**Beyond the Pathogen: Cultural Influences on the Impact of Epidemics Viewed from History**

Linda A. Newson

For millennia humans and parasites have coexisted, but it was only in the Christian Era that acute infections causing high mortality began to appear. Infectious diseases can be characterized as chronic or acute. Chronic diseases, such as tuberculosis, herpes simplex, HIV, and treponemal infections, can become endemic in small communities taking a low but regular toll on the population and generally without conferring immunity. However, acute infections such as smallpox and measles, which historically caused high morality, can only persist where populations are sufficiently large to sustain them. It was, therefore, only when populations in China, India, and the Mediterranean grew sufficiently large in the Christina Era that epidemics began to appear. Historically, all acute infections had their origins in animals, generally domesticated animals, jumping the species barrier to become human diseases. Hence, smallpox is related to cowpox, influenza to swine flu, and measles probably to rinderpest and/or canine distemper (McNeill 1976, 54–56). It has been suggested that the Covid-19 virus may have originated in bats and spread to humans via a pangolin in a wet market in Wuhan, the capital city of Hubei Province in the People’s Republic of China (Cyranoski 2020). Although there have been rumors that the outbreak may have been leaked from a laboratory in Wuhan where coronaviruses were being studied, as yet there is no credible scientific evidence to support this view (Marshall [2020]). Meanwhile, the precise animal source of the virus remains elusive (Mallapaty 2020).

When new diseases emerge, they cause high mortality since humans lack any immunity to them due to the absence of previous exposure. This scenario was seen most recently with the Ebola crisis and SARS (severe acute respiratory syndrome), but from the start of the Christian Era it was repeated multiple times in the past. As William McNeill (1976) has shown in his global history of epidemics, their incidence increased dramatically from the fifteenth century with the development of transoceanic trade and colonial expansion. Those regions most profoundly affected at this time were those that had been relatively isolated in the precolonial era, notably the Americas, Australasia, and the Pacific islands. Although the extent of the demographic impact of acute infections in the sixteenth century has been debated, most scholars agree that in those regions epidemics were a major factor in the decline of their populations, with individual epidemics, particularly of smallpox, causing 20 to 30 percent mortality (e.g., Dobyns 1966, 395–416; Crosby 1976, 289–99; Cook 1981; Stannard 1989).

While high mortality may be associated with the initial introduction of an acute infection to a nonimmune population, it is difficult to generalize about its wider impact, including its long-term effects. Pathogens differ in their infectiousness and the way they spread, while their impact is highly influenced by the cultural and environmental contexts into which they are introduced. Some depend on face-to-face contact, others on an insect or animal vector, while those associated with the tropical fevers can only survive in warm climates (Newson 1998, 45–47). Diseases themselves change over time, a fact that is especially true of viruses, such as those that cause influenza, which mutate more rapidly than other pathogens. Although caused by a bacterium rather than a virus, it is thought that scarlet fever, once a deadly disease, declined due to changes in the pathogen itself (McKeown 1976, 82–85).

In modelling the spread and impact of acute infections epidemiologists have recognized the importance of population size and density as crucial factors. However, less explored, especially historically, has been the influence of the economic and sociopolitical context into which a disease is introduced. This context may not only affect the spread of a disease, but also a society’s ability to develop immunity to it and recover economically, socially, as well as demographically, including over a long trajectory. History has demonstrated that these cultural influences can result in considerable geographical variations in the impact of even a single epidemic.

This is a large topic, which I have explored in several books and papers particularly in the context of the colonial experiences of Central America, Ecuador, and the Philippines. Here I will focus on two issues that seem particularly pertinent to the Covid-19 pandemic. These are (a) the significance of cultural factors affecting the ability of societies to develop immunity to a disease and to recover, and (b) how they may influence the way in which a disease is controlled and the health crisis is managed.

**Developing Immunity**

Some individuals have innate immunity, which derives from their genetic, biochemical, or physiological make-up, but most people acquire immunity through exposure to an infection. Acquired immunity cannot be inherited, so historically a society could only develop immunity where the parasite remained in the community and continually infected susceptible individuals; today it is more often induced through vaccination.

Acute infections are infectious only for short periods, so they can only circulate where populations are large or where there are intense contacts with an external source of infection. The period for which a disease is infectious varies, and the shorter the infectious period, the chances of “fade-outs” occurring increase.

Epidemiologists have calculated that for measles to become endemic, which is infectious for eight days, it is necessary to have a population of between 200,000 and 300,000, or even 500,000, in order to generate 7,000 susceptibles to maintain the parasite, and it becomes a disease of childhood (Bartlett 1957, 48–70). The period of infectivity for influenza is often shorter, so larger populations are generally required to maintain it. Smallpox, however, remains infectious for two weeks and can even survive on clothing and bedding for up to eighteen months. As a consequence, it is associated with a lower threshold population of 200,000 (Dixon 1962, 297–98; Fenner et al. 1988, 118). It is argued that this lower threshold can explain why, during the first century of European presence in the Americas, smallpox epidemics were more frequent than those of other diseases, notably measles and especially influenza (see, e.g., Cook 1981, 60–61).

Where acute infections remain in the population, a significant proportion of the population may become immune and develop “herd immunity.” With the development of scientific medicine, “herd immunity” may be induced through vaccination, but without it immunity can be acquired only through previous infection, which confers lifetime immunity. The ability of a society to develop “herd immunity” thus depends on the size and density of the population and the intensity of outside contacts. However, it also depends on the fertility rate that produces a new generation of nonimmune hosts in the form of children. Evidence from the colonial Andes suggests that epidemics generally resulted in reduced fertility as marriages were broken up by the death or flight of partners, as economic conditions deteriorated, and as the psychological effects of an epidemic encouraged smaller families. In colonial Ecuador it took about 100 years for the population to acquire “herd immunity,” such that smallpox and measles became diseases of childhood (Alchon 2002, 57–58, 76–77). It is worth noting that in preindustrial non-contracepting societies, which are characterized by high mortality and low life expectancy, population growth is not normally more than 1 percent a year. Even a small change in fertility, therefore, can affect its ability to recover demographically.

The current dilemma, which in many respects parallels the colonial experience, is that, in the absence of vaccines, “herd immunity” can only be acquired through exposure to Covid-19, which would result in high mortality. Some countries, such as the UK, initially pursued a strategy of developing “herd immunity” in the belief that for most people the disease was relatively mild (Freedman 2020). However, it soon became apparent that this would result in high mortality, and allowing a significant proportion of the population to die of the infection would be socially and politically unacceptable. Such a strategy probably has never been tolerable, but it is perhaps even less so today, given greater knowledge of how epidemics operate and therefore societies’ higher expectations about the ability of their political leaders to control them.

Societies can only acquire immunity to acute infections if their populations are large and the fertility rate can continue to produce a pool of susceptibles to infect. Where populations are small and the fertility rate is low, “fade-outs” often occur. As a result, the population is unable to acquire immunity, and when a disease is reintroduced it results in high mortality. For colonial Ecuador I have argued that the dense population of the highlands was able to develop immunity to several acute infections at an early stage, with some becoming endemic by the beginning of the seventeenth century and enabling the population to begin to recover. Meanwhile, societies in the Amazon headwaters continued to suffer high mortality at regular intervals throughout the colonial period as infections were reintroduced, resulting in their continued decline, which was effectively reversed only through the introduction of scientific medicine (Newson 1993, 1187–95). Despite this access to modern medicine, the lack of immunity among Amazonian populations still makes them particularly susceptible to the introduction of new infections today. I have drawn parallels between Amazonia and the Visayas, but in the colonial Philippines the demographic decline appears to have been moderated not by the immunity that communities acquired but by their lack of contact with outside sources of infection (Newson 1999, 1845–46; 2009, 258–59).

**Disease Control and Management in History**

In the current Covid-10 pandemic many states have sought to contain the disease through reducing social contact, often by confining people to their homes. Historically, quarantining has been used to inhibit the spread of certain diseases, notably bubonic plague and leprosy, but the public health measures taken generally focused on improving sanitary methods rather than reducing the level of contact (Carmichael 1993, 196–99). Quarantining might be effective where face-to-face contact is involved, such as with smallpox and measles, but not with a disease spread by an animal vector, such as malaria or typhus. However, in the past, and as we are experiencing today, when a new pathogen emerges, knowledge of how it spreads may be limited, so that measures taken are often inappropriate and do little to contain the epidemic (McGrath 1991, 410–17).

It is clear that population density and distribution would affect the *initial* impact of the disease, but the nature and intensity of interpersonal contact were also affected by a large number of political and cultural factors.1 These factors would have included, for example, the nature and frequency of religious and ceremonial gatherings, external trade, bathing practices, or whether families resided in nuclear or extended family households. In sixteenth-century Ecuador, Spanish attempts to control promiscuity by suppressing extended and multifamily households in favor of nuclear family residence were recognized at the time as reducing the impact of an epidemic (Newson 1992, 109).

Less frequently discussed in the literature is the way in which cultural factors may influence the ability of a society to recover from an epidemic. Among other things this ability varies according to the population cohort affected. The death of able-bodied adults has a much greater impact on the ability of a society to recover, especially where those dying possess specific and scarce skills, than when children are affected. In the colonial Andes, where the indigenous population ~~may~~ might have been reduced to only a tenth of its size in the sixteenth century, the drastic fall in population led to the widespread abandonment of irrigation works, terracing, and raised fields (Denevan 1992). Depending on the nature of food production and landholding, large-scale losses could affect food supplies and result in reduced levels of nutrition, which might increase susceptibility to some infections. At the same time, evidence from the colonial Andes suggests that epidemics resulted in reduced fertility as marriages were broken up by the death or flight of partners and as economic conditions deteriorated and the psychological effects of the epidemic encouraged smaller families (e.g., Cook 1981, 234–35; Alchon 2002 55–56, 88–89). The death of fertile women can have a particularly significant impact because it results in an immediate loss of reproductive capacity that cannot be restored until a new generation of reproductive women emerges. Where only one partner dies, demographic recovery may also be held back by opposition to remarriage and/or by marriage rules that determine the suitability of spouses, factors that are more significant in smaller communities where marriage pools are generally small.2 For the Philippines I have argued that differences in fertility, which derived from preexisting marriage rules, birth practices, and population policies, contributed to lower levels of demographic growth in the Visayas than in Luzon (Newson 2015, 78–95).

Leadership can play a critical role in determining the outcome of an epidemic, both through the measures that are taken to contain it and the support given to aid recovery. State societies generally have greater administrative capacity to organize practical responses to crises. However, where leadership is weak, or a leader dies or fails to command confidence in the health measures being taken, the epidemic can lead to social unrest and conflict. This point can be illustrated most dramatically by the case of the death of the Inca ruler, Huayna Capac, probably from smallpox, about 1524, which precipitated a widespread dynastic civil war between his sons Huascar and Atahualpa, that together with the Inca wars of conquest are estimated to have cost 100,00 lives *before* the Spanish arrived (Newson 1995, 124–25, 337). In addition, where the cause of a disease is unknown or there is a lack of strong leadership, blame might be attributed to an outside group or class, leading in the case of Amazonian groups to intertribal conflict that raised mortality (ibid., 318). A pandemic may not only be a health crisis, but also a political crisis that may lead to questioning of the existing social order.

**Conclusion**

Each new acute infection poses multiple questions, some of which relate to the nature of the disease itself, its infectiousness, how it is spread, and who it infects. As Covid-19 spreads, scientists are learning more about the characteristics of the pathogen. However, we should not expect that the impact of the disease, and indeed a society’s ability to recover, will be the same throughout the world or even within a country. History demonstrates that cultural factors, including the actions taken by leaders, will be important factors in explaining geographical variations in its impact.

**Notes**

1. These and other factors are elaborated upon in Newson 1998, 52–59.

2. These factors are elaborated upon further in Newson 1998, 50–58.

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**Linda A. Newson** is director, Institute of Latin American Studies, School of Advanced Study, University of London, Senate House, Malet Street, London WC1E 7HU, UK. She is also emeritus professor, Department of Geography, King’s College London. She is the author of six monographs and has published extensively in both English and Spanish, including *Conquest and Pestilence in the Early Spanish Philippines* (Honolulu: University of Hawai’i Press, 2009). She has received numerous awards, the latest being an OBE for her services to Latin American studies in the Queen’s Birthday Honours 2015. In 2000 she was elected a Fellow of the British Academy. <linda.newson@sas.ac.uk>