

## Epidemics

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### Abstract

An unprecedented disease outbreak in a certain geographical location is epidemic. It can be due to both communicable and noncommunicable diseases, but the ethical issues that arise out of epidemics of communicable diseases have been given considerations, mainly with the advent of HIV/AIDS and multidrug-resistant tuberculosis (MDR Tb) and emergence of new diseases such as severe acute respiratory syndrome (SARS). Consequently, in bioethics, the discussion of the ethical issues out of epidemics, especially that out of communicable diseases, has been a recent addition. This entry mainly considers epidemics in this sense, though it briefly discusses epidemics of noncommunicable diseases, which are yet to occupy a proper place in the bioethical literature. In general, the entry discusses three major ethical issues related to allocation of resources, healthcare workers, and public health measures, which arise out of epidemics of communicable diseases and are pertinent in the context of global bioethics. By global bioethics, the entry here adheres to the original connotation of “global bioethics” as propounded by the American cancer specialist Van Rensselaer Potter in 1970.

### Keywords

Bioethics; Disease; Epidemics; Ethics

### Introduction

Disease outbreaks can take the endemic, epidemic, or pandemic proportions depending on the intensity of the pathogen, its mode of transmission, herd immunity, and prevalence and incidence of the illness and disease in the community. Endemic occurs when a disease is constantly present in a community. Disease outbreaks take the forms of pandemics when a large population, over a broad geographical area becomes susceptible to the disease agents, as a result of the simultaneous outbreaks of the diseases (Halsey 1986). In between these two extremes of disease outbreaks, when there is a temporary increase of cases in the disease prevalence in the population, then the outbreak is called epidemic. It is defined as an outbreak of disease “. . . for a limited period of time when a significantly greater number of persons in a community or region are suffering from it than is normally the case” (Walton et al. 1986).

The term “epidemic” has been found to be almost 2,500 years old. The etymological origin of the word epidemic lies in the Greek word *epidemiōsis*, which is the combination of the preposition *epi* (on) with the noun *demos* (people). The word “epidemic” has undergone long semantic evolution through the centuries and culture and has been used by Homer, Sophocles, Plato, and Xenophon mainly in nonmedical sense. However, the term in the medical context was first used by Hippocrates, the Greek philosopher and physician, in 430 BC. For Hippocrates, an epidemic meant a collection of syndromes occurring at a given

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place over a given period, e.g., winter coughs on the island of Kos or summer diarrheas on other islands. Besides this connotation of epidemic by Hippocrates, three major steps can be identified in the semantic evolution of the term epidemic in its medical sense. In the Middle Ages, the term epidemic referred to the long and dramatic succession of waves of the disease outbreaks, mainly that of plague. Plague, by then had established itself as a well-characterized communicable disease and had enabled physicians of the time to identify this disease with increasing precision and certainty. The next stage of evolution of the term followed with the historic contributions of the germ theory of disease by Louis Pasteur and Robert Koch. With such proposals, the origins of the epidemics were attributed to the microbes. The final stage in the semantic evolution was as a result of the progressive acquisition of the notion that most epidemics were due to the expansion of a clone or a clonal complex of either of bacteria or viruses known as the epidemic strain (Martin and Martin-Granel 2006). In the second half of the twentieth century, the term epidemic was also applied to noninfectious (noncommunicable) diseases. In this context, it refers to a non-transmissible disease, as in the epidemic of cancer, obesity, dengue, diabetes, etc. This continuous change and semantic evolution of the medical connotation of the term “epidemic” were mostly due to the impacts of the evolution of scientific discoveries and progress of medical knowledge (Martin and Martin-Granel 2006).

As per the study of the distribution and causes of disease in a population, that is, epidemiologically, an epidemic occurs when a susceptible population comes in contact with a disease agent. Many factors in the surrounding environment influence the intensity and efficiency of this interaction between human population and pathogens. Thus epidemics of cholera were traced to polluted water and puerperal fever was found to have its origin in the contaminated hands of medical attendants (Halsey 1986). Populations are susceptible if they have not acquired immunity by previous experience with the disease agent, and the resultant immunity could arise from having a prior infection caused by the same organism or through the use of vaccines prepared from that of the organism. Disease outbreaks in epidemic proportions, the behavior of which may not be completely predictable, can occur repeatedly in cycles and waves, often cutting across geopolitical and cultural boundaries (Walton et al. 1986). Small pox, plague, and influenza are some of the major disease outbreaks that have disturbed human civilizations in such epidemic proportions through the ages (Dobson 2007).

Generally, the extent and duration of an epidemic are determined by the interaction of variables such as the nature and infectivity of the causal agent, its mode of transmission, the degree of preexisting and newly acquired immunity (Walton et al. 1986). And depending on how a particular disease is transmitted, a susceptible population may be protected by avoiding contact with (a) persons who are affected with the disease; (b) vectors such as mosquitoes, fleas, and lice that transmit disease; (c) vehicles such as water that may be contaminated with the disease agent; and (d) animal reservoirs in which the disease is maintained, such as rat populations. Rarely infection with one disease may also protect against another, such as the protection afforded to smallpox by cowpox (Halsey 1986).

Until the twentieth century, as mentioned earlier, the conventional connotation of epidemic in the domain of medicine has been dominated by the evolution and progress of infectious diseases only. From the second half of the twentieth century, as the emphasis changed to diseases out of lifestyle factors, there has been an increase in the sophistication of epidemiological methods and scientific techniques such as cohort studies and case-controlled studies which are then used to establish the links between environmental and lifestyle factors to that of diseases. Thus, the link between lung cancer and smoking has been established and the information about the relative occurrences of coronary heart disease in different countries and different types of cancers obtained (Halsey 1986). And this then had led the term epidemic to also refer to noncommunicable diseases. Epidemics, be it of infectious or noninfectious diseases, are public health problems. Large sections of the public may be affected, and the health of society needs to be safeguarded through public health interventions such as surveillance, screening, vaccination, and sometimes by the implementation of isolation, quarantine, and other social distancing methods. Acute

epidemics sometimes may turn out to be public health emergencies. As emergencies, they have the potential to cause serious harm to the health of individuals as well as to the population. Such harm can be prevented or reduced by appropriate decisions and actions, but these decisions and actions need to be taken urgently, promptly, and in many cases proactively. While some epidemics can be forecasted, others occur unexpectedly, such as influenza epidemics, but the urgency of right decisions and scope of justified actions remains true for all the epidemic events (Ezeome and Simon 2010). And herein, disease outbreaks in epidemic proportions invite ethics and bioethics to play a role.

When it comes to the discussion of epidemics and ethics, on one hand, it is found that a much explanatory discussion of ethics and epidemics of noncommunicable diseases is yet to occupy a due place in bioethics literature. Perhaps, it is due to the following reasons: (a) the evolution of the separate discipline of bioethics, during 1960–1970, coincided with ethical dilemmas arising from the revolutionary development of hi-tech medicines and technologies (Battin et al. 2009), and (b) noncommunicable diseases was mainly considered as lifestyle diseases and perhaps thought to be easily controlled by the advanced medicines and technologies, as well as by the modulations of the day to day living habits of the individuals, without any requirement of deep ethical insights in their evolution and spread. On the other hand, with reference to infectious diseases, a strong consensus has gradually emerged that infectious diseases need special ethical considerations due to their certain characteristic features. And the ethical dilemmas that arise out of the infectious disease outbreaks need the bioethical considerations, for better policy making (Smith et al. 2004). Very lately, these considerations have occupied a due place in the bioethics literature (Selgelid 2005). However, this entry does not go into the details of the reasons of exclusion of such topics from the initial bioethics literature.

Considering the primary meaning and usage of epidemic to denote epidemics of infectious or communicable diseases, this entry mainly discusses three issues such as distribution of resources, duty and obligation of healthcare workers, and implementation of public health measures, which arise out of epidemics (or pandemics which are global outbreaks of epidemics) of communicable infectious diseases and also are concerns and pertinent for global bioethics.

By global bioethics, here, this entry adheres to the original connotation that global bioethics is an ethic of responsibility for long-term acceptable survival based on both healthcare and earth care (Potter 1995). This entry adheres to this original connotation, for epidemics which maintain no geographical and political borders are threat to human survivals from local to global levels. And prevention and mitigation of epidemics, which many times are induced by environmental causes, need the help of not only scientific knowledge of pathogens and environmental factors but also ethically guided interdisciplinary interventions, from both within and outside the medical domain. An epidemic control and management also need ethically guided intersectoral and multisectoral actions, beyond the usual responsibilities of the healthcare sector, to deliver just and fair outcomes. And adopting such measures, it not only welcomes responsible actions from different fraternities, different levels, and different nations, but epidemics place itself in the larger domain of bioethics with simpler and broader aim to protect human rights, human dignity, and human survival at large.

## Major Epidemics and Some Ethical Considerations

Human civilizations have been continually disturbed by the invasions of epidemics. For centuries, scientists struggled to classify the symptoms, morbidities, and mortalities out of specific diseases, to identify the specific causes, to prevent and control the epidemic diseases effectively (Halsey 1986). In spite of their endeavors as well as scientific and medical advancements, very few epidemics (such as smallpox, poliomyelitis) have been eradicated, some epidemics have reemerged, and many others have

emerged as newly formed. Epidemics, be it an emerging or reemerging one, bring with them certain public health and socioeconomic crisis and endanger lives of lay people, physicians as well as healthcare workers. Some of the epidemics that devastated human civilizations and have given rise to the controversial decisions are described below with a brief introduction to their biological basics, clinical symptoms, past impacts, and present status.

**Smallpox:** As an epidemic, smallpox outbreak deserves special attention. For, perhaps, the disease outbreak that caught attention as epidemic for the first time was the outbreak of smallpox. Also, though it was one of the most dreaded, lethal, and common of all infectious diseases, human world has been successful in eradicating the disease at large scale from the majority of the human population. Biologically, smallpox is an acute and virulent viral disease, also known as *Variola* or *Variola vera*, derived from Latin words *varius* (spotted) or *varus* (pimple). The disease characterizes as rash and later on fluid-filled blisters on skin (Dobson 2007).

The first recorded epidemic out of smallpox was that of 735–7 BCE which occurred in Japan. However, the first medical description of it came in 910, when Rhazes (Abu Bakr Muhammad Bin Zakariya Ar-Razi, 864–930 CE) documented its human to human transmissibility. It crossed the Atlantic shortly after arrival of Columbus in 1492. And by 1500 BC, it resulted in devastating consequences, most likely contributed to the collapse of the Aztec Empire in Mexico and that of Inca in Peru respectively. In Europe, it had become the dreaded “speckled monster” by 16th century, attacking all classes alike and causing the burden of some 10–15 % of all deaths. It got established as endemic disease in cities and as frightening periodic epidemic in towns and villages. At least 80 % of its victims were under 10 years of age and it had the potential to kill between 25 % and 40 % of its victims. Those who survived were either left scarred or became blind for life (Dobson 2007). During the twentieth century, smallpox alone killed between 300 and 500 million people, which is estimated to be more than the people killed by “all the wars and epidemics” of the period (Selgelid 2004). Though smallpox outbreaks have continued to cast its shadow on the human population through the centuries, there have been no curative measures for smallpox. Rather, inoculation against it was widely practiced in Europe and North America until eighteenth century. In 1796, Edward Jenner, an English physician and scientist, tried out its vaccine for the first time, and by 1800, vaccination for smallpox was undertaken in many parts of the world. Consequently, it was eliminated by several American and European countries. However, the disease outbreaks continued in Africa, South America, and in Asia. In 1972, while South America eliminated the disease, the last case in Asia was detected in Bangladesh in 1975, and in Africa, the last case occurred in 1977 in Somalia. In 1979, worldwide vaccination campaign by World Health Organization(WHO) achieved the ultimate goal of completely eradicating the disease from the world, and in 1980, officially, smallpox had been declared to be removed from the world (Dobson 2007). However, it continued to remain in endemic forms and had some sporadic outbreaks in at least 14 countries during 1999 (O’Toole 1999).

Since its development, mandatory vaccination had been gradually adopted as the major preventive measure, to eradicate smallpox, effectively and efficiently from the world. However, as a public health measure, smallpox vaccination had given rise to several controversial, rather, ethical issues. For instance, during the 1901–1903 smallpox epidemic in Boston, although the vaccination program was launched, an investigation to the series of potential complications such as ulceration, abscess formation, cellulitis, secondary sepsis, and tetanus unveiled that there was no regulation for the production and quality of vaccine. As a whole, the campaign raised the ethical concern for the safety and efficacy of the vaccine produced. Several other ethical issues cropped up by the manner in which the produced vaccines were implemented. In spite of the voluntary vaccination program, those who refused to undertake it willingly were assaulted and in many cases were subjected to a \$5 fine or a 15-day jail sentence. This vaccination measure had also brought to notice the issues of compulsive and derogatory actions, discrimination, and stigmatization for it was the homeless who were mainly blamed as the vector, and in several instances they

were compelled to undertake the vaccine. In November 1901, the Boston Board of Health ordered “virus squads” to forcefully vaccinate men and the people who were targeted were living particularly in low cost houses. In one such case, this smallpox vaccination measure in Boston had led to the landmark legal case of *Jacobson v Massachusetts*, on the constitutionality of compulsory vaccination, when a citizen challenged a Massachusetts law that allowed the Cambridge Board of Health to fine him for refusing revaccination (Albert et al. 2001). In sum, for the sake of common good to protect all from this viral disease, the vaccination measures in Boston violated individual rights, liberties, restricted freedom, and suppressed autonomy in many cases (Albert et al. 2001).

Besides giving rise to these ethical issues, small pox had continued to impose fear in the population, for there remained a possible threat of bioterrorist attack out of it. After the eradication of smallpox epidemic, its remaining samples were preserved under tight security at two facilities: the Centres for Disease Control and Prevention (CDC), Atlanta, and the Ivanovsky Institute of Virology, Moscow. And it was out in the news that Soviet Union, until its fall in the early 1990s unlike its counterpart of the United States, was manufacturing and storing tens of tons of smallpox viruses only for the use of military purposes but not for the sake of any public health good (Selgelid 2004). In short, incidences related to smallpox outbreaks and virus storage invoked the greater ethical concern of trust of the common people on the government as well as accountability and efficiency of the public health authorities to control the disease effectively.

**Plague:** As an epidemic, plague deserves due attention, for it is one of the oldest companions of the human civilization. The conventional meaning of the word “plague” is blow or strike. The etymological origin of the word “plague” lies in the Latin word *plaga*, which is derived from the Greek word *plege*. The disease of “plague” is a bacterial disease and can be bubonic, pneumonic, and septicemic. Bubonic plague is caused by the bacteria *Yersinia pestis*, mainly transmitted to humans by fleas from infected rodents, notably the black rat, *Rattus rattus*. It results in the hard swollen buboes in the groin, armpit, and regions much closer to the site of the flea bite and is potent enough to kill 60 % of its victims. Bubonic plague can turn to be pneumonic plague when *Bacilli* enter the lungs through respiratory droplets and there is human to human transmission. Pneumonic plague can kill 90 % of its victims. Septicemic plague, on the other hand, is the most lethal form of the disease. *Bacilli* go straight into the bloodstream resulting in hemorrhage. It is potent enough to kill 100 % of its victims (Dobson 2007).

The epidemic of plague swept the world in seven successive cycles. The first cycle has been recorded during 540 to eighth century. It possibly started in Asia and then had spread to North Africa, Mediterranean, and Middle Eastern countries. During this cycle, in 541, the Justinian plague swept a large geographical area, from Egypt to Europe, and might have played a role in the collapse of the Roman Empire. The next epidemic of plague, popularly known as “Black Death,” originated during the so-called second cycle in 1330s and had spread rapidly through Europe in the mid-fourteenth century. Perhaps, initially it was carried overland from central Asia via caravan trading routes, and later on it was disseminated to major coastal ports across Western Europe on merchant ships. After the ravages of the “Black Death”, recurring cycles of plague epidemics hit Western Europe and Middle East over the next 400 years. Of this, Great Plague of London alone claimed 70,000–100,000 million people (Dobson 2007).

The disease is still noticed in many countries, especially in endemic form in Africa, Russia, South America, and in Asia. It is recorded with approximately 2000 new cases and 180 deaths per year and 98.7% of cases and deaths are found to be in Africa (Dobson 2007). The three most endemic countries are Madagascar, the Democratic Republic of Congo, and Peru (WHO 2014a). Most recently, the worst outbreaks of plague epidemics had been noticed in the Asian country of India in 1994 and in the African nation of Madagascar in 2014. In Madagascar, since its first identified case on 31 August 2014, there were 119 confirmed cases and 40 deaths by 16 November 2014 (WHO 2014b).

Some of the factors that can be monitored and manipulated for the prevention of the plague incidence and prevalence are as follows:

1. Making one's home, work place, and recreational areas as rodent proof.
2. Wearing gloves if one is handling or skinning potentially infected animals to prevent contact between one's skin and the plague bacteria.
3. Using repellent if there is a possibility to get exposed to rodent fleas during activities such as camping, hiking, or working outdoors.
4. Keeping fleas off pets by applying flea control products.
5. Keeping away dogs, cats, or any other pets that roam free to sleep on one's bed in endemic areas (CDC 2013).

Centers for Disease Control and Prevention (CDC), USA, notifies that unlike smallpox, vaccines for plague are in development, but are not expected to be commercially available in the immediate future (CDC 2013). However, they specify that plague is treatable and preventable by the dosages of antibiotics (CDC 2012). Apart from the pharmaceutical measure of prescribing antibiotic dosages, some of the major non-pharmaceutical measures that are adopted to keep the plague at bay are isolation and quarantine. In the fourteenth century, Milan, Florence, and Venice employed the public health measure of quarantine with a vengeance toward plague-affected victims. The homes of sufferers were sealed from outside, leaving both well and sick to die together for lack of food and water (Harvard University 2002), thereby, hindering their liberties and violating their rights to live. Besides, plague outbreaks in many places had given rise to social as well as economic disruptions. For instance, in 1994 when a small outbreak of bubonic plague had quickly spread to develop into a larger epidemic of more virulent pneumonic plague, with 197 confirmed cases and 54 related deaths, the worst sufferers were mainly the city's "underclass" communities in Surat, India. A half million people who fled Surat, included 78 % of the professional healthcare providers, working at the time in the city's most affected areas. The persons, who fled the Surat city and had taken refuge in other states, faced the much worse situation when many of these immigrants were turned away from the neighboring communities and cities. Few trains, though passed through Surat, did not stop at the city station, and ships refused cargo from the city. While several Persian Gulf states banned Indian imports, China banned all Indians. Hong Kong either implemented forceful quarantine measures for 2 days or ordered immediate deportations of the Indians, and Sudan implemented jailed quarantine for 6 days for the travelers from India. Ukraine, in one of its most drastic measures, placed 100 Indian passengers under armed guard, thereby refusing them to disembark from their aircraft (Garrett 2000, pp. 18–32, 33, 42). As per World Health Organization (WHO), trade as well as socioeconomic disruption, as a consequence of plague outbreak, did cost India an estimated loss of some \$2 billion (Gannon 2000). As a whole, the Plague incident in India provoked the ethical question of just implementations of public health measures of quarantine. It invoked that the public health measures should be proportional to the harm involved, should be reciprocal to the measures adopted, and also raised a concern for global cooperation and solidarity to respect human rights, human dignity.

**Influenza:** Epidemics of influenza deserve special attention for it distinguishes itself from other deadly and devastating communicable diseases. Influenza epidemic comes back to human population at certain intervals and results in widespread infection out of new *A* virus subtypes, resulting from virus reassortments (Potter 2001). The English word influenza is derived from the Latin word *influentia* meaning that which can influence, such as stars." "Grip," "grippe," or "flu" as it was commonly known, was first described by Hippocrates (412 BC), but was nicknamed as "influenza" in 1357. The virus, the agent behind the flu, was identified in 1933. Of the three kinds of influenza viruses, *A*, *B*, and *C*, it is the *A* virus which causes epidemic or pandemic. It is transmitted through airborne droplets out of

coughing and sneezing and primarily attacks the respiratory tract – the nose, the throat, and sometimes the lungs. It is usually characterized by high fever, headache, malaise, sore throat, and cough (WHO 2005).

The epidemic of influenza, perhaps, was first noticed in 1173 in Europe. By 1510, influenza epidemic invaded Europe and gradually had spread to distant territories. The 1889–90 “Russian flu” is the first well-documented human pandemic (global epidemic) with one million deaths. In twentieth century there had been three major global epidemics of influenza. 1918 “Spanish influenza” was exceptional in nature and is considered as one of the deadliest disease events in human history. It had killed an estimated 20-100 million people worldwide. Its first and second waves left countless of children orphaned and bereft. In 1918-1919, more people died from influenza than from any other infectious diseases ever, including smallpox and plague. A few years back, it had been projected that due to globalization and fast communication, at a minimum 2–7.4 million people would have died, if a pandemic of the severity of 1918 had emerged in the then human population (WHO 2005). Besides this deadly 1918 pandemic influenza, the other major global epidemics of influenza were “Asian influenza” of 1957 and “Hong Kong influenza” of 1968. These subsequent pandemics were much milder with an estimated loss of 2 millions and 1 million lives respectively (Dobson 2007). This twenty-first century has also witnessed two major events of influenza outbreaks; *A* H5N1 (2005) and *A* H1N1 (2009) but they have been much milder than the earlier epidemics.

Influenza epidemics invite due attention for its sudden invasiveness, acuteness, uncertainty, and communicability. They prompt early detection and rapid diagnosis and implementation of pharmaceutical as well as non-pharmaceutical measures. The pharmaceutical measures involve vaccination and usage of antiviral drugs. The influenza vaccine was first developed in 1940, and realizing its potential public health threat, World Health Organization (WHO) in 1948 established a global influenza network to observe the virus and to speed up its isolation and vaccine production. However, influenza epidemic vaccination strategy has always been a consideration for ethical investigation (Kinlaw and Levine 2007). While some suggested priorities are to be given to the respective individuals based on utilitarian principle of saving most lives, many others suggested that social usefulness or worst off should also be taken into consideration. As the result of the fast mutating characteristic of influenza *A* virus, a vaccine developed for one event of influenza pandemic or epidemic does not work in the next event. So, till date there is no vaccine to prevent the epidemics and pandemics of influenza, though there are curative medicines such as antiviral drugs to address the clinical symptoms (Dobson 2007).

Some of the non-pharmaceutical measures that are required to delay the spread and stop the spread of influenza epidemics are surveillance, quarantine, isolation, and social distancing measures such as school closures, avoidance of public gatherings. To cope with the sudden invasiveness and communicability of the influenza epidemics, the planning and implementation of these measures might involve drastic and faulty decisions and can also be draconian in nature, thereby violating the rights and liberties and causing injustice in several contexts. For example, during the 1957 epidemic of “Asian influenza” in India, Government of India Influenza Centre, Coonoor, in order to stop the entry of the epidemic in the country, had quarantined the whole ship *ss Rajula*, which was on its way to India from Singapore. The ship being quarantined with all the 1622 passengers and 200 crew members on board, the people not infected with influenza were compelled to stay with only 44 identified cases of influenza and faced the threat of being infected with the disease. This epidemic of “Asian influenza” in India, had also put the lives of healthcare workers at risk (Menon 1959), perhaps, for the reason that they were put to face the maximum exposure to infection without any adequate supply of protective gears. Thus the 1957 influenza epidemic in India have shown that the drastic decisions and its implementation can bring upon unfair consequences by spreading the infection and risking the lives of healthcare workers.

Besides these major killers, epidemics of tuberculosis and HIV/AIDS have continued to bother human civilization for years. While the spread of tuberculosis reached its peak in the nineteenth century, HIV/AIDS emerged as a silent killer in twentieth century. In addition, some new diseases such as Ebola, SARS have emerged as epidemics (Dobson 2007), for which treatment or cure regimen is yet to be available. Severe acute respiratory syndrome (SARS), a new respiratory disease out of *Coronavirus*, came to notice at the end of 2002 and first half of 2003. Being airborne, within months it traveled around 29 countries of the world, infecting about 8,000 people and claiming 700 lives. The invasiveness and acuity of the disease compelled World Health Organization (WHO) to issue emergency global alerts, airport screening, international travel and trade restrictions. The major issues that came to notice out of SARS were (a) massive social and economic disruptions within days of the outbreak, (b) hundreds of doctors, nurses, ambulance drivers, and other healthcare workers contracted the disease and became ill, (c) schools, cybercafes, discos, cinemas, and theaters had to be closed, and it even led to suspension of marriages to avoid public gatherings (Dobson 2007). On the whole, for the sake of common good, many personal and individual interests had to be sacrificed, autonomies had to be compromised, and injustice was caused at several spheres and spaces out of the SARS epidemic.

## Bioethics and Epidemics

Bioethics is both a field of philosophical inquiry and public policy guidance. It is a multidisciplinary study, as it seeks to develop a set of guidelines for moral decision making utilizing the resources of not only medicine and biology, but also of law, philosophy, theology, and the social sciences. It has gained popularity as a discipline, as a discourse, as a concept, and also as an approach (Kuhse and Singer 2001, pp. 3–11). In its earlier days, bioethics has focused more on the impacts of the use of new technological procedures such as kidney dialysis, organ transplantation, in vitro fertilizations, abortions, prenatal diagnosis, artificial respiration, and genetic engineering (Kuhse and Singer 2001, p. 3). With medical ethics within its province, earlier bioethics has been distinctly different approach for its concern of not only patients' rights but also that of the rights of the communities (Kuhse and Singer 2001, pp. 3, 4). Drawing the issues into the sociocultural sphere, its focus has always remained on the confidentiality, informed consent, beneficence, respecting the autonomy, truth telling, doing justice, and implementing non-maleficent practices for the individual patients as well as for the similar others in the community.

Within such domain of discussion, infectious diseases, epidemics, and the ethical issues out of them have not been much discussed. Infectious diseases, especially, have been discussed infrequently in the form of case studies, namely; the Tuskegee revelations of 1972, the AIDS epidemic of 1983. In these case studies, even if infectious diseases were used as examples, the traditional concern of patient confidentiality was considered as the sole concern. Besides this, in a very few texts, it has also been pointed out that infectious diseases could affect the patient's decision-making or could affect the role of the physician in the physician-patient relationship (Battin et al. 2009, pp. 41–59). Whilst a much discussed concern in medical ethics, it went without elaboration in early bioethics literature. This sporadic reference to infectious diseases, perhaps, is due to the reason that its transmissibility characteristic and subsequent impact on the individuals have been oversights or overlooked in the earlier bioethics literature (Battin et al. 2009, p. 47).



Some of the other major reasons of exclusion of infectious diseases and ethical issues of epidemics of infectious diseases from early bioethics literature are as follows: (1) Bioethics was born (as an autonomous discipline) with advances in medical technologies and thus had largely focused on the dilemmas of autonomy, confidentiality, truth telling, non-maleficence, beneficence, justice, etc., arising out of the use of such technologies. (2) The birth of bioethics and its initial development (as an autonomous discipline) coincided with time when it was believed that infectious disease can be conquered by medicine and infectious diseases and epidemics out of infectious diseases can also be controlled. (3) Infectious diseases were often conceived as problems of the others. (4) Bioethical research on infectious disease, especially, in the developing world was considered difficult because it was empirical and interdisciplinary. (5) Ethical questions about infectious disease (especially in the developing world) might not have appeared to pose the deep philosophical questions that academic ethicists, of the time, were interested in (Selgelid 2005; Battin et al. 2009, pp. 41–59). In addition, (6) as has been considered by some, the debate on the bioethical issues was hijacked by the church in its earlier days (Selgelid 2005).

Gradually infectious diseases and the ethical issues out of the epidemics of infectious diseases occupied due place in the bioethical literature mainly for the following three reasons:

- (a) The historical and likely future consequences of infectious diseases are almost unrivalled. For they have been the biggest killers in human history. The Black Death eliminated one-third of the European population in a year during the mid-fourteenth century, tuberculosis killed one billion people from 1850 to 1950, the 1918 influenza killed between 20 and 100 million people, and smallpox killed between 300 and 500 million people during the twentieth century alone. Infectious diseases have also been identified as the biggest killers of children and young adults. And there has been a continuing threat of infectious diseases due to the emergence of many new diseases during the recent decades including human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), Ebola, severe acute respiratory syndrome (SARS), and avian influenza. In addition, there is the growing problem of drug-resistance and increasing threat of bioterrorism. The experience of AIDS epidemic and possibly the appearance of multidrug-resistant tuberculosis (MDR Tb) made the public health policy makers and modern bioethicists to rethink that infectious diseases and epidemics out of them are not fully controlled and need reconsiderations.
- (b) Infectious diseases are found to have some specific characteristics such as invasiveness, acuity, communicability, preventability, and treatability that raise difficult ethical issues in their control and management.
- (c) The outbreak of infectious disease is closely connected to the topic of justice. For there remains an identified vicious cycle between poverty, socioeconomic status, and disease prevalence and incidence. Malnutrition, dirty water, overcrowded living and working conditions, lack of sanitation and hygiene, poor education, and lack of access to healthcare make poor people more likely to become infected and more likely to suffer poor outcomes when infection occurs (Selgelid 2005; Smith et al. 2004; Battin et al. 2009).

Besides this concern for infectious disease as a bioethical consideration, it has been observed, with the control and management of HIV/AIDS, tuberculosis, SARS (2003), and avian influenza (2005), that epidemics out of infectious diseases deserve bioethical considerations and discussions too. For the public health decisions and strategies adopted to prevent the epidemics or pandemics out of infectious diseases, many a times violate the individual as well as collective rights, give rise to serious ethical issues and challenge the early bioethical concerns; respecting autonomy, beneficence, non-maleficence, and justice (Kotalik 2006; Smith et al. 2004). Bioethical issues out of epidemics range from fair decision making to

just screening, monitoring, and implementing public health measures in proportion to the threat of the disease, from the involvement of stakeholders through a fair process to the open, transparent, and adequate information disclosure, from fair distribution of the benefit and harm of the disease outcome, to respecting dignity, and balancing rights and interests. Of the various bioethical issues, the entry discusses three major issues which are pertinent and concern for global bioethics.

### **Distribution of Resources and Prioritization**

Epidemic responses involve deployment and utilization of both human and medical resources, e.g., trained healthcare workers (also essential service providers), diagnostic facilities, hospital beds, intensive care units, drugs, vaccines, and protective gears (Kotalik 2006; WHO 2007). Demand and need for these resources rise up in the crisis time of epidemic and pandemic for there may be shortage of staff, inadequate healthcare facilities, and also limited production and supply of drugs and vaccines. For instance, SARS (2003) situation in Hong Kong was worsened by the factor that even though the intensive care wards became overwhelmed with SARS patients, there were staffing problems for large numbers of medical personnels were already affected by the SARS (Reilley et al. 2003). These medical and other resources such as drugs and personal protective gears can also be at the hand of the countries with manufacturing capacity (Fleming 2005) leading to a global shortage and distribution crisis. Considering the potential shortage of these essential resources, fair resource procurement and just allocation for equitable access to these resources pose serious challenges for epidemic mitigation from global to local level.

With the resources for epidemic mitigation in hand, question also arises who to prioritize to have a fair outcome, to avoid unjust discrimination, stigmatization, and how to have just, efficient, and effective prioritization. These questions bring the issue within the bioethical purview as with the greater concern of protection of everybody's health and life, it demands just distribution of benefit and harm by maintaining beneficence, non-maleficence, the core bioethical principles.

### **Duty and Obligation of Healthcare Workers**

During the outbreaks of epidemics, healthcare workers, as part of their professional, social, as well as, moral obligations, are compelled to provide care to the patients (Reilley et al. 2003). However, they also have the obligation to protect themselves and their own families back home from the infection (Kotalik 2006; WHO 2007). Public health emergencies of epidemic proportions bring out three issues in relation to the duty of healthcare workers; a) numerous references to heroism. For instance, in 2014 during the worst Ebola outbreak in Sierra Leone, a doctor who had treated hundreds of patients, himself contracted the disease and had died (Paye-Layleh 2014), b) high level of emotional distress, and c) desire and commitment to care for sick colleagues (Kotalik 2006). However, the scope and extent of the reciprocal societal obligation to these healthcare workers have always been fuzzy in nature (Kotalik 2006).

Moreover, as it was noticed during SARS (2003) outbreak, countries manufacturing the protective gears were holding their stocks, to protect their own healthcare workers (Reilley et al. 2003). Consequently, healthcare workers in the countries, facing the shortages of protective gears, were deprived of their rights to be protected. Balancing such competing interests; professional as well as personal, rights of the healthcare workers residing in wealthy and powerful nations versus that of the healthcare workers of the not so powerful nations, makes the issue a bioethical issue as it demands to respect the lives and health of all the frontline healthcare workers, irrespective of their geographical locations and also because the issue invokes the greater concern of solidarity, cooperation, trust, justice, and reciprocity both at local and global levels.

## Public Health Measures and Balancing Rights and Interests

SARS (2003) epidemic had highlighted that the public health measures such as surveillance, isolation, quarantine can be drastic, inhuman, and coercive in nature (Singer et al. 2003), if hastily undertaken. For instance, in a large housing complex in Hong Kong, officials used barricades and tape in an attempt to confine over 300 residents, known to be SARS infected (Mandavilli 2003, p. 487). In Singapore, to monitor the movement of the quarantined people, authorities installed surveillance cameras at home and enforced electronic monitoring devices as wristbands. And citizens in China faced harsh penalties for breaching quarantine orders (Mandavilli 2003, p. 487; Ries 2004, p. 3). With such drastic and dramatic incidences, the issue of implementation of public health measures during epidemic, makes itself a bioethical consideration. Because, for the sake of the greater good of protecting the community as well as the individuals and to have a fair outcome, it demands that these measures should distribute the benefits and harm fairly, should respect the privacy, confidentiality, and autonomy of the people involved and nevertheless, should be proportional to the threat of the epidemic. From the traditional bioethical perspective, this issue also demands that rights and interests are to be balanced with the aim of practicing non-maleficence, especially for the life and health of those who are involuntarily involved with the whole phenomenon of the epidemic (Kotalik 2006).

## Conclusion

In this era of globalization, the whole world has taken a form of global village or global community (Ten Have and Gordijn 2013). The SARS outbreak of 2003 established that with the rapid increase in global communication, infectious diseases can travel from one-quarter of the world to another within a few hours (Singer et al. 2003). And epidemics, both of remote and recent pasts, have shown that they require both local and global coordinated actions and policies by means of solidarity, trust, and cooperation. They have also shown that prevention and mitigation require diverse perspectives to explain and understand complex phenomena of nexus between the microbean and human world, the complex course, pattern, and distribution of their evolutions, and the complex issues that arise out of them. These imply that the problems of epidemics can no longer be approached only from the scientific perspectives. It also needs input from empirical studies as well as philosophical analysis (Selgelid 2009). With such interdisciplinary considerations, epidemic prevention and mitigation aim to have a responsible action to protect the human rights, human dignity, integrity, and survival as a whole. And with such aim, the epidemics and the issues out of it establish their bioethical linkages and come within the domain of global bioethics, as conceived by V.R. Potter.

## Cross-References

- ▶ [Bioethics:Global](#)
- ▶ [Common Good](#)
- ▶ [Epidemiology](#)
- ▶ [Global Justice](#)
- ▶ [Pandemics](#)
- ▶ [Professional Ethics](#)
- ▶ [Professional-Patient Relationship](#)
- ▶ [Public Health](#)
- ▶ [Resource Allocation](#)

- ▶ [Responsibility:Collective](#)
- ▶ [Responsibility:Social](#)
- ▶ [Solidarity](#)
- ▶ [UNESCO](#)
- ▶ [Triage](#)
- ▶ [WHO](#)

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