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Henk ten Have

The Covid-19 Pandemic and Global Bioethics

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For Felix Jansen, and all those born in the era of corona

Preface

The emergence of Covid-19 is a perfect example of a global phenomenon that affects everybody across the world. In 2020, it demonstrated its powerful effects on human well-being and healthcare, but also on all dimensions of human existence. It does not take long to notice that the pandemic is associated with challenging ethical issues. Exploring the Covid-19 pandemic from the perspective of global bioethics is therefore not an unusual decision. As many others have observed, writing a book during subsequent lockdowns, and even a curfew, is a bizarre experience. On the one hand, you are working in almost monastic circumstances, which is beneficial for reflection and study, on the other hand, opportunities to test and discuss ideas with students and colleagues are limited. At the same time, scientific research, at least for an expert in ethics and philosophy, has never been so untroubled since all relevant information is easily and freely accessible online, so that the latest scientific information about Covid-19 can be directly read without consulting libraries or providers.

It is obvious that this book is work in progress. Covid-19 is a moving target, and the virus continues to surprise us. New study data and research results are published every day. Yesterday's certainties become questionable tomorrow. Information in this book has been updated up to November 2021, and I am sure that numerous findings will change in the near future. However, the bioethical challenges will not alter so rapidly because they often relate to longer-term trends and moral principles with a long history of concern which have now found new relevancy in exceptional circumstances.

Although I have published extensively in the field of global bioethics, and particularly explored the ethical dimensions of vulnerability as well as the bioethical concerns in regard to biodiversity loss, Covid-19 is obviously a novel topic, and therefore an interesting subject to test and trace the theoretical and practical apparatus of global bioethics. I am grateful to Springer Nature for permission to use parts of earlier publications, notably "Sheltering at Our Common Home" (*Journal of Bioethical Inquiry* 2020; 17 (4): 525–529) in Chap. 6 of this book, and "Vulnerability in the Light of the Covid-19 Crisis" (*Medicine, Health Care and Philosophy* 2021; 24 (2): 153–154) in Chap. 9.

This book is dedicated to our grandson Felix who was born just at the beginning of the Covid-19 pandemic. He started to move around and talk when the country was in lockdown and social contacts were minimal. As grandparents, we created a "bubble" with his parents so that we could cuddle and watch him grow and explore the world while Amsterdam was exceptionally quiet for a long time. Following Millennials and Generation Z, he and others born during the Covid-19 pandemic will undoubtedly be a demographic cohort, a new generation that will face unprecedented challenges which are already present but will be more articulate. His early experiences may hopefully foster his sensitivity to solidarity and relationality.

Amsterdam, The Netherlands Henk ten Have
1 November 2021

We stand and embrace at the window, they watch us from
the street:
it is time, for this to be known!
It is time that the stone took the trouble to bloom,
that unrest's heart started to beat.
It's time for it to be time.

Paul Celan (1920–1970), *Corona*

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Chapter 1
Introduction: The Perspective of Global Bioethics

Abstract The Covid-19 pandemic is a global threat that requires collective and global action. The global nature of the disease calls for international cooperation and solidarity. It illustrates that a global bioethics perspective is needed to address the challenges of the pandemic that go beyond an individually focused ethics. The chapter shows how the book will provide a broader ethics perspective in order to highlight the significant dimensions of this global disease phenomenon.

Keywords Global bioethics · Globalization · Global South · Infectious diseases · Social ethics

1.1 Introduction

Covid-19 is an illustration *par excellence* of globalization. The virus does not respect national borders or political affiliations. Even when it started in a particular country, it cannot be contained. That highlights the responsibility of countries to be as transparent as possible because the threat is global. This is particularly urgent to prevent future pandemics, and not to blame or settle scores. In fact, many countries have enacted inadequate policies so that the whole of humanity has to learn lessons. In almost all countries, policy makers started with denial, disbelief and defensive strategies, underestimating the need for preparedness and prevention. Concerns about economic activity and productivity, as reasonable and understandable as they could be, seemed to come as first for too long. What is not recognized is that globalization has amplified human vulnerability. It has also exacerbated inequalities and injustices which is now reflected in the extent to which Covid-19 especially harms poor and marginalized people, particularly in the Global South.

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1.2 Global Threats

Early in 2019, the World Health Organization published a list of ten threats to global health requiring attention for the next decade [1]. Air pollution and climate is on the top of the list. It also includes infectious diseases such as global influenza, Ebola and other high-threat pathogens, dengue and HIV. The list has been the basis for the new 5-year strategic plan of the Organization (the 13th General Programme of Work), allocating three billion US dollars to transform the future of public health to ensure more access to health care, better protection from health emergencies, and make more people experience improved health and well-being. The 2019 list differed from the one published one year earlier. The number one on this 2018 list was pandemic influenza. In fact, the majority of threats on this list were infectious diseases, including cholera, diphtheria, malaria, meningitis, and yellow fever. The 2019 list was revised in January 2020. The most urgent health challenge in 2020 is now elevating health in the climate debate. Number 5 is stopping infectious disease, and number 6 preparing for epidemics [2]. It is obvious that the Covid-19 pandemic not only was not expected but also disturbed priorities and planning of global organizations such as the WHO. However, the WHO Director-General issued an auspicious warning just before the pandemic disturbed the world: "We need to realize that health is an investment in the future. Countries invest heavily in protecting their people from terrorist attacks, but not against the attack of a virus, which could be far more deadly, and far more damaging economically and socially. A pandemic could bring economies and nations to their knees. Which is why health security cannot be a matter for ministries of health alone" [3].

1.3 International Cooperation

Health care challenges as identified in the past are characterized by their global nature. Many challenges are interconnected and will require a coordinated international effort. As a global threat, Covid-19 requires collective and global action. Without international cooperation the infection can perhaps be mitigated in some countries but it can never be controlled as long as it is not carefully managed in other countries. It is therefore important to coordinate activities, to engage in international research, to compare and improve policies, and bring together scholars and researchers. The global nature of the pandemic also calls for international solidarity, focussing not merely on domestic interests but on the well-being of the human community.

Responsibility, vulnerability, solidarity and cooperation are fundamental values. Their importance is now articulated and rediscovered in the experiences with Covid-19. The usual ethical emphasis on individual autonomy and personal responsibility is no longer sufficient in the face of this global threat. What is needed is a

broader perspective of bioethics that emphasizes that the planet is our common home, and that human beings are interconnected in a world-wide community.

1.4 Ethics and Health Care

Health care practitioners are not objective technicians intervening in the patient's body, attempting to repair physical defects in the corporeal mechanism. They are not like engineers or architects who work with materials or develop new constructions. Their work is focused on patients as persons who suffer, are impaired, and sometimes mortally ill. Of course, health professionals need to be experts, have the latest scientific knowledge, and base their interventions on evidence and experience. But, first of all, they need to care, be engaged with what bothers their patients, and show empathy and concern with their predicament. That means that they have to establish relationships with patients, and be primarily driven by the interests of their patients. This explains why medicine, and health care in general, has been associated with ethics from its very beginning, not only in Western cultures but also in Islamic, Chinese, Indian and traditional cultures. While it has more recently developed into a science, it has always remained a moral profession.

The concern with ethics in health care was significantly transformed in the 1960s and 1970s. Until that time, ethics was considered as professional ethics. At least some health care practitioners wanted to distinguish themselves from others by a commitment to high moral standards so that patients could trust them. In the nineteenth century, medical professional organizations adopted codes of conduct, emphasizing professional responsibilities and duties rather than personal commitment and virtues. Professional medical ethics came under pressure after the Second World War. Health care professionals were increasingly criticized since they were often concerned with self-interest and protection of their profession. Advances in medical research and technology enormously increased the power of medicine. At the same time, the social and cultural environment changed, with concerns for the rights and values of patients, contrary to what has more and more been regarded as medical paternalism. These developments led to a transition from medical ethics into a broader ethical discourse. This transition became evident in a new vocabulary. In the 1970s, 'bioethics' was the new catchword. Coined in 1970 by Van Rensselaer Potter, the new term rapidly expanded in scholarly and public debate [4]. It indicated that ethical concerns were not only the business of health care professionals but of everyone. Many ethical challenges were beyond the professional orientation on good conduct, duties and virtues. They were often associated with questions of life and death, reproduction, limits to treatment and intervention, and allocation of scarce resources. These questions were the concern of all citizens. Ethical debate therefore increasingly took place in the media and policy fora. This broadening of the ethics debate encouraged the growth of bioethics as a new discipline with specific institutions, journals, committees, and experts [5].

The expansion of bioethics during the second part of the last century unquestionably influenced health care. Guidelines, regulations and legislation proliferated in most countries, while medical practice was also shaped by ethics committees and moral case deliberation. Ethics teaching was generally introduced in medical education. However, bioethics was increasingly criticized, particularly since the 1990s. Its dominant approach applied a limited set of ethical principles, often prioritizing the principle of respect for individual autonomy. The social, economic, and political context of bioethical problems was not frequently addressed. Environmental ethics was considered as a separate area of applied ethics. Simultaneously, under the influence of processes of globalization, medical research and healthcare internationalized, and new problems emerged such as biopiracy, brain drain, pandemics and organ trafficking. This global dimension of health care and its challenges put into question the feasibility of the approach of mainstream bioethics as originating in developed countries. This criticism of bioethics was anticipated by Potter. In his view, bioethics may signify a new approach but it was in fact medical ethics under a new name, and not innovative enough. First of all, it is restricted to the medical, especially clinical setting, focused on individual survival and short-term solutions. Second, and in connection to this point, it emphasizes individual autonomy, rather than public health or the common good. Third, it does not address environmental and social issues. And fourth, it is concerned with problems that are specific for developed countries, lacking a global perspective. In Potter's view, the most important problems of our time are population growth, war and violence, pollution and environmental degradation, poverty, short-term politics and the uncritical belief in progress. These problems are vital since they jeopardize the survival of humanity. To guarantee that there is a viable future for our children and grandchildren, a new type of wisdom is required, based on combining biological knowledge and human values. This is, according to Potter, the basic mission of bioethics. In order to clarify this, and to show that more is needed than a reformulated version of traditional medical ethics (under the now fashionable label of bioethics), he launched the new term of 'global bioethics' [6].

1.5 Bioethics as Social Ethics

Global bioethics is an emerging discipline with a broader scope than mainstream bioethics. In ethics in general, and bioethics in particular, the primary moral question is: what should *I* do? In global bioethics on the other hand, the basic question is: what should *we* do? Global bioethics, in other words, is social ethics. This social-ethical nature of the global ethics discourse is first due to the fact that global bioethical problems have a specific character. If a poor or uninsured Covid-19 patient does not receive appropriate care, there is a moral question: why is that patient not receiving care or treatment that can benefit him or her, and how can this be justified? But the moral problem is beyond the level of individual cases. Global bioethics assesses the more general issue: why do people not have access to care and medication when

they are poor or marginalized? The fundamental moral challenge is generic and global. The problem manifests itself at the level of individual patients, but it cannot be restricted in ethical discourse to individual cases. Normative analysis requires a broader perspective. Second, global bioethical problems are not addressable by individuals. Even if individuals could address them, it would be unfair to leave the problem to individual management since individuals have not caused these problems. This is clear in the case of climate change. Global warming affects many countries, particularly in the Global South, when the changing climate is primarily associated with the life styles of populations in the Global North. Global threats cannot be addressed by individuals but require cooperation and solidarity. Third, while the global bioethical principle of respect for diversity demands that people take into account diverging moral views, international cooperation and global governance aimed at addressing global challenges such as pandemics require agreement on basic ethical principles. The need for global governance, therefore, implies the search and development of common perspectives that provide a basis for practical actions. Global bioethics is not merely theoretical reflection. Due to the confrontation with serious challenges to health, global bioethics is forced to apply its ethical framework in practices and policies, even if this framework is shaky, uncertain, and provisionary. The need for governance will require continuous reflection on the basis of everyday experiences. Fourth, the social nature of global bioethics is articulated in its basic ethical principles. Being 'global' means that a bioethical problem is affecting in principle all human beings wherever they live. Of course, problems challenge individuals, who have to determine what they ought to do in response. It is evident that global problems can be translated into individual ethical problems. But as typically global phenomena they do not first of all present ethical challenges at an individual level. One conclusion from the global nature of contemporary bioethics problems is that they force us to go beyond an individually focused ethics. The implication is that global bioethics needs to articulate ethical principles that transcend the point of view of individual moral agents. This is also why global bioethics differs from mainstream bioethics. The debate cannot merely focus on potential treatments and new vaccines that will benefit individuals but also has to take into account the social, political, and economic contexts in which for example pandemics emerge and expand, and in which some groups of people are more affected than others. The final reference should be humanity, not the autonomous individual. The fifth and last reason why global bioethics has a social-ethical nature has to do with the sources and roots of the global problems with which it is confronted. Contemporary global bioethical problems are not simply the result of globalization as such but of specific processes of globalization that are primarily driven by economic motivations. In contemporary economics and politics 'market' has become the dominant metaphor for the organization of social life, encompassing everything, from transportation and research to healthcare and education. Competition rather than cooperation is the core value. It is clear now that neoliberal policies have had a negative impact on global health. Social inequalities have increased. The damaging effects of these policies are particularly clear in the breakdown of healthcare systems in many developing countries. Reduced expenditures for health and social

services, privatization of care, lower salaries for healthcare workers, and introduction of user fees for patients have reduced access to health services for the majority of populations. In Latin America for example, health reforms have increased inequity and inefficiency. Entire populations are deprived from necessary treatment and medication, simply because the prices are unaffordable [7]. Globally, each year, two to three million people die of tuberculosis. Effective treatment exists but 79% of tuberculosis patients do not have access to appropriate medication [8]. Against this backdrop, global bioethics is redefined as a *social* ethics. If global problems are produced within the context of broader political choices and patterns for human relationships, it will be inevitable to critically address this context. If global bioethics wants to understand and resolve the global problems that human health is facing, it, therefore, needs a specific normativity. This book will explore this normativity and will argue that a broader perspective on moral challenges is needed on the basis of philosophical and anthropological reflections.

Global bioethics is not a ready-made product but a process. It is the aspiration to realize the universal in the local. But it is, first of all, a social ethics that goes beyond the view that ethics is primarily a matter of personal commitment and individual lifestyle. Global bioethics presents a horizon of reflection, analysis, and action that brings ethical principles associated with cooperation, future generations, justice, protection of the environment, solidarity, social responsibility, and vulnerability (back) into the debate of globalization.

1.6 Images of Globalization

The notion of global bioethics has two meanings. One is 'encompassing,' i.e. comprehensive and bringing together medical, social and environmental concerns. The other is 'worldwide' or 'planetary' [9]. Frequently, the planet is visualized as a lonely globe in outer space, articulating the experience that it is the fragile and finite common home of human beings within the universe. This image of the globe, powerful as it is, posits the Earth as an external object. It does not provoke the sense that it is in fact the habitat of human beings so that our relationship to 'environing' conditions is internal rather to external; we cannot disengage ourselves from our habitat; our lifeworld cannot be disconnected from the planet. The image of globe risks therefore to separate humans from the context within which they dwell. A more appropriate metaphor to emphasize this internal relation is 'sphere' [10]. Using this metaphor evokes interconnectedness, relatedness, and interdependency. This is also expressed in notions such as 'atmosphere,' 'biosphere,' 'ecosphere,' and 'virosphere.' The planet is not just the dwelling location but the world within which humans live, in which they feel at home. For human beings, embedded in spheres, the environment is part of their lifeworld. The notion of sphere presents the world as lived experience, perceived and understood from within. The human world begins in the local rather than the global because the spherical view accentuates embeddedness, and thus locality. Globalization therefore is not an external process that

impacts our common globe; it concerns the human world, the *mundus*, expanding the life world through global interaction and cultural diffusion. This is why *mundalization* is sometimes proposed as a better term for global processes [11]. Mundialization (as expressed in the French 'mondialisation' and 'bioéthique mondiale') underlines the interchange and integration of ideas and values of people and cultures around the globe, rather than the spatial and geographic dimensions of the world as our home.

1.7 Overview of the Book

The first part of the book will discuss the experiences with Covid-19, showing why a move towards a perspective of global bioethics is inescapable. The pandemic has not only emerged as global phenomenon but is also associated with how human beings are interacting with the environing world. It is not the first time that humanity is confronted with pandemic diseases. Human life has always been marked by infections, since humans, animals and microbes cohabitate in the same world. But the advances of medical science have promoted the belief that these diseases can be managed and controlled, and sometimes eradicated through vaccinations and medications (especially early in life). Infectious diseases as lethal threats have become less frightening for many people. However, this is a cultural prejudice since populations in less developed countries are continuously threatened by infectious diseases. In fact, especially in developing countries, many more people are infected by malaria, dengue, and tuberculosis than by coronavirus until now. In 2019, just before the Covid-19 outbreak, 409,000 people have died from malaria, and 1.4 million from tuberculosis [12]. The second chapter will discuss lessons from history. Previous pandemics such as cholera in the nineteenth century have had a major impact on society and culture. The third chapter will examine the emergence of infectious diseases during the past decades. Diseases such as Avian flu, Ebola, and Zika have been an early warning for the current pandemic but the lessons have not been taken seriously in most countries. This is clarified in the fourth chapter, analyzing the policy responses across the globe. These responses are diverging and uncoordinated as if the viral threat has come as a surprise. Another characteristic of the pandemic is the gap between facts and values, elaborated in the fifth chapter. While public health measures need to be taken, scientific knowledge of the new disease is inadequate, and only slowly increasing. Facts are changing and evolving while often not taken seriously. In this predicament of uncertainty and ambiguity, policy responses are based on values such as individual autonomy, privacy, economic growth, and public security. What is most striking about the pandemic is its influence on human experiences. Human interactions are interrupted and intimate connections such as touching and meeting are disrupted and regarded as threatening. Especially older, sick and disabled people feel isolated and deprived of human communication. These effects of the pandemic on human experiences are discussed in the sixth chapter. It highlights the need to reflect on these experiences, and interpret

them from the perspective of philosophy and anthropology so that it can be clarified what they mean not only as a medical event but as a fundamental human reality.

The second part of the book (Chaps. 7 and 8) will examine the ethical challenges of the pandemic. It is clear that widespread infectious disease has confronted all societies, more or less developed, with serious trials of the healthcare system. First of all, in the domain of treatment. The overwhelming number of seriously ill patients initially focused the ethical debate on life-saving interventions. Hospitals and especially intensive care units saw a rising number of dying people as well as patients who needed long-term care. Less attention was given in the early stages to people in care and nursing homes. Basic protective materials such as face masks, gloves and protective clothing were not available. Most care homes were closed for visitors, isolating patients and reinforcing psychological problems. Thirdly, what is striking is the lack of preventive efforts, not merely prior to but also during the pandemic. The lack of testing equipment is illustrative for the impact of globalization; it shows that basic ingredients are now mostly produced in a limited number of countries. Similar challenges have confronted countries in the development, production, distribution and application of Covid-19 vaccines.

The third part of the book (Chap. 9) analyzes the implications of the Covid-19 experiences for bioethics as well as globalization. The Covid pandemic highlights fundamental experiences which have not received sufficient attention in bioethical discourse since this is primarily focused on individual autonomy, and the balancing of harms and benefits. Anthropological experiences such as vulnerability, connectedness and community, solidarity and cooperation have been articulated in the perspective of global bioethics, and should be better elaborated in post-pandemic bioethical debate. Pandemic experiences furthermore direct attention to the positive and negative dimensions of globalization. Especially neoliberal policies of globalization are nowadays scrutinized [13]. These policies have increased inequalities, so that marginalized populations are more severely hit by disease. They have also made health care systems less equipped to deal with public health challenges. The experiences with Covid-19 are raising questions about how the world will look like after the pandemic. Economies of all countries are depressed, and many businesses are severely affected. The global system of travel and tourism has been upset. The challenge is how these systems will be rebuilt when the pandemic is over. This question is particularly important in view of the other major global threat: climate change. Answers will depend on ethical articulation: what kind of values should be guiding the global community, and what kind of community should humankind pursue?

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Chapter 2
Pandemic Pasts. Experiences from History

Abstract The Covid-19 pandemic is not the first time that humanity is confronted with a sudden and lethal global disease threat. This chapter discusses previous lethal pandemics in human history. Examples of the Black Death in the fourteenth century, the cholera pandemics in the nineteenth century, and the Spanish flu in the twentieth century show that not only millions of people have died but that these scourges have also led to significant changes in society and culture. From these examples, patterns in the manifestations of epidemic diseases and in the responses to them are identified and examined.

Keywords Black Death · Cholera · History · Contagionism · Miasmatism · Pandemics · Plague · Public health · Spanish flu · Thucydides

2.1 Introduction

"In the first days of summer the Lacedaemonians and their allies … invaded Attica… Not many days after their arrival in Attica the plague first began to show itself among the Athenians. It was said that it has broken out in many places previously … but a pestilence of such extent and mortality was nowhere remembered. Neither were the physicians at first of any service, ignorant as they were of the proper way to treat it, but they died themselves the most thickly, as they visited the sick most often; not did any human art succeed any better. Supplications in the temples, divinations, and so forth were found equally futile, till the overwhelming nature of the disaster at last put a stop to them altogether" [1]. With this description, the Greek historian Thucydides begins his story of the plague of Athens, in the second year of the Peloponnesian War (430 BCE). He observed the sudden outbreak and rapid dissemination of a contagious disease, killing many people (possible one-third of the population) while no remedies were effective, and everybody, strong or weak, young or old, was affected. In modern times, Thucydides is acclaimed for his eyewitness account and his cool, accurate and detailed reporting as he carefully

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described the symptoms, their evolution and complications. In the Greek language, the word 'plague' or 'pest' is used for any epidemic disease in general, not a specific infection [2]. The precise symptomatology has led to many attempts to identify the nature of the disease. Now it seems most likely that the plague of Athens has been measles or perhaps smallpox [3]. Thucydides is most famous for his description of the moral and political consequences of the epidemic. Since the disease makes no differences among people, and no remedies are available, despair and a sense of doom are prevailing. Some people are abandoned, others receive care but all die. If they are not near to others, they expire in isolation. Courageous persons who care for one another face the same destiny. People lose all hope as soon as they realize that they are ill. Management of the disease is absent. Thucydides does not mention any efforts to control or mitigate the infection. Instead, scapegoating is usual. The disease is regarded as an outside enemy, arriving at the port of Athens, coming from 'Ethiopia.' It is also believed that the wells are poisoned by the Spartans as a kind of biological warfare. Leading statesman Pericles becomes the subject of growing animosity, and is put on trial but reinstalled a year later when he unfortunately died of the plague. His death led to the eventual loss of the war. Thucydides outlines how the disease was the beginning of the decline of the Athenian democracy. People became concerned with immediate pleasure and profit rather than sacrifices for the common good. Social disintegration produced increasing lawlessness and individualism as well as loss of moral standards. For example, funeral rituals which have been important in Greek civilization were abandoned. So many corpses accumulated that bodies were simply disposed off as quickly as possible without proper ceremonies.

In the Covid-19 pandemic Thucydides' book has become an icon for the interpretation of disaster experience, much like *The Plague* of Albert Camus and *The Decameron* of Giovanni Boccaccio [4]. *History of the Peloponnesian War* is read not simply as a candid narrative of what happened long ago but as a warning about what might result from general calamity. Thucydides vividly portrays the demoralization of the population and the collapse of the social, moral and political order. The way of life that characterized Athenian civilization was corrupted and traditional values undermined. The balance between private and public interests was compromised. Unregulated passions, short-term interests, and indifference to law and religion came to dominate social life [5]. The approach used by Thucydides strengthens this cautionary dimension. His reporting is considered as objective, although he has been a victim himself. He does not want to speculate about the origin and the causes of the plague: "I shall simply set down its nature, and explain the symptoms by which perhaps it may be recognized by the student, if it should ever break out again." The purpose of history in his view is instructive: it shows the world as it is or has been so that future generations might learn from the past.

This chapter discusses previous lethal pandemics in human history. Examples of the Black Death in the fourteenth century, the cholera pandemics in the nineteenth century, and the Spanish flu in the twentieth century show that not only millions of people have died but that these scourges have also led to significant changes in society and culture. While its causes were unknown for a long time, cholera for example

has been a major impetus to the development of public health, safe water provision and sewerage as well as hygienic practices.

2.2 The Black Death

The deadliest pandemic in the past has been the plague in the fourteenth century [6]. The disease originated in Central Asia (especially around the Tibetan Plateau), possibly disseminated through the Mongol conquest and spreading over Western Asia, the Middle East, Europe and North Africa between 1346 and 1353. Bubonic plague was known to exist in North Africa and the Middle East (first described in the Bible as well as in the Hippocratic writings), but it was not mentioned in Chinese and Indian history. The point of departure of the fourteenth century pandemic was the Italian trading city of Kaffa, a port at the Black Sea. From there it was transported by ships to commercial seaports such as Constantinople, Alexandria, Messina, Genoa and Marseille (in 1347). After arrival, the pestilence followed the main routes of trade and travel by land and sea, reaching Florence (March 1348), Paris (August 1348), London (September 1348) and Vienna (February 1349). Some cities such as Milan that took drastic measures (closing the city gates and isolating patients and their families in their houses) avoided a major outbreak [7].

The fatality rate of the plague is 80%. It is estimated that 60% of the European population died (50 million people) [8]. Especially the countryside was severely ravaged, more than the towns since there were comparatively more rats per human in rural environments. At this time, almost 90% of the population in Europe lived in the countryside. Between 1347 and 1497, the population declined with 60–65%. The disease was also dreadful because of its fast course. After the onset of symptoms, patients on average die within 14.5 h [9].

The horror of the pandemic was amplified because its cause and dissemination mechanism were unknown. Nonetheless, there was no lack of explanations: divine punishment, astrological events, and miasma (foul air). Interpreted as punishment by God, the disease necessitated penance and prayer, religious rituals and ceremonies [10]. The medical framework of miasma led to emphasis on sanitary measures such as purifying contaminated air. Physicians used special protective gear (with a beak filled with smelling herbs). It also led to the invention of quarantine in Venice, requiring arriving ships to wait 40 days before disembarking. The disease, however, was unstoppable, undermining religious and medical authority. God-fearing people died as much as other persons. Physicians could only advice to avoid the sick. The sense of helplessness was expressed by Petrarch who wrote in 1348: “When has any such thing been ever heard or seen; in what annals has it ever been read that houses were left vacant, cities deserted, the country neglected, the fields too small for the dead, and a fearful and universal solitude over the whole earth? Consult your historians, they are silent; question your doctors, they are dumb; seek an answer from your philosophers, they shrug their shoulders and frown, and with their fingers to their lips bid you be silent” [11].

Fear and the general sense of doom provoked by the pest fomented scapegoating. Especially foreigners, lepers and Jews were blamed and pogroms were common [12]. There also was the story of biological warfare. When the Mongol army besieged Kaffa, plague broke out. The Mongols then catapulted the bodies of dead victims into the city. This story of biological warfare cannot be true since bodies of plague victims are not contagious [13].

The effect of the plague was that everything stopped. People locked themselves in, and towns were closed. It was evident that the disease moved by contact and travel. But since the cause was unknown, countermeasures were not effective. Rats and their fleas could easily penetrate locked-down communities. People who fled, carry rat fleas in their clothing and luggage, helping to disseminate the disease. Many studies have described the long-term consequences of what was called the 'great mortality.' The normal way of life, human behaviors and attitudes changed. In the city of Florence (where 60% of the population died), behavior changed in two directions. Some people closed themselves in while others engaged in partying and drinking and the rich escaped to the countryside [14]. The social and economic impact of the plague was significant. The massive depopulation created shortages of labor to work on the land. This caused lack of food and starvation. It also increased wages, destabilized the existing serfdom system thus hastening the end of the medieval feudal system. Because the plague weakened the authority of institutions such as the Church, it is argued that it encouraged the growth of individualism, personal mysticism, and privatization of faith, resulting in the Renaissance and the Reformation [15]. Finally, the pandemic generated cultural changes. The dread of deadly infection intensified concerns with human mortality and transformed attitudes towards death. Pessimism and surge in sense of sin as well as obsession with death and decay of the body found artistic expression in the Danse Macabre and in literature on the art of dying [16]. In the perspective that worldly goods are frail and futile, veneration of saints and their relics became more popular (with specific plague saints such as St. Roch and St. Sebastian).

With historical hindsight, the plague is regarded as a transformative experience: "A great catastrophe … breaks many links with the past…" [17]. Whatever lessons may be presented, a pestilence on this scale is a so-called liminal event. It signifies a transition to a new phase, leaving behind the traditional ways of living and thinking. The experience of lethal threat is a time in between the old and the new, triggering people to redefine experiences and customs, and thus engendering a new era. Historians usually indicate that the plague demarcate the last phase of the Middle Ages (1350–1520) [18]. The fourteenth century was the age of calamities: famines, wars, brigandage, rebellions and uprisings. The plague returning five times before the end of the century certainly magnified the feeling that the end of the world was near [19]. Only in 1894 it was discovered that plague was caused by the bacterium *Yersinia pestis*. The pathogen is transmitted by rat fleas with the black rat as the normal host. If rats die, the fleas attack human beings and infect them. It takes on average 15 days before an infected rat population is so decimated that fleas attack human beings. It then takes 3–5 days before infected humans get symptoms. It is now known that the bacterium can be hosted by many species of rodents as well as

other animals (e.g. marmots and camels) [20]. Dissemination of the pathogen is comparatively slow compared to viral spread through droplets. As long as the mechanism of transmission is unknown, effective countermeasures cannot be taken. Although plague is nowadays almost forgotten and regarded as a historical event, it is still reported today (with 243 cases in 2018, mostly in Africa). In 2020, cases were reported in China, Congo, and the United States [21]. It can effectively be treated with antibiotics.

2.3 The Blue Death

Memories of the plague returned five centuries later. A new disease entered European countries in 1831, creating an atmosphere of crisis as would a foreign invasion. The unpredictable nature and sudden eruption of cholera, the so-called 'Blue Death,' revived the horrors of the medieval Black Death, without empirical justification since the number of deaths was small compared to earlier plague death rates, and nearly equal to the contemporary death rates of diseases such as typhus and common diarrhoea [22]. The pestilence was also called 'Asiatic cholera' because it emerged from India. It has been endemic in the Asian Subcontinent for thousands of years. The first pandemic started in 1817, originating in the Ganges Delta and affecting Asia and the Middle East. The second pandemic also originating in Bengal in 1826 infected Europe and the United States in 1831–1832.

Although the plague has reemerged in Europe as a pandemic in the seventeenth century, the sudden and massive strike of the cholera overwhelmed societies that have assumed that the time for deadly pandemics in Europe was over [23]. After infection, 10–20% of people show symptoms and fall ill. Without adequate treatment, 40–60% of the victims die mainly because of dehydration. The lethality of cholera, however, is less than that of the plague (killing approximately 1% of the population). It was also clear that cities were more severely affected than rural areas, and that within cities poor people were more afflicted [24].

The invisible threat that suddenly makes many people ill and rapidly spreads among populations caused a flood of publications with advices, recommendations and remedies. Medical doctors engaged in disputes and quarrels about the nature of the disease and its best treatments. Many remedies were advertised as cures (e.g. brandy in Britain) [25]. Especially, those arguing that 'Asiatic cholera' did not really exist, or was not contagious, found a large audience [26]. Conspiracy theories flourished, for example the belief that foreign enemies or immigrants were responsible, or that the rich disseminated the disease in order to reduce the population. Distrust of medical doctors was increasing and sometimes resulted in intimidations and attacks. In Berlin in 1831 physicians could only visit patients in some neighborhoods with a military escort.

Because cholera moved relatively slow, there was time for preparation. When the disease broke out in Germany in 1831, the Dutch King sent three experts to Prussia and Hamburg to study the most effective way to treat the disease. They published

their report in April 1832, just 2 months before the disease reached the Netherlands. However, the experts concluded that cholera was not contagious and they did not provide helpful recommendations [27]. Nonetheless, the government applied quarantine measures. It also instructed provincial authorities to set up cholera commissions to coordinate policy responses such as special hospitals and cleaning activities in cities. In many cases, responses were different and sometimes absent. Quarantine and isolation were ineffective because authorities could not really enforce them and because citizens did not implement them. Many patients resisted admission to cholera hospitals which was not mandatory. Local authorities, dominated by commercial interests, frequently delayed stringent measures such as quarantines. Authorities were also reluctant to intervene because of ideological reasons. The political philosophy of liberalism prevented stringent government intervention while poverty was often moralized and regarded as the consequence of immoral conduct. Furthermore, as soon as the threat was over, policy measures were reversed until the next pandemic appeared [28]. Slowly, there was a learning effect with a shift towards prevention and the elimination of unhealthy conditions, moving from a medical to a social approach of the disease. After several pandemics, more strict health legislation was adopted and more sanitary environments created with new infrastructure (sewerage and drinking water systems) and sanitation of urban living conditions but in many European countries these were realized only after the last pandemic was over.

It is now known that cholera is caused by a bacterium (*Vibrio Cholerae* identified by Koch in 1883) and transmitted through contaminated water (or food) and spread by ingestion. Although the cause was unknown, there was no lack of explanatory frameworks. Like in the era of the plague, the disease was attributed to sinful behavior and failings in morality. To many, cholera was the manifestation of a moral defect: intemperance, filth, wickedness and impiety [29]. The dominant medical framework was the miasma theory. The idea that epidemic disease was caused by contaminated air was based on the observation that especially cities and poor neighborhoods were affected. In 1830, most cities in Western Europe were more densely populated than hundred years earlier or later. Overpopulation produced enormous pollution and degradation of the living environment. Stench was everywhere. Without sewer systems, systematic waste removal and clean drinking water, symptoms of diarrhoea were common, and usually diagnosed as ‘cholera’ or ‘tyfus.’ In the early stages of the pandemic, symptoms were therefore not recognized, but the intensity and rapid course made clear that this was not the ‘common cholera’ but a new disease.

The theory that disease is produced by odors and emanations assumes that unhealthy miasmas are generated by several sources in the environment: dirt, bad drainage, crowded housing, lack of ventilation and polluted water. The poisonous miasmas are propagated through the air. There is no patient-to-patient transmission; individuals, and groups of people are affected by widely diffused, atmospheric agents. This theory has ancient roots in the writings of Hippocrates and Galen. Malaria was a paradigm case, showing the disordered relation between humans and the environment. The usual response was to purify the air from obnoxious

emanations. In the eighteenth century, miasmatism was associated with active applications that attempted to modify the environmental conditions themselves and removing the causes of noxious air. An alternative explanatory framework was contagionism. This theory attributed epidemic disease to 'contagia', minute living organisms that were transmitted between individuals. It was influential in Greek and Roman medicine, and became more important after the sixth century with the spread of leprosy. As a coherent theory it was first formulated by Fracastoro in the sixteenth century, postulating the existence of small imperceptible particles as causes of disease. On the basis of this theory the only effective measure against an epidemic disease was stringent isolation of infected persons. The theory was corroborated by the successful inoculation against smallpox in the early nineteenth century.

The arrival of an unknown, deadly disease such as the cholera challenged these explanatory frameworks. At first, while most medical experts believed that the disease was due to atmospheric conditions and not contagious, contagionism was the common-sense view [30]. The general population regarded the epidemic as contagious. It provided some measure of control: contamination could be avoided by abstaining from any personal contact. However, policy measures such as isolation and quarantine were not stopping the spread of cholera. These experiences discredited contagionism and made the theory of a miasmatic origin more plausible. During the third pandemic (1848–1849), miasmatic thinking dominated medical research and professional opinion. It was also attractive for policy-makers since measures were necessary that not impeded trade and commerce, were not socially disruptive, and that not restricted individual freedom. Miasmatism was also the expression of belief in progress and social activism. It produced a sanitary movement, inspired by the utilitarian philosophy of Jeremy Bentham, that emphasized the social origin of disease, the need for scientific study of environmental conditions (using the new science of statistics), and the priority of prevention. The idea was that sanitation of the physical environment would benefit the greatest number of the population. It would have economic benefits since it reduced expenses for curative health care and poor relief. Furthermore, it produced moral benefits, encouraging changes in lifestyle and morals, promoting hygienic habits [31].

The subsequent cholera pandemics signify a fundamental transition in medicine. The controversy between competing frameworks to explain the etiology, transmission and prevention of epidemic disease reflect different styles of thinking, each producing their own facts and policies [32]. The choice between thought-styles is not merely a matter of argumentation, empirical evidence and rationality. In some instances, physicians vote to determine whether cholera is contagious or not [33]. Opinions oscillate between the two theories. In the second part of the nineteenth century, the majority of European physicians adhere to a contagionist origin of the cholera, even before the major bacteriological discoveries in the 1870s and 1880s are made. In the confrontation with contagionism, miasma theory becomes more specific and sophisticated. Instead of uncontrollable conditions and ill-defined emanations as sources of disease, it specifies the nature and origin of miasma, compiling disease histories, meteorological journals, mortality registers and topographical data, gathering specific evidence of the association between environmental factors

and diseases. Moreover, miasmatism transforms into a program of social reform. It becomes more than a medical theory, as practical alliance of scientists, technicians and politicians, much in line with the liberalism espoused in France, England and Germany [34]. Most European countries face significant social and economic changes due to the Industrial Revolution, especially mechanization of production and transportation [35]. Railways and steamships increase mobility while steam power intensifies industrial production. The Industrial Revolution is associated with demographic changes: exponential growth of the population and rapid urbanization. At the same time, poverty is growing. Conditions of labor and housing are appalling, and child labor is common. Nutrition for the majority of the population is deficient. In 1859 in Amsterdam, 26% of children die before their first year of life [36]. It is clear that cholera is primarily a disease of the poor. Although authorities often blame the poor for their condition (attributed to alcohol use, laziness and immoral behavior), they also realize that some measure of governmental intervention is necessary [37]. In the mid-nineteenth century context, autocratic policies (based on contagionism and the traditional idea of medical policing) are no longer acceptable. At the same time, assistance and healthcare cannot be left to charity and philanthropy. Rational approaches of disease and indigence shall focus on sanitizing social circumstances, and governments at various levels must have a central role in this. Simultaneously, it is important to civilize the habits and lifestyles of the masses. Not repression or coercion can transmit norms of behavior, such as cleanliness, soberness and moderation but the subtle means of advice, persuasion and education will pass the norms of a healthy, regular and disciplined conduct into domestic life. Medical doctor and local politician Samuel Sarphati can serve as an example. He initiates many practical projects to improve the living conditions of the lower classes in Amsterdam, and to create a healthy city without medieval walls and with green parks, walking space, and sanitation [38]. Sarphati personifies the mission of the sanitary movement and of hygienism; the first to produce clean and healthy social circumstances, the second to reform private morality and promote personal hygiene. Instead of the coercive external control of contagionism, a less visible system of internal control emerges, based on internalized norms. This emphasis on moralization and normalization is at the same time responsible for the decline of hygienism (and the miasmatic thought-style) in the last decades of the nineteenth century. The emergence of the germ theory of disease and the results of laboratory science articulate the idea that medicine is a value-free, objective science.

While miasmatism in retrospect was an incorrect theory, its practical implications were significant since it had a positive effect on public health. Better sanitation, housing, waste collection, sewage systems, clean drinking water, removal of graveyards outside inner cities all contributed to improvement of the health of populations. It can be argued that the dynamic interaction of thought-styles has promoted the growth of medical knowledge [39]. Both styles make intensive use of modern sciences such as chemistry, physiology, pathology and mathematics. The controversial interaction between different styles of thought demonstrates that the progress of medical science is not a linear process. An example is the work of John Snow in London during the outbreak of 1848–1849. With meticulous empirical studies