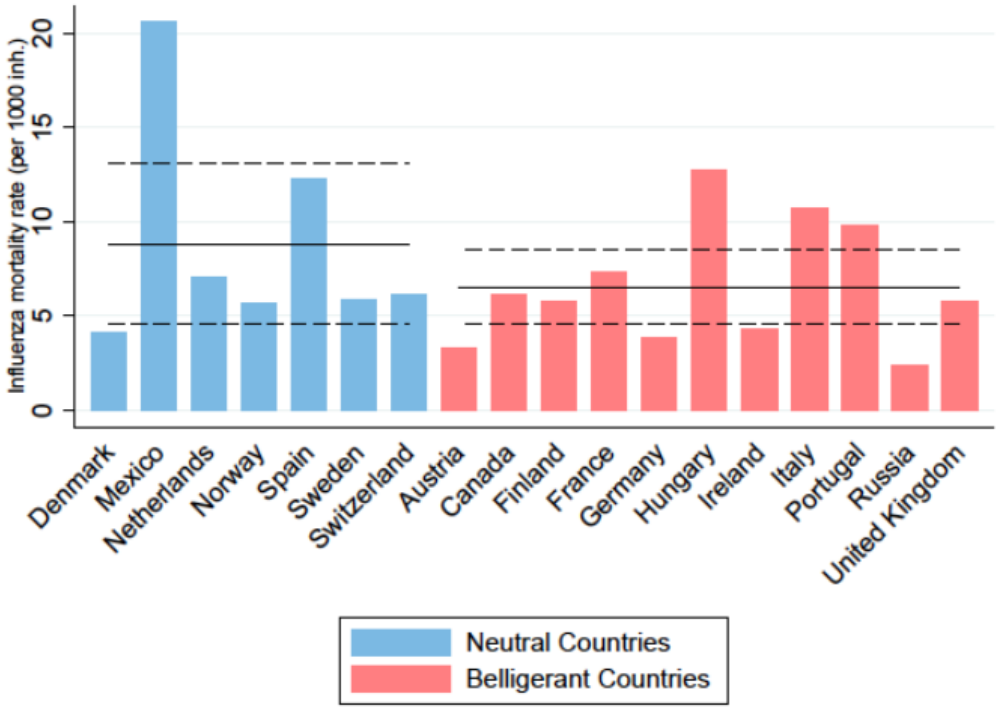

Figure 21 Chart showing the death rates for various countries. Source (Aassve et al 2021)|

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3.3 Social Impacts of Pandemics

Most of the time, when we look at pandemics, we only see the physical manifestations of the disease in the human body. Pandemics can also have dire consequences on the social, mental and political landscape. These pandemics can cause, create or widen the class system that already exists in the population, and this can further increase discrimination and lead to unrest. Due to the high mortality rates that occur during a pandemic, there is usually a demographic shift, and this weakens some of the indigenous populations in most cases. In some places during pandemics, there is also the tendency to blame one group or another for the cause of the pandemic. This happened during the Black Death when the Jews became the scapegoat for the cause of the pandemic (Jamison et al. 2017) (Madhav et al. 2017).

Apart from disease, there is nothing more devastating than war and having a combination of disease and war can be devastating. Now, more terrifying than having an illness that you do not understand is the idea of people trying to figure out how to use it as a weapon against other humans. Biological warfare is one of the most terrifying things that humans can face. During the Black Death, there was a war against the city of Kafa. It was a war between the Tartars and the Christians. While the siege was going on, the Black Death struck all the soldiers who were on the outside of the city wall. They began to die in their hundreds, and the Tartars were horrified by the disaster that was brought about by the disease. Realising that they had no escape, they lost interest in the city's siege but came up with a brilliant idea. They took all of their dead bodies, placed them into the catapults and hurled them over the walls of the city. (Captivating History 2019).

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The people could not run away from them, and besides, hiding from the dead bodies was not possible. Most of the bodies were thrown into the sea, and it did not make a difference as one infected person would carry the disease to another person. Moreover, "the Tartars did not have to deal with the smell of the dead; it only overpowered the town's inhabitants; this biological combat weakened the city."

(Captivating History 2019).

It is said that during the Black Death, the situation was so adverse that the family members would leave those who became infected. They would flee the house and leave their loved ones to die. People were terrified and depressed. In his book “The Black Death in a Nutshell”, Edward the Confessor quoted some of the remarks made by persons living during the Black Death. These quotes are shown below.

> “Within the walls of the city are more than 7000 houses where no one lives because everyone in them has died” - Louis Heyligen
>
> “This scourge had implanted such great terror in the hearts of men and women that brothers abandoned brothers…wives deserted husbands…fathers and mothers refused to nurse their children.” – Giovanni Boccaccio
>
> “They put in the same trench many other bodies…layer upon layer until the trench was full…Some of the dead were…so ill-covered that the dogs dragged them forth and devoured many bodies throughout the city…” – Agnolo di Tura
>
> “Waiting among the dead for death to come” – John Clynn

-

> "No fellow human being could be surprised if we were inwardly desolated by the sting of grief, for we are human too." Edward III on the death of his daughter.
>
> "18 May, Nicholas, brother of William; 16 July Robert, brother of William; 5 August, Peter, father of and Joan, sister of William;10 Aug, Joan wife and Margaret, sister of William. All dead" – William Wakebridge of Derbyshire
>
> "An infallible way to ward off this appalling evil was to drink heavily, enjoy life to the full…gratifying all one's cravings" – Giovanni Boccaccio
>
> "[Victims] would plead with relatives not to abandon them… when the person fell asleep, the relative left and did not return." - Marchione di Coppo Stefani
>
> "Everyone in Paris is frightened." – Peter Damouzy.
>
> "The living were hardly able to bury the dead…so much wretchedness…afterwards, the world could never return to its former state." - Thomas Walsingham
>
> "If his aforesaid wife and children [William, Thomas, John, Johanna, Isabella, and Katherine] should die within one year after his decease, the whole of the aforesaid tenements [to be] given to holy Church for the good of their souls" – Will of William Hanhampstede
>
> Agnes Hanhampstede bequeathed a sum to her servant Alice or "whoever else shall nurse her son John until he is weaned."
>
> "And I, Agnolo di Tura…buried my wife and five children with my own hands."

As seen from the quotes of the people who were living through the Black Death, It was inevitable that people go through mental and social stress due to fear and isolation. During the Spanish flu, there was an increase in the incidence of suicides in the USA. The strange thing was that the suicide

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rates differed among the races. It was found that persons who were white had a higher suicide rate than those who were coloured. One suggestion that was put forward for the lower suicide rates among coloureds was the strong religious belief that the coloured people had as opposed to the whites and also the stronger family bonds that occurred between the coloured communities. They also had a better community support system than the whites (Bastiampillai, Allison, Looi 2021)

The Spanish flu affected people mainly of working age, and this decimated the workforce, which in turn had a social impact on the fabric of society. There was also the fear of catching the disease, so there was a drastic change in behaviour as persons restricted their social interaction, and this created a climate of distrust that persisted long after the pandemic had subsided. (Riley 2020)

Another problem was the disproportionate access to health care in some communities, which further helped divide and fracture the society. Since the disease ravaged the adult population, it left many children without parents as orphans, and there was no one to take care of the elderly persons. (Riley 2020)

The Spanish flu also sparked a myriad of strikes and unrest among workers as there were shortages in the labour force, and this saw the workers insisting on more money for their labour (Riley 2020)

3.4. Impact of Pandemics on Religion

During pandemics, most people turn to the church for comfort, and during the Black Death, the Catholic Church was the dominant religion in Europe. The Church had absolute power, and because

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of this, many clergy and officials abused their power by asking the population to pay penance for the forgiveness of sins. (Captivating History 2019).

When the Black Death started, the church tried to find solutions according to their religious doctrines. The church began to explain why the population was suffering from the disease. The first thing they did was blame the people for their sins, saying that their sins caused the disease to fall upon the human race. Then, they began to blame the God of the Old Testament, who they said was a vengeful God punishing the people. Finally, the church came around to blame the Jews as the leading cause of the plague. (Captivating History 2019).

The priests of the Catholic Church were not immune to the Black Death, and many of them died. Those who remained were afraid to come in contact with the population. Church services were no longer conducted, especially administering the last rites for persons who died. This was a serious issue as people believed that they would not get to heaven without these rites. (Captivating History 2019).

In reaction to the church not doing its work and for blaming the population's sinfulness for the Black Death. The population tried to stop the plague by atoning for their sins. Some of them went to the extreme. They were walking around from town to town, whipping themselves until they bled. These persons were referred to as the flagellants. (Captivating History 2019)

Now, the popularity of the flagellants became a challenge to the established Catholic Church, and they were intent on stamping them out because people were now turning away from the established

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religion and beginning to follow the flagellants. However, as the disease began to wane, people began to lose interest in the flagellants. (Captivating History 2019)

The sad thing is that the Black Death did not only kill people, but it also inspired other people to kill. So, people began to look for scapegoats, and the lot fell upon the Jews, and people began to execute members of the Jewish population. (Captivating History 2019) See the chart below.

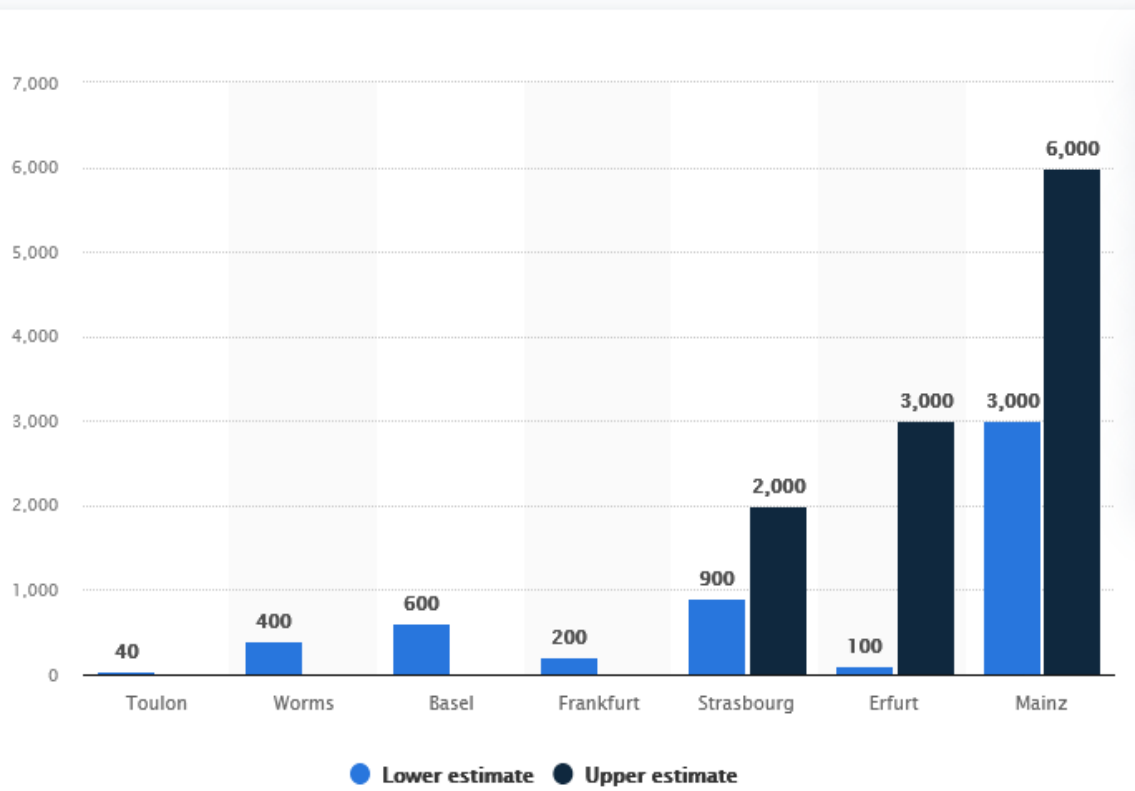

Figure 22 Estimated number of Jews murdered in select pogroms in European cities during the outbreak of the Black Death in the mid-14th century Source (O'Neill 2024)

Because the church was the Central authority of the day, it looked after most of the daily needs of the poor and underprivileged. It provided education in the form of schools and universities, but the

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Black Death caused many of these poor persons to turn away from the church and look to other religious movements. (Captivating History 2019)

During the Spanish Flu Religion was affected just like with the Black Death. The states and countries imposed so much social distancing that many people were prevented from gathering en masse in an enclosed area. The churches were forbidden from holding indoor services during the pandemic. Most of the churches took their services outdoors. Some churches resisted this, but when the number of deaths began to mount, they had no option but to close the churches since the people became afraid of catching the flu, so they would not go to church in any case. When the death toll began to decline, the ministers of the church began a petition to the States for the reopening of the churches. The leaders argued that was a denial of their freedom of religion. Leadership also insinuated that the church positively impacted people curbing all the negative emotions stirred by the Spanish flu. (Mariella 2020)

There were letters from pastors to all the leaders, letting government know that they were disobeying God and were flying in His face because they were restricting the population from worshipping Him. (Mariella 2020)

3.5 The Impact of Pandemics on the Economy of the Period

Pandemics affect the physical and social perspective of the regional economies. During the Black Death, the European economy was purely agricultural; hence, prices and gross domestic product

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data were minimal. However, there is traceable data for England, Italy, and Spain. The graphs for the GDP of the three countries during the Black Death is represented as follows. (Remi et al. 2022)

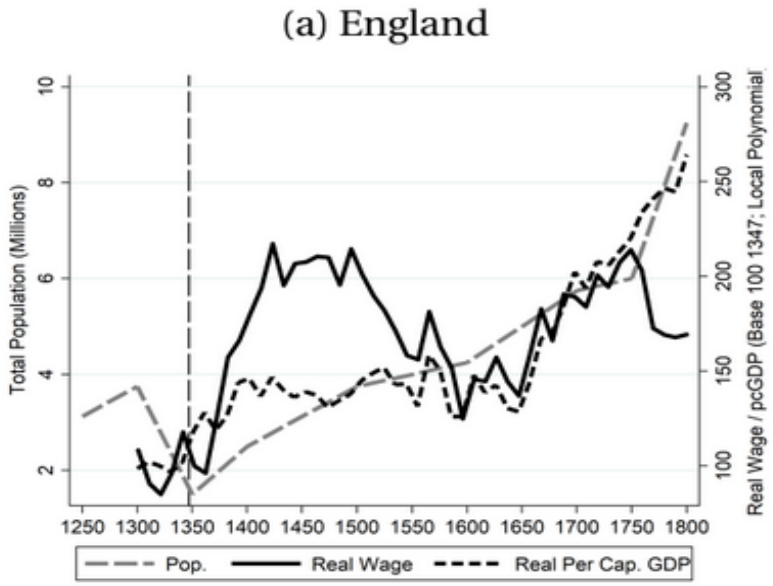

Figure 23 GDP of England for the period 1250 to 1800 Source (Remi et al. 2022)

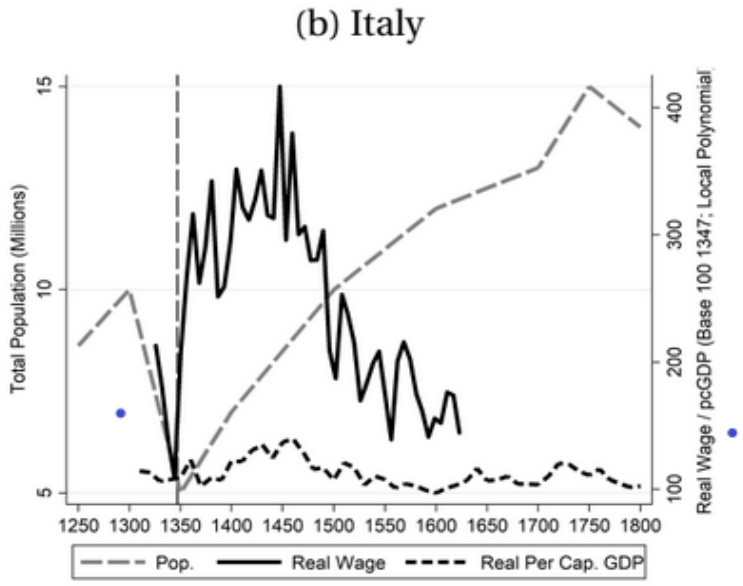

Figure 24 GDP of Italy for the period 1250 to 1800 Source (Remi et al. 2022)

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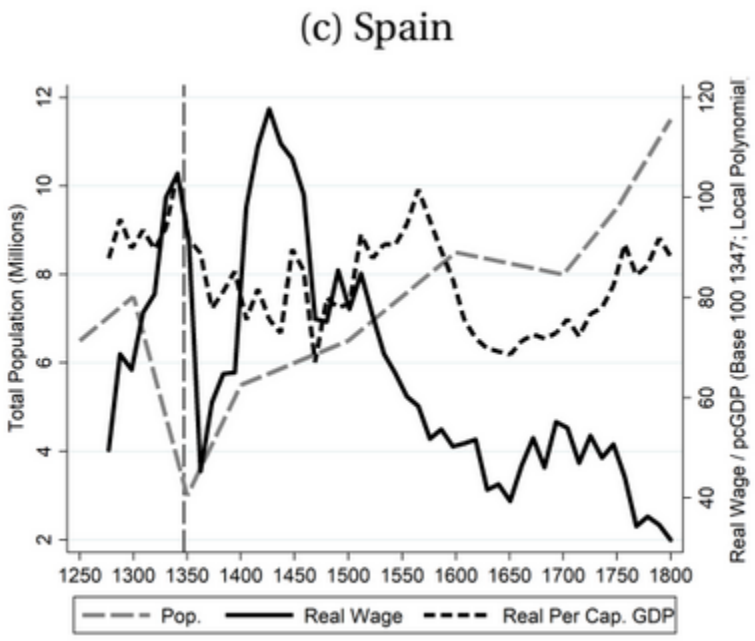

Figure 25 GDP of Spain for the period 1250 to 1800 Source (Remi et al.. 2022)

The Black Death did raise wages in the short term but also caused a breakdown in economic activity. Fewer people were available to harvest the crops because of the dramatic drop in population. Similarly, construction of buildings had all but ceased because so many of the occupants of these homes had died. There was no need for more buildings. The wages were growing; however, the prices of commodities skyrocketed because of the shortage of goods that resulted from a shortage of labour, hence wiping out the wage increase. (Remi et al 2022)

The impact was, however, was different in all the sectors. An example is that the demand for buildings was reduced, and as such, wages for construction workers, instead of increasing, were reduced in some instances. On the other hand, wage earners in agriculture and non-durable goods saw their wages increase more rapidly. Some countries like England tried to contain the wages that

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got out of hand due to fewer workers by fixing the maximum wage any person could receive. City workers in Italy received a higher wage than those in the countryside. However, despite comparably higher salaries in the cities, the highly inflated commodity prices still eroded their purchasing power. (Remi et al 2022)

Another way the Black Death affected the economy was that the people living in rural villages and on farms left. They entered the city since most of the buildings were not occupied due to their families having died.

These villagers could now occupy the new locations. This led to the complete desertion of villages and the shrinking of others. It also brought about another problem of increasing the number of labourers required to work in the agricultural sector
(Remi et al., 2022).

In addition to reducing the human population, there was a reduction in the number of animals used for food and transportation. So, apart from fighting the plague, they fought starvation also because most of the animals died during the epidemic. Most of the rural people did not have any alternative source of food. However, the cities that were near the sea could get a good supply of fish, which they could use to supplement their diet (Captivating History 2019)

There was also a shortage of wool as most of the sheep had died. Wool was needed for the clothes and blankets that were required by the populace, and this scarcity of wool continued much after the effects of the plague had worn off. Although the plague and its aftermath were long gone, it

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influenced the people through years of labour shortage that followed the pandemic's end. (Captivating History 2019)

It is hard to estimate what a global pandemic costs economically, but during the Spanish flu the world was now coming out of a devastating World War, and most countries were devastated economically, and their economies were almost on the brink of collapse. The average loss in GDP for most countries was about 6 percent from 1918 to 1920. This was also accompanied by a severe drop in economic activity in all areas. This amounted to about 7 percent of the GDP, which was typical for most countries. (Van der Veken, De Santis 2020).

See the figure below.

	Expected loss	**Bad scenario** (additional loss)	**Worse scenario** (additional loss)
Year	Cumulated 1918-1920	1918	1918
		Panel A: Typical country	
World	-7.0	-5.5	-19.6
		Panel B: Lower and higher income countries	
Higher income	-4.7	-5.0	-13.5
Lower income	-9.8	-9.7	-30.6
		Panel C: Some individual countries	
US	-2.5	-1.9	-5.5
Spain	-6.1	-5.6	-17.2

Figure 26 Table showing GDP during the Spanish flu Source (Van der Veken, De Santis 2020)

The Spanish flu deepened inequalities between nations since there was an unequal burden of the flu on unskilled or low-skilled workers. Additionally, it increased based on the fact that the disease was able to spread much quicker in countries lacking the capital to invest in their respective health systems in order to combat the disease. Where human incomes were low, the real income lost to the Spanish flu was estimated to be twice as large and was assessed at a 9.8% loss of GDP as

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compared to countries that were much better off in terms of human incomes whose GDP loss was estimated at 4.7% ((Van der Veken, De Santis 2020).

An example of how the Spanish flu affected a country with a low income is what happened in the subcontinent of India. The Spanish flu forced the already poor into extreme poverty and forced them to survive by returning to farming activities. This brought about the rise of disparity in income between the various groups.

On the other extreme, however, was the increase in the price of food items and other necessities, which complicated things even further when there was a shortage of food supply. Since the government put a lockdown in India and most other countries, there has been little or no economic activity; hence, mass unemployment was found since most of the workers in India work in the informal sector. This caused a tremendous demographic shift as people were forced to leave the urban areas and move to the rural areas to survive through the use of Agriculture, and this was a boost to the agricultural sector in India (Sharma et al. 2021).

In India, during the Spanish flu, the real GDP fell from US$1111 in 1917 to US$968 in 1918 (see the figure below).

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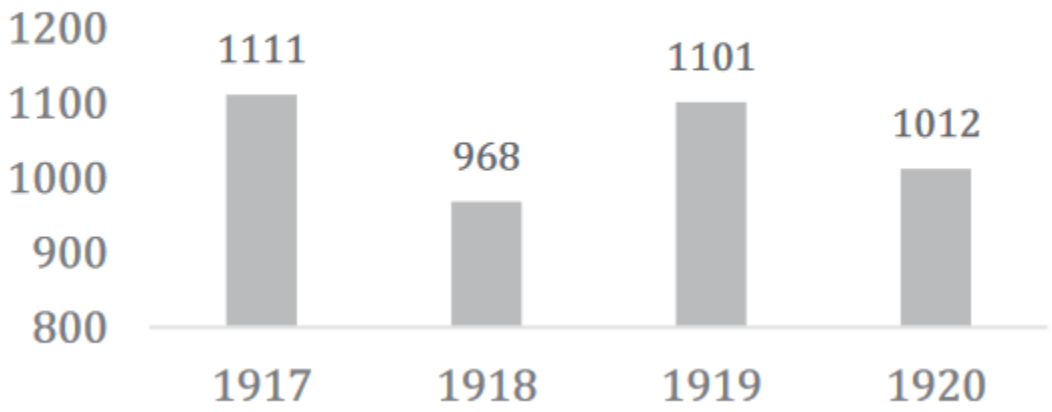

Figure 27 Chart showing real GDP in India from 1917 to 1920 Source (Sharma et al. 2021)

Another aspect of the impact of the Spanish flu on the United States was its economic effects. For example, in Philadelphia, it was estimated that in October 1918, there was a 55 million dollar loss to businesses, which translates to 27.50 per capita. For 1918, there was an estimated loss of about three billion dollars for Baltimore and New Orleans, about 3. 9% of the GDP. Due to workers failing to show up to work, the absenteeism of the workers caused many companies to shut down and often forced company closure altogether. As many of the stores were closed, people could not get the supplies they needed, and therefore, the state had to institute food banks and rationing so that the people could continue to eat. Unlike originally, many businesses had to abide by the state law to close. As the disease progressed, they could not stay open as they needed workers.

People were afraid to go out of their homes due to fear of contraction of the virus; many shops on their own closed down by weighing the effects of the dollar they would gain against the loss of lives of so many people. . (Bastiampillai, Allison, Looi 2021)

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Chapter 4: Pandemics, the Aftermath (Literature Review)

4.1 Introduction

Unfortunately, pandemics cause destruction and mayhem. Still, if you look at history, the human race has advanced in significant leaps and bounds after every major pandemic. We have seen political structures brushed aside and the roles of males and females expand. This chapter will focus on the developments that came out of the pandemic. Things like equality for women, scientific discoveries in medicine, the creation of new communication methods, a higher standard of living and the invention of many gadgets which did not exist before the pandemic. It will look at the two significant pandemics before the COVID-19 pandemic, the Black Death and the Spanish flu. It will examine the influences on architecture, art, travel, and communication. Most people think that pandemics are destructive, but they can be viewed as necessary to jump-start the population at the current time and find innovative ways of surviving after the pandemics.

4.2 Improvements Because of the Black Death Pandemic

The Black Death profoundly influenced medieval Europe's economic and demographic structures, leading to a low population and a wealthy society. The economy was saturated, as all available resources were used to produce food, clothing, and shelter. Agriculture was used to make cereals,

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and cultivation was extended to available land areas. Although the people were living in conditions of extreme poverty, the population showed a continuous growth pattern, and the economy was resilient and capable of withstanding the increase. (Herlihy 1997)

The pandemic also increased demands for specialised services, including undertakers, medical practitioners, and clergy. In a time of mortality, gravedigging provided much-needed jobs for the poor, the peasants who had lost everything, beggars, and the unemployed in towns and cities. With so many untrained people who had no idea about medicine trying to help, the demand for doctors became very high. (Herlihy 1997)

The Church viewed laypersons, particularly women, who assumed pastoral responsibilities or were involved in sacramental ministry with suspicion. When epidemics swept through communities, the legal order faced the exceptional social circumstances of an outbreak. Legal privileges were established, allowing women to serve as witnesses, and notary guild members were licensed to compose legal documents. (Herlihy 1997)

The mortality rates hit hard on the careers of the artisans and other skilled workers. It was found that the average length of a job decreased by almost 20%. It fell from about 32 years in the late thirteenth century to 26 years in the last part of the fourteenth century. The guilds were to actively seek out and enrol new apprentices not related to any person in the guild profession to provide continuous admission of new members into the profession (Herlihy 1997),

The Malthusian Theory of Population refers to the theory of exponential population and arithmetic growth of food supply. The solution of the Malthusian check produced long-term benefits, the release of resources and the possibility of developing a more diversified economy. However, such

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abundance and excess soon turned into overindulgence in expensive food and clothes, thus threatening to blur class distinctions and social structures. Therefore, from 1300 to 1500, the government introduced sumptuary regulations that regulated many aspects of society, from clothing to food (Herlihy 1997).

During the late medieval period, the wages of the economically poor rose, and living standards improved. The shift from crop growing to pasture land became even more profitable due to the high price of wool. Silk turned into a competitor for wool in the textile industry, targeting a high-end market of more well-off consumers. (Herlihy 1997)

The land value dropped, and the costs favoured substituting factors with cheap land and capital. Factor substitution in agriculture included purchasing oxen and seeds, but it involved acquiring more sophisticated equipment or technology in the urban economy. Further, substitution was attained by employing technological inventions to create labour-saving devices. The prospect of high profits from the high labour cost attracted inventors of labour-saving devices. (Herlihy 1997)

Dramatic technological advances throughout the late Middle Ages, including printing with moveable metal type in 1453, shifted from time-consuming, labour-intensive methods to relatively inexpensive techniques, like the printing press. The art of Gutenberg combined several technologies into artistic pursuits, such as making printing shops possible, allowing for a similar type of revolution in ships, where larger vessels could now be built with fewer men. Significantly, the economy after the plague in the late medieval period revealed some cardinal changes, including diversification of the economy, access to capital, broadened technological capabilities, and a rise in living standards. (Herlihy 1997)

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Though the plague was catastrophic, Europe changed its habits and gained the modern Western pattern of demographic performance. The fall in population brought about more agricultural land with higher and more profitable employment opportunities; these two factors fostered many people's general life improvement. Difficulties in managing property and ensuring the continuation of living conditions were closely connected and even intertwined with decisions related to marriage and procreation. (Herlihy 1997).

Notwithstanding the problems caused by the sickness, Europe adopted the modern Western pattern of demographic behaviour. Boards of Health were set up and vested with comprehensive powers to isolate persons who were sick or suspected of being ill from persons of good health. The late Middle Ages had remarkable technological progress and economic changes. (Herlihy 1997)

As such, the plague significantly affected the institutions of learning, especially universities that were then training theologians, lawyers, academic doctors, and physicians. The student population at Oxford University dropped from 30,000 to just 6,000, with the mortality count falling from 60,000 to less than 3,000. There were 30 existing universities before 1348; five were destroyed. However, during the pandemic, when the human population decreased and clergy was in short supply, many new institutions, colleges and universities were created along with an inflow of charitable donations. (Herlihy 1997)

The founding of the University of Prague in 1348 was the most essential phase of expanding new universities on the Continent. This diluted the influence of old main centres and instituted new places with a more solid national support base than any previous educational institution. This

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weakened the worldwide cohesion of medieval culture and supplied the ideological schisms that developed during and before the Reformation. (Herlihy 1997)

The outbreak marked the beginning of the age of cultural nationalism in Europe. The decline in the number of masters competent in Latin necessitated using vernacular languages for instruction, particularly at the non-university level. The poor standard of Latin university teaching also caused a reactionary movement to restore the language to its proper classical form. (Herlihy 1997)

At the cultural level, the plague challenge did away with the differentiation of theoretical physicians and practical surgeons, gave regard to the surgeons' class, and rejuvenated the empirical study of the human body in sickness and health. (Herlihy 1997)

4.3 Increased Women’s Rights and Expansion in Art, Architecture and Science

Gender equality dramatically improved during the medieval period. Women's status in society improved. Before the outbreak, women enjoyed few privileges because of the influence the church and nobility had on them. Lower-class women worked as bakers, milkmaids, barmaids, weavers, and workers on the lord's estate; however, they had no power to control their fate (Mark 2020).

The Cult of the Virgin Mary provided a link between women and Christ's mother and contributed slightly to the elevation of women's visual arts status. The plague impacted architecture significantly, resulting in a change of style and subject to more realism and death-centered works like paintings, woodblock prints, and sculptures. The Dance of Death or Danse Macabre was the predominant theme for those works (Mark 2020).

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The Black Death made the style more sober in England, evolving from the luxuriantly ornamented form of French Gothic to the plain Perpendicular style architecture that emerged after the prevalent sense of sadness that prevailed during the epidemic and an intense preoccupation with sin and death (Mark 2020).

Women acquired the right to own land, manage companies and have more freedom to decide whom to live with. The invention of the clocks and medical discoveries changed the focus from the elite to the ordinary people, as well as experimentation and the discovery of drugs. Advancements in technology rendered the use of manual skills impracticable. Therefore, crossbows, innovative medical concepts, clocks, eyeglasses and curiosity about other learning invented themselves. (Mark 2020).

4.4 Life Expectancy Increased after the Black Death

You will find the process of natural selection and survival of the fittest within the animal kingdom. When a location has been depleted of all its resources and cannot further support a species because its numbers have grown too great, nature itself, so to speak, culls the herd to reduce the population so that those who survive will be stronger. The author of the book "How the Black Death Affected Western Civilization agrees that it happens to human beings also.

Pat Lee Shipman's PhD dissertation deals with the catastrophe of the Black Death. She investigated it from a historical and present human health perspective, including pandemics' social and genetic impacts. She based her conclusions partly on data collected by archaeologist Sharon N. DeWitte. (Shipman 2014).

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DeWitte examined 490 skeletons from the East Smithfield Black Death cemetery in England. She matched her findings to 291 skeletons from two medieval cemeteries in Denmark. She noted that the old and the frail died more from the plague. DeWitte suggests that the Black Death was 'harvesting' the frailest members of populations and removing them in such short order. The epidemic culled, on a massive scale, the most vulnerable members of the population, irrespective of the level of vulnerability throughout Europe. DeWitte's new investigations further looked into the lasting biological impact of the Black Death, trying to determine whether there were signs of better health and nutrition among the population. She found that a higher percentage of people lived into advanced ages, which was impossible for most individuals before the Black Death. The offspring of the survivors would have been likely to survive to reproductive age themselves and so pass on the genetic advantages that had allowed their ancestors to outlast the plague. (Shipman 2014).

4.5 The Spanish Flu Inspire Vaccine Trials

The 1889-1890 influenza epidemic was the first Western pandemic after 1848-1849 and after affluent nations had formed health departments and vital statistics systems. Influenza spreading, as depicted by an increased number of literary works and two critical biological syntheses during the epidemic. Characteristically, the pandemic had severe illness and low fatality, with up to 50% of Germans and 25% of Greater Londoners infected. Age-specific morbidity and death were most significant in 20-40-year-olds during the pandemic. (Eyler 2010).

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By applying new medical microbiology techniques, scientists could determine the microbiological origin of influenza during the pandemic. It was in 1892 that Richard Pfeiffer discovered B. influenzae, and immediately began, research on an influenza vaccine began. The pharmaceutical companies worked on cold and flu vaccines but never disclosed the contents of such vaccines. Further research discovered that Pfeiffer's bacillus is relatively complex to tell apart from influenza in throat washings or sputum in influenza patients. (Eyler 2010).

By 1919, influenzae was found only in 8% of 62 cases, which negated Pfeiffer's bacillus' role in the spread of influenza. Various researchers isolated various types of Pfeiffer's bacillus, but no one could demonstrate that B. influenzae was a cause of flu. Captain George Mathers isolated green-pigmented streptococcus strain in 87% of pneumonia and influenza cases during the pandemic. Filterable viral notion was considered, but Researchers from America could not confirm it. The role of Pfeiffer's bacillus declined, and influenza vaccinations changed. The medics had different opinions on the immunisation research criteria for the 1918-1919 outbreak. This led to no standards and data. Due to its unknown aetiology, the American Public Health Association published a manifesto against developing influenza vaccines. The 1918-1919 pandemic destroyed biomedical knowledge, and the fundamental properties of influenza became vague. (Eyler 2010).

The 1918 Flu Pandemic coincided with the ending of World War I, which, as such, brought unrest throughout the globe and fueled further research in medicine within the following decades. This pandemic is more commonly known as the Spanish flu and has killed more than 50 million people worldwide, which accounted for approximately 3% of the world's population. Although earlier examples of influenza did appear worldwide, the current outbreak was highly different in intensity. The disease was worldwide, and the mobilisation of a high-population military heightened the

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situation. The US Navy and Army reported that 40% and 36% of its populations had been affected, respectively. At the end of the pandemic, it was realised that blood transfusion from a recovered patient was quite helpful in saving lives. The research on the compatibility of blood groups was still not well developed. Scientists had previously blamed influenza on a microscopic bacterium called Bacillus influenzae, now known as Hemophilus influenzae. Vaccines for these tiny organisms, or viruses, had already been developed since the late 1700s when the smallpox vaccine was invented. (The National WWII Museum 2020).

In the year following the epidemic, scientists continued researching the dangers of influenza. In 1931, Richard Shope did research relating to pigs that contracted swine flu and showed that H influenza only intensified the disease but not the cause of the disease itself. In 1936, he further proved a close link between the two diseases by showing that individuals working and living on pig farms had swine flu antibodies in their blood. In 1931, a technique for growing the influenza virus in viable chicken eggs was first developed at Vanderbilt University and identified the presence of two distinct types: A and B. The finding that the 1918 pandemic virus was a Type A virus was the cue for researchers to begin vaccine development. The soldiers received the first extensive vaccination against influenza in the United States in 1944. Later, in the following year, 1945, it was issued to civilians. This discovery gave birth to the methods of vaccine production and the discovery of genetic structures and their molecular forms. (The National WWII Museum 2020).

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4.6 New Communication Techniques Helped During the Spanish Flu

The 1918 flu pandemic spread worldwide with significant disruption to daily life, and novel uses of technology and applications played a substantial role in helping people cope with the spread of the disease. Already established throughout World War I were the wireless communications between ships and between ships and land. The University of Washington's Naval training station trained cadets in various service areas, including a large radio communications class. At the UW training station, one of the first contagious, exponentially growing Spanish influenza outbreaks in Seattle occurred in the country's military and naval barracks. Even though some cadets from the University of Washington died, radio communications proved very vital during the epidemic as they helped send information regarding health conditions in isolated areas, particularly indigenous tribes (Berger 2020).

The Seattle press followed how the flu spread in Alaska, but at the same time, the port of Seattle was busy in every way during the 1920s. The harbour radio station KPE broadcasts to ships leaving or entering the harbour, helping the port control keep track of all vessels. However, the understanding that flu could be brought by a person who was not yet showing the symptoms of the disease was beyond human perception at that time (Berger 2020).

A good example of radio communication stimulating life-saving action occurred in the South Pacific, in Western Samoa, then under New Zealand occupation. In 1918, tourists carrying the Spanish flu were offloaded. The governor of nearby American Samoa, U.S. Navy Cmdr. John Martin Poyer knew about the dangers and instituted a strict quarantine; no deaths from Spanish flu occurred. Poyer received the Navy Cross for his work (Berger 2020).

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The influenza pandemic of 1918 impacted ships from the Northwest travelling in the South Seas, resulting in quarantines and disruptions in the cod fishing season. Local technology solutions encompassed the implementation of electric dishwashers and home telephones, specifically emphasising their use for shopping and teaching purposes. In 1921, Seattle's Sunset Telephone-Telegraph Company, which eventually became Pacific Telephone & Telegraph Company and then AT&T, constructed a new exchange building to accommodate 83,347 users and facilitate half a million local telephone calls daily. (Berger 2020).

The flu even struck the telephone service, and its human operators, particularly women who handled calls at phone exchanges, were particularly susceptible. Phone operators in Ontario, California, were administered a prophylactic flu serum, but only one patient died from the virus. A further problem that arose was demand because the Spokane and Sacramento Bee newspapers had informed people not to use the telephone due to the war conditions and the influenza epidemic. (Berger 2020).

Despite several disadvantages due to personnel vulnerability, a fierce and optimistic boosterism embraced the telephone and its future. There was a strong sense of hope for wireless telephony. Godfrey Isaacs of the Marconi Wireless Telegraph Company had speculated that "wireless telephones would span the globe." We have electronic devices with us today in our pockets, which we call cell phones, and we use them to communicate and keep ourselves in touch with each other, especially during this pandemic. (Berger 2020).

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4.7 Inventions That Came Out of the Black Death

Economic history and economic development are closely related, for both branches study the process of economic progress. While economic history mainly studied the economic experience of high-wage countries, the main focus of economic development was on the economic progress of low-wage economies. According to recent research, contemporary technology is most profitable when wages are high. It follows that underlying demographic tendencies might prevent successful development. Thus, a generation ago, a new economic history emerged to bring economic history into correspondence with the immense growth in economics that has occurred since World War II. (Temin 2014).

Based on Voth's results, Western Europe in the 14th century was transformed into a high-wage economy. The European marriage pattern triggered the transformation. The latter had been pre-determined by the implications of the Black Death. He contended that high profits, along with low costs of energy, acted as the main drivers of the Industrial Revolution in the 18th century. Other factors, such as the Black Death and European marriage pattern, partly caused this. Industrialisation technology was adapted to these price factors, and it is not economically feasible when wages are low (Temin 2014).

The introduction of new agricultural technologies after the Black Death changed the social status of women in Medieval Europe. This resulted in better wages and a shift in marriage traditions. This change led to a persistent rise in people's incomes and more meat consumption. (Temin 2014).

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The story connecting the Black Death to the Industrial Revolution also explains the industrialisation of Europe during the last two centuries. It sheds light on how other continents have found economic development very challenging. Modern technology has generalised the innovations of the Industrial Revolution. However, the high wages and cheap power needed to drive these innovations are expected only in some parts of Africa and Asia. As such, it is not easy for low-wage countries to maintain contemporary manufacturing with today's low-tariff world system (Temin 2014).

The Black Death in medieval Europe spawned the phenomenon of "revenge spending," whereby peasants did religious journeys or pilgrimages after the plague, which were not necessarily religious. This outlook was akin to "YOLO", when people realised their lives could end anytime. The peasants took comfort in their new economic advantage as they did not have the disposition to work very hard for no pay (Tong 2021).

Since the Black Death had already created a labour shortage, opportunities opened up for peasants. Some demanded higher wages and frequently received them, while others left their employments to find jobs in cities. The pressure on the labour market squeezed the wool industry, which needed manual labour to clean the fabrics. The fulling mill, powered by rivers, was more widely adopted as peasants tried to buy fashionable garments that were popular during that era. (Tong 2021).

Many contraptions were adopted and augmented workers' productivity in the years following the Black Death. Eyeglasses were invented in the 13th century in Italy but were created much faster after the plague. The labour shortage continued long after the plague ended around 1353, with the occasional case occurring until the 17th and 18th centuries. (Tong 2021).

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As previously discussed, Gutenberg's press was the most significant innovation of the time. It was invented in 1450, allowing scribes to mass-produce books and gain higher wages. If historians look closer, they will find that technology is created by a mix of labour shortages, new buyers with grand ambitions, and wars. The Black Death hugely impacted the economy and managed to "reset" society to a certain degree, thus paving the way for innovators to take advantage of the situation. (Tong 2021).

4.8 The Black Death Inspired the Renascence in Europe

After the Black Death epidemic, Europe entered the Renaissance the period of Western thinking dominated by the revival of Greek and Roman art, philosophy, and ideas. Dramatically, the epidemic had changed the economic and social structures of Europe. Peasants' income was increasing. The disparity of wealth decreased. Thus, the feudalism and manorial system disappeared. When the manorial system collapsed, Europe created mercantilism exports enhanced national prosperity. These moneybags were used to compete with other nations by discovering new lands and financing wars. Capitalism as a socio-economic aspect emanated from Mercantilism. (Franke 2017).

The pandemic resulted in economic and social changes, which created an income that contributed to the artistic revolution of the Renaissance. The high number of deaths was translated to increased wealth for art patrons. This conspicuous spending of the newly rich strengthened arts exploration and patronage. Following the death of nearly half of Florence's population, a wealthy banking family called the Medicis started to patronise Renaissance artists like da Vinci and Michelangelo. (Franke 2017).

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As the lay piety movement and epidemic reforms continued, religious rituals came under increased scrutiny. Religious beliefs began to shift from the source of global problems to one of personal salvation. In the early 16th century, religious implications and a desire to question Catholic dogma led to Martin Luther's Protestant Reformation and other religious sects. (Franke 2017).

In the 14th century, the Black Death attacked Europe while venturing into discovering new trade routes with Asia. The pandemic shattered European civilisation and gave birth to new systems and the quest for knowledge of contemporary economic, theology and scientific perspectives. Along with such expeditions, the outbreak in the 14th centry changed Europe's culture and civilisation. The plague outbreak determined Europe's Renaissance, resulting in cultural and theological discoveries, the abolition of serfdom, and enhanced economic sophistication. (Franke 2017).

4.9 The Spanish Flu's Contribution to Improved Health System

The Spanish flu was terrible. Nonetheless, the epidemic had a few bright spots. The expansion of public health care, especially in the urban poor and rural areas, reduced reliance on physician care over nurse care. Canada established the federal Department of Health in March 1919, and Nova Scotia redesigned its Department of Health the following year, with lessons learned from influenza. (Nova Scotia Museum 2023).

The focus of medicine after 1918 was on the prevention of illness. With the support of the Rockefeller Foundation, Dalhousie University set up a Public Health Clinic in 1924. During that time, Dalhousie opened a new Infectious Disease and Tuberculosis Hospital. The empathy and

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sacrifices of Nova Scotian nurses who went to help in Massachusetts likely established a close friendship between Boston and Halifax that remains today (Nova Scotia Museum 2023).

Figure 28 A postcard of the completed Dalhousie University Public Health Clinic Courtesy of the Dalhousie University Photograph Collection, Dalhousie University Archives, Halifax, Nova Scotia, PC1, Box 61, Folder 165

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Figure 29 shows the new post-pandemic Infectious Disease Hospital in Halifax. Courtesy of the Dalhousie University Photograph Collection, Dalhousie University Archives, Halifax, Nova Scotia, PC1, Box 31, Folder 15, Item

The 1918–1920 Great Influenza Pandemic produced lasting public health effects. The many public health tactics established then have been used over the years to fight comparable viral epidemics, such as H1N1 and "bird flu", not to mention SARS and Ebola. Vaccinating and immunising people against all viruses, notably children's diseases previously thought to be eradicated, such as TB, measles, and polio, remain important for preventing pandemics and childhood mortality. Medical study on "Spanish" influenza virus strains continues. Such a study aids the development of vaccines against influenza pandemics. (Nova Scotia Museum 2023).

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Figure 30 A vaccination clinic at the Dalhousie Outpatient and Public Health Clinic. Courtesy of the Dalhousie University Photograph Collection, Dalhousie University Archives, Halifax, Nova Scotia, PC1, Box 30, Folder 3

4.10 New Way of Heating During the Spanish Flu

The radiator, a rather popular feature of college dorms, has existed since the beginning of campus history in 1913. As many buildings were built, so was the radiator. These were Guerin Hall and Conservatory of Music in 1913 and Le Fer Hall in 1923. Hulman Hall and Rooney Library were built in the 1960s at Saint Mary-of-the-Woods College. One of the more significant design elements included on campus was an extensive steam heat system connected by underground tunnels. (Dyer 2021).

The 1918 Spanish Flu Pandemic made the idea that open windows and fresh air could help prevent illness famous. The engineers designed radiators to be oversized so that a room could be warmed on the coldest day of the year, even if the windows were open. (Dyer 2021).

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After the outbreak, engineers reduced radiator emissions by painting them aluminium or metallic and putting covers in place. Silver paint was decreased by 20% of the output, while the coverings were reduced by 30%. The Woods are still fond of this revolutionary design dating back to 1918. (Dyer 2021).

4.11 What We Have Gained From the Occurrence of Pandemics

History has always been marked by diseases that cause extensive destruction to human populations and, at the same time, also serve as a means or impetus for massive societal changes and development. Development in water and sanitation facilities and some famous scientific discoveries have driven improvements in the prevention and treatment of diseases, including the development of vaccines (McDonald 2020).

Another pandemic that swept through Europe in the 14th century, the Black Death, contributed to better living conditions for the poor population, accelerating the decline of serfdom. Employment rates increased, and living and working conditions improved. Metropolitan centres initiated public sanitation systems, especially where the plague had a strong presence, and cities initiated quarantines. (McDonald 2020).

The 1918 influenza epidemic, known as the "Spanish flu," prompted more significant interest in the care of patients, leading to centralised healthcare systems and employer-based insurance programs. Physicians began to pay more attention to occupational and social factors that could

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cause illness and recommend methods for their prevention. The study of public health has evolved to its current status, where the primary backbone is the science of studying patterns of diseases and determinants of health, which is called epidemiology. (McDonald 2020).

Pandemics usually lead to an overhaul in patient care, primarily through subtle changes that are not necessarily noticed. The evolution of the hospital bed has been from wood to metal to enhance sanitisation. Moreover, severe public health conditions usually force a much more significant transformation in the design of hospital beds (McDonald 2020).

Protective clothing and housing have also changed since the world has embraced full social distancing, which includes physical distancing from others for an extended time. Social isolation has affected the design of residential houses. It is echoed in legislation like Franklin D. Roosevelt's New Deal, which required fire exits, ample corridors, and private baths (McDonald 2020).

AIDS, discovered back in 1981, is a medical condition whereby the immune system of a person deteriorates, finally leading to death through diseases the body would otherwise be able to defend against. The virus originated from a chimpanzee infection in West Africa around the 1920s. There have been quite several kinds of therapeutic approaches invented to hinder the growth of the disease, although as unfortunate as it may seem, 35 million people have died because of it ever since it was first discovered. (McDonald 2020).

Pandemics have also acted as the catalysts that brought some of the most brilliant works of art to life, evidenced by Giovanni Boccaccio's great literary piece, The Decameron, and the necessary prints of painters David Wojnarowicz, Therese Frare, and Keith Haring. The epidemic in

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Philadelphia made the Founding Fathers realise that public health was inseparable from the new nation's social, economic, and political fate (McDonald 2020).

They say necessity is the mother of invention. See the innovations, inventions, and changes that followed the significant calamities. The human race can adapt and reinvent itself to become more robust and better after each catastrophe.

We have now come through a severe pandemic. Although the death toll might not have been as bad as that of the Black Death or the Spanish flu, thanks to those two pandemics, we have created or invented many pieces of equipment and devices to aid us in getting through this pandemic. We can thank the previous pandemics for the vaccines, proper health systems, better sanitation, social distancing, mask-wearing to protect ourselves, and better sanitation.

All those things resulted from the previous pandemics. They could all have come about naturally over time, but because of the pandemics that were happening then, these inventions were fast-tracked. So, all the lessons learned and the innovations conceptualised during the former pandemics mitigated the very severe effect of the COVID-19 virus.

I would not want another pandemic to visit in my lifetime, but as you will see from the following chapters, so many great things have come out of the COVID-19 pandemic.

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Chapter 5: Covid-19, a Modern Pandemic, Facts, Fear and Fake News (Data Collection Methodology)

5.1 Introduction

We live in a modern technological world. We have eradicated most pathogens that would have caused major epidemics and pandemics. We have modern hospitals and medical centres with the latest equipment. We have better hygiene practices, indoor plumbing, housing, and sanitation. No one expected we would have a disease that would become a global pandemic in this modern age. However, in 2019, the novel coronavirus, reportedly first discovered in China, brought the world to a standstill. The virus affected every country worldwide and disrupted most of our systems. Education, tourism trade, etc. It caused many countries to close their borders and flights to be cancelled. Countries implemented lockdowns to slow the spread of the disease. In this chapter, we will look at the epidemiology and some of the adverse effects of the coronavirus. The methodology is as follows: a survey was conducted among citizens from various countries. They were fielded with questions about the coronavirus and its effects on their lives. The questions were both positive and negative. Data was collected from articles and statistics from organisations. There are also personal reflections from persons who lived through the coronavirus, and this was in the form of voice notes that were transcribed or written summaries of their experiences during the COVID-19 pandemic. The COVID-19 pandemic caught us by surprise, and some countries were overwhelmed with the number of sick and dying.

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5.2 COVID-19 Origin, Symptoms and Testing Procedures

Since December 2019, it is known as the contagious disease COVID-19, caused by the coronavirus SARS-CoV-2. Scientists reckon that the new coronavirus virus spread from natural zoonosis to populations of human beings, much the same as many pandemics that plagued the earth for years. Some of the reported symptoms due to the fast spread of the virus include fever, tiredness, cough, shortness of breath, loss of taste and smell, and shortness of breath. Symptoms may appear anywhere from one day to fourteen days after exposure. Eighty-one percent of patients had mild to moderate symptoms, while fourteen percent had severe and five percent were in critical condition. Elderly people are prone to high-intensity symptoms, and some of the complications even lead to death. Those who maintained proximity to each other were more prone to infection since the virus was airborne and had direct contact with the eyes, nose, and mouth (Wikipedia, 2024). The figure below shows the life cycle of the virus.

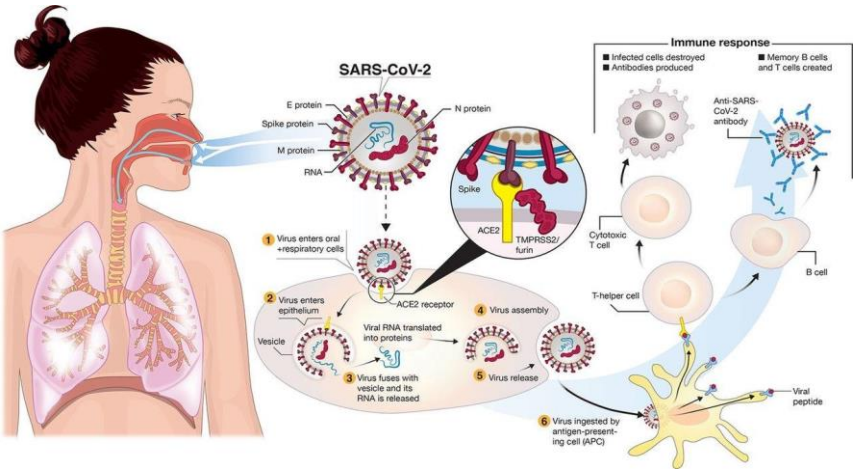

Figure 31 The SARS-COV2 virus life cycle Source (Wikipedia 2024)

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Virus origin: The novel coronavirus probably resulted from some intermediate animal host-virus spillover to humans. The first reported case with related symptoms was on December 1, 2019—unrelated to the Wuhan market. We may have seen instances as early as mid-November with those associated symptoms. Positive cases have been confirmed in both wild and farmed animal trade areas and among environmental samples at the market. The market may constitute one primary source or site of amplification for the virus. The symptoms are shown in the figure below. (Lu et al., 2020).

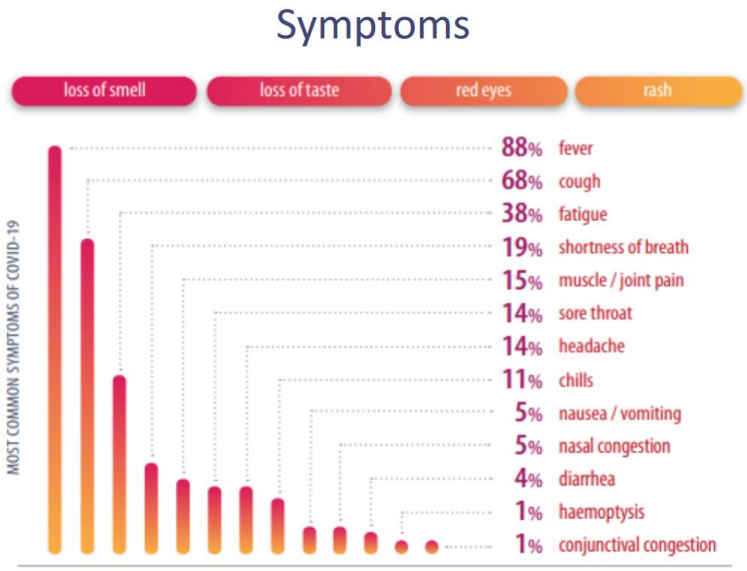

Figure 32 Symptoms of the COVID-19 disease Source (Lu et al. 2020)

Transmission: COVID-19 spreads in respiratory droplets when coughed or sneezed. Inhaling or touching them resting on surfaces could place them on your face. From contact to the first symptom of infection, 1–14 days elapse, with the average being 5–6 days, and over 97% of people develop symptoms within 14 days. (Lu et al., 2020) See the figure below.

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Figure 33 Incubation Period for the virus. Source (Lu et al. 2020)

The virus replicates in the upper respiratory tract and lungs, although initial studies suggest the virus replicates in the GI tract; however, fecal-oral transmission is unclear. The most significant viral shedding occurs at the onset of symptoms, after which the shedding decreases. Pre-symptomatic transmission is possible. Children without a cough, which helps spread germs, are less likely to transmit the virus. (Lu et al., 2020)See the figure below.

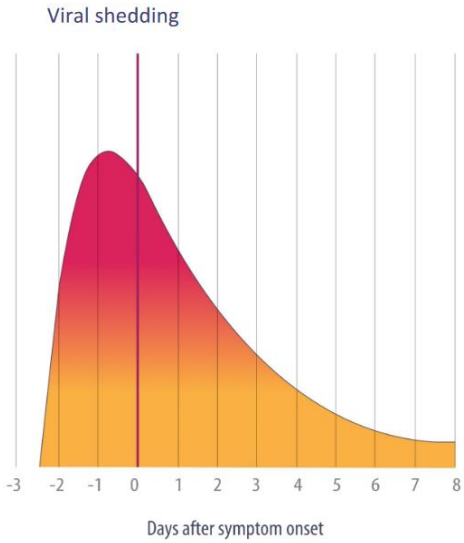

Figure 34 Viral Shedding after the onset of symptoms Source (Lu et al. 2020

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Disease severity and reproduction rate: The mean number of susceptible individuals infected by a single is at the Basic Reproductive Rate (R0). R0 for COVID-19 is 2–4. Clinical Onset Interval is the period from symptom onset in consecutive transmissions. In most research, it is 4–5 days. CFR measures the fatality of the disease in percentage. Worldwide crude CFR was 7% from Dec 2019–May 2020 (Lu et al. 2020). See the figure below.

Figure 35 Global CPR rate December 2017 to May 2020 Source (Lu et al. 2020)

Super-spreading events are virus transmission from one individual to a vast number of persons. Potential reasons that can lead to a super-spreading event include large-scale gatherings, elderly populations, displaced populations, global presence, urban population density, inadequate public health infrastructure, government opacity, and restricted press freedom. (Lu et al., 2020).

Public health measures. Healthy people who could contract COVID-19 were quarantined . The idea was the interference of disease transmission with symptoms. Segregating the contagious COVID-19 patients halts its transmission. Physical distancing provides distance among them. The World Health Organisation suggested seeking at least 1 meter of separation. Healthy persons also followed this sort of distancing. (Lu et al., 2020).

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Disease tracking detects the SARS-CoV-2 virus that causes the COVID-19 virus in samples of mouth or nose. Every test has to align with the regulations set by the FDA. Two different viral tests are performed using PCR and antigens. Healthcare workers were tested using nasal swabs for COVID-19 and PCR. PCR is called the COVID-19 "gold standard" as it detects more viruses, as the anterior tests are nucleic acid amplification tests. Health workers forwarded the cases to top laboratories for testing, and the outcome would take 1 to 3 days. (Lu et al., 2020).

Rapid antigen tests showed results in 15-30 minutes. Good results are reliable. PCR is more sensitive than antigen tests in detecting the virus, especially in its absence of symptoms. One negative antigenic test, therefore, would not exclude the infection. To exclude the disease, the FDA advised two negative antigen tests in symptoms or three in non-symptoms 48 hours apart. One PCR is done to confirm the antigen test (Lu et al., 2020).

5.3 Death Toll, Hospitalization and Recovery

We've always been glued to our TV sets throughout this pandemic, watching these live-tracking sites that have been giving information on the death toll, rates of infection, the number of people infected, and the number of survivors of the disease such things we never saw in our lifetime. We saw pictures of overcrowded hospitals, persons in ICUs, large numbers of people being isolated, and families not able to be with them at the time of death. We have seen bodies piled in refrigerated trailers because the hospital morgues were full and could handle no more dead people, as the number of people was dying faster than they could be buried. (Worldometer, 2024).

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It was the same scenario being played out in almost every country. It was most interesting to note, however, that some of the developed countries had more infections and more deaths per capita of the population compared to the least developed countries. This may be because less developed countries impose stricter quarantine regimes than more developed countries. In more developed countries, if you tested positive, they would usually let you go back home, and sometimes, your family members would catch it from you. In several countries, you got quarantined away from the population, reducing infection risks and lowering death rates. As of April 13, 2024, the sum of human populations around the world who had been infected with the virus was 704,753,890, with 7,010,681 cases of deaths and 675,691,811 recoveries. (Worldometer, 2024)

The number of severe interventions and hospitalisations that most countries required was very high; in the case of most countries, there was a shortage of ventilators. It was such a fight to get the ventilators that could support the breathing of infected persons. A richer country would, therefore, have a better advantage. All these factors went a long way in inflating the number of deaths reported per country. The situation was made worse with the existence of the virus because it gives a more potent type of illness to its victims if one is immune-compromised and has underlying conditions that range from cancer, diabetes, hypertension, and any other chronic diseases. This mainly depends on the individual and the state of health in which he or she is. It also made many of them more likely to be attacked by the virus, prone to the virus, and more susceptible to being consumed by the disease. The figures below show data from the disease reported as of 13th April 2024. It presents hospitalisation, mortality, and recovery rates, alongside statistics on the number of those infected and their weekly hospital admissions. It also includes statistics from countries where virus infection and death cases have been at high. The data ranges from February 2020 to April 2024.

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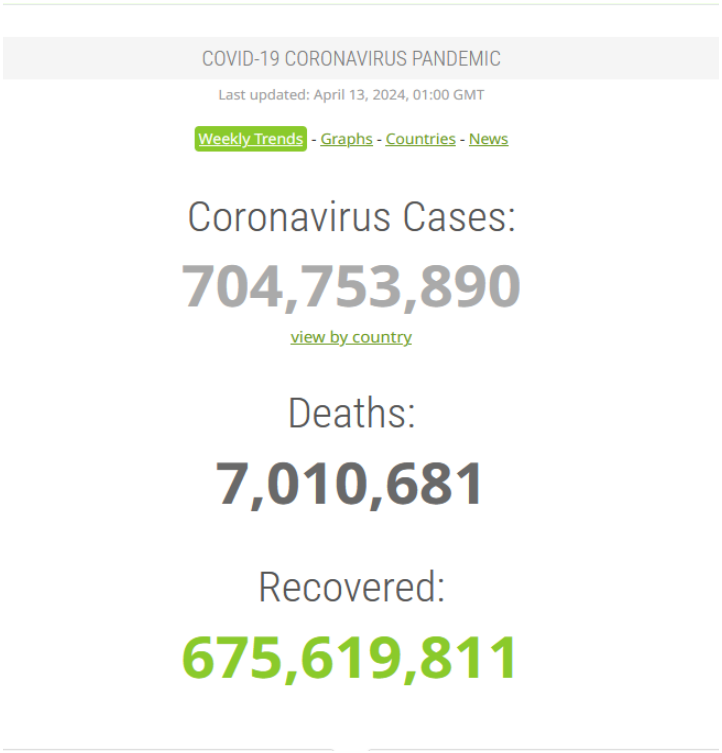

Figure 36 Covid-19 Statistics at April 15th 2024 Source (Worldometer 2024)

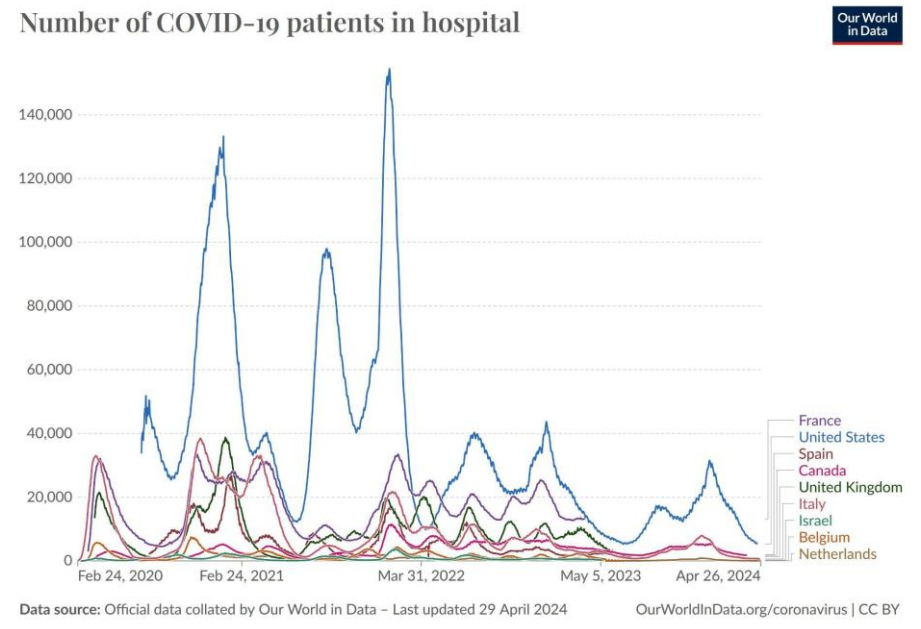

Figure 37 Hospitalisations from February 2020 to April 2024 Source (Mathieu et al. 2024)

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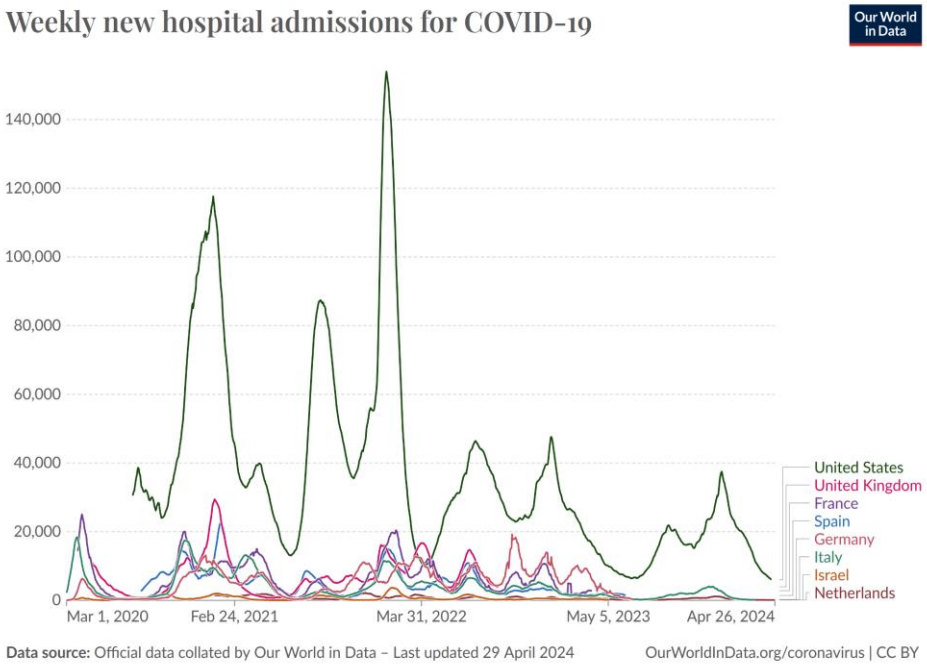

Figure 38 Weekly Hospitilisations February 2020 to April 2024 Source (Mathieu et al. 2024)

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#	Country, Other	Total Cases	New Cases	Total Deaths	New Deaths	Total Recovered	New Recovered	Active Cases	Serious, Critical	Tot Cases/ 1M pop	Deaths/ 1M pop	Total Tests	Tests/ 1M pop	Population
1	USA	111,820,082		1,219,487		109,814,428		786,167	940	333,985	3,642	1,186,851,502	3,544,901	334,805,269
2	India	45,035,393		533,570		N/A	N/A	N/A	N/A	32,016	379	935,879,495	665,334	1,406,631,776
3	France	40,138,560		167,642		*39,970,918*		0		612,013	2,556	271,490,188	4,139,547	65,584,518
4	Germany	38,828,995		183,027		38,240,600		405,368	N/A	462,891	2,182	122,332,384	1,458,359	83,883,596
5	Brazil	38,743,918		711,380		36,249,161		1,783,377	N/A	179,908	3,303	63,776,166	296,146	215,353,593
6	S. Korea	34,571,873		35,934		*34,535,939*		0		673,523	700	15,804,065	307,892	51,329,899
7	Japan	33,803,572		74,694		N/A	N/A	N/A	N/A	269,169	595	100,414,883	799,578	125,584,838
8	Italy	26,723,249		196,487		26,361,218		165,544	22	443,445	3,261	281,126,449	4,665,010	60,262,770
9	UK	24,910,387		232,112		*24,678,275*		0	N/A	363,666	3,389	522,526,476	7,628,357	68,497,907
10	Russia	24,124,215		402,756		23,545,818		175,641	N/A	165,454	2,762	273,400,000	1,875,095	145,805,947
11	Turkey	17,232,066		102,174		N/A	N/A	N/A	N/A	201,399	1,194	162,743,369	1,902,052	85,561,976
12	Spain	13,914,811		121,760		13,762,417		30,634	231	297,840	2,606	471,036,328	10,082,298	46,719,142
13	Australia	11,853,144		24,414		11,820,014		8,716	3	454,687	937	81,916,639	3,142,326	26,068,792
14	Vietnam	11,625,195		43,206		10,640,971		941,018		117,481	437	85,826,548	867,342	98,953,541
15	Taiwan	10,241,523		19,005		*10,222,518*		0		428,720	796	30,742,304	1,286,903	23,888,595
16	Argentina	10,128,845		130,841		*9,997,258*		746		220,143	2,844	35,716,069	776,264	46,010,234
17	Netherlands	8,635,786		22,992		*8,612,599*		195	N/A	501,747	1,336	25,984,435	1,509,718	17,211,447
18	Mexico	7,702,809		334,958		6,899,865		467,986	N/A	58,549	2,546	20,013,810	152,124	131,562,772
19	Iran	7,627,186		146,811		N/A	N/A	N/A		88,665	1,707	57,320,267	666,338	86,022,837
20	Indonesia	6,829,221		162,063		6,647,104		20,054	N/A	24,466	581	114,158,919	408,975	279,134,505
21	Poland	6,661,991		120,598		N/A	N/A	N/A	N/A	176,524	3,196	39,323,709	1,041,970	37,739,785
22	Colombia	6,400,173		143,200		6,212,152		44,821	342	124,244	2,780	36,951,507	717,327	51,512,762

Figure 39 Covid-19 statistics for countries with the highest infections as of April 15th2024 (Worldometer 2024)

5.4 Debunking COVID-19 Vaccination and Preventive Misconceptions

There was much misinformation on various preventive measures and the immunisation process. In addition to being a way forward in the treatment and prevention of the disease, immunisation for COVID-19 is a way to reduce the likelihood of very ill patients dieing. Despite these rumours, they do not cause the disease, and they do not contain any preservatives, antibiotics, metals, or babies who have been aborted. The vaccines are such that they are administered using genetically engineered messenger RNA, instructing the body on how it can ensure immunity is established against the virus. Those previously infected with the virus can also obtain maximum protection against COVID-19 by vaccination. (Mayo Clinic Health System, 2021).

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People spread misinformation about these products that could be used to prevent one from catching the virus or be used in their treatment. For example, COVID-19 infection is not prevented by garlic or alcoholic beverages, exposure to the sun, or temperatures higher than 77 degrees Fahrenheit. The virus also does not reproduce when using 5G networks. Other germicides kill germs; however, they are far better avoided since they irritate the skin and may even poison the user. (Mayo Clinic Health System 2021).

Some people support their immune system through vaccination and supplements such as high Vitamin C and Zinc doses, green tea and Echinacea. None of these supplements have been proven to prevent illness, and they should not be used as dietary supplements or in place of the vaccine. Generally, vaccination intervention is a safer and more effective method of protection against COVID-19 than any other. (Mayo Clinic Health System 2021).

A lot of injuries and loss of life have been witnessed due to misinformation about COVID-19 therapies. Various medicines, products, and practices are not recommended when treating COVID-19. Antibiotics are effective against bacteria but do not affect viruses. Similarly, applying alcohol or chlorine onto the body and hoping for the killing of viruses did not work. Ivermectin is a medication taken to kill parasitic worms in animals, but it is used only to rid the body and not to cure viral infections. The FDA has not approved the use of it for treating or preventing COVID-19 (Covid-19). (Mayo Clinic Health System 2021).

To avoid getting the virus, people must be vaccinated for COVID-19 and well-informed on emerging developments. Vaccinated people are supposed to resume the activities initially withdrawn from them with vigilance and care. However, in public, people are supposed to wear

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masks if that place is still regarded as a coronavirus patient-dense area (Mayo Clinic Health System 2021).

At the pandemic's peak, the Centers for Disease Control and Prevention recommended ways to lower the risks of contracting and spreading the virus to others. Avoiding people in indoor public areas, staying away from crowded settings, and masking in public places were some of the protective measures that could be taken to protect oneself. If you are sick, you avoid sharing household things and regularly cleaning and disinfecting surface areas. If you were ill, the better action would be to remain at home and shun public transportation, taxis, and ride-hailing services. Consult a medical practitioner for further advice if a medical condition persists over a long period. (Mayo Clinic Health System 2021).

5.5 The Danger of Misinformation in the COVID-19 Crisis

The media's relentless coverage of the subject has rendered the SARS-CoV-2 pandemic omnipresent in our thoughts and emotions. This pandemic is a modern innovation in this highly advanced age of technology. The skirmish of public policy versus medical readings has sparked an inherently existing political dispute. Providers were under increased pressure to accurately negotiate the unknown because of the flood of medical literature and the pressure from the community and the media. It was a devastating force, as in this era of global communication, misinformation may reach quite sensitive ears; misinformation is a destructive power (Nelson et al., 2020).

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It changes a person's mental health problems, such as their coping strategy, feelings of hopelessness and loneliness, psychological pain, and many others. False information spread caused a fall in the visits for chronic diseases, preventive care, and unrelated medical emergencies other than COVID-19. There was confusion through fear-driven actions about the psychological and physical effects of receiving wrong information. (Nelson et al., 2020).

Fear is a genuine emotion that has continued to outlast the pandemic and is often compounded when a trusted authority promotes opinions that are opposites of each other. For example, after a Brazilian study that showed both low-dose and high-dose chloroquine worked variably, the results spurred death threats and required the use of police protection from the public. (Nelson et al., 2020).

This distortion problem of medical literature arose with the Hydroxychloroquine scandal. Consequently, the World Health Organization cancelled this drug three days after publishing the article. This fact caused the withdrawal of the report and the resumption of investigations by the World Health Organization for some time. Most other professionals from outside had doubts about the study methodologies and the reliability of the data.

Considering that time is of the essence in a state of emergency, and preprint versions of research were accessible before peer review, this gave way to the more complicated usual process of academic review. With that in mind, care providers open themselves to the possibility of error, increasing their stress levels, impacting their mental state and lowering their self-assurance (Nelson et al., 2020).

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When a model was designed to evaluate the spread of misinformation concerning the COVID-19 epidemic at Stanford University, the factor of social media was also included. Researchers found that the propensity to accept misleading and untruthful information reposed in the young, active social media users and those with an educational background inferior to others. (Nelson et al., 2020).

Many companies have tried to educate themselves with an analytical mindset to halt the avalanche of misinformation from disseminating and rallying around this problem. All professionals involved in the medical department should be honest and truthful, educate themselves with an analytical mindset, and conduct thorough and peer-reviewed testing and research to pave the way for future cures and vaccines against SARS-CoV-2. (Nelson et al., 2020).

5.6 Pandemic Fears

The "fight-or-flight" response is an example of an evolutionary sensation that helps organisms avoid or respond to possible dangers. Fear contributes to the survival of species. For the duration of the COVID-19 pandemic, fear has been a primary motivating factor behind attempts to avert health problems. Several factors, including limitations on public health, financial losses, and symptoms of seasonal allergies, the common cold, or influenza, may cause fear. The importance

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of self-reporting cannot be overstated since the subjective perceptions of a person about closeness, predictability, and controllability determine fear. (Martens et al 2023).

Fear will have been an adaptive mechanism in the pandemic in that it will enforce better adherence to government health initiatives and result in higher vaccination rates. Indirectly, fear induced by COVID-19 may protect against long-term COVID-19 and increase vaccination. Indeed, no research model directly predicts the relationship between the fear of COVID-19 at the individual level and the reduced risk over the long term. (Martens et tal 2023).

In conclusion, fear has played a crucial role in the COVID-19 epidemic, and people and society have experienced both beneficial and harmful outcomes as a result of this dread. To effectively handle the pandemic's issues and successfully promote health preventive measures, it is vital to have a solid understanding of the adaptive and dysfunctional behaviours connected with fear. (Martens et al 2023).

Because of the pandemic caused by COVID-19, there has been a substantial effect on mental health, especially among those individuals who were afraid of the virus itself. The dread of COVID-19 has been linked to several mental health conditions, including anxiety, sadness, stress, and poor sleep, according to research. The risk of acquiring post-traumatic stress disorder (PTSD) is higher among healthcare workers and COVID-19 hospitalised patients. (Martens et al 2023).

Threat reactivity, attentional bias, and intolerance of ambiguity all play a role in developing fear of COVID-19. It has been shown that a greater fear of COVID-19 is associated with a more robust willingness to receive vaccinations and higher levels of hygienic habits. On the other hand,

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decreasing levels are associated with the idea that the threat is exaggerated, which results in less hygienic practices and higher attitudes against vaccination. (Martens et al 2023).

Indeed, the fear of COVID-19 has already been associated with panic buying during this epidemic, leading to congestion within supply networks and subsequent shortages. This trend has persisted throughout the pandemic. Here, the idea of the "tragedy of the commons" is being played out, wherein whatever is beneficial to individuals in terms of taking their course of action could prove insufficient for groups to act upon. (Martens et al 2023).

The amount of dread that people have with COVID-19 differs from population to population, with whites displaying a lesser level of terror in comparison to that of racial and ethnic minorities. There is a possibility that persons who are immunocompromised and those who have impairments would suffer more anxiety if limits on public health are decreased. (Martens et al 2023).

On the other hand, fear of a pandemic may lead to mental health issues, risk reduction, uncertainty about immunisations, panic purchasing, xenophobia, and socioeconomic disparities. Pandemic fear may stimulate preventive efforts but can also lead to these adverse outcomes. In the event of a pandemic, effective fear management is necessary. (Martens et al 2023).

5.7 Pandemic Effect on Trade

The COVID-19 pandemic caused severe damage to world trade. It is estimated that the drop in worldwide trade in 2020 is about the same as it was during the financial crisis of 2008/2009. This was caused by lower demand worldwide, more substantial limits to crossing international borders, closures of ports, and logistics difficulties. By contrast, the value of world trade

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rebounded in 2021 and reached a new record high of nearly $28.5 trillion. That represents a 13% increase in the value of trade before the outbreak of the epidemic. . (United Nations, 2022}.

Various types of diverse economic regions, commodities, and services existed and went through the multiple effects of the pandemic on world trade. The lockdown procedures implemented saw demand fall across a broad spectrum of businesses, but trading of essentials like food was more resistant. At the same time, the transport business lost trade value; the tourism sector fell by fifty percent. In contrast, the transport sector recovered in the second half of 2021 and was driven by recovering demand for both passenger air transport and air freight. (United Nations, 2022}.

Although similar trends were observed in the trade between the least developed, developing, and developed countries, more marked differences might have been obscured when the data was examined at the country and regional levels. Trade first declined in the East Asian economies and later recovered after they decreased. When countries are categorised based on their GDP per capita, the pandemic affects trade across borders differently. For instance, in 2021, countries with lower GDP per capita would have a worse recovery in exports compared to countries with higher revenues. (United Nations 2022).

5.8 Education Disrupted by the Pandemic

The COVID-19 epidemic affected as much as 87% of the student population due to the shutdown of schools worldwide, subsequently causing the most substantial global disruption to the learning sector. Consequently, the tremendous amount of stress that people had been experiencing

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increased, and cultural activities were disrupted. Hotels, restaurants, religious buildings, and entertainment venues closed down operations. Strict measures were adopted to prevent further spread in the developing nations and to avoid future spread. Opportunities for distance learning were presented but with challenges to be solved. These included limited internet connection, access to information technology, and low digital technology skills. (Tadesse, Muluye 2020).

The developing nations help children from poor economic backgrounds in their pursuit of education with aid in terms of providing textbooks, radios, gadgets, and other materials that can enhance their study experience. A study was conducted regarding the effect of the pandemic on the school system worldwide. The impact of the pandemic on children, students, teachers, and parents associated with the learning system was studied. It was difficult for teachers, learners, parents, and governments to transition from learning in a classroom to online learning. Several difficulties are tagged along with distance learning. (Tadesse, Muluye 2020).

As a result of the pandemic, several children, students, parents, and teachers worldwide, especially in developing countries, have been reported to be suffering emotionally and physically. Among the many measures adopted by governments are making provisions for free access to online academic resources, allocating funds for universal service, and confirming that schools are connected to the Internet. They have also improved information and communication technology infrastructure, encouraged mobile learning, used online teaching and learning materials, and worked on improving their infrastructure. (Tadesse, Muluye 2020).

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Various governments have been developing policies and strategies for education finance to curb the pandemic's effects and sustain the school system. More than twenty-eight percent of North and Middle East African countries offer education through radio and television, while less than forty percent offer education through the Internet. Most students in low- and middle-income countries need access to online and broadcast learning technology. (Tadesse, Muluye 2020).

Governments should provide extensive training in technology-driven education so that children will continue to receive an education despite the pandemic or future ones. (Tadesse, Muluye 2020).

5.9 Global Tourism Affected by the Pandemic

The COVID-19 pandemic has undoubtedly affected tourist sectors, economies, livelihoods, public services, and opportunities globally. The industry opens ten to thirty percent of employment and livelihood opportunities in several developing and developed countries. A fall of $910 billion to $1.2 trillion in export earnings from tourism was estimated for 2020, ultimately reducing the world's gross domestic product. The export share has gone as high as 80% in some Small Island Developing States (SIDS) driven by their tourism, forming an essential share in these states' economies. (UN Tourism 2020)

The United Nations World Tourism Organization has, in turn, made several appeals for the need to protect the natural environment by minimising natural and cultural destruction. In SIDS and LDCs, tourism dropped so sharply that this monetary assistance in biodiversity conservation, as

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one of the most essential components of conservation, was halted. The focus, therefore, should be on the impact on ecosystems and biodiversity in these places. The COVID-19 pandemic has worsened the situation of heritage conservation while trying to find a solution; therefore, ninety percent of countries have closed their World Heritage Sites. In comparison, ninety percent of museums closed their operations, bearing in mind that this could affect the income of Indigenous women (UN Tourism 2020).

5.10 Political Denial of the Pandemic

Several countries rejected the virus in the early phases of the COVID-19 pandemic. Some of these countries denied the virus's existence, while others misinterpreted the data provided about the virus. The scientific conclusions of the virus were called into doubt by several countries, including Nicaragua, Tanzania, Turkmenistan, and Burundi, as well as Chile, Belarus, and Russia. Despite having access to a wealth of knowledge, several governments supported the propagation of false information and conspiracy theories. (Robertson 2022)

For instance, former President Donald Trump of the United States and President Jair Bolsonaro of Brazil said that drugs such as hydroxychloroquine might be used as a treatment even though there has been little research on the subject. The propagation of erroneous information, which weakened the efficacy of scientific measures and policy interventions, was caused by scepticism and hostility to measures intended to reduce the transmission of the virus. (Robertson 2022).

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5.11 Impact of the COVID-19 Pandemic on the Music Industry

The outbreak of COVID-19 has grossly affected the music business, as evidenced by revenues in the worldwide recorded music industry that has grown for a fifth year in succession. The music business contributed £5.2 billion to the economy in the United Kingdom alone, from which the live music sector contributed £1.1 billion. On the contrary, it has led to the closure of music venues, record stores, and studios, resulting in enormous losses for musicians and representatives representing them. Compared to the previous year, £1.1 billion was recorded as a contribution from the live sector by the UK Live Music Group. In turn, 82% of the venues were near-closure, with three-quarters of the workers in the business having been temporarily laid off in the second quarter. Live Nation Entertainment recorded a 98% year-on-year drop in its overall revenue, while CTS Eventim returned a revenue loss of 96.6%. (Oliver 2022)

Furthermore, almost 140,000 full-time equivalent jobs had been lost, and another 26,100 full-time employees were to be laid off before the end of the year. Still, each major record company posted a noticeable increase from last year's streaming revenue to this year's. The Recording Industry Association of America argues that the expansion of paid subscription streaming services has more than offset revenues that have been lost in other areas of the recorded music business in the United States. At a time when new opportunities are created for the music industry by digital technology and consumer behaviour, the pandemic is adding new potential (Oliver, 2022).

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5.12 How has the Pandemic Affected you? A Population Survey.

To get a feel for how the COVID pandemic affected the lives of the general population, a survey was conducted among the citizens of various countries. These countries included Barbados, the United States of America, Jamaica, Canada, Trinidad and Tobago, Guyana, the Cayman Islands, St Vincent and the Grenadines, the Virgin Islands, the United Kingdom, Bermuda, Antigua, Grenada, the Bahamas, St Lucia and Nigeria. The questions asked on the survey focused on the adverse effects of COVID-19 and the positive results. The Survey received responses from 250 persons. The following charts and summaries are responses showing the impact of COVID on the population. The second part of the survey, which showed positive outcomes, will be looked at in Chapter 6.

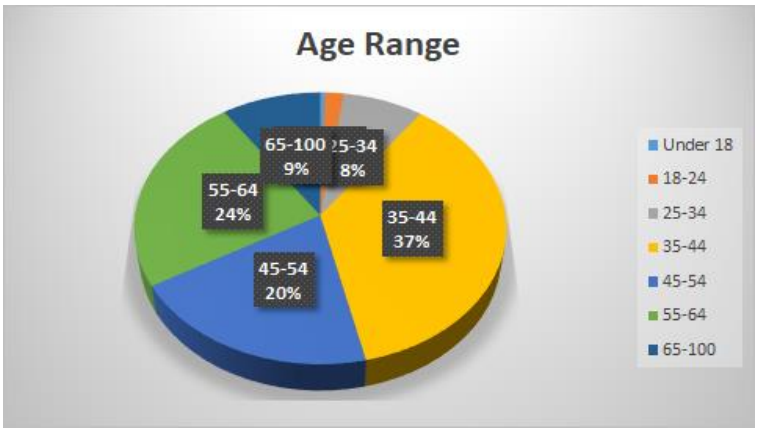

Figure 40 Chart showing the age range of people taking the survey

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Question 1

Figure 41 Chart Showing online shopping

Question 2

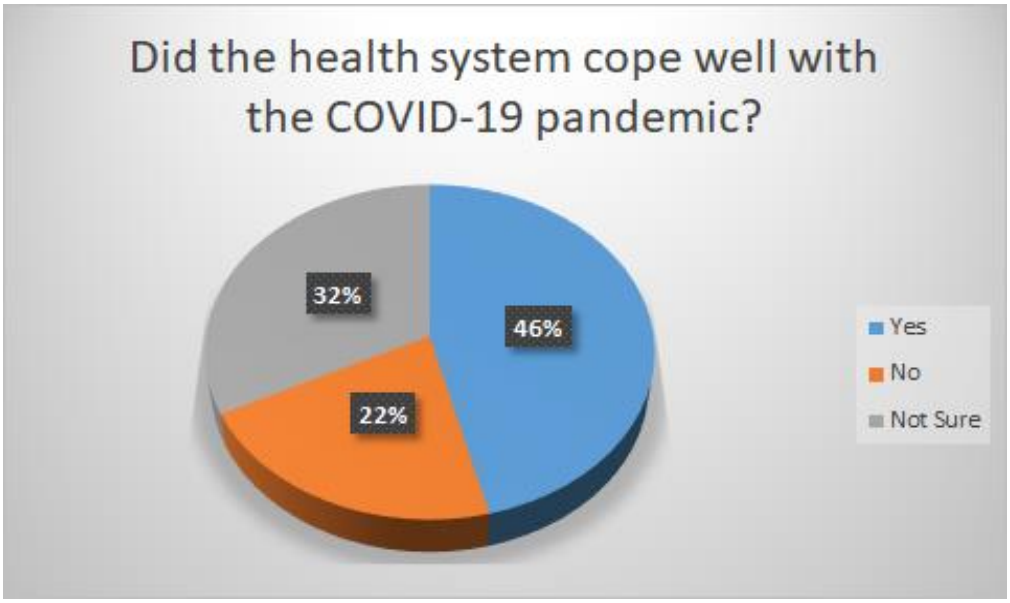

Figure 42 Chart showing the health system response to the pandemic

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Question 3

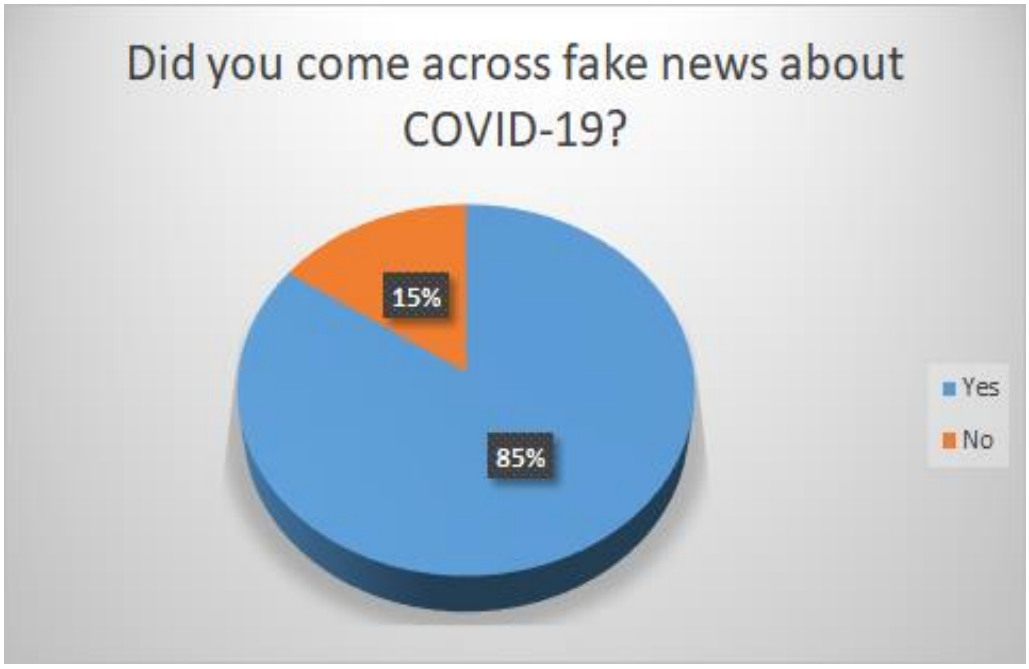

Figure 43 Chart showing exposure to fake news

Question 4

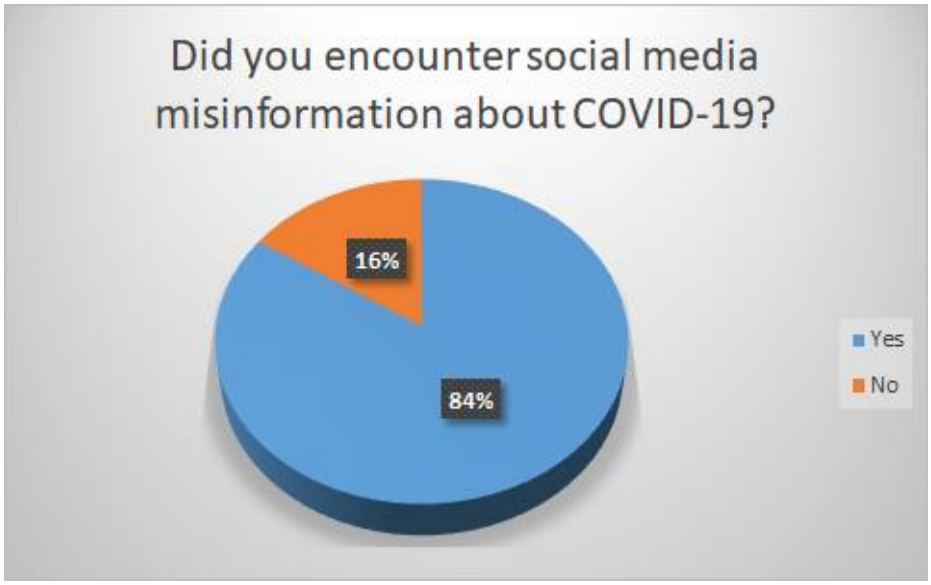

Figure 44 Figure showing the extent of Social Media misinformation

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Question 5

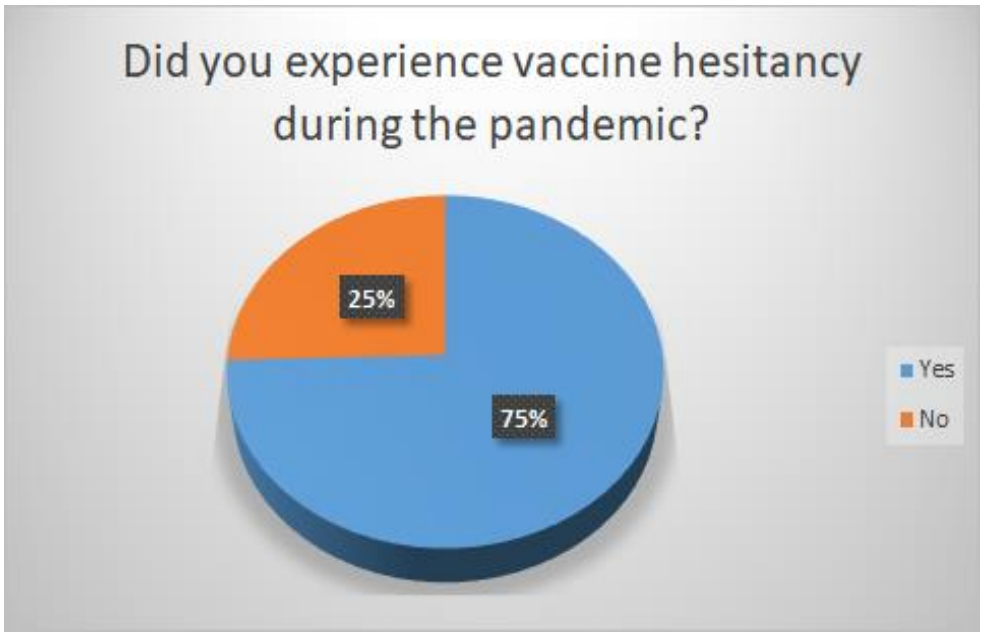

Figure 45 Chart Showing the level of vaccine hesitancy

Question 6

Figure 46 Chart showing the level of fear of contracting COVID-19.

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Question 7

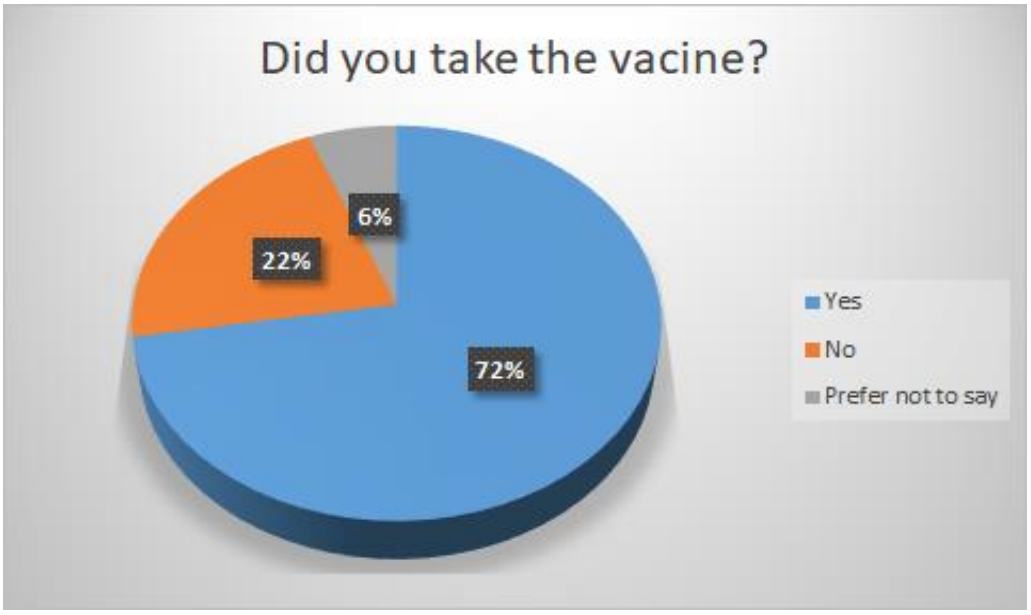

Figure 47 Chart showing vaccine compliance

Question 8

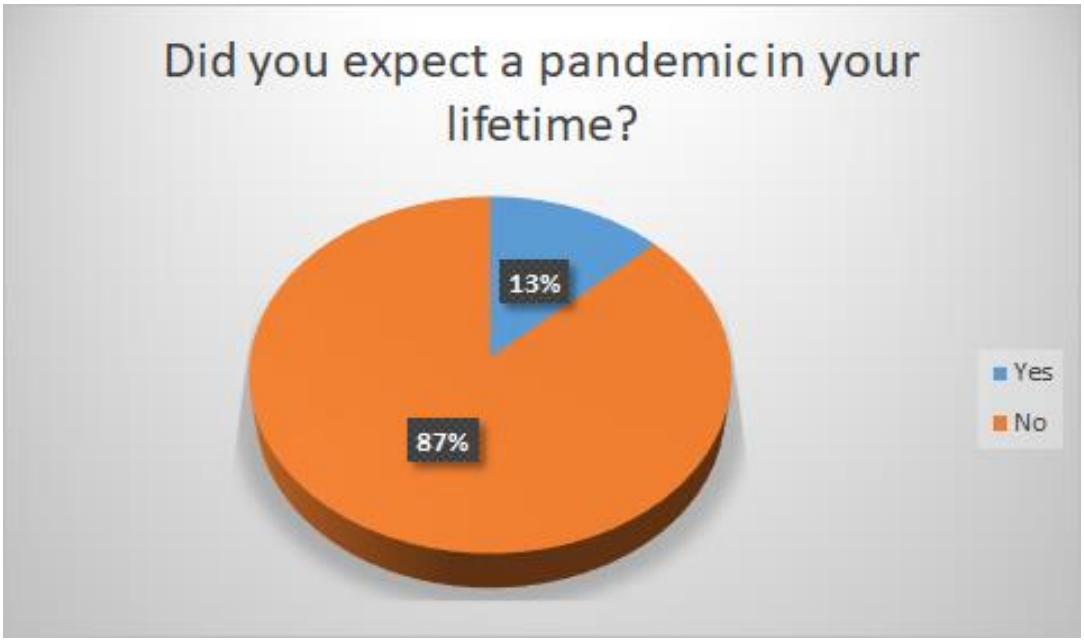

Figure 48 Chart showing pandemic expectations in one's lifetime

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Question 9: How did the COVID-19 pandemic affect your social life?

People were asked how the COVID-19 pandemic had affected their social lives. Their responses to questions on specific prompts regarding social activity, communication, and lifestyle changes all indicated that there was a limited effect on their social life for some, and they could adapt to the situation with little change. Since they were introverted, many respondents had little social life before the pandemic or were satisfied with limited social interaction. Others viewed the Pandemic as having more positive than negative impacts. The pandemic resulted in more quality time spent with family and reduced everyday hustle and bustle.

Some responses suggest that the pandemic constrained outdoor activities and face-to-face socialisation, nudging the person toward more online interactions. Besides, people needed new jobs in the creative/cultural sectors; therefore, they had to readjust their skill profile in social media. Others mentioned less interaction with their friends and fewer activities. Some others made a way to get together socially and do it safely after all was cancelled and restricted.

They also emphasise that the pandemic had varied effects on the social life of some people, stating that there were little or even some positive effects. On the other hand, some faced challenges and limitations in their social activities and relationships with others.

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Question 10: How did lockdowns affect your employment status?

The responses obtained herein were to how lockdowns affected the employment situation. Based on the survey, most respondents realised no impact on their employment status. Some mentioned working from home, others were self-employed, and some claimed they were part of the 'essential workers' whose jobs remained unaffected during the lockdowns. Some indicated that they worked harder to make it easier for others to operate, or they had been restrained from delivering services because they had been confined. Others mentioned pay reductions, their inability to work due to travel limitations, or shifting to work remotely. Some had retired, while others reported unemployment during the pandemic.

Other respondents would explain that there was less promotion at the workplace during COVID-19 and that they were appointed on the job without advertisement. There were also comments on being forced to vaccinate, having fewer staff, and having a safer work environment during the lockdown period. The survey shows that though others who participated in it did not go through changes in their working status, others had to brave varying effects, such as the COVID-19 lockdown period. Workers were forced to endure situations such as working in a remote environment, retiring from work, unemployment, and limited job promotion.

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Question 11: How did social distancing impact your daily life?

The effects of social distancing on individuals' daily routines and social interactions varied widely in their responses. Some reported no significant impact or a positive experience with social distancing. Others indicated challenges and negative implications that affected carrying out daily tasks more challengingly, adapting to changes, being unable to attend face-to-face classes, longer waiting time, feeling more anti-social, missing hugs and physical interactions.

Many participants mentioned an inability to exercise or engage in generic activities intentionally to approach others and a lack of trust in people. Their responses also reveal the toll on social and religious activities, as many said that they could not meet and greet, worship in church, or hold family gatherings. Some fear being near others for fear of existing diseases.
Others, however, said social distancing made one feel lonely and created a distance from family and close friends.

Overall, the responses to social distancing are both negative and positive. They highlight the challenges posed by getting used to new norms and the effect these norms have had on social lives, daily routines, and activities. The findings present how, in many respects, social distancing affected people's lives, signifying the complications and multidimensionality of its impact on everyday life during the COVID-19 pandemic.

Question 12: How was your mental state during the pandemic?

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Responding to the people's mental states during the COVID-19 pandemic, several descriptions were given about the characterisation of the respondents' mind states. The responses included a variety of emotional states such as "good," "normal," "okay," "stable," "depressed," "anxious," "stressed," "fearful," "confused," "relaxed," "excellent," "great," and "same," to mention but a few.

Some people reported feeling stressed or anxious due to job security issues, news reports regarding the high death rate, or personal family issues concerning the pandemic. This group of responses first showed anger, fear, and confusion but later coped with the event; others felt lonely and mentally tired due to the lengthy time spent on the Internet. Some also noticed that some related their mental well-being to God, but others said they were strong or mentally prepared for any difficult situation.

Respondents said they felt good, relaxed, or content tending to their online connections with friends or loved ones, being safe, or praying religiously amid this pandemic. Different experiences were shared, from negative emotions like fear, stress, and confusion to positive feelings like faith, strength, and contentment.

This opinion poll represents a diversified profile of emotional responses and coping mechanisms that emerged at the individual level during a pandemic. The findings show minute details of the impact of the COVID-19 crisis on mental health, revealing how sophisticated an emotional experience has been and what coping strategies were adopted to face such unprecedented challenges.

Question 13: How did the COVID-19 pandemic affect your or your children's education?

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Responses were numerous, citing various effects of education with differing opinions. Many replied, touching on problems in online learning, and several responded about lack of access to the internet and some to devices required for online programs. Many showed concern about the impact of online education; the children turned inattentive and distracted during classes. This has been reported by both children and educators as overwhelming, with technical disruptions and the lack of interaction highlighted. Furthermore, isolation from peers—interactions in general—has been accentuated as influencing children's overall well-being and adaptation during a pandemic.

Other respondents also shared benefits associated with online learning, including increased focus and the ability to adapt to the new environment. However, negative impacts that were raised pertained to consequences on social skills and addiction to digital devices. Financial challenges were identified as a constraint or barrier to effective online education, meaning some learners needed laptops or tablets. It also pointed out some individuals, particularly principals of some schools, who often negatively influenced students' experience.

The analysis encompasses a vast spectrum of estimated effects on education, from problems of online learning and adaptation to new platforms to financial implications for schooling during a pandemic. These findings present a strong case for the need to understand the complexity of an educational landscape during the pandemic and the varied experiences of students, parents, and educators. This is an essential understanding of mitigating the challenges associated with remote learning and developing appropriate strategies in light of the continued effect of the pandemic on education.

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Question 14: How did the COVID-19 pandemic affect your work?

Responses were retrieved from different people, some reported no significant effect on work, retirees, and the unemployed, showing a decrease in working days. The responses also show challenges like limited access to resources, overwhelming issues in communication, stress meeting the members' needs, and challenges resulting from the transition to online teaching and work duties. Some respondents reported longer hours working from home, finding temporary work due to the closure of their primary jobs, and suffering mental strain from online work and a lack of social interaction.

Some participants reported getting used to the new normal, wearing PPE, and getting regular COVID tests. The pandemic affected many people, such as shifting to remote work, while others could not even visit clients or secure work contracts. Typically, the study replicates how the COVID-19 pandemic affects most areas concerning work and employment, like challenges to adapt to new safety measures, time constraints in performing activities, and mental stress resulting from working at home.

5.13 Personal Experiences During the Pandemic

In addition to the survey, several people were asked to reflect on their experiences during the COVID-19 pandemic. The participants requested that their names not be published so that they

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would be referred to as citizens for this study. Some of the reflections were summarised, while others were recorded as given.

Citizen 1: The days of the pandemic helped the author to be with his mother a moment before the stroke of 2020 as the lockdown ensued. At least he could give her some quality time on the weekends as they were working.. The author also enjoyed working from home because they could log in late and avoid morning traffic. This leniency, which gave staff time to unwind , gave credence to this strategy that might solve HR-related problems such as lateness and absenteeism.

This epidemic has transformed this author's life into working from home and learning new skills. They now have ample free time for personal interests and to acquire new skills. Getting groceries, standing in line for hours, and avoiding sunlight are other negative impacts of the lockdown.

He needed to catch up on film and socialising and felt rusty. Since returning to work, he has felt awkward around others, but the lockdown has driven him to participate in more family activities. He places his family first and has saved a lot on petrol.

Working from home allows one to have privacy and enhance one's skills. However, others took this negatively, as it has limited their social relationships and comfort in public. For instance, the author needs help with sociability; he gets rusty in public.

In the final analysis, the author said the epidemic helped, but it injured him. It helped him get more time and energy to focus on things of a personal nature and earn many of the new experiences he

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craves; however, it also forced him to go out for family gatherings and save petrol. Huge effects were placed on the author's life and the importance of family due to the epidemic.

Citizen 2 He was concerned that most activities worldwide were still offline despite internet news and press conferences. This reduced community life, especially in small companies, which hold up any economy. While he and others could work from home and have the same income and perks, 80% of society couldn't. This could result in societal catastrophe, general unemployment, and the collapse of social systems.

The author also worries about the future, especially in Barbados and globally. They wanted the world to return to normal, learn from the situation and start afresh. He also probed the breakdown of the supply chain, resulting in problems in shipping, logistics, and the mass buying of toilet paper, which was also probed in the text.

He also warned of phoney shortages, looting, criminality, and food shortages because people panicked and bought up supplies. Most people were not like them and got total incomes, so they worried about how long this change would be tolerated.

The epidemic closed the offices, and the staff had to work from home. Remote jobs, supermarket shopping, long lineups, and heel spurs plagued the author. They could hardly pay their bills and utilities in person but could pay from the bank account. He liked staying home, chatting with his mom, and helping his daughter with online education during lockdowns. He liked seclusion and online testing.

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The author had to work from home instead of dressing up and driving. The pandemic-unavailable treats were prepared in the kitchen, and experiments were done. The author felt that travelling was more complicated and frustrating. Planning and exercise did help, though. He carefully watched what they ate and exercised more. His family stayed slim. But the fear of contracting and passing the infection on to susceptible people was always there.

In the end, he was worried about what was happening in the world and wanted everything to return to normal. He said there must be a balance between online and offline for everyone's sake.

Citizen 3 The pandemic brought some gain to the author, from meaningful interactions with her mother while following the lockdown rules to working from home with most job duties. They could visit her on weekends and spend quality time, which became an undercover gift. Working remotely also provided a conducive environment that allowed people to work without worrying about the early morning or travelling through traffic. It helped handle some human resource issues, such as dealing with latecomers and recording sick leave correctly.

The author found the sick days could have been more manageable as they offered a chance to rest up and deal with illness without losing work hours. Due to working from home, the author developed new skills and spent their free time, including shopping days. However, the author experienced negative consequences, including waiting in long queues in the store and being uncomfortable with the people who refused to give way.

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The author should have been depressed , the atmosphere of being cut from one's social surroundings because one is at home. Instead, they thought staying at home gave them time for themselves. But after a while, they figured that staying home reduced their social skills and comfort. When they returned to work, they felt nervous and weird in front of people. But they never thought or bothered about the situation back home.

Ultimately, he confesses that the epidemic had brought advantages and disadvantages. Though it opened up many opportunities for self-improvement and further study, it also took away social grace and finesse.

Citizen 4: The writer reflects on how the pandemic has affected their lives and how they relate to society. Firstly, they became less skilled or able because they were less exposed to social skills and engaged in more frequent activities online. However, returning to their hometown made them realise family bonding was essential, and they needed to be involved in family-related activities more often.

The author further shows concern about the worldwide shift from online to offline activities, as most community activities happen in the offline world. Small businesses that form the backbone of any economy usually have their activities carried out in the physical space, and in many cases, clientele want to interact offline. Such factors have brought concerns about the rise in crime, erosion of community bonds, rampant unemployment, and breakdown of social systems.

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The author argues that the world needs to return to its state before the outbreak, focusing much on the supply chain as a significant issue. Shipping of commodities has been delayed due to logistical challenges, mainly cargo planes; this has contributed to a low level of cargo aircraft, silently killing the economy through shipping problems. This can lead to food shortages by creating panic and, consequently, unreal or premature shortages.

Food shortages also affect vulnerable populations, including pregnant women, infants, elderly people, and the sick. The author is concerned about how much the world can tolerate such happenings, as most people have to endure the constant experience of not having a full salary.

The pandemic has visibly affected the author's personal life and social interactions. While the world is significantly affected, the author remains optimistic that it will rebound into its pre-pandemic state.

Citizen 5: "As someone who works in the media, I was not negatively impacted by the lockdowns and curfews. I had a pass, allowing me to go to and from work without inconvenience. Considering that you know that media teams have hours during curfew, I was not affected by that. What impacted me was that I had to wake up at five o'clock in the morning to wait in line at the store. The temperature-checking guns, which seemed to be pointing a gun at my head all the time and then pulling the trigger, were another thing that I detested. It's not cool."

Citizen 6: "The pandemic brought about unprecedented uncertainty and fear, with people wearing surgical masks in hospitals and requiring proof of vaccination for entry into workplaces and other places. Rumours flew, and non-compliance led to court proceedings and reduced mass gatherings. Even funerals took on a different nature, with closed caskets and graveside services becoming routine.

Gradually, things began to improve, with vaccination compliance attributed to the high rate of public obedience. However, mask mandates were eventually removed, and hand sanitisers were

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no longer required. Life began to return to normal, with few people wearing masks or using hand sanitisers. The answer to whether this was a test run for something bigger or a curved ball of life remains uncertain."

Citizen 7: "My experience during the pandemic was quite good. I live in a relatively small, close-knit family, and we got along well during the lockdown period. I thoroughly enjoyed the change of pace from the usual hustle and bustle of life; I enjoyed the opportunity to read, enjoy being at home and generally, not being as busy. Of course, it caused some dislocation and hardship in my life, specifically in work, but I weathered that storm well, and it was not too overall traumatic. My faith also played a significant role in making me feel generally stabilised during that period."

Citizen 8: "The COVID-19 pandemic was sudden and unprecedented; as expected, many Barbadians needed to be in a position financially or logistically to handle such an event. As a result, many lives were temporarily or permanently changed. I would have first heard about the COVID-19 pandemic on American news stations.

At that time, many people were dying in America, but none of the public health organisations were sure of the cause of the virus or where it originated from. Barbados is a highly sought-after tourist destination. It was inevitable that the pandemic would profoundly impact its tourism industry and act as a gateway for the entry of COVID-19 into the country.

Due to the high transmissibility of the virus and the increasing rate of death, the government of Barbados mandated quarantine protocols to reduce the spread of the virus. Only essential services, such as security firms, hospitals, gas stations, banks, supermarkets, etc., could be open. At the time,"

Citizen 9: "I worked as a programming analyst for an insurance company; they would have implemented a work-from-home policy. As part of the information technology department, we retooled the workforce and ensured that selected staff could connect to the network from home. The abrupt transition to remote work brought challenges, blurring professional and personal life boundaries. I found myself working longer hours with tighter project deadlines. Yet, there was a strange sense of solidarity as colleagues rallied together in virtual meetings; it felt like business as usual.

Days turned into weeks, and weeks turned into months; life began to feel very restricted. I slept, ate, logged in, ate, logged in, ate, logged in, swam the internet, and logged in; this became a daily cycle. As an introvert, this is common; however, the monotony was less of a problem than having the option to stop it—leaving the house as I desired.

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The day I had finally arrived when I tested positive for COVID-19. The virus had minimal impact on me. However, the thought that I might have unintentionally exposed my loved ones to the virus made me fearful. Worst-case scenarios rushed through my head, especially in light of my grandmother and son being infected and considering their ages. Both my son and my grandmother remained unscathed by the virus. It was a stark reminder of the unpredictable nature of this pandemic and the importance of always remaining vigilant and cautious.

Introducing the various vaccines and ramping up vaccination efforts relaxed me. Once we were free to travel, I became more social for a few months; I played sports and indulged in more partying. From my point of view, the COVID-19 virus was not going anywhere, and the economy and life had to continue regardless of the outcome."

Citenn 10. "During the COVID lockdown, the author worked from home, keeping them busy during the day. They spent evenings watching turtles in the sea, spending time outdoors with family, and exercising on the streets. The author's uncle and wife were trapped in Canada, but having family around helped them cope. Online services and connecting with church members allowed them to stay creative with presenting programs. Watching television was realistic, but only sometimes possible due to working during the week. The author also enjoyed walking in the mornings and exercising outdoors with their volleyball club. They also had opportunities to leave the house, allowing them to balance their daily tasks and manage their time effectively. These challenges helped the author cope and manage during the lockdown period.

Citizen 11. We were all aware of how fragile life can be during the pandemic. It was a period of great uncertainty as we all faced a period in life none of us had ever experienced. The only place many of us had witnessed people wearing surgical masks was in a hospital setting. Nobody ever thought this would be an everyday requirement for all citizens, old or young, class or non-elite, student or adult, poor or rich.

It was a period of frightening uncertainty. Rumours flew by the second, and verifying fact from fiction became as difficult as attempting to walk up Mount Hillaby backwards. If one sneezed or coughed even slightly, it was a natural body reaction; one was shunned and ostracised. The verdict? He/she probably has COVID-19.

In many instances, proof of vaccination was mandatory to enter workplaces and other places. Why? Fear of the unknowns. Hand sanitiser was the norm for everyone entering a controlled/closed space. Even talking in public was forbidden. No handshakes were allowed for fear of being contaminated by an infected person. There were even COVID-19 Police. People were dragged and hauled before the court in any instance of noncompliance. Mass gatherings were reduced.

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What a thing. The dreaded COVID-19 dashboard daily instilled absolute fear in many. Funerals took on a different nature: closed caskets, graveside services, and burials. The agony of being unable to say goodbye as usual became routine.

Gradually, things began to improve. We were told it was due to vaccination compliance and the high rate at which the public obeyed this task. Was it? We will never know the whole truth. Slowly, the mask mandates were flung out. The hand sanitisers were no longer required. Then, things evened out in a few breaths over a few months. Life was beginning to return to normal. Today, it is as if it never happened.

Few, if any, people wear masks, use hand sanitiser, or even think about vaccinations or boosters. Life has returned to normal. Was this a test run for something bigger? Or was it one of life's curved balls/bouncers? The answer, my friend, is blowing in the wind. Only time will tell."

5.14 The Pandemic Hits Home. The Barbadian Experience

I live in the beautiful Caribbean island of Barbados, and 2020 was supposed to be a year of celebration. It was the year when all Barbadians outside of Barbados were invited back for the year-long celebration. Barbados is divided into 11 districts and each month, a district was to hold a particular event, and then in December, there would be a national event to culminate the year. But that was not to happen. The COVID-19 virus came on the scene. We had the first case in March 2020, and the Prime Minister told the population that if the numbers got above 50, there would be a total lockdown in the country.

The Ministry of Health began to implement contract tracing for all infected people. But by the end of March, we had passed the 50 mark for people infected, and immediately, the government imposed a complete lockdown for four weeks. The only entities that were open were essential services and the supermarket. All persons not working in a critical service were restricted from

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leaving their homes. Those working in the vital services had to walk with company identification cards because the police enforced the strict lockdown. If you were caught outside without permission, you would receive a fine. For those going to the supermarket, the government devised a system of alphabetically using families to be there on particular days.

The vigorous contract tracing and the lockdown caused the number of infected persons to decrease to the point where slowly, little by little, the country began to reopen various sections. During that lockdown, the airport was closed. There were no flights bringing people in, and the only flights allowed were those that were taking visitors who were already here back to their home countries. Because Barbados depends heavily on tourism, about 40% of the population became unemployed during that mouth lockdown because the hotels were closed and no visitors were coming in.

The government had to pay large sums of employment benefits to these workers during that period. However, later in 2020, things began to improve; the airport was reopened, and persons coming into Barbados had to be tested or have a vaccination certificate to enter the island. Workers at some companies had to be tested or have a vaccination certificate to come to work. All establishments had to take the temperature of everyone entering, and every establishment had to record all the people who visited. They recorded their contact number and their address just in case they were needed for contract tracing. People were allowed on the streets once more for small gatherings, but they could still not visit persons in medical institutions during that time.

The Barbados government refurbished an old naval base that belonged to the Americans and converted it into a quarantine Hospital for patients with the severe form of COVID-19. They also

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used schools and hotels to quarantine persons who were asymptomatic or had few symptoms. All schools were closed then, and the Ministry of Education moved to the online platform. This presented a severe challenge as many children and parents did not have devices. Some did not have internet connectivity, and some teachers needed to be trained to use the online technology. However, over time, the system began to settle as companies donated devices, and the telecommunication company offered free internet services to parents who could not afford it. Since the parents were at home, they could assist their children with the online sessions, especially the younger ones.

In January 2021, the infection rate had dropped so low that it was decided that the schools would return to face-to-face classes and allow small gatherings of people for social occasions once you adhere to the social distancing policy, which was 3 feet. A few more people would be allowed to be at church.

But then we had a new variant in 2021, and the numbers began to spike out of control. Instead of the hundreds, we had thousands infected with the virus. There was no longer the possibility of doing contact tracing, and the isolation centres were full, so the government decided to allow persons to quarantine in their homes while fitted with an electronic tracker. Hence, the COVID centre knew where they were at any time. You could not go to your doctor or the hospital if you were sick with viral symptoms. You had to call the COVID unit, and transportation would come to your house and take you to one of the specially designed medical centres. They would assess you and determine if you needed critical care or if you would be able to be quarantined at home.

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Many testing centres were established on the island. Before the COVID-19 virus, many of our tests for viruses were done in other countries. However, because of the large numbers of infected persons, a testing lab was established here in Barbados that performs both the rapid antigen and PRC tests. The government also in 2021 established a Covid emergency disaster law. This gave the government powers to impose fines, lockdowns, quarantine, and all other issues surrounding the COVID-19 virus. A summary of the law is seen in the following few paragraphs.

"A curfew will occur from 7:00 p.m. to 6:00 a.m. from February 3rd through February 17th, 2021. During this period, all persons in the public must wear face masks and adhere to physical distance regulations. No parties, banquets, meetings, bus crawls, karaoke events, picnics, or other social gatherings are permitted within the standard rules that apply to everyone. Visitors cannot enter facilities subject to isolation or quarantine, prisons, or government industrial schools. Many persons may visit patients to receive treatment; nevertheless, it is forbidden to record those who are in isolation or have been placed in quarantine.

Unless they are vital service personnel or in an emergency, everyone must stay inside the bounds of their house, as stipulated by the directive, which will take effect from February 3rd to February 17th, 2021. The Attorney General can issue emergency passes through the website www.gov.bb. If there are more than five persons in a group, they can go outside; however, up to eight members of the same home can stay outside. Anyone departing is required to produce identification.

Businesses are holding themselves accountable by adhering to stringent distancing standards, providing hand sanitising stations, having the fewest staff necessary for safety, restricting individuals inside or outside the facility, and ensuring they only congregate for business reasons. Owners or operators can incur fines and revoke their exemptions if they violate the regulations.

In addition to constantly carrying identification, employees, essential service members, and emergency workers are required to adhere to the curfew hours, which are from seven o'clock at night to six o'clock in the morning.

Only certain events, including funerals, marriages, and showcasing services, are permitted to take place at venues of religious worship. The number of guests, including the officiant, is limited to ten. Receptions are not permitted to be hosted or attended by anybody.

Beaches and parks are open from six to nine a.m. to allow for swimming and exercise. Additionally, it is permissible to exercise outside between six and nine a.m., with two persons exercising together unless they are members of the same family.

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Under Directive 3 of February 3-17, 2021, it is required that all individuals wear a face mask, face shield, or facial covering that covers their lips, nose, and chin when they are in public locations and while they are using public transportation. Those responsible for a kid must ensure their youngster is wearing a mask. Business owners are accountable for guaranteeing that members of the general public are not permitted to enter or stay within a company unless they wear a mask. Children at least five years old are needed to attend. Masks may be removed to talk, but only for a limited amount of time and at a distance from other people. Masks are not worn by those who cannot do so due to mental, physical, or medical conditions or limitations." (Prime Minister's office Barbados)

The Ministry of Health provided daily updates by way of a board on their website and other social media platforms that showed the number of persons who were tested, how many were infected, the number of males and females, the age ranges of the persons infected, the number of persons who recovered and the percentage of the population who were vaccinated. Some only received the first shot, while some received both. The charts below give snapshots from 2021 to 2024 of the status of infections, hospitalisations, quarantines and vaccinations.

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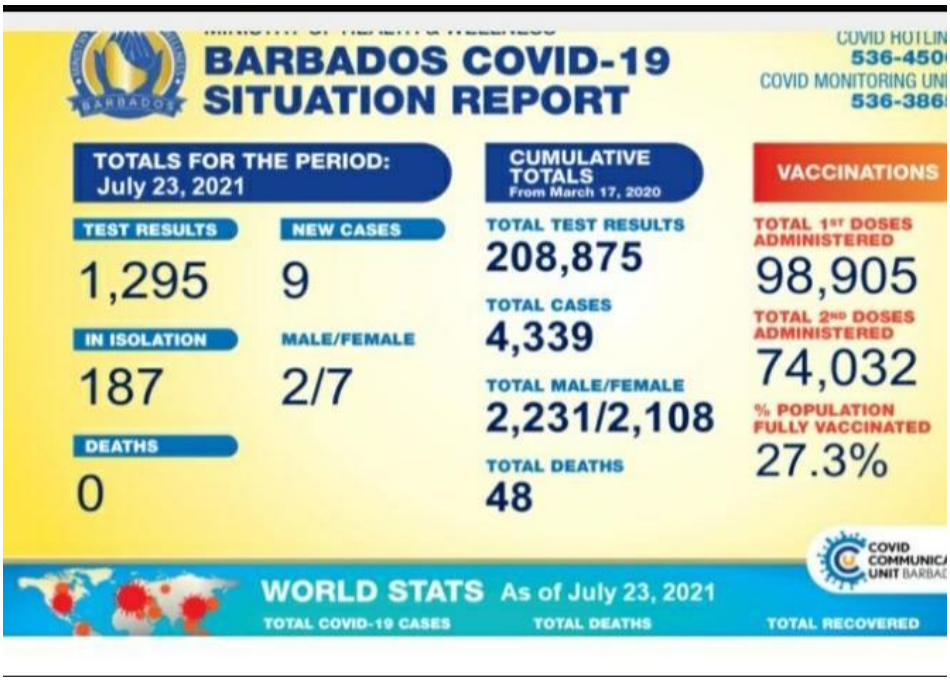

Figure 49 Covid stats for Barbados July 23, 2021 (Source the Ministry of Health Barbados)

Figure 50 Covid stats for Barbados October 25th, 2021 (Source the Ministry of Health Barbados)

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Figure 51 Covid stats for Barbados October 1 - 14, 2022 (Source the Ministry of Health Barbados)

Figure 52 Covid stats for Barbados April 15- May 10, 2024 (Source the Ministry of Health Barbados)

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In Barbados, we were inundated by the American news system. Daily, we watch the mountain of misinformation and fake news pour into our homes via television and various social media channels. People in Barbados also began to circulate erroneous information about the COVID-19 pandemic and the vaccine process. I was in a bank, and a gentleman was telling everyone that all those who took the vaccine would be dead in three years. Other information circulated was that the government is injecting a chip into you to keep track of you.

The religious zealots referred to the vaccination as the beginning of the Mark of the Beast, saying that the biblical prophecy of not being able to buy or sell was coming to pass. All these stories and misinformation caused many Barbadians to refuse to be vaccinated, and some of them even died because of listening to and following the fake news on various Media.

This was a very trying experience for Barbarians. Many were fearful, and some people refused to leave their houses. They would not even go into the yard for fear of catching the disease. People became very careful if you had a cough or runny nose. Even if it was just the ordinary cold people who would shun you. The government implemented a mandatory mass-wearing initiative. You could only catch public transportation with a mask and enter an establishment with one. Every establishment implemented sanitisation stations so that you had to sanitise your hands and take your temperature before entering.

Gradually, due to the level of vaccination and natural immunity by persons who contracted the virus, the level of infections has dropped significantly to the point where now they are negligible, and the economy has bounced back to the point where it is even better than the pre-Covid era. We

are still careful because one never knows if the virus will mutate into another more contagious strain, so even though the mask mandate has been removed, susceptible persons are advised to wear their masks in public. As a nation, you were able to keep the death rate down, and currently, we only recorded 648 deaths out of a population of 285,000 persons, with about 60 percent of the population receiving the vaccine. That is due to the Ministry of Health's diligence and the population's obeying the quarantine rules and the mask mandate. We were able to slow the spread of the disease and bounce back so quickly while other countries were still grappling with their economic recovery.

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Chapter 6: Covid-19, Inventions, Innovations and Coping Mechanisms. (Proof of concept Data)

6.1 Introduction

In keeping with the trend that has occurred as we look at past pandemics, we see that the population living at the time had to find creative ways to cope with all the death and destruction happening around them. After each pandemic, there was advancement in various areas of the population that remained after the pandemic had subsided. They had advancements in culture, technology, working arrangements, the economy, health, etc. The covid-19 pandemic is no different.

The COVID-19 pandemic occurred in a world where people are more educated, and the use of technology is an everyday norm. This meant that the concepts, innovations, and inventions could roll out quickly, and some of the things that people came up with were very peculiar. This may not have happened if the pandemic had not occurred. This chapter examines some new concepts and innovations from the pandemic. Some of these are expected to continue after the veracity of the pandemic has subsided. This chapter will also look at the positive aspects of the COVID-19 pandemic. It will continue the survey results that were started in Chapter 5. This time, the report will highlight the positive experiences of the respondents.

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This chapter will use scientific articles, news reports, and technical papers to highlight some of the new technologies and concepts that have come about due to the COVID-19 pandemic. Some of these Innovations would have been implemented at a future date and time, but the pandemic caused them to be sped up. Ideas that would not commonly be thought of were brought to the forefront, leading to some very creative technological innovations. The chapter will show various industries, economies and environments that benefited from the COVID-19 pandemic.

6.2 Benefits of the Covid pandemic. A population survey Continued.

Even though the pandemic may have been severe, some positive feelings and opportunities emerged from the COVID-19 pandemic. This survey is part 2 of the survey displayed in Chapter 5. It shows the positive responses of the various persons who completed the survey.

Question 1

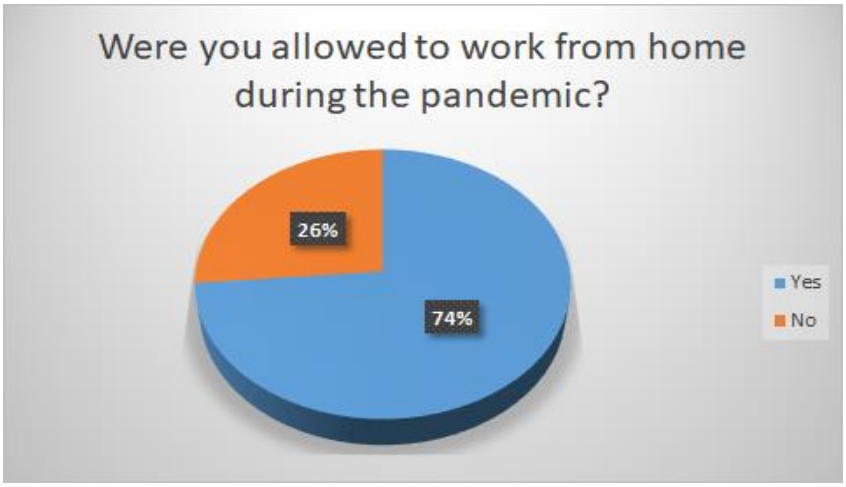

Figure 53 Chart showing work-from-home statistics

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Question 2

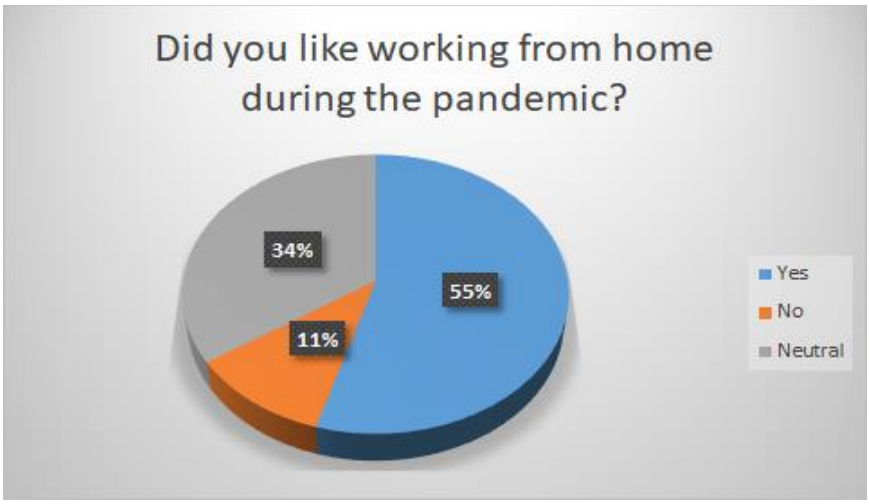

Figure 54 Chart showing responses to working from home

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Question 3

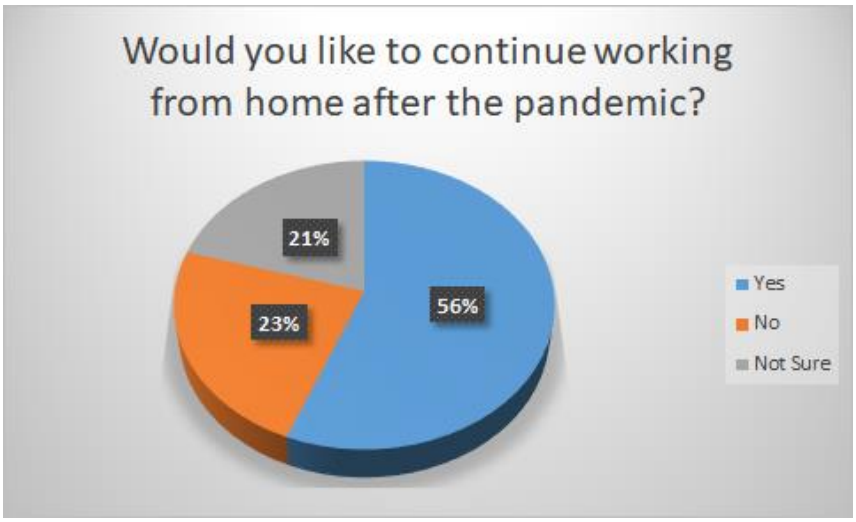

Figure 55 Chart showing work-from-home preference after the pandemic

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Question 4

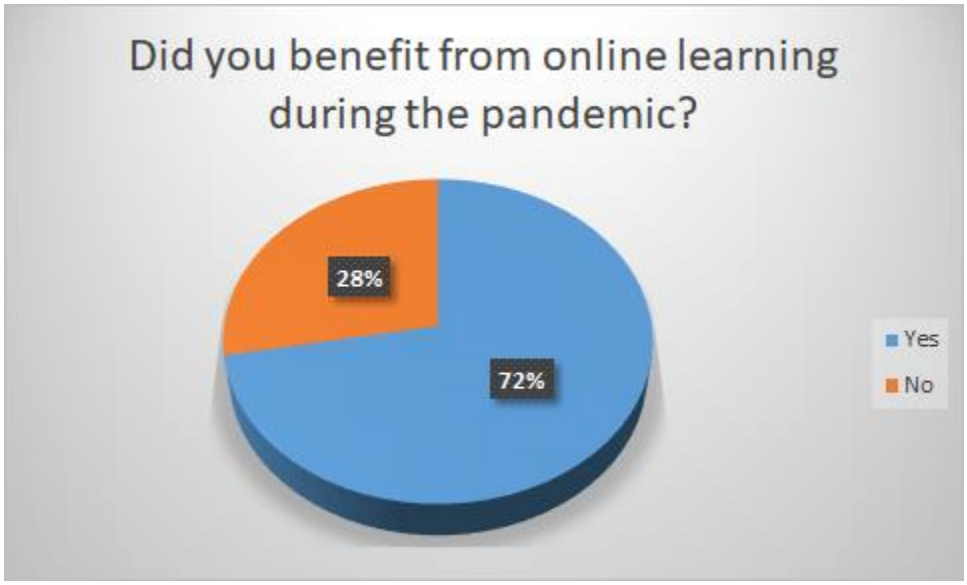

Figure 56 Chart showing benefits from online learning.

Question 5

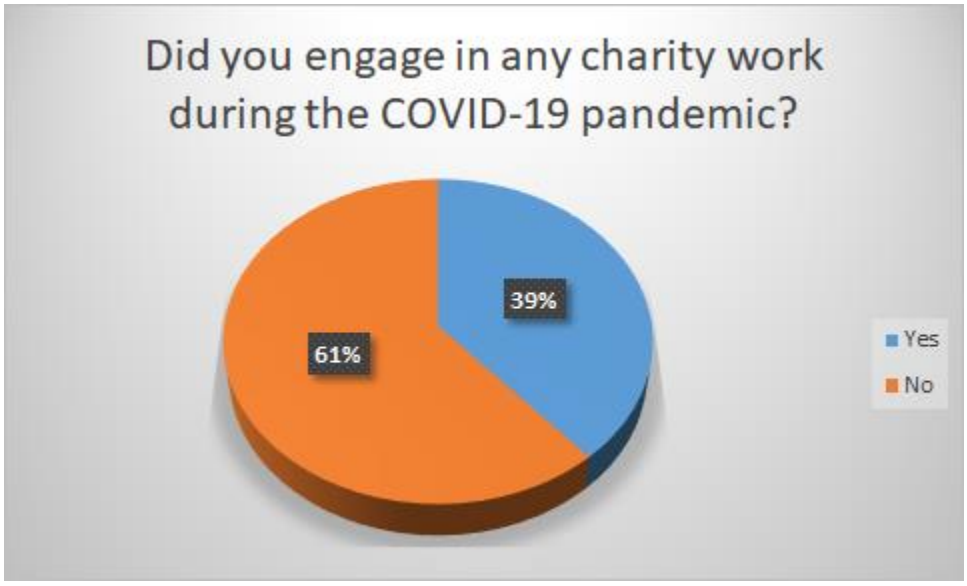

Figure 57 Chart showing engagement in charity work

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Question 6

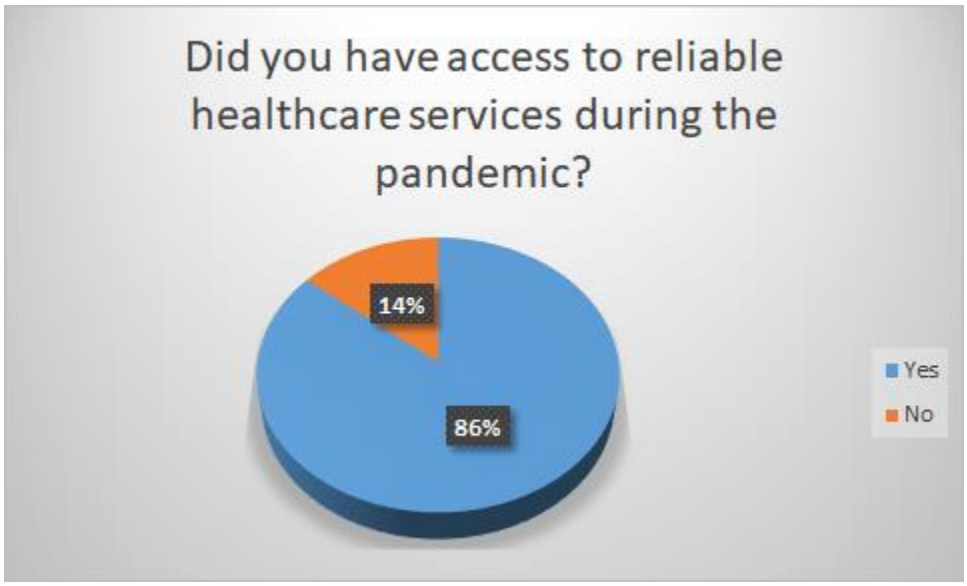

Figure 58 Chart showing the reliability of the health

Question 7

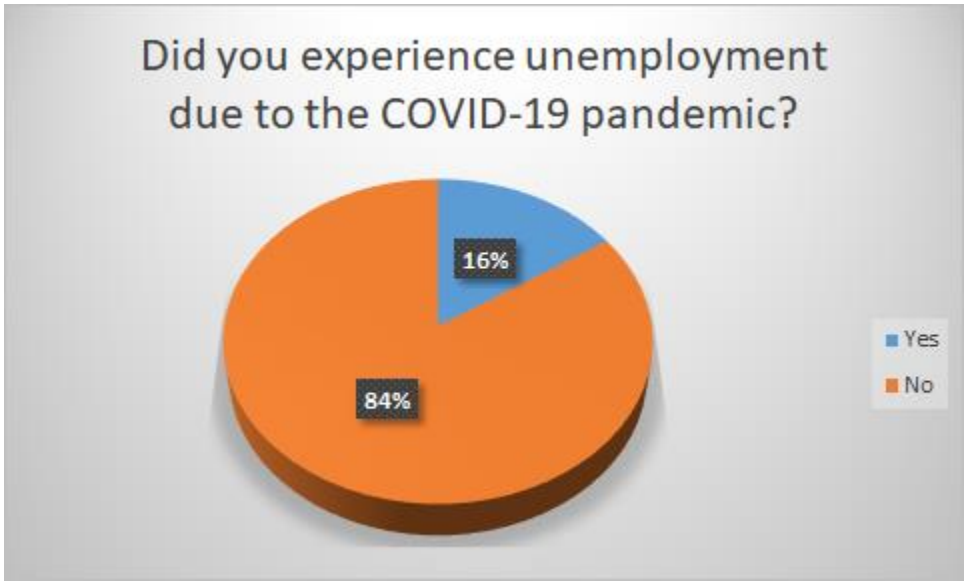

Figure 59 Chart showing the effects of unemployment.

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Question 8

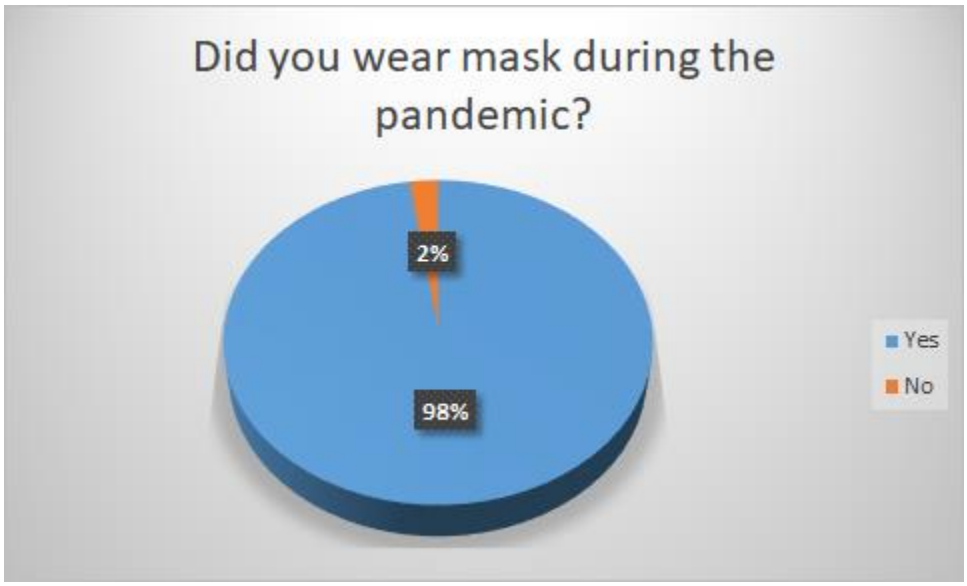

Figure 60 Chart showing compliance to mask-wearing

Question 9: What role did the church play in supporting you during the pandemic?

The results range from diverse experiences to views about the church's support. Some, for example, said the church did not play a massive part in supporting them during the pandemic; some of those spoken to spoke of empty pews and a lack of concrete support. Others, however, were against this, arguing that the church had established programmes that offered emotional support, distributed food, and implemented some safety measures like sanitising stations and social distancing. In response to the limit on the number of physical meetings, most churches resorted to online services and meetings, and the number of prayer calls went virtual, with online services and virtual meetings increasing significantly.

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The survey underscored the church's role in providing spiritual comfort, encouragement, and fellowship in times of uncertainty and fear. Much of the responses were on the issue of virtual services, daily devotions, and online Bible studies that had kept them encouraged and supported. The survey also underlined that many church members kept calling each other to find out how everybody was doing and to offer their counsel and support if somebody was facing hard times. These responses thus indicate the full spectrum of experiences insofar as some people received significant support and encouragement from their church communities during that most trying period of the pandemic spreading.

Question 10: What good things came out of the COVID-19 pandemic, if any?

The responses to the above question looked into how COVID-19 disrupted various elements of everyday life brought about by the shift to remote work, increased online payments, digital investments, and attention to hygiene practices. The pandemic has changed work culture into a 'new normal', wherein people have been forced to adjust to remote work and become more tech-savvy. According to the survey respondents, this brought new flexibility in work arrangements—spending more time with family and reassessing priorities. They also emphasised the new streams of income that are location-independent and not attached to a 9-to-5 job.

Responses reflect the benefits of saving time and cost, enabling spending more time with one's family and nurturing a greater appreciation of life and faith. This pandemic has fostered further digitisation, upgrading technology infrastructures, and automating many processes. Moreover, people have boosted their skills in planning and survival and created closer relations with their

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colleagues at work and their family members. Other responses indicate increased awareness of the fact that there is a need to interact socially and, at the same time, bridge territories through technological means.

For some respondents, there was an almost immediate change of heart about the essential things in life. This led to a reduced carbon footprint, time with family, and a general return to practices like home cooking and growing vegetables. It has also influenced creativity and innovativeness, whereby one is more aware of and practised good hygiene, engaged in online education and training, and sought alternative ways of communication. In general terms, the respondents write that the pandemic has greatly influenced work, family, technology, and personal values, leading to changes in personal habits and social customs.

Question 11: Were there any innovations during the pandemic?

Many reported using technology and online media for activities that had otherwise been carried out in person and how online birthday parties, social gatherings, and business networking sites had also developed. Besides, the survey respondents pointed out how the pandemic changed their outlook on life, money, and relationships. The respondents further commented on using innovative methods, such as holding online classes, and how the accelerated decision-making process dealt with supply chain disruption.

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The responses indicate that the COVID-19 pandemic had a far-reaching effect, provoking many innovative responses and adaptations in different sectors of people's lives, from technology and business to personal activities and social interactions. At the same time, it underlined critical behavioural changes and the use of technology to endure the difficulties brought forth by the pandemic.

Question 12: What new skills did you acquire during the pandemic?

The most frequent ones stated were gardening, baking, and cooking. Many respondents mentioned they had not learned any new skills during the pandemic. Some people also mentioned investing in and training in tiling, craft, and cooking skills—all mostly connected to opening one's own business.

A key trend was the acquisition of technology-related skills. Many class respondents mentioned improved technological proficiency, the use of online meeting apps, and the adoption of various electronic platforms that enabled them to manage their teaching and other school-related activities more effectively. Other people mentioned that they had started to learn website design, software development, and improved internet navigation. Several respondents also mentioned skills related to crisis management, such as coping in a box, survival, and managerial skills.

Moreover, the pandemic motivated people to learn new skills in public speaking, organisation, and social media management. Others also mentioned competencies around using and embedding

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electronic platforms for teaching. Other skills identified included videography, meal preparation, running online cookery classes, and developing PowerPoint skills.

The findings were very diverse concerning the skills learnt by individuals during the pandemic, with solid biases toward technology-related skills, crisis management, and new hobbies like gardening, baking, and cooking. Generally, this adds to the broader understanding of the skills that seemed most important for people to acquire during the unprecedented circumstances posed by the pandemic.

Question 13: What did you learn from the COVID-19 pandemic?

These responses identify what has been learnt from the COVID-19 pandemic. They start with the effect on health and safety by remarking on the spread of the virus and its economic impact. They underpin how life can be so fragile and, at the same time, devastating if the side effects of the vaccines are not disclosed. Most importantly, they mention the lesson learned: people will do anything to get what they want at whatever cost to others. The survey also elaborates on the new appreciation for personal space and the productivity of working from home. It warns against the blind following of authorities, big pharmaceutical companies, and media and promotes common sense, facts, and faith. Cleanliness, how online schooling will negatively affect small children, and, most notably and fundamentally, the uncertainty of life are also addressed in the survey.

The responses to this prompt continue in the line of government control and loss of personal freedoms in the name of safety. They said it is essential to keep a distance from any person who manifests flu-like symptoms and pointed to time management, priority setting, and better hygiene

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as very crucial. They acknowledged human vulnerability and, as such, emphasised the need for expression of appreciation and care for loved ones. The most important messages from the survey include cautioning not to take anything for granted and the necessity of resilience with an adaptable approach under undesired conditions. One must know how to unburden oneself from the misinformation, learn to appreciate life, and understand that pandemics come at any time. It ended by realising that lost freedoms can come about out of the blue, where one has to adapt with a positive mindset, being grateful for life and the loved ones around them.

6.3 The Pandemic Changed My Life, a Testimonial by Gale Weithers

Gail narrates how COVID-19 laid her off unintentionally after 15 years of employment. That was an event that surprised her and led to moments of shame and a sense of grief. Furthermore, the loss challenged Gail's faith; she lost her work. She learned to pray from her executive counsellor to God for help, as it hurt her job and income, which affected her mental health. Gail bought a new car and took out a new mortgage to care for her son during his last year in Jamaica. The lockdown in Barbados reduced many essential services. Anxiety and stress plagued Gail since she was over 50 trying to get medical insurance. She couldn't socialise, work out or go to church. The year was topped off with an aunt and uncle's death toward the end. Gail's story highlights turning to God for help in troublesome times.

She regrouped, redefined, and began to redefine her talents. She gained accreditation as a virtual trainer and instructional designer and assisted with meeting and training preparation. She attended

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free HR emotional well-being and professional development webinars to demonstrate that she cared for people as individuals.

Gail permitted her experience to be quoted in the thesis. Here is her testimonial, and I quote: “It has been four years since my entire team and I were immediately severed virtually during COVID-19 on April 1, 2020. I was 55 years old, with a mortgage, car payment, and a son in his final year at university—for starters. I was not ready.

During this challenging time, they taught me that Ageism is not a myth. True friends may not be your true friends. Company loyalty and employee loyalty are different. No matter what, tough times do NOT last, and they WILL pass.

Do not imagine for one moment that the last four years were easy. There were many days I swore I was losing my mind as I tried to keep it together while looking for a job, searching for medical insurance, making sure my son was ok and wondering about my next steps.

I had a shaky start to rebuilding and reinventing my life, but here are seven snippets of some good stuff: I became intentional about protecting my mental and emotional well-being via "lifetime-outs" by returning to nature. I have upskilled my training facilitation game by becoming a Certified Virtual Trainer and a Certified Instructional Designer.

I launched nVision Training Solutions, my own Training Consultancy Company; I got my first client within three months. Bravely went live on LinkedIn and picked up two clients from that first livestream conversation with my co-host, Karen Frazer. Started a LI newsletter featuring entrepreneurial journeys of epic entrepreneurs whom we should all emulate (link in Featured section and next season coming soon) Grew my professional and personal network to include some of the most amazing people ever across the globe Got better at loving myself as a person - the fab and the flaws.

A wise man once told me, "Life is like a circle: sometimes you are at the top, and sometimes at the bottom. Do what you need to do when you are at the top so that you will be okay when you are at the bottom."

There IS Life AFTER Layoff, and I am happy to have made it this far. Here is to four more years of growth for everyone reading,” Gale Weithers from Linkedin Blog.

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6.4 Creative Inventions as a Result of the Pandemic

6.4.1 Inventor Makes Ventilator from Spare Parts to help fight COVID-19 in Kashmir

At the beginning of the outbreak, a 22-year-old man living in Indian Kashmir read an article about the shortage of ventilators, which was only 72 in his area. This happened in March 2020. That is when he started thinking about the problem since other countries also faced a similar shortage of ventilators.

Mass production was suspended because of the outbreak, which made him think of coming up with a solution. He started looking at every object in his house and then deliberately dismantled them, for instance, his telephone, printer, and central processing unit. He then collected all the valuable objects involved and sorted and developed them into a new practical design. (AFP News Agency, 2020)

His prototype was made of totally recyclable material: soap boxes, dry fruit boxes, a CD driver, and an old printer motor. His idea of developing this ventilator was mainly to build a production system at the local level so that it may be used in times of emergency. It should help the local population, and the same model could be reproduced elsewhere. (AFP News Agency, 2020.) See figure below

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Figure 61 A ventilator made from spare parts Source (AFP News Agency 2020)

6.4.2 COVID-19 Cameroon Engineers Develop Ventilator Prototype

The first driving force towards innovations is necessity. As the world grappled with the COVID-19 disease, engineers from Cameroon made headlines regarding their innovations. Engineers from L'Agence Universitaire pour l'Innovation developed prototypes of ventilators and vaporised sanitising doors in Bafousam, the central city in the western portion of the nation. Prototypes were created in the basement of a building under construction. (Africanews 2020) See figure below

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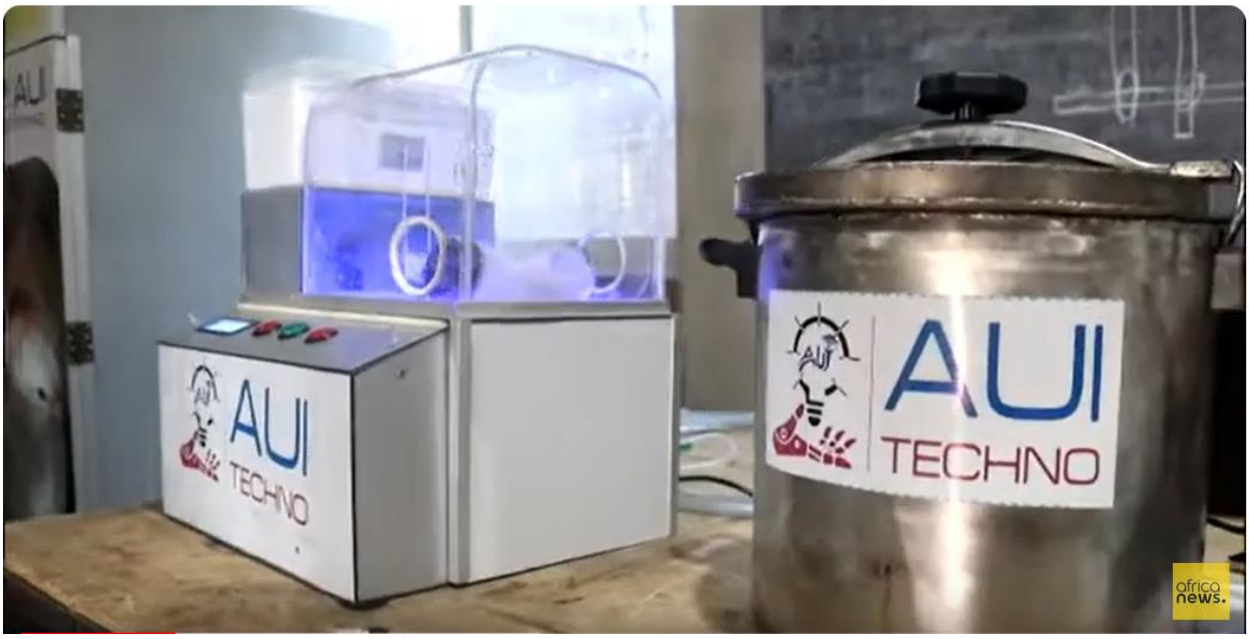

Figure 62 Prototype ventilators from Cameroon source (Africanews 2020)

An engineer explained that they had the ventilator, mask for the patient's face, and the tubing that carried the air. The current version was a prototype; thus, other elements still needed to be implemented.

The SAID initiative has been working with a local group managing previous productions since the clinics will allow for accurate prototype testing. Also, community authorities have embraced this potentially life-saving decision. The engineer is quite optimistic about the state doing what it takes to supply support so these prototypes can be put to work (Africanews 2020).

He said they had to make the goods within our country. This innovation reflects the expertise of engineers in Cameroon, which has given them a higher platform in the international arena. Of

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course, the government of Yaounde will have to assess and approve this mass production of these locally made products to reduce the threats of the spreading pandemic (Africanews 2020).

6.5 How the Coronavirus Pandemic Sparks Innovations

The COVID-19 pandemic catalysed innovation in the medical domain since scientists accelerated the development of vaccinations. Vaccines were given to communities to outsmart the virus, and scientists were looking for other ways of innovating. In 2021, a survey conducted by McKinsey showed that 90% of CEOs believe COVID-19 would create change in business operations. Few of them felt adequately prepared to exploit the opportunity. The commitment to innovation did not remain that high, except in the pharmaceutical and medical sectors, after the pandemic. (DW News 2021)

Italian scientists have developed an LED light that could spell the end for the scourge of coronavirus. This works by tearing up microorganisms essentially, dismantling their structure, entailing breaking it down by disrupting the outer membrane and protein spike. So far, the project has established its effectiveness against bacteria and has even been tested by the Italian military. (DW News 2021)

Moreover, the pandemic has accelerated many innovations, including the prototype valve for ventilators and the anti-Covid carpet, to reduce germ and virus transmission from the outdoors into interior spaces. Many of these discoveries had started before the epidemic, but real needs for new technology and a growing product market accelerated innovation. It is essential to note that other

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problems require attention, and the pace of research might decrease in these other scientific areas. (DW News 2021)

The pharmaceutical sector focuses on innovation amidst the COVID-19 epidemic. While the need to earn a profit acts as the natural driver of innovation, the need and the need to survive the crisis has driven people in the industry. Respiratory devices have witnessed affordable innovations during the early days of the pandemic. Furthermore, companies investing in innovation during crises typically outperform their peers during recovery. (DW News 2021)

Maintaining a high level of innovation during the pandemic is challenging because most research efforts have reduced as people observe the stay-home provisions with limited access to laboratories. The future impact of pandemics could be contained if there is strong support for developing a scientific community through funding institutions and introducing appropriate immigration laws. A very effective knowledge society will help dampen the effects of the next pandemic. (DW News 2021)

Critical lessons from COVID-19 include rapid response to spillover events, early detection and notification of the emergence of new threats, and response faster and more safely across borders. Human health is inextricably linked to the state of the natural environment. Air and water pollution results in millions of untimely human deaths each year, and habitat destruction brings about new diseases. It can help, but there is no short-term fix. (DW News 2021)

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Science can contribute to achieving green and sustainable communities by recognising that human health and the health of the physical environment are linked. (DW News 2021)

6.6 American Inventions that Have Emerged during the Pandemic and Are Expected to Continue in the Future

Before the COVID-19 epidemic began, the United States of America seemed to stand at the threshold of a new brace for futures founded upon innovative digital technology applications and the ability of the internet to bridge distances between and expand resources through Artificial Intelligence. That future was confident, but advancement was slower than many wanted. (POLITICO Staff.2021)

Then came the coronavirus outbreak, which changed our daily routines overnight. It forced millions to be confined to their homes for months, breaking the usual patterns of commerce, work, and learning. We need these changes powered by technology not years ago but today. (POLITICO Staff.2021)

This epidemic, which none had expected, evoked a bundle of bright ideas and numerous solutions. Amidst so much death and tears, COVID-19 accelerated the pace toward the future.(POLITICO Staff.2021)

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Cocktails to go: Consequently, because of the pandemic, businesses were forced to operate differently, and some states allowed liquor sales outside restaurants' premises during the peak days of the pandemic. See the figure below.

Figure 63 Restaurants serving cocktails to go source (POLITICO Staff.2021

This gave rise to cocktails to go allowing restaurants to sell beverages away from premises, a direct result of the pandemic. Local governments in thirty-five states and the District of Columbia reacted by enacting regulations allowing the sale of such beverages. Both eateries and customers took this change with open arms. (POLITICO Staff.2021)

Legalising Cannabis: Moreover, the Cannabis sector changed its legal status, whereby 18 states legalised marijuana for adult use, and 36 states allowed cannabis for medical use. Of course, these

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programs remain highly regulated in states but are illegal under federal law. The pandemic has also brought more legitimacy to the cannabis sector. (POLITICO Staff.2021)

Figure 64 Sale of medical Cannabis source (POLITICO Staff.2021)

That's because states have placed cannabis businesses in the "essential" category, thereby positioning them to stay open during lockdown. This step toward greater accessibility is quite helpful for patients using marijuana for medical purposes and for recreational users, too, more and more of whom shop online. (POLITICO Staff.2021)

Telehealth: Moreover, telehealth has changed with the Centers for Medicare and Medicaid Services having eased restrictions on its use, allowing people to access healthcare from couches.

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Figure 65 Doctor using technology to consult patients(POLITICO Staff.2021)

The fact that telehealth has flattened at a much higher rate than before the pandemic reveals that many patients prefer seeking care online. (POLITICO Staff.2021)

Covid vaccines:

Figure 66 Moderna Covid-19 vaccine source (POLITICO Staff.2021)

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mRNA vaccines have been the backbone of vaccination efforts across the United States because of their directness against conventional vaccinations, quickness, and ability to adapt to the ever-changing nature of circumstances. (POLITICO Staff.2021)

Within days after the viral sequence became available, companies like Moderna and Pfizer BioNTech constructed viable models for mRNA coronavirus vaccines. These vaccines were the first licensed COVID-19 vaccines and have been the first-ever mRNA products to make it to the market. This swiftness and flexibility have also propelled the development of vaccinations against various diseases and therapy applications. (POLITICO Staff.2021)

Robot Deliveries:

Figure 67 Robot makes a delivery. Source (POLITICO Staff.2021)

Robot deliveries have also seen broad appeal due to their efficiency and environmental-friendliness. In 2021, Starship Technologies, an early innovator in delivery robots pre-pandemic, sent over one thousand robots nationwide. Those robots could make an estimated 10,000 deliveries

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per day. The challenge is manufacturing robots large enough to meet the demand. (POLITICO Staff.2021)

Financial Assistance: Direct cash assistance has become more common during the pandemic. Even with the economy sliding down, the amounts of direct financial relief Congress offered millions of Americans through stimulus checks and payments for child tax credits were remarkable, helping to temper an increase in the number of persons suffering from food insecurity. Most of the time, the benefits went toward what legislators requested money to pay for: food and other necessities for the home. As far as these technologies are concerned toward the future, their success will depend on their ability to meet demand and adjust to the context continuously. (POLITICO Staff.2021)

Online Education:

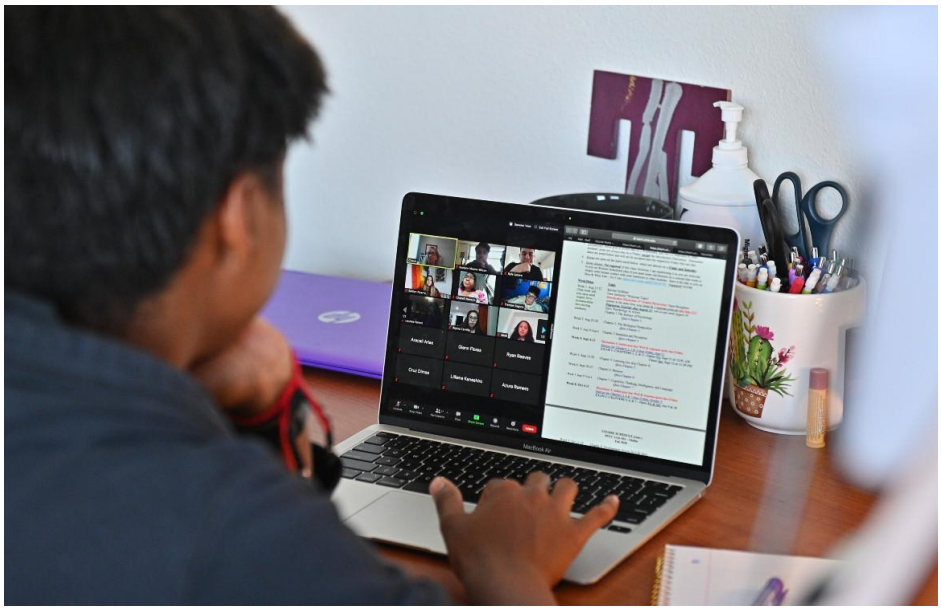

Figure 68 Student participating in an online class source (POLITICO Staff.2021)

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Questions of equity over the ability of vulnerable students to attend courses have been raised due to the online shift during the pandemic. These students required technology, internet connectivity, and study space within the school environment.

On the other hand, the forced adoption of online learning accelerates a trend of traditional universities developing online degree programs and normalising hybrid teaching models even within the most change-resistant parts of higher education. It could improve access for those students who live in far-flung areas or otherwise face barriers to in-person education. (POLITICO Staff.2021)

QR codes: Beginning in the middle of the 1990s, QR codes, abbreviated as "quick response," have been gaining tremendous popularity. The summer of 2020 saw the beginning of the reopening of restaurants and bars, and with it came the introduction of QR codes on dining tables.

Figure 69 Customer using QR code at a restaurant. Source (POLITICO Staff.2021)

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These "quick response" codes, as the name suggests, began to rise in popularity in the middle of the 1990s. During the summer of 2020, when restaurants and bars entered the restoration phase, a new guest the QR code appeared on the dining tables. (POLITICO Staff.2021)

These codes allow customers to receive the menus and, in most cases, order food directly through their mobile phones. Besides, technological advancement made it easy for the average consumer to operate these codes. (POLITICO Staff.2021)

In most restaurants, pubs, and other eateries, it is evident that the trend of QR codes would prevail just because of its ease. This is particularly true now that individuals are used to bringing up the codes on their mobile devices. It allows companies to conserve part of their employees' time for a specific client. At the same time, clients may enjoy the fact that they can order anytime they want and the ease by which they can execute single-item acquisitions. (POLITICO Staff.2021)

School Feeding Program: During the pandemic, schools changed how they provided free and reduced-price lunches to children. School districts nationwide made these changes and continue to make them.

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Figure 70 Student benefits from the school meals program. Source (POLITICO Staff.2021)

California and Maine enacted an interstate policy. This change is expected to work because most children qualify for free or reduced lunch, so the cost will not rise too much. (POLITICO Staff.2021)

Eating in the Open: De Blasio extended and merged these two programs to open the streets to more outdoor dining when the caseload of COVID-19 was already easing.

Before the outbreak, local authorities and restaurant owners did not pay attention to outdoor eating spaces, especially in densely populated metropolitan areas. Al fresco eating places, on the other hand, proved pivotal to reopening local businesses when public health authorities discovered that the COVID-19 virus spread rapidly indoors but less readily out of doors. Cities loosened their rules

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to let restaurants expand their outdoor seating areas into adjacent parking lots, sidewalks, and streets.

Figure 71 Persons dining on the outside source (POLITICO Staff.2021)

Because the "streateries" have proved so popular everywhere, including Tampa and Philadelphia, several municipalities are considering making them permanent. (POLITICO Staff.2021)

Voting by Mail: Because the pandemic was a catalyst, mail-in voting rapidly became the norm across multiple states, greatly expanding their postal voting systems due to the virus outbreak. Forty-six percent of United States voters voted by mail during the presidential election 2020—the first time in modern presidential elections that most people who voted didn't vote in person on Election Day. While most people who mailed their votes reported satisfaction with the procedure, this sudden switch to postal voting is difficult for election officials. Due to understaffing or

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overworking already, it is overwhelming. Some jurisdictions have acted to make this a permanent policy. Three states California, Vermont, and Nevada have codified a universal vote-by-mail system in the wake of the pandemic. (POLITICO Staff.2021)

6.7 Coolest Innovations to Come Out of COVID-19

Even though the COVID-19 outbreak can barely be contained, public sector providers always find new and original means to ensure continuous health and safety amongst the general population. The items on this list are among the most unique and inventive ways to prevent COVID-19 spread and its effects. As shops and offices adapted to business amidst a pandemic, these products are among the most effective (Demaral 2020)

Figure 72 Sanitisers that use ultraviolet light (Demaral 2020)

This portable mobile phone sanitiser from Happyhomeslife purifies micro-germs hiding even in those spots that washing wipes can't reach with the help of ultraviolet-C light. Another product, the phone-disinfecting toaster by Yanko Design, will disinfect the smartphone while it's being charged via ultraviolet radiation. These products could disinfect tiny things like jewellery, credit cards, and

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keys. Now, the self-disinfecting face mask by Amazfit is a transcendent epitome of how even this face mask exploits the power of ultraviolet light. (Demaral 2020)

Figure 73 Necklaces that are worn to maintain social distance and to discourage face-to-face contact Source (Demaral 2020)

Designed by Architecture Discipline, this necklace makes the user aware through visual and auditory clues when someone is nearby, breaking the safe radius for social distancing. This product detects a person's presence near it through infrared radiation from the human body temperature. Another necklace developed by NASA and produced by Jet Propulsion Laboratory vibrates to make the user aware when they touch their face. This necklace helps reduce the COVID-19 pandemic by minimising the contact of faces with hands infected by the virus. (Demaral 2020)

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Figure 74 LED face masks activated by voice Source (Demaral 2020)

Avtipus Patents and Inventions spread a face mask with LED lights that flickered to indicate emotion via vocal intonation to inhibit the negative impact of face masks on identifying social and emotional cues. Tyler Glaiel was the first to code the mask, and it can mimic natural lip motion while speaking and even smiling and smiling! (Demaral 2020)

Figure 75 Face masks that are attached to the garments Source (Demaral 2020)

Some garment manufacturers have started to add attached face masks to their products because face masks are socially standard and are required in various enterprises or public places to avoid

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COVID-19. Two of them were G95, which designed a hoodie with a face mask, while the other firm was Marta Scrampi, which created a whole-body jumpsuit complete with a face mask and a hood, especially for air travel. Both these firms are located in the United States. (Demaral, 2020).

Figure 76 The Corporation shows high-tech robots and contactless dining and delivery options. Source (Demaral 2020)

FreshBytes was the first supplier to offer a contactless dine-in experience with mobile ordering options. This is compared to the many meal delivery companies available before the epidemic. Another meal delivery app, Rappi, took the service of food delivery to the next level by creating robots that allowed the products to be delivered without human contact, therefore eliminating the delivery person. They are working on eliminating the delivery people. (Demaral 2020)

Further, Rappi developed five robots that were utilised in Rwanda to check on the temperature and health condition of COVID-19 patients, carry food and drugs, and keep medical records. Since the robots can test between fifty and one hundred fifty individuals for the COVID-19 virus within a minute, the screening procedure is much more efficient. Rokid has developed glasses with infrared sensors, making it possible to read a person's body temperature from three meters. (Demaral 2020)

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Symptom Tracker App Symptom tracker apps allow users to monitor their symptoms once they have contracted the COVID-19 virus or after contacting an infected person. An example of such an app is Hyfe's cough tracker. Through Hyfe's cough tracker, users monitor their coughing, follow up on family members' symptoms, and contact medical specialists. (Demaral 2020)

Figure 77 Robotic aircraft that spray disinfectant Source (Demaral 2020

In the pandemic, the sanitisation process increasingly used drones. At the same time, disinfectant technology was fast developing. This was as the risk of COVID-19 exposure to workers increased. Such an invention which Garuda Aerospace had developed is a means by which drones can be used in fumigation and disinfecting public spaces such as roadways, hospitals, train stations, or other major facilities that pose a high risk. (Demaral 2020)

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Figure 78 Workout pods that provide social distancing Source (Demaral 2020)

One California chain of fitness centres has set up plastic pods to separate each customer physically during group classes. The move was in reaction to needing to maintain social distancing. At the same time, the gym reopened, but the remaining owners wanted to take matters into their own hands, thus creating bespoke pods for gym-goers where they wouldn't need to wear masks while exercising. This was based on a decision reached after several complaints regarding breathing problems due to the mask-wearing mandate. Inclusion of pods used for a range of other functions, such as outdoor functions and exclusive dining experiences. (Demaral 2020)

Clinical Psychology: Due to the pandemic and the ensuing national lockdown, clinical psychology benefited from technological innovation through a myriad of programs geared towards benefiting mental health for those whose feelings of sadness, worry, or loneliness were affected. A brand mobile phone app was developed in association with trained therapists to help people who succumbed to anxiety, stress, addiction, and other mental health problems associated with COVID-19. (Demaral 2020)

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6.8 Pandemic-Driven Tech Innovations That Will Continue To Impact the World

The inventive remedies the IT sector devised during the COVID-19 epidemic probably prevented several organisations from reaching a complete standstill. Despite the arguably positive impact of the efforts made by technology teams to lay the groundwork for remote work, e-commerce, and networking, the pandemic has favoured some technological sectors over others. Videoconferencing entered both the business and consumer worlds.

Which of the many inventions born during the pandemic will have a lasting impact on our jobs and lifestyles? On that note, in the article, fourteen members of the Forbes Technology Council analysed what enduring technology improvements are anticipated to persist long after the COVID-19 pandemic. (Forbes Technology Council 2021)

1. Cloud computing

The pandemic accelerated the rate of cloud computing adoption, which had already been widespread. Cloud computing is at the core of business model change and consumer experience transformation. Given the pandemic, organisations have to adapt and evolve to cope. Cloud computing could be the core technology bed for speed, flexibility, and digital operations. (Forbes Technology Council 2021)

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2. Computer-aided telephone interviews

One method born out of the pandemic, computer-assisted telephone interviews (CATI), has immensely helped health researchers, particularly during the COVID-19 lockdowns. A primary advantage of CATI is that it can be used on most telephones and does not require any reading skills on the part of the respondent. This way, researchers can get information from various individuals, making the research fair and inclusive.. (Forbes Technology Council 2021)

3. Mechanisation techniques for financial procedures

Regardless of the region, more financial procedures must be automated to enable finance departments to shift their capacity to support strategic projects that will bring furtherance to the company. Organisations are adopting new work patterns, and a near-term ramification of this is an increased investment in systems that underpin remote workforces. (Forbes Technology Council 2021)

4. Embedded Integrated Financing Technology

Successful integration of technology into financial institutions has resulted in accelerated growth since the onset of the pandemic. More and more non-banking firms are in the financial services business relating to digital wallets, payments, and loans. Companies from various industries, such as retail, telecommunication, automobile manufacturing, insurance, transportation, hospitality,

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food, logistics, and technology, have now shown interest in developing embedded finance for corporate and consumer groups. (Forbes Technology Council 2021)

5. Non-fungible tokens, meaning not interoperable or replaceable with one another.

The pandemic has forced artists to become creative in how they distribute their work and make money for future songs, concerts, or any other kind of entertainment. Since it's a more entrepreneurial nature that now characterises the Gen Z customer, arts and entertainment industries quickly adopted NFTs. This new asset class is here to stay. (Forbes Technology Council 2021)

6. High-tech for intelligent security

The pandemic has already shown the innovative prowess of cybersecurity in mitigating the increased pandemic security threats. One way companies successfully protected their data against breaches from within was with advanced security measures that would significantly prevent such. The pandemic has become a challenge to adopting preventive insider threat measures as the world approaches the reality of permanent hybrid work. (Forbes Technology Council, 2021)

7. Cybersecurity providers and firms

Those who supply cybersecurity products are gaining. Most attacks can be traced back to workers who are careless with their passwords or PCs. With the pandemic, companies send the same PCs home, significantly increasing the risk security threat they are exposed to. Companies have realised

that seeking cyber technology to safeguard these resources is a strategic goal. The same problems apply to mobile devices and networks. . (Forbes Technology Council 2021)

8. Virtual Reality

The interest in and engagement with virtual reality launched immediately when many people and organisations began working remotely. Releases of creative virtual reality apps and software have been increasing lately. These are meant to engage better with a user's feeling of connection, productivity, and entertainment. Whether remote or not, people use virtual reality to connect with other human beings, whether for business gaming or video conferencing, because of COVID-19.. (Forbes Technology Council 2021)

9. Artificial intelligence

The COVID-19 pandemic has accelerated a resurgence in artificial intelligence, and we live it. This creates the impetus for organisations to transform themselves with the power of artificial intelligence to succeed in the long term. Moving into the future, on our road to recovery from this pandemic, we will see the renaissance of AI, where AI transforms from a technology enabler to a technology catalyst. AI must be part of the corporate strategy for long-term value creation. (Forbes Technology Council 2021)

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10. Telehealth Service Methods

Medical services were curtailed in the early days of the pandemic, allowing hospitals to focus on triaging patients and their safety. Later, videoconferencing enabled practitioners to provide virtual services as operations and practice management needed optimisation. Technology companies that supply these solutions brand their mark in the marketplace. (Forbes Technology Council 2021)

11. Uses of Cognitive Wellness

The popularity of programs like Calm could be linked to the impact of the pandemic. With all the time people spend in isolation, humankind has been putting immense focus on their mental health. This will have massive effects and ones that will last. Even when this pandemic is passed, people will likely continue in their practices to maintain their mental health. (Forbes Technology Council 2021)

12. Streaming-Based Services

Without a doubt, streaming services come out as winners. Peacock, Paramount+, and HBO Max all made their debut in 2020. Those firms joined the ranks of Disney+, Netflix, and Apple. Since the streaming platforms provide them with dependable subscription money, the firms can instantly know whether their movie has succeeded. In addition, the money goes directly to the source and

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does not go through the cinemas. Consumers love the model. The future belongs to streamers that will be promoted and sold in packs. (Forbes Technology Council, 2021)

13. Home Internet access

Winners are the home broadband service providers. Many of us have upgraded the speeds and capabilities of our in-home internet connections to meet the heightened bandwidth demands of remote work and homeschooling. How many will we revert to our previous packages to avoid the extra cost? Few people are unhappy because we are all happy with the improved work speeds we are getting. (Forbes Technology Council, 2021)

14. Individualised–Service Applications (Apps)

The apps serving personal service providers, like Instacart, Doordash, and the ilk, have made anonymous people valuable helpers who serve several households. You can get everything you need in your home delivered to your doorstep at your leisure. (Forbes Technology Council 2021)

6.9 How COVID-19 Has Changed the Music Industry

The Music industry experienced good growth in 2020, relying on digital streaming. However, COVID-19 lowered the number of live music performances to online music learning. This led to a $30 billion loss in 2020 since artists still depend on virtual concerts and online broadcasting platforms to reduce their financial losses.

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Thus, the pandemic partially reversed this decline, causing digital streaming revenues to shoot up. Virtual music lessons are now standard, offering cost reductions and convenience. Live performances gain more popularity because, with platforms such as Spotify, Tidal, and Apple Music, there can be direct interaction between the artist and his audience. (Ahmed 2022)

Innovative monetisation strategies for live-streaming sites include charging virtual events and paid opportunities to engage with an audience. Some even introduced exceptional membership levels that provided followers with exclusive content. (Ahmed 2022)

The music industry is presently experiencing permanent changes that are about to change its future fundamentally, even though it will return gradually to the typical distribution method once the pandemic subsides. The industry will move on and evolve further to adapt to the pandemic's challenges in the sector. (Ahmed 2022

6.10 Covid-19 Brings About Innovation and Collaboration for Musicians

During the global lockdowns in 2020, most people had to turn to their creative needs or, for some, create new ones. Some spent their time wisely working on a long overdue project, exercising to get in shape, catching up on long overdue books that had been collecting dust on their shelves, or, as was often the case, learning to play a new musical instrument. Although it pushed the sales for these music retailers because of the quarantine, the case was quite the reverse for the producers, who needed help to keep up with the demand coming from new enthusiasm. Firms often innovate

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new ways of engaging their customers when there is sudden interest. Three excellent examples of ground-breaking innovations that came about as a result of the COVID-19 pandemic are Facebook's NPE Collab app for iOS- version 1.3, Roland's 4XCAMERA app for Android, and Avid® in cooperation with Dolby Laboratories' AvidPlay. (Dale 2020)

Upcoming and established musicians benefit from participating in collaborative musical endeavours. The desire to collaborate with other musicians pushes an artist to work harder for even more extraordinary levels of mastery in their craft and can yield extraordinary music. The early days of lockdowns worldwide took away the inherently social aspect that making music produces, creating the incident above. Under the circumstances, musicians or bandmates couldn't get together to play live or just jam. Today, NPE announced Collab, an iOS app designed to help producers and fans connect, create content, watch it, and combine artistic films—especially in the music genre. Collab's heart makes its users feel as close and connected as possible despite geographical distances. (Dale 2020)

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Figure 79 The Colab app source (Dale 2020)

This application contains three videos playing simultaneously. The recording or accessing of other layouts is left at the discretion of the user to finish their task. Collaboration feature: It only works on iOS 13.0, at least or later versions. It only works on iPhones, iPads, and iPod Touch. (Dale 2020)

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Figure 80 Roland 4XCAMERA App Source (Dale 2020)

Roland has developed an Android app that makes content on Collab and similar services a breeze. 4XCAMERA is a mobile app for both Android and iOS. The music videos created can have up to four musicians displayed on the screen. First, an app user makes a single video; this is the standard. The addition of one to three more performers adds their parts. (Dale 2020)

Recording can be made with the smartphone's built-in microphone or an external audio capture device. The new software version allows access to thousands of royalty-free footage videos, including those involving live percussions. This will enable users to record soundtracks of their own choice and create as many as they want. The free version allows the user to make two video contributions, while the premium edition gives full access to all functions of 4xCAMERA.

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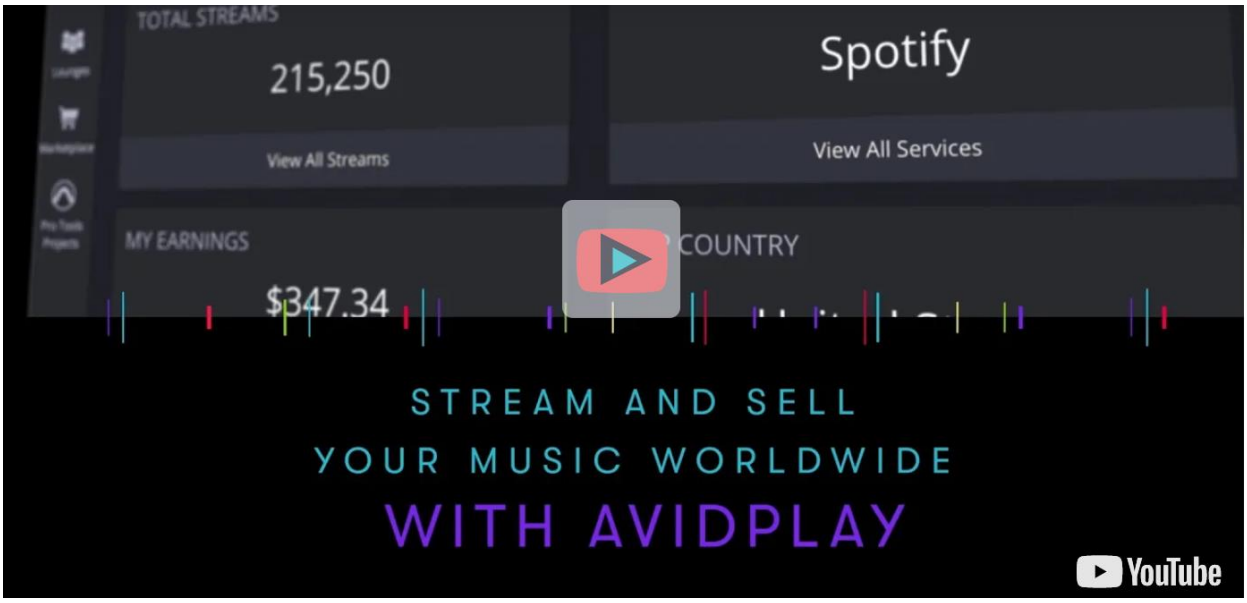

Figure 81 the AvidPlay App Source (Dale 2020)

AvidPlay, a joint product of Avid and Dolby Laboratories, is responsive to the demand for solutions since the tendency is that more and more artists look for ways to bring their art in front of more people. Only recently has a partner released a game-changing way of self-directed music distribution. This will allow independent artists, producers, and record labels to distribute their music in Dolby Atmos® to popular streaming services such as Spotify, Apple Music, Amazon Music, and TIDAL. Through AvidLink's mobile or desktop app, customers will log into an AvidPlay subscription package. In return, they will upload the final Dolby Atmos Music masters and artwork. (Dale 2020)

AvidPlay allows consumers to create tracks and albums from any DAW supporting Dolby Atmos; this also goes for Avid Pro Tools. One can upload their music to the AvidPlay interface to properly handle and oversee tracks and albums. AvidPlay gives members a clean dashboard to manage their

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finances and fully control their rights and income. These are just three examples of several innovations developed throughout the COVID-19 pandemic.(Dale 2020)

6.11 Examples of Business Innovations in the Post-COVID-19 Era

The pandemic year 2020 changed the business environment drastically into a technology-driven and digitised one. If there is anything that shook industries such as health, customer care, and manufacturing to their core, then it was the stringent lockdown by governments across the globe. Therefore, it has accelerated the digital revolution, making information handy and crucial, creating magnificent tools and resources. (Merriel 2021)

1. Remote medical consultation and treatment using telecommunications technology.

The 2020 edition globally implemented virtual treatment modalities to avoid face-to-face contact by patients and healthcare practitioners. Telehealth and remote health monitoring services provide linkage between patients and healthcare providers through the use of modern technologies. (Merriel 2021)

Telehealth services evaluate patients demonstrating symptoms characteristic of COVID-19, monitor patients after being discharged from the hospital, engage in physical rehabilitation, conduct low-risk urgent medical care, and many more. (Merriel 2021)

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Still, before the coronavirus breakout, some doctors hesitated to integrate telemedicine into their medical practice. However, live video consultations between patients and healthcare practitioners have been highly effective. Moreover, wearable technology is becoming famous for monitoring incidents of COVID-19 victims.

Video communication-based therapy, known as teletherapy and virtual exercise, has had vast participants since the pandemic, and they will be long-term trends. (Merriel 2021)

2. Telecommuting

Wide acceptance of telecommuting has helped accelerate the implementation of digital infrastructure and flexible and dynamic office spaces. (Merriel 2021)

As traditional fixed offices start to wind down, more and more firms are moving into pop-up offices and temporary office space. The former options are a better and more cost-effective way of doing business. Moreover, in-house associations worldwide were introduced to agile, cost-effective virtual offices when they turned to remote and hybrid work arrangements. The demand for this type of workspace thus became very high throughout 2020. (Merriel 2021)

Because COVID-19 has disrupted operations, companies can finally do without the costly traditional workspaces irrelevant to modern business needs. Contributing to Remote Work Using a Virtual Office (Merriel, 2021)

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3. Remote Learning Technology

The Covid-19 pandemic has caused waves of closures of learning institutions worldwide. As such, all governments across the globe should provide distance-learning alternatives to ensure the well-being of students is guaranteed as they finish the 2019-2020 academic year.

Although remote learning is solely applied to an educational setting like a school or a university, it can also be used in a work setting.

This can be made possible by the online learning platforms through the optimisation of their training, and this can be of great help, especially now that there are more cases of distant employment. Various online courses can sharpen workers' abilities, hence advancing their careers. Several companies will provide online sites containing and saving learning resource materials for employees to log in and access them at will. There has been incredible growth in language programs, virtual tutoring, and online learning tools in the last year. (Merriel 2021)

4. Introduction of Automatic Manufacturing Processes

The COVID-19 pandemic has taken a heavy toll on the manufacturing industry. It has caused different manufacturing firms to reassess their products and processes. According to the report by PwC, the manufacturing sector is very exposed to the risks since most of its staff hold on-site jobs that cannot be performed remotely. By nature, the producers within this sector should deploy

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mechanisms that will promote social distancing in working environments heavily populated by employees, such as production sites, warehouses, and logistic operations. (Merriel 2021)

Nonetheless, due to the COVID-19 pandemic, the manufacturing industry has been able to enhance and facilitate production processes through the construction of smaller facilities that can be more easily automated with highly innovative technical systems that enable producers to make quick adjustments in their lines of products depending on the demand of the product. Moreover, such changes offer additional opportunities to manufacturers of automation components. (Merriel 2021)

5. E-commerce and online grocery shopping

Home deliveries are therefore anticipated to be more frequent in civilisation post the epidemic. The crisis made people take a second look at the way they access food. The pandemic marked an incredible turn of events in the home delivery business. Online grocery and electronic commerce firms became very profitable. Many people experienced online grocery delivery for the first time during the lockdown. (Merriel 2021)

A new report by Deloitte indicates that panic-buying has reduced as people become accustomed to new standards of supermarket shopping. A distinct shift in how people shop has occurred, with most relying on online platforms and home delivery services. Because this change in customer expectations about grocery shopping is permanent, all the companies involved in grocery are now facing a challenging benchmark to meet to be successful. (Merriel 2021)

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E-commerce activities have increased remarkably due to the pandemic, as transactions move from high-end products and services to essential commodities. (Merriel, 2021)

6. Enhanced Customer Experience

The COVID-19 pandemic has dictated that the actual definition of customer service and experience be revisited. People became more proactive in seeking additional knowledge and support that would help overcome new challenges, such as which products would best safeguard their families during the lockdown. With retail closures and physical distancing presenting challenges to customer service delivery, customer concerns regarding shop closure, timings, and draconian measures for refunds and cancellations have increased a lot more than usual due to the current situation. Global organisations had to respond to these. (Merriel 2021)

Chatbots and virtual receptionists were significant drivers in ensuring a better customer service experience during the outbreak. Chatbots are software programs powered by artificial intelligence that is specially designed to assist and guide customers. However, even after COVID, the trend remains that customers still prefer to deal with a person rather than reverting to an automated piece of technology. (Merriel 2021)

Because of this, demand for virtual receptionists, work-from-home natural agents, is forecast to be very high as they allow fast, accurate, and complete customisation of feedback to the client. (Merriel 2021)

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7. Digital Entertainment

Since social distancing mechanisms have been established, event organisers and corporate clients rely on Zoom, Google Meets, or Microsoft Teams to handle their events. Virtual entertainment includes but is not limited to the following activities: Digital Storytelling, remote team-building activities, Seminar series, which include health and wellness programs, Children's parties, Fundraising activities, Corporate events, Product launches, and other similar activities. (Merriel, 2021)

Concerts, movie premieres, gourmet festivals, and art exhibitions have been cancelled, although most have been cancelled. Online events have been another matter; including those who cannot travel in person has been possible.

Therefore, many artists and organisers have been scaling up these events, including a much more significant online presence, proving people can still be engaged in virtual events long after the COVID-19 pandemic. Virtual event planners are inventing new ways to make large-scale virtual events possible. (Merriel, 2021)

8. Virtual Restaurants

Cloud kitchens, or ghost or virtual kitchens, are custom-built facilities that only prepare food for delivery or take-out orders. They provide a profitable business model by which restaurant owners

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can expand their businesses, enter new markets, or even try new concepts with minimised high rent, labour, design, and tableware expenses.

Shared kitchens are becoming increasingly popular. Shared kitchens are cooking facilities restaurant owners use, but another company owns the space and equipment. Most restaurants take orders through websites or food delivery services like Deliveroo or Uber Eats. Therefore, technology is essential in operating a cloud kitchen because it involves setting up a linked technological system to monitor ordering and payment. (Merriel 2021)

Cloud kitchens have seen increased adoption because they only require minimum money, give room for experiments, and have advanced technology that streamlines operations and ways of delivery. (Merriel 2021)

With the worldwide recovery, firms are reviewing their innovation strategy and looking for ways to adapt in these new times. The business innovations in the article below can provide solutions for the risk assessment and mitigation of climate change. For example, it may be time to update how we get around to minimise our ecological footprint. (Merriel, 2021)

Therefore, the many company innovations born of the mass lockout can strengthen the global economy as companies survive the current crisis and prepare for the future.

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6.12 Positive Environmental Effects of the Coronavirus

6.12.1 Overview

Air pollution is one of the significant health risks, killing 7 million people yearly. The COVID pandemic has reduced air pollution worldwide, specifically in industrialised countries, due to the lockdown of entire industrial areas and reduced traffic, which has decreased at least 5-10% of gases like CO2. The Wuhan lockdown reduced NO2 concentrations by 40% in the industrial zones of China. According to the European Space Agency Sentinel-5P satellite data, there were respective reductions in ground-level NO2 and ground-level O3 by 29% and 11%. (Mousazadeh et al., 2021)

6.12.2 Quality of air Contamination

Air pollution is one of the significant health risks, killing 7 million people yearly. The COVID pandemic has reduced air pollution worldwide, specifically in industrialised countries, due to the lockdown of entire industrial areas and reduced traffic, which has decreased at least 5-10% of gases like CO2. The Wuhan lockdown reduced NO2 concentrations by 40% in the industrial zones of China. According to the European Space Agency Sentinel-5P satellite data, there were respective reductions in ground-level NO2 and ground-level O3 by 29% and 11%. (Mousazadeh et al., 2021)

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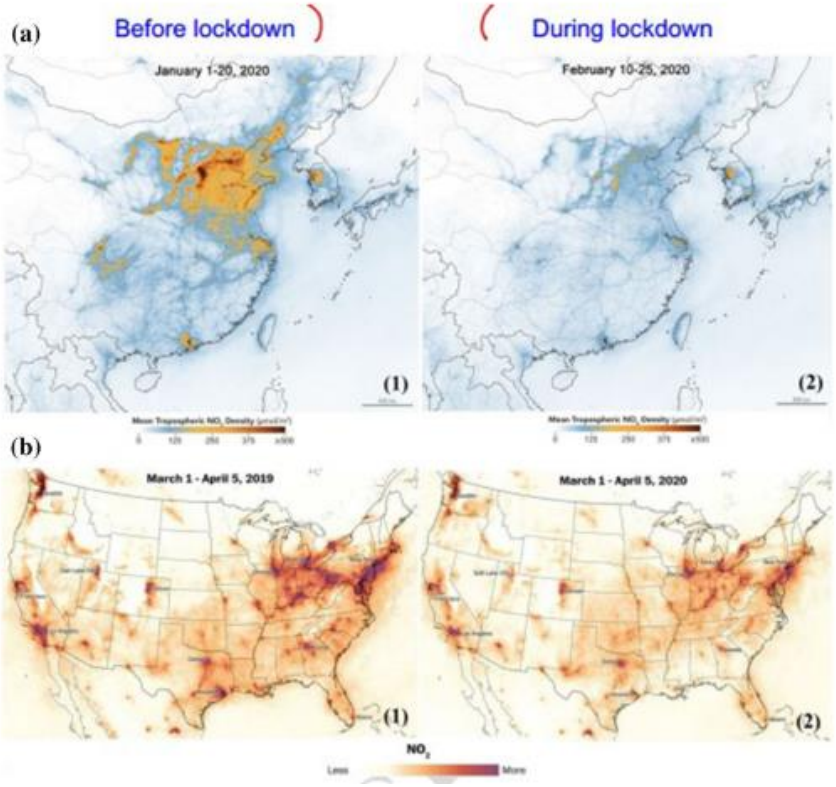

Figure 82 : Nitrogen dioxide levels in China, before and during lockdown and in the USA in 2019 and 2020. (Mousazadeh et al., 2021)

The pandemic, however, reduced the levels of most air pollutants. New evidence has shown a positive association between long-term exposure to polluted air and COVID-19 mortality. Long-term exposure to contaminated air causes inflammation of the lungs and respiratory disease. The interventions for improving air quality should be designed to reduce the intensity of the COVID-19 pandemic and optimise air quality to reduce health pressure during the pandemic. (Mousazadeh et al., 2021)

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6.12. 3 Wastewater and Surface Water Quality

The purity of surface water in areas such as Venice's canals and Indian rivers has been substantially enhanced by the COVID-19 pandemic. See the figure below.

Figure 83 Venice lagoons and waterways quality (top) in 2020 and (bottom) after a month of pandemic lockdown in 2019. Due to the lockdown in Venice, Italy's canals, in March 2020. Source (Mousazadeh et al., 2021)

Reduced sediment deposition and TSM provided greater water transparency for aquatic organisms. This resulted from the imposition of different lockdowns by countries. By reducing effluent discharge, the Indian government has conserved the water quality. As a result of the industrial suspension and closure, the Ganga River in India water quality improved more than fivefold. However, the coronavirus can affect the effluent of the population; therefore, WBE is essential in

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making the line between undiagnosed and successive diseases. Further research should be conducted to enhance the possibility of detecting SARS-CoV-2 in effluent. (Mousazadeh et al., 2021)

6.12.4 Transportation and Traffic

The COVID-19 pandemic has dramatically changed transportation, and the operations of commercial flights have reduced. Urban transport demands, including passenger and public transportation, have also been reduced. However, this reduced the amount of fossil fuel consumed by the transport sector. Public transport demand fell by 90% in Europe, while European demand for aviation fell by 80%. The United Kingdom recorded a decline in road traffic by 73%. It also helped the environment since the workers did not have to drive to work or use public transport. However, the long-term effect of the pandemic is still a task to evaluate. (Mousazadeh et al., 2021)

6.12. 5 Conclusion

COVID-19 has dramatically impacted the global environment, with reduced nitrogen oxide emission by 20-77%, as well as CO2 emission, particulate matter level, and CO level due to the lockdown. Global aviation industry. The aviation industry implemented strict lockdowns in some areas, slowing the flights. The United States passed strict regulations that reduced flight prohibition by 50%. In 2020, fossil fuel consumption decreased by 4 percent, while that of coal dropped by 8 percent. The congestion in traffic was reduced by 50 percent, while water quality improved by up to 79 percent. In many nations, the requirement for conventional energy sources, such as electricity,

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has been reduced by almost 30 percent. Notwithstanding the socio-economic upheavals, the positive ecological impacts of COVID-19 underline the need for better environmental management in the future. (Mousazadeh et al., 2021)

6.13 The Fourth Industrial Revolution Increased in the use of AI.

The pandemic has accelerated investments in AI for organisations, particularly in retail, education, and healthcare. Enhancements to remote work, improved consumer experience, and cost reduction have characterised these developments. As such, 41% of organisations have increased the speed of their AI strategies owing to the pandemic. In 2020, AI was considered one of the critical factors of success, and many have already benefited from it. (World Economic Forum 2021)

Changes across industries are also being driven by AI, where even retailers feel the rise of no-contact pick-up and delivery of meals, appointment reservation systems, and more autonomous stores. As for educational innovations, smart-learning technology powered by AI pulled off fantastic strides to generate digital content that became differentiated from those created by humans. It is also applied in the healthcare sector through contactless check-in options for patients who need to visit hospitals. Chatbots are also used to help answer patients' basic questions. (World Economic Forum 2021)

AI developments have also played a significant role in detecting and diagnosing COVID-19, allowing doctors to make fast analyses on MRI and other imaging systems. The translators initiated

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the Translation Initiative for COVID-19, and without borders, they initiated TICO-19 in conjunction with several academic and industrial partners. It has been at the forefront of the global dissemination of critical information in as many languages as possible. (World Economic Forum 2021)

Now, with the world entering into a new era and coping with the changes brought forth by the pandemic, AI will be seen to be pivotal in COVID-19 detection and social distancing that is safe. This has brought interlocking between AI and our lives for the long-term, investing in increased AI and a more extended set of changes regarding our dealing with technology.

6.14 The pandemic Enabled the Church to Reach a Wider Audience

Religious congregations have been the most common social networks in communities for centuries, uniting people through their values and beliefs and physical presence in worship services, rites, and community activities. COVID-19, however, compelled religious groups to transfer these ties online through Facebook, Twitter, and YouTube. Although religiously affiliated organisations had not grown reliant on them before the pandemic, almost all U.S. congregations did so essentially overnight. (Bukovich 2020)

The construction of the virtual community and worship space began between March and December 2020 by religious communities. Social media serves as a record of the changes that religious communities have faced, including their initial closures, live feed experiments, and complete virtual worship during the early months of the pandemic. Most congregational leaders reported that

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live broadcast church services were a big adjustment because they only required minimal equipment, relatively low expenses, and were easy to use. Many more seasoned, more prominent leaders had blog posts and even production guidelines for those new to testing out this social media feature. (Bukovich 2020)

Reverend Susan Fortunato of Christ Church in Poughkeepsie, NY, shares her story of creating a comprehensive channel on YouTube, a website, and all the associated social media platforms to connect with her congregation despite the distances. It points out what religious leaders were being forced to change due to COVID-19, what is available to members currently online, how one gets further information if you are not a member, and that the channel serves as a central hub for outreach and information. (Bukovich 2020)

These implications are much more significant than the video's intention, showing the strong potential of outreach via social media, in this case, YouTube.

Social media platforms have been a critical way to share information during the COVID-19 pandemic. Another Seattle congregation that responded fast to the crisis was the Suquamish United Church of Christ. Their posts on Facebook from March showed how urgent the situation was, with eight cancellations. The frequency of their posts picked up indicates a greater need to share information. Nonetheless, their posts went down in a heavily toned concentration on virtual worship events and community events. The emphasis remained on information sharing how, what, when, where, and why with COVID-19 in their posts. Such posts during the pandemic went to

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bridge the chasm of using social media to establish a virtual community among religious communities. (Bukovich 2020)

Religious organisations have used social media sites to establish a community of believers online, an extension of the services, especially during the COVID-19 pandemic. Members discuss issues online and participate in other online events, enabling real-time connections with members they would otherwise meet physically. Across the country, religious organisations have established in-person communities that have become an extension of social media platforms such as Facebook, Twitter, and YouTube. For example, Peace United Methodist's "Minute of Peace" series includes posts on the importance of positivism and religion in dealing with the pandemic. (Bukovich 2020)

As platforms like TikTok and Instagram grew in popularity, religious organisations could grow by capitalising on the interest through even shorter-form videos such as "Rosh HaShanah services in under three minutes." They let congregations deliver religious experiences and details to people more easily understood to make it easier for the group to connect with young adults and teenagers. (Bukovich 2020)

Although not all religious organisations have seized these opportunities, early movers indicate an attempt to expand the virtual community across age groups and applications. As the pandemic continues, more religious organisations may begin to try out these options and grow virtual communities to Instagram. (Bukovich 2020)

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In summary, the origins of social media use for legions of congregations, outreach, and information sharing have birthed new virtual communities that preserve traditional communities while introducing new methods of religious experience throughout the United States and the rest of the world.(Bukovich 2020)

6.15 Homegrown Innovations. What happened in Barbados?

Before the pandemic, most business operations in Barbados were face-to-face and conducted using paper documents and large manual files. Most people went to restaurants or fast-food places to eat because home deliveries were few and far between. There was no online shopping and delivery. However, when the pandemic hit, all that had to change.

We could no longer go to restaurants or fast food places, so many of these businesses developed online ordering and home delivery. You could still go to your doctor for severe conditions, but doctors began to consult with patients over the telephone.

Because banks were closed, many transactions had to be done online. People who were never accustomed to paying bills online had to do so because no face-to-face locations were open for bill payment.

In the company I work for, the National Insurance and Social Security, we were accustomed to having our claimants fill out a physical form and bring it to us to be entered into our system so that

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we could make payments. However, that was impossible during the height of the pandemic, so we had to create online forms that people would fill out online and the data sent into our systems in real-time. This made for faster processing of claims.

Before the pandemic, we printed many checks. But, because there was no way to change them because the banks were closed, we upgraded our system of depositing money in the person's bank account so they could withdraw from any ATM or transfer it to any account Online. The COVID pandemic also got us into the area of web services that communicate across government departments. There was a technological revolution as many people used smartphones and computers to pay more.

One of the most significant changes was to move from face-to-face education to online learning. Before the pandemic, universities and colleges insisted on or preferred students to face-to-face classes. The pandemic caused the closure of all educational institutions, and therefore, everyone had to go online. This meant that educators had to learn how to cope and teach online, and the students had to learn how to navigate the various learning platforms used to impart the knowledge. Even though the pandemic has subsided, universities and colleges in Barbados have continued to use a blended approach to many courses, some entirely online.

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Chapter 7 COVID-19 Pandemic What was done and Lessons for the Future (Discussion)

7.1 Introduction

The pandemic surprised us, and we were unprepared for an outbreak at that level. Some of us denied that the pandemic was real; others took too long to take action. Some allowed fear to cripple them and their country. Some countries imposed draconian measures to stem the tide of the pandemic, while others had a wait-and-see attitude towards the pandemic. There were some things that we did right and some things that we did wrong. In the following chapter, we will look at what we did right and wrong and lessons we can learn from the COVID-19 pandemic that could help us in the future if we have another epidemic or pandemic of the same scale or worse.

7.2 What have we learned A Barbados Population Survey

A survey was given to the citizens of Barbados to see what they have learned from the pandemic, things we did right or wrong, and what could be done better. 100 respondents took the survey

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Question 1

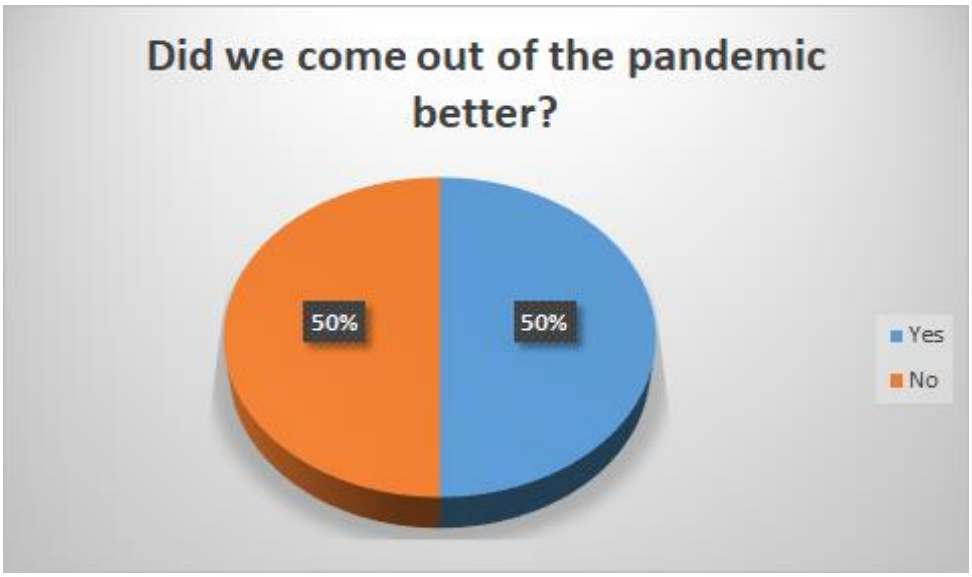

Figure 84 Chart Showing how Barbadians are coming out of the pandemic

Question 2

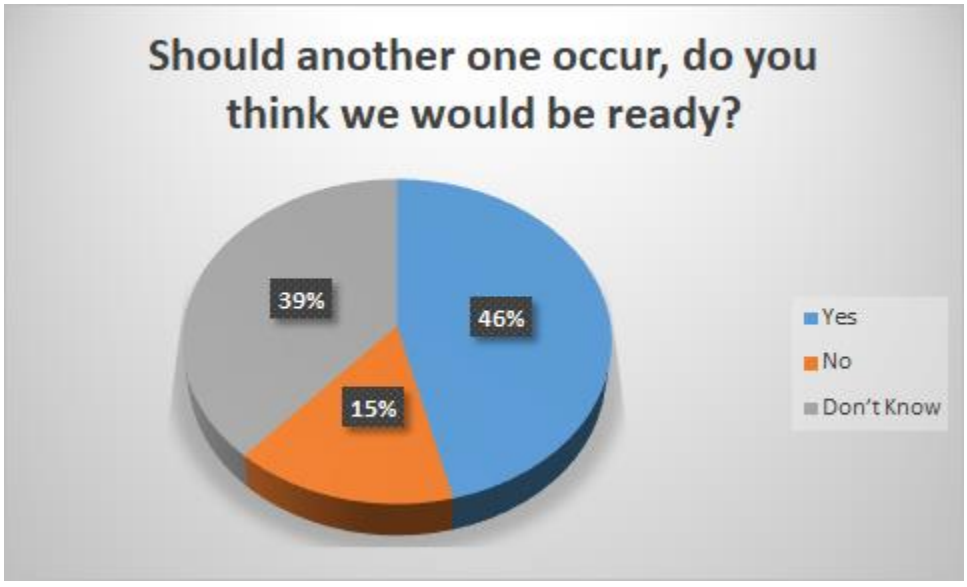

Figure 85 Chart showing readiness for the next pandemic

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Question 3

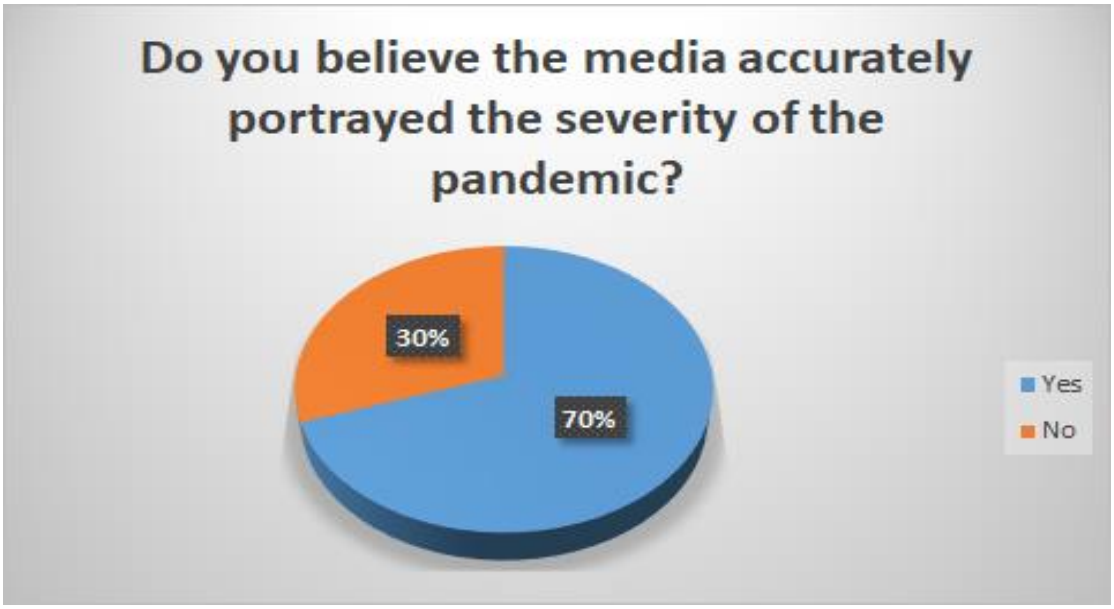

Figure 86 Chart showing media portrayal of the pandemic

Question 4

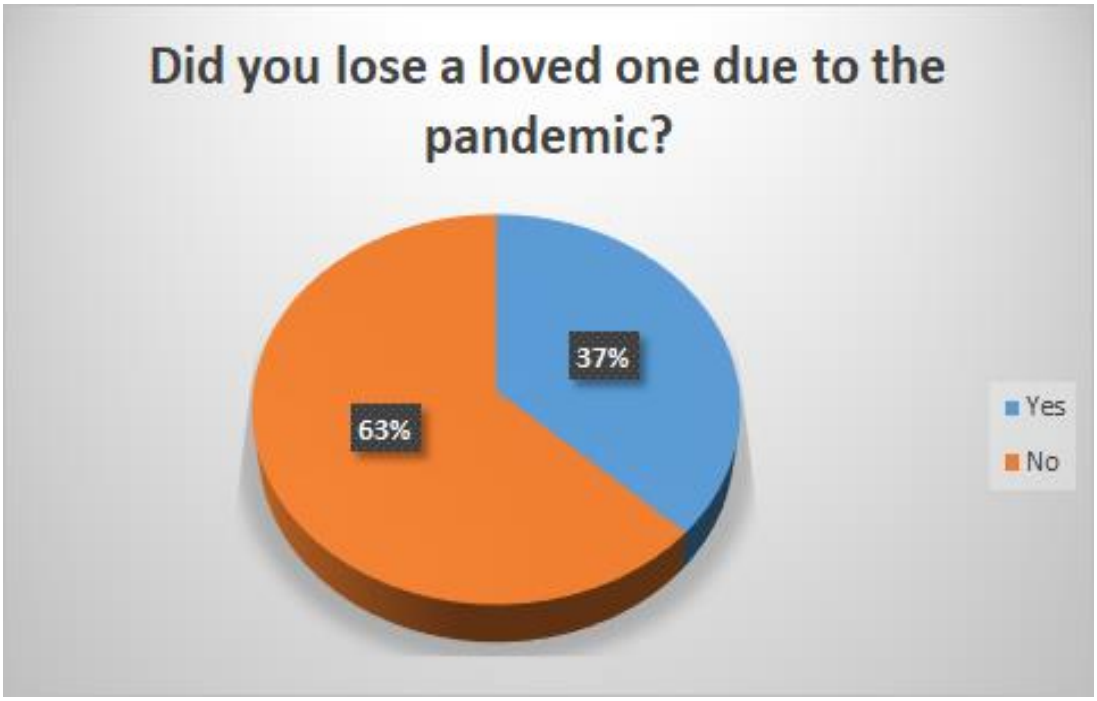

Figure 87 Chart showing persons who lost love ones during the pandemic

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Question 5

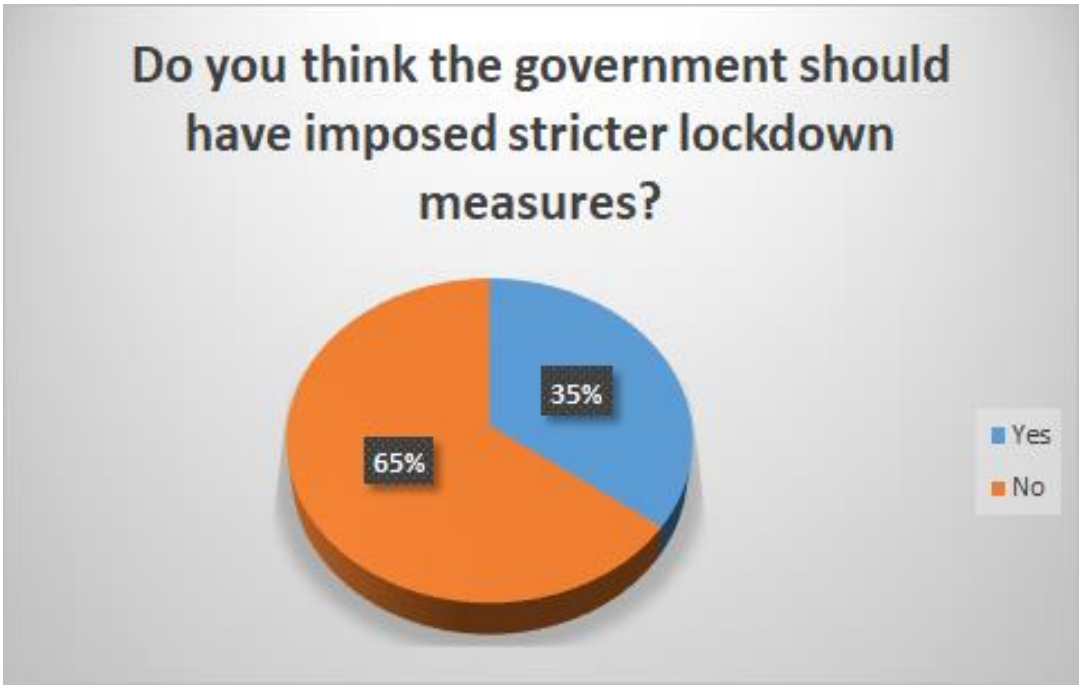

Figure 88 Chart showing opinion on government lockdown

Question 6

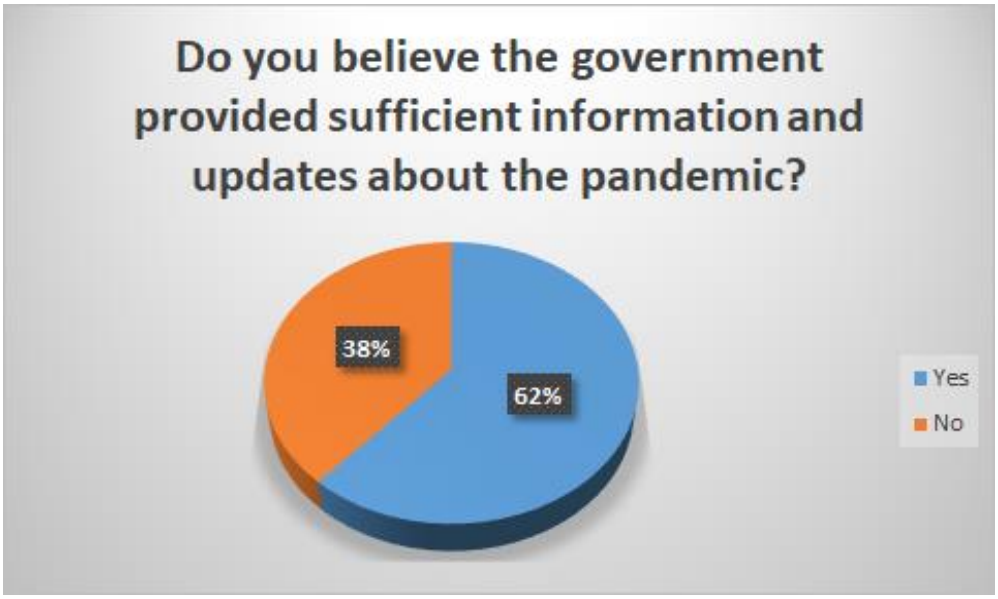

Figure 89 Chart showing opinion on government provision of information

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Question 7

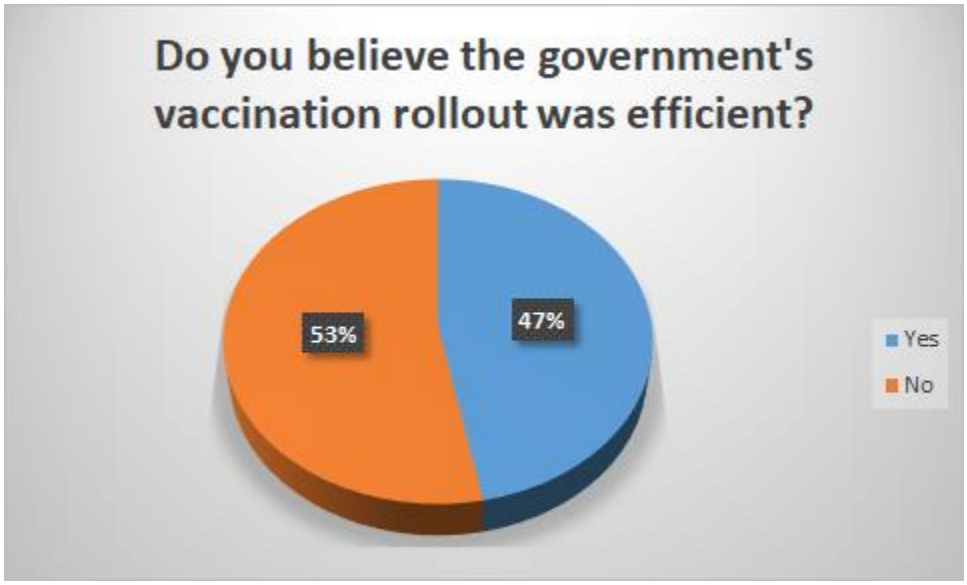

Figure 90 Chart showing opinion on government vaccine rollout

Question 8

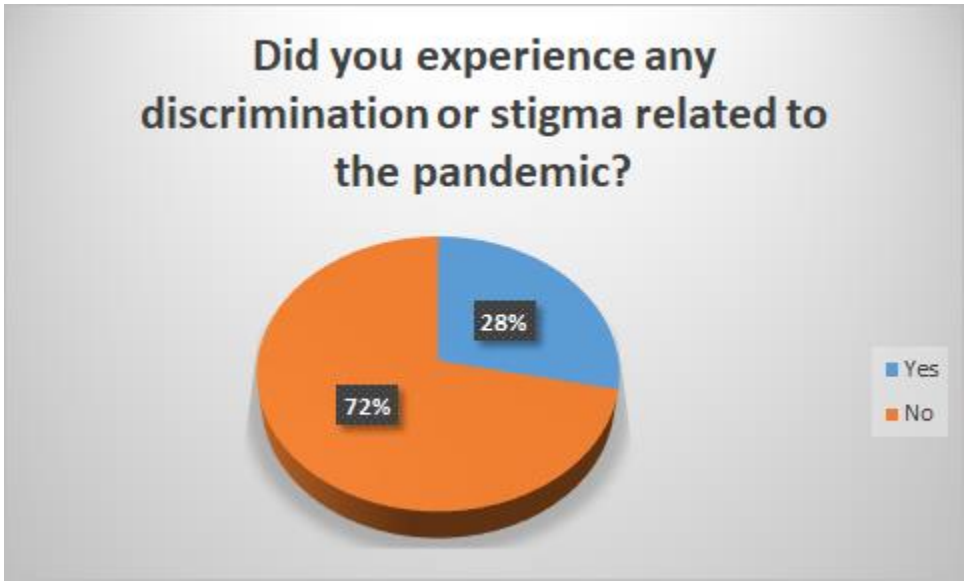

Figure 91 Chart showing reaction to stigma and discrimination

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Question 9 The COVID-19 pandemic was unexpected. How did we handle the crisis?

The COVID-19 pandemic was a shock and a disaster that needed a wholesome response from the government, individuals, and businesses. Governments would sensitise the public about transmission, management, and possible consequences of not observing the protocols laid down. Individuals were inconvenienced, though, with time, they had to adjust to wearing masks and restrictions imposed on them. This was an international disaster. The government, scientists, and businesses worked in vaccine production, and technology was implemented.

The Government of Barbados handled the crisis based on the guidelines provided by the World Health Organization. This allowed the population to adjust to the changes. However, it could have been more reliable regarding science and the human fighting spirit. The government and the people were diligent concerning adherence to safety measures, effective communication, and adapting to the situation.

The pandemic was quite well contained by the government and its people due to the strong emphasis on vaccination and rigid hygienic practices. However, areas of improvement did come up, and the situation got better with time as more information was gathered. Overall, the response to the pandemic was quite commendable.

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Question 10: is there anything that could have been done better?

Though responses to the COVID-19 pandemic in Barbados were not as expected, lessons learned can still be applied in the future. There is a need for the health sector to upgrade how it manages an ageing population by setting up better lines of communication and early warning systems concerning protocols. There could have been more transparency with the development of the vaccines, and remote work systems for staff could have been instituted. The organisation of polyclinics and facilities managing the pandemic could have been better. Human dignity and; freedom of expression should have been upheld; there is a potential for greater information sharing. Distribution of care packages and resource development planning could have been better. The government should have put the interests of its people first, as well as the potential for access to information provided. Better dissemination of results and advisories could have been practical. Agencies are advised to consider both compassionate and parental styles of communication.

Question 11: What lesson can be learned from the pandemic?

Yet, so much has been learnt from the pandemic for preparedness against other disasters in the future. This crisis brought its importance regarding the laws on private service transport vehicles, efficient utilisation of medical staff, and a national financial incentive plan at crisis funds down to the local level. It also brought into sharp relief the need for public transparency, faith in God, and effective policies to improve our health, the environment, and general welfare. Such pandemic simulations can help us learn from past crises and adapt to new situations. Those lessons learned

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include better preparation, mitigation against future disasters, embracing change and technology, and accepting mental health relevance and importance. The pandemic further made it clear that a playbook is needed to sail through pandemics, emphasising the need to prioritise our lives and be considerate toward one another. It also brought out the emergency teams, proper sanitation, timing, and the need to trust in God.

Question 12: What were the global effects of the pandemic?

The pandemic has shaken the world population hard, creating tension in all levels of society: mental, physical, emotional, social, and economic. It has put forward the need for cooperation globally and shown how an individual citizen is prone to worldwide events. Another impact of the pandemic is the entrenchment of distrust and conspiracy beliefs, affecting psychological development and sustainability globally. It has caused loss of life, limitations, and disruptions to various people's economies and lives. It has also caused an increase in domestic violence and depletion of resources in governments and also economic and social disruption. In addition, due to the pandemic, food prices have increased, food shortages, and losses in employment. It has resulted in a depreciation in educational standards and an ability to work from home, increasing anxiety, disorientation, and irritability.

Question 13: what impact did it have on the environment?

The lockdowns and closures did affect the environment, which came with attendant benefits: reduced emissions, less consumption of materials, and better air and water quality. Among the dire

implications are readjustments of protocols between countries and global leaders, increased plastic pollution, reduced litter due to reduced vehicular traffic, and reduced air pollution. Moreover, the lockdowns caused reduced usage of plastic gloves, drugs, and alcohol, as well as fraud cases, homelessness, and criminal activities. The economic impact of the lockdown needed to be more transparent because most small businesses closed down, leaving millions of people without jobs. The environment recovered a bit; in some areas, there was a slight decrease in global warming, regardless of these challenges.

Question 14: The hospitals were overwhelmed with cases of both vaccinated and unvaccinated persons. How was this handled?

Absolution overflowed hospitals with COVID-19 cases, vaccinated or otherwise. The management of these events was highly criticised as inadequate, some even claiming they were duly warned by the establishment of Harrison's Point Health Facility. Critical cases were attended first, and new hospital facilities and resources were established. There was a separate hospital for COVID-19 cases in Barbados, and it was considered to be excellent, but with too many deaths, the hospital has faced some problems. The separation with no proper science was not managed despite the hard work of the medical staff. The quarantining procedure was done to the best of our capacity, but some things could have been improved initially. Despite opening new facilities to assist the patients, the hospital needed to be equipped. The situation could have improved if the digitised information had been compiled and health personnel worked harder.

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Question 15: What measures could have been implemented to control the spread of the virus more effectively?

The respondents examine the effectiveness of measures to contain the viral spread through social distancing, increased surveillance at borders, and closure of borders. As improvements, the authors add more public information that could have been given as health regulations and stricter protocols. They also feel that the government should focus on solid borders and isolation from humans, spreading information amongst the people, and vaccination. It is also suggested that work-from-home be deployed earlier and more effectively. The author concludes with the remark that though the efforts taken by the government were appreciable, they needed more comprehensive and effective measures, including lockdown, more stringent protocols, and public awareness.

Question 16: What role do you think technology played in managing the pandemic?

Technology was the real driver during the pandemic because it enabled people to communicate and allowed the population to receive new data on the situation. It monitored the spread of the virus, consulted with doctors, dispensed health care, and worked from home. It has also played a key role in communication, keeping people connected and adhering to their regimens. The increased demand for virtual communication technologies and remote work has enabled the fast communication of critical information to the public. Social media allows social interaction, modulating information and its continuity. Technology also played a vital role in disseminating much-needed awareness by providing access to information, attending virtual meetings, and

joining online conferences. This helped immensely in keeping the channels of communication open and imparting education to students. After all, technology played a very vital role in combating this pandemic.

Question 17: What changes should be made to healthcare systems based on the lessons learned from the pandemic?

The lessons learned from the pandemic must see the Barbadian healthcare system adjusting by enhancing information systems, increasing the number of medical personnel, and upgrading polyclinics to emergency care status with improved people management systems. It should be able to serve the population's needs now and guarantee that the resources required by each polyclinic are made available to deliver health care in each parish. This can be done by alleviating pressure on polyclinics through the augmentation of appropriate hygiene, vaccine selection, and mobile clinics. More resources and specialised training must be provided for frontline workers concerning the safety and handling of daily operations. More assertiveness, medical support, and affordability in personal healthcare providers are imperative.

Also, additional medical personnel and larger institutions with enough fundamental supplies are required. Better infection control measures, proactive training, and better employee compensation are also needed. More 24-hour emergency polyclinics, flexibility

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Question 18: What are your thoughts on the long-term effects of the pandemic on society?

The long-lasting societal effects of the pandemic are that individual rights are not as they seem, possible harm to some people through isolation, global leaders' ability to plan and act when faced with a crisis, and education. Poverty around the globe and how far advanced renewable energy has come is also at stake because people are now distrusting science and the government because of the pandemic. Society has to recover and turn back to God to solve problems effectively.

The pandemic destroyed many businesses, created psychiatric or emotional problems, and increased the cost of living. In addition, it showed us the importance of technology infrastructure, the value of human contact, and how life can be so fragile. The vaccine should have been the people's choice, not mandated by the government.

Many others stay depressed and less socialised during lockdowns, while financial burdens and mental health issues persist. Society is going through an exhausting pandemic and still needs much more help. Other concerns include rising discrimination and deteriorating transport services and jobs.

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7.3 Mistakes Governments Made During COVID-19 and Their Effects on the Future.

The annualised risk of death from COVID-19 is increasing to 10%. It is estimated that 17.9 million deaths were attributable to COVID-19 worldwide. On the other hand, Russia, most Eastern European countries, some Southeast Asian countries, including Australia and New Zealand, and Norway have had some success. Peru, Bolivia, Ecuador, and most Mexican states have recorded the most significant deaths. The age-standardized excess mortality rate was divergent, and many regions performed well, including most of Europe, Canada, and Sri Lanka. (Murray 2022)

The global health community could have been more responsive to COVID-19 as governmental governments needed certainty about the virus's behaviour before any necessary action was undertaken. People like to wait and want to see what is happening as the watch level has to be raised to a very high level. There were no preparedness metrics because governments did not estimate their losses from false positive tests and, inversely, the costs of inaction. In this regard, only two variables explained performance meaningfully: interpersonal trust and confidence in the government. More precisely, greater trust predicted better vaccination rates and behavioural adherence to the norms set by the government. A pandemic strongly predicted success, but public perception and governmental preparedness should have been accounted for.. (Murray 2022)

COVID-19 has thrown up substantial obstacles regarding the herd immunity misconception being spread through vaccination. An Omicron variety was spreading fast and is supposed to regulate the levels of diseases effectively. It dropped to less than 5% by March 2022 for those not infected or

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vaccinated against COVID-19. Omicron was discovered to be more infectious than the Delta variant, and most of the cases were asymptomatic and mild. There has also been a gigantic burden on hospitals as a result of the pandemic because vaccines' effectiveness has dropped tremendously. (Murray 2022)

Other long-term consequences of the pandemic include disruptions in education, fertility decline, and perception by members of the public of the public's lack of trust in vaccines and masks. The COVID-19 pandemic precipitated a rebellion against public health measures, with some arguing that the public has been continuously misinformed about vaccine efficacy, risks from disease, and even the effectiveness of masks. (Murray 2022)

The UN will have to refocus on what matters in health hospitals and simple remedies and provide independent oversight of global health if it is to respond effectively to such challenges. Nevertheless, the struggle for the limited funds to fight antibiotic-resistant infections, climate change, and non-communicable diseases could intensify if governments are unwilling to sustain the present level of spending on health throughout the pandemic. (Murray 2022)

7.4 Lessons Identified for a Future Pandemic

The COVID-19 pandemic has underlined why a global and concerted response is needed to avert future pandemics. Strategic and operational resilience should be inculcated into public health initiatives to make the global population less vulnerable. The paramount goals of public health are the identification and control of transmission and care. Economic disruptions, including trade,

supply chains, and travel disruption, will likely increase social inequality and disturb international relations. Government investment is required in research and development, health infrastructure, and emergency preparedness systems. (Cunningham , Hopkins 2023)

Further investments in five main areas will be required to respond to a pandemic: infrastructure in health care, countermeasures, risk communication, and people and partnerships. For infectious diseases, scalable public health and health infrastructures are the staples of management during epidemics. This would include surveillance, genomics, diagnostics, and contact tracing. Digitalising electronic medical records and online surveillance systems enabled rapid reporting of the case finding, contact tracing, and identification of COVID-19 variants. (Cunningham , Hopkins 2023)

This would involve investments in laboratories, metagenomics, and rapid diagnostic assays with contact tracing in studying disease processes, early therapeutics, and vaccine studies. The operational capability to provide support for the performance of clinical research in emergent infections is already demonstrated by the International Severe Acute Respiratory and Emergent Infection Consortium. (Cunningham, Hopkins 2023)

A robust horizon search has to be adapted for all-hazard preparedness because the preparation of medications and vaccines will require a lot of time, be very expensive, and be complicated. Public health interventions need timely technical communications to maintain public and professional confidence and trust in government. (Cunningham, Hopkins 2023)

Future pandemic responses will need a multidisciplinary workforce equipped with the necessary skills to prevent, detect, respond to, and mitigate different hazards. (Cunningham, Hopkins 2023)

7.5 Healthcare Lessons Learned from the COVID-19 Pandemic

The fast response to the pandemic won developing countries some time. Many developing countries responded fast to the different secondary effects of COVID-19 by strengthening medication supplies and boosting health service provision to overcome the management challenges of NCDs. At a fast pace, countries implemented a system where some hospitals were declared COVID-19 centres while others remained regular, receiving NCD patients who didn't have symptoms of COVID-19. A good example is the mobile cabin hospital approach developed and executed by China, Serbia, India, and Indonesia. (World Economic Forum 2022)

Dedicated COVID-19 facilities guarantee the building of medical services for patients without symptoms of COVID-19. All in all, most NCD patients require long-term and timely medications. Pharmaceutical companies adjusted their policies to offer large packaging of medicines concerning NCDs. Local health commissions issued extended "long prescription" policies. (World Economic Forum 2022)

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People, prevention and technology

A three-pronged technology, prevention, and people strategy must be adopted to transition to integrated health systems in developing countries. These rapid responses can enhance equity, accessibility, quality, efficiency, and resilience. This includes models of care at the community level, digital integration models, and people-centred care. (World Economic Forum 2022)

Transformation of diagnosis and treatment process in a people-centred way

Patient-centeredness is one of the most significant defining features of integrated health systems. Good examples are its chest pain centres, which are dedicated to improving treatment efficiency and reducing the on-set treatment time of acute chest pain patients. Its Metabolic Disease Management Centres are committed to enhancing the follow-ups and management of diabetic patients. Its Cough and Wheezing Management Centres are dedicated to improving the quality of life of respiratory disease patients. (World Economic Forum 2022)

Improved productivity through innovation and development, together with the application of new technology

The pandemic has hastened the urgency for telemedicine and AI-assisted decision-making tools; these have put pressure on healthcare systems and, at the same time, bridged several medical gaps. For example, Halodoc, an Indonesian company, integrates e-commerce and ride-hailing with doctor consultation services through voice, video, or chat. AI can enhance primary medical

institutions' diagnosis accuracy and treatment efficiency. Imaging solutions standardised diagnosis and reduced time of evaluation. This collaboration between the government, the private sector, and international organisations could help policymakers apply the best NCD intervention and treatment pathways. The partnership should be based on learning and sharing to unite forces and efforts around the world. (World Economic Forum 2022)

7.6 Lessons From the First two Years of the Pandemic

In 2020, the World Health Organization (WHO) announced that COVID-19 was a pandemic that resulted in more than six million mortality cases worldwide. The pandemic has demonstrated that infectious diseases are a concern that affects the entire society, with indirect consequences on health, including delayed routine care, overstretched healthcare systems, and an increased mental health burden, becoming increasingly significant. Biomedical science has changed the emergency vaccine development paradigm by developing highly effective vaccines against severe COVID-19. (Carvan, Staples, Wilson 2022)

This, however, needs systemic change in dealing with endemic vaccine production shortages and its equitable distribution. Low-income regions plan to develop their local capacity independent of global agreements and extended supply chains, making allocation and manufacturing capacity for emergency outbreaks paramount. Building confidence in specific areas, such as biomedical science, is essential for an effective pandemic response, as trust is critical. The new basis for differentiation will be agility and rapidity, as emergent evidence necessitates policy and behavioural modifications. Research indicates that specific organisations have been able to more

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effectively address the crisis than others due to their agility and effective communication. (Carvan , Staples, Wilson 2022)

The pandemic has underlined how a global health crisis can be mitigated due to the personal behaviour of every human being. Since 2020, lockdowns and mask mandates have succeeded, although they were dependent upon the characteristics and interactions of people. Such hesitancy to get vaccinated led to a significant fraction of the population refusing it, which can go on to spread SARS-CoV-2. Across the world, lost schooling has disrupted mental health, upended families, and threatened a generation of children. Lower-income students needed to catch up due to inadequate replacement through online learning. The pandemic further underlined how essential workers need a new definition since their quantum and profile changed considerably during the pandemic. The missing link between the economy and the virus has resulted in a personnel shortage and calls for readjustment of office duties. Only new investments in disease surveillance, response systems, hospital preparation, R&D, and disease prevention can save future infectious disease threats from repeating the same mess. It will cost the global economy $16 trillion. Adapting to the current crisis and preventing future crises call for continuous learning and humility. (Carvan , Staples, Wilson 2022)

7.7 Ways to Prepare for the Next Pandemic

The COVID-19 pandemic has taken too much for us to learn, and the lessons learned put forth the need to support the entire chain of outbreak response and maintain global health security. This shall

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include monitoring zoonoses, sequencing at a worldwide scale, strengthening manufacturing, preparing vaccines for super-fast production, and bringing respiratory pathogens under control in preparation for future pandemics. (Sridhar 2022)

While the World Health Organization has identified several priority diseases with pandemic potential, many unknown pathogens are circulating in animals. Places of interaction between humans and animals need to be identified and risk reduced. The viruses need sequencing as they emerge so that diagnostic tests can be developed, along with vaccines and treatments.(Sridhar 2022)

Manufacturing ensures that the one billion vaccine doses and treatments are equitably distributed. Local manufacturing capacity requires developing infrastructure, including plants and training to operate such facilities. Intellectual property rights have to be waived before training and facilities are constructed. The private sector is a precondition for vaccine research, production, and distribution. (Sridhar 2022)

Pre-emission of vaccines for the rapid production process is paramount in containing and preventing the spread of viral pandemics. Regarding emerging threats, some resource allocation by the government should be dedicated to developing plug-and-play technical platforms and vaccines to protect against a heterogeneous range of variants. (Sridhar 2022)

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In other words, governments need to abandon the belief in the inevitability of a respiratory pathogen. Pandemic preparedness needs to maintain momentum and invest resources in these measures. (Sridhar 2022)

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Chapter 8: Conclusion Pandemics, Catalyst for Change.

8.1 Introduction

Nature always balances itself on planet Earth. I remember watching the movie Jurassic Park, in which they genetically made dinosaurs all females so that they could not reproduce. They also made them lysine deficient. Lysine is a protein that is essential for the survival of dinosaurs. This made dinosaurs dependent upon humans for their survival. However, one of the characters in the movie, a doctor called Malcolm, said that no matter what we do, nature finds a way, and that is precisely what happened as the female dinosaurs started laying eggs and reproducing.

Human beings have polluted this earth. We have over-exploited its resources, some even to extinction. We do not respect the laws of nature in their natural form. We kill animals for sport and fell trees without replacing them. We divert rivers and build dams, destroying the habitat of the area where these dams are built.

Nature is a relatively orderly and balanced creation. For example, nature occasionally prunes the forest by fire. This clears thick undergrowth and dead trees, allowing the rest of the plants to flourish. On the Savannah, grass fires always burn away the old grass, and the new growth replacing it is more nutritious and vibrant than the grass initially.

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In nature, there is control in the food chain. Herbivores control plants by eating them so there will be no vegetation overgrowth. Carnivores control the herbivores, preying on them so no one species dominates at another's expense.

Humans are at the top of the food chain. We are an ultimate predator. We have no other creature to control us. We believe that we can do all we will and nothing will bring us to our knees, but nature often teaches us who is in charge. At times, she throws at us a disease so rife that it paralyses us. Nature then uses these epidemics to give the planet a reprieve from being ravaged by humans, if only for a second

8.2 Why are Pandemics Necessary?

Pandemics, or wide-scale outbreaks of infectious diseases, have been part and parcel of human history, with enormous effects on human populations. On the other hand, even though severe after-effects of pandemics cannot be ruled out, they are necessary. In the paragraphs below, the potential benefits of pandemics shall be reemphasised.

Pandemics are justifiable on a relatively broad spectrum because they can spur scientific advancement and medical innovations. In many ways, pandemics push for new vaccines, treatments, or diagnostic techniques, which scientists and medical experts rush to apply to the awful challenges an outbreak creates. The need to find the right solution within the shortest possible time

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could lead to breakthroughs or even long-lasting effects in the scientific, medical, and technological fields.

Pandemics are essential to researchers in understanding how pathogens evolve and behave to develop more preventative measures and control strategies. Understanding how such diseases are, their dissemination, mutation, and behaviour within host populations is crucial. This is meant to unravel the intricate dynamics of infectious diseases and improve outcomes in public health accordingly.

Another argument that pandemics are necessary is that they determine the ability and flexibility of populations, be they human or animal. A pathogen could convey physical health and fitness to a population by either exposure to build natural immunity or the selection of resistant genetic variants. The pressures that the pandemic exerts are thus a fundamental drive of natural selection intrinsic to evolutionary biology and part of the continuing adaptation of living organisms.

However, pandemics also influence the societal and economic systems through which the institution of essential changes and adaptations are executed. Thus, it is noteworthy that, in 2020, COVID-19 accelerated telework and telemedicine and shifted several sectors. Systemically, this change may have a long-lasting impact on life sciences, thereby setting the parameters for future research, knowledge shared, and treatments delivered in healthcare.

Though one can't help but consider the destructive impact of pandemics, there is a strong case for their necessity.

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Pandemics move scientific progress and advance learning. They develop a population's resilience to these infectious diseases and sometimes even offer jump-starts for significant adjustments in society and economies. In recognising this diversity and, at times, the beneficial roles that pandemics can and do play, researchers and policymakers may hope to reduce their worst impacts while embracing the potential for pandemics to transform and improve human and planetary health.

8.3 Pandemics, Agents that Accelerate Change

Thus, the work commenced with whether pandemics were agents of destruction or catalysts of change. Indeed, the study has shown how pandemics disrupt human life within a short period after each pandemic, but the human race has moved faster than it would have had the case where the pandemic had not occurred.

The Medieval ages were especially bad for human sanitation. Humans and animals existed together, with their waste thrown randomly in the streets. Every kind of rodent and pest existed among the city's citizens.

Humans survived on agriculture in the 14th century, yet they seemed to explode in population. They were burdening the land; famine would have occurred if they continued. Besides, the life span at that time was much shorter. Then, the Black Death removed the diseased ones with weak immunity from the gene pool. As discussed at the beginning of chapter four, it was a process of

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natural selection and survival of the fittest. The ones who survived the pandemic had a more robust immune system, and better genes passed on to the next generation. Plagues of each disease following this were not as deadly to the population. They had developed some immunity against the plague. The successive generations led a healthier life and lived for longer years; therefore, all successive plagues could not wreak havoc in the population like the first one.

Wealthy landlords promoted a system of serfdom in the 13th century that drove people to work for a crumb and a corner of shelter on their plantations. A similar system was implemented in most European countries, so it made no sense to work elsewhere. However, after the Black Death, the population declined significantly. The wealthy landowners who had not died could no longer force the workers to work on the Estates. Workers now could demand a wage for their work and move from estate to estate in search of the highest wage. Some even occupied the lands left by the rich, who died from the plague. Peasants, who had never had anything before, could live comfortably, too.

Some even became very extravagant, buying expensive clothes and eating tasty foods. In the 14th century, women were endowed with little rights. Many could not hold land and were just being hired for jobs as bakers, maids, and many others. After the Black Death, such women found better jobs on large estates. They also got the right to own land and companies. That is where the birth of rights that women have today happened. Labour scarcity introduced mechanisation. Many mechanical inventions were invented to help in the work, most of which were the forerunners of our modern machinery.

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The church even benefited from the Black Death. Because of it, many other branches of Christianity came into existence, giving people a choice of what denomination they would worship. The people turned their faith away from the Catholic Church.

In the 19th and early 20th centuries, scientific understanding of these tiny organisms was just in infancy. The Spanish flu started people experimenting with the then-novel idea of vaccines that would help stop the rapidly increasing death toll from the Spanish flu.

Much later, after the flu had passed, companies worked to develop vaccines against it. The other research the scientists worked on regarding types of flu would lead to improved means of vaccine production and an unprecedented knowledge of the genetic makeup of viruses and bacteria.

Back in 1918, nobody could have imagined a wireless communication system like the one that many of us use today, at least on one cell phone or tablet connected to the network wirelessly. However, all this started during the Spanish flu when the Navy was issued wireless radio communications to call ships and warn them against this epidemic.

Most individuals speak of the greatness of the Renaissance, but many might not know that this occurred after such devastation caused by the Black Death. Due to mercantilism, a new order of capitalism had emerged. With money being so predominant after the disasters of the Black Death, many individuals invested significant sums into music, art, and architecture.

The other positive but lasting legacy of the Spanish flu pandemic is the development of health systems in most nations. From this experience, the medical community, which had been focused

on treatment following the infliction of diseases, turned to preventing diseases. Hospitals were built not only for the well-off class but also for the people. Currently, most countries have a national health system in place. While most of us are used to central heating, before the arrival of the Spanish flu, most buildings had fireplaces.

However, the medical opinion clarified that closing the building was unnecessary. The windows had to be kept open so that the air could circulate since closed rooms made the spread of Spanish flu more rapid.

The inventors designed a system of boilers and radiators that heated rooms from the inside to seal off the room, and during this process, the windows could be opened. This was accomplished using a steam heat system. Even though it is more advanced, we still use central heating today. You can use it with gas or electricity. It was improved because of the Spanish flu pandemic.

Also, sanitation and living conditions improved because of the great Spanish flu pandemic. Each family had a bathroom inside the house, the streets were cleaned, and everything was going fine. Little did the world know that in just a few months in 2019, it would come to a standstill because of a new pandemic called COVID-19.

We were pretty unprepared because it had been over 100 years since we'd had one. The latest virus took its toll on the human population while allowing innovation in searching for ways of defeating the virus.

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One good thing that came out of the pandemic was working from home. Before the pandemic, most employers required employees in the building to keep an eye on the workers. The lockdown in most countries during the pandemic compelled most employers to give the green light for employees to work from their homes.

This extended beyond the pandemic period for several companies are still allowing their staff to work at home. This would reduce their overhead, as they no longer need to maintain buildings and pay utilities for workers on the site. The pandemic also caused the education system to revert from face-to-face to online teaching. Many countries insist that university students need to have face-to-face contact.

Some students did not believe in online learning, but the pandemic compelled them to do it. It has also forced many universities that could never have imagined moving their programs online to do so, at all levels, from bachelor's to Master's and PhD. This might not have happened otherwise except due to the restrictions brought about by the COVID-19 pandemic.

The COVID-19 pandemic made many countries revisit their healthcare systems and work on their weak points, as the number of people entering their facilities overwhelmed them. The government spent money to enhance their healthcare systems. That might have happened over time, but because of the pandemic, they needed to fast-forward all these upgrades to cope with the number of people who had contracted the virus.

Religion has also somewhat benefited from the pandemic. Before the pandemic, not many churches held services online, as they met in buildings.

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Due to the pandemic, Innovation, creativity, and content creation, in that respect during the lockdown, could be streamed on social platforms. This grew the church population or congregation from those who came to the physical building to people anywhere in the world. Thus, more people heard the gospel during the pandemic than before.

Many people were compelled to change their vocation or occupation and acquire new skills. With curfews in place, most companies closed, and people lost their jobs. Hence, they had to learn something new to survive.

In most cases, this new field they ventured into was much better than what they were doing before the pandemic. Most of them did not return to their previous work. They continued in whatever field they had started. And because of the pandemic, many started small businesses to provide for their families.

One thing the pandemic caused was the making of vaccines in a very short period: Vaccines were never designed this fast using new technology. Although vaccines usually take years to develop and undergo a series of test processes before being approved for human trials, because the pandemic was decimating the world's population, vaccines were developed in record time to stem the proliferation of the COVID-19 virus.

Similarly, many innovations and inventions that never have occurred will be credited to the COVID-19 pandemic. The poorer countries could not get ventilators, let alone any of its associated medical equipment; therefore, local people would develop models of ventilators made

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from homemade materials or items found lying around in the house. Many even developed prototype ventilators, hoping they would become products made in their native country. If another pandemic breaks out, it will be easy for them and not depend on developed countries.

Given the reality of this pandemic, developed countries have been competing to order all that is available. Since they were given priority, there was not much equipment and medicine for poor countries. COVID-19 opened up creative talents for many researchers and inventors. This has led to people working on many projects that will help reduce the impact of the COVID-19 virus on humans.

This includes allowing people to purchase alcoholic beverages away from an eating establishment and take them home and easy access to legal cannabis by people. Many people benefited from the virtual check-ups. The doctor's virtual diagnosis saved them time they would have spent visiting the doctor. Most doctors continue this process even now, even though the pandemic has faded.

Many companies have started delivering their products to customers with robots since most people cannot go shopping due to social distancing. These robots take the recipient's GPS location and use it to deliver the parcels right to their doors. The only problem these companies faced was not producing enough of these robots to serve millions of willing customers.

Now, with QR codes introduced, restaurants would send people straight to a table. Then, they scan their code, get menus on the phone, select whatever they want, and service is quicker. Some

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places still work with that system. I had the experience when I visited Las Vegas in September 2024

Because transmitting COVID among congregated populations was much more likely, most cities set up public seating on sidewalks. States changed the law so restaurants could have outdoor seating, which became popular. Some cities and states continue this process.

COVID-19 accelerated the invention of many peculiar gadgets. One was a phone sanitiser, and the other was a necklace that warned of someone's presence. Many clothiers started making clothes with matching masks, and many others even used drones to disinfect larger areas.

Some gyms have established personal workout bubbles for those who want to work out. These bubbles are encased in plastic, so they can still join group classes but will not come into contact with other people, keeping a minimum distance.

Technology became the driver during the pandemic. Before the pandemic, most organisations had no online presence, but due to the restrictions and lockdowns, they had to take their services online. Some developments include cloud computing, computer and telephone interviews, and intelligent security. Most of the cyber providers use virtual reality and artificial intelligence. Some of the technologies were implemented or improved.

Some people enjoy concerts and even listen to music, but during the COVID-19 pandemic, most countries have passed laws against indoor gatherings and, in some places, even outdoor ones. The

music industry thus needed to adapt music to social media platforms to be able to sell or rent its musical content on Spotify, Apple Music, and YouTube. This is done by monetising their content so that the artist gets royalties for those who have played the music.

This was an amazing uphill task for bands and choirs, as they had to meet and practice; hence, companies developed software that allowed musicians to come together and play even at different locations. This allowed bands and choirs to come together and work on practising and performing a piece of music without being in the same area.

The pandemic has further boosted e-commerce and online shopping. The COVID-19 pandemic also ushered in what we would otherwise call digital entertainment. Events were thrown and streamed through Google Meet, Microsoft Teams, and other streaming applications. You have your virtual parties, virtual graduations, and such, but you also have things like virtual concerts, for which you even pay online to watch a concert.

There were ghost restaurants, better described as cloud kitchens, where food was prepared to be delivered or ordered out. Some of them remain, although the COVID-19 pandemic is not as prevalent

COVID-19 also gave that little breathing space to the Earth. Due to the pandemic, air and water quality improved, and in some areas of the world, which were once bustling with human activity, you could not see the bottom of some canals. These were now clear, and numerous animals started coming back to areas once occupied by humans.

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Because humans were grounded, the carbon footprint was less because no demand was placed on public transportation. That being said, the pandemic brought the fourth industrial revolution: the acceleration of artificial intelligence in every aspect of society not least in business, education, and government. This will spur one into realising that what has been learned throughout these various pandemics, from the Black Death to COVID-19, is that pandemics place humanity in a better situation concerning human brainpower, resiliency, creativity, and the invention of devices and methodologies that can help humankind deal effectively with pandemics. Research in the earlier chapters points toward how human civilisation progressed more post-pandemic than if the pandemic had not occurred. Therefore, I needed to respond to the question that originated at the inception of the research, and the response is that pandemics do work as catalysts for change and the effect lasting long after the pandemic has been long forgotten.

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