Infectious Diseases as New Risks for Human Health

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Abstract

Throughout history, significant changes in the relationships between human beings and the natural and built environment have served the impetus for the emergence and redistribution of new diseases. The last quarter century has been witness to an unprecedented number of such diseases including, for example, HIV, Ebola, West Nile, mad cow disease, hoof-and-mouth disease, antibiotic-resistant strains of bacteria such as those involved in tuberculosis and *Clostridium difficile*, SARS and, more recently, Influenza A/HIN1. The question therefore arises, could recent changes in the human-environment relationship explain this surge in new and emerging diseases? I address this question by discussing how the forces of economic and cultural globalization over the last few decades have resulted in changes conducive to the emergence and spread of new threats to human health.

Key words: emerging infectious disease, globalization, neoliberalism, security, urbanization

Introduction

Throughout history, significant changes in the nature and types of relationships that human beings have had with nature, and particularly animals, have led to changes in the development and spread of infectious diseases. It is from this perspective that McMichael (2001) outlines how, for instance, the change in settlement patterns over 10,000 years, from nomadic hunter-gathering to settled agrarian-village living, enabled countless strains of bacteria and viruses to jump from domesticated herd animals and from rodents to relatively stationary human beings. Indeed, many existing infectious diseases that affect human beings today, including smallpox, measles, tuberculosis, leprosy, influenza, the common cold, malaria, dengue, and the bubonic plague, can be traced to this historic

period of transition. Other examples of changes in the human-environment relationship, as it relates to the spreading of diseases, include the increased trade, travel, and military movements of the past 1,000 to 2,500 years, during which time smallpox and measles spread from the Indian Subcontinent to Europe via Roman Empire troops returning from settling unrest in Syria (in 2 BCE). During the same period, trade along the Silk Route facilitated the spread of the same diseases from Europe to China. Furthermore, the introduction of the bubonic plague to 14th century Europe occurred as the caravans and armies of the Mongol Empire entered the European continent through the Black Sea. A third major shift in the human-environment relationship accompanied the practices of the colonialist period that spanned the 17th to 19th century and led to the well-documented transoceanic spread of disease via European ships and the decimation of indigenous populations within the Americas. McMichael (2001) concludes by speculating that we may be entering a fourth transitional period in the ever-changing environment-human relationship – a new epoch defined by globalization.

Some supporting evidence exists for the claim that globalization has led to changes in the environment-human relationship which, in turn, has induced changes in infectious disease patterns. Consider the fact that over the last quarter-century, the world has witnessed an unprecedented number of "new and (re)emerging" diseases. These may be thought of as a set of infectious diseases that appear in a population *de novo* or that have been known for some time but are rapidly increasing in incidence or in geographic range (Mayer, 2000; Morse, 1993, 1995). There are numerous examples of these diseases, including HIV/AIDS, Severe Acute Respiratory Syndrome (SARS), *E. coli* 0157:H7, *Clostridium difficile*, West Nile virus, Lyme disease, antibiotic-resistant tuberculosis, the Ebola virus, and avian influenza (Drexler, 2003; Garrett, 1994; Levy & Fischetti, 2003; Nikiforuk, 2006). Not only has the number of the types of such diseases increased dramatically over recent times, but so too has the actual number of disease outbreaks. For instance, outbreaks caused by food and waterborne pathogens have risen substantially from 533 in 1990 to 1,414 in the year 2000 (Nadakavukaren, 2000). This mirrors the dramatic intensification of globalized and vertically integrated large-scale livestock operations – a practice also referred to as factory farming (Ali, 2004; Davis, 2005; Nikiforuk, 2006; Schlosser, 2002). In what follows, I explore various aspects of McMichael's hypothesized relationship between globalization and infectious disease emergence by broadening the focus of discussion. I adopt a more sociological focus, in order to cast some light on the implications that globalization, and its associated developments of urbanization, neoliberalization, and post-9/11 securitization have for understanding new and emerging diseases such as SARS and Influenza A/H1N1.

Globalization

Throughout his writings, Weber (1978, 2003) argued that, from an historical perspective, large-scale societal developments such as the development of capitalism, democracy, and

bureaucracy were informed and guided by the process of "rationalization" (see also Merton, 2002, on the relationship of rationalization and the development of modern science). As such, for Weber, rationalization could be viewed as a kind of all-encompassing "master process" that significantly influenced a wide range of values, beliefs, activities, and organizational developments within the European context of the day. Arguably, it could be said that the process of "globalization" exerts a similarly wide-ranging, pervasive, yet underlying, influence on social, organizational, and institutional life in the contemporary era. A useful starting point for the current analysis in this respect is Held, McGrew, Goldblatt, and Perraton's (2002) general conceptualization of globalization. For Held et al. (2002), globalization may be thought of in terms of the transformations involved in the organization of human affairs that occur because of and through the linking together and expansion of human activity across regions and continents. These transformations may be understood to operate through several mechanisms. The first mechanism involves the increased *extensivity* of global networks, that is, how global networks today have a wider and more pervasive reach than in the past. The second mechanism involves increases in the *intensity* of global interconnections. The third mechanism refers to the speeding up in the *velocity* of global flows. And, lastly, globalization is facilitated by an increase in what is referred to as the "*impact propensity*" – that is, the deepening enmeshment of the local and global, such that the impact of distant events is magnified, while local events may have global consequences. Thus, we can see these mechanisms in action when considering the international spread of infectious diseases such as SARS or Influenza A/H1N1 as a globalized phenomenon. First, it can be noted that the networks of social contacts involved in the spatial diffusion of these diseases were quite extensive, involving long chains of transmission connecting Southern China to Toronto for SARS, or Mexico City to Northern Canada for Influenza A/H1N1. At the same time, the intensity and velocity of the flows involved in the infectious flows were also critical factors involved in the spread of the diseases. The increased volume of passenger flow through airlines in the contemporary era increased the risk of infection, while the speed of air travel has meant that those infected can show no signs of the disease until after their arrival at a distant location, thereby contributing to the possibility of unwittingly spreading the disease across large distances (i.e., the development of a new type of vulnerability). The impact propensity can also be identified as a crucial consideration in infectious disease spread today, because the cross-over of the SARS Coronavirus from the civet cat, or Influenza A/H1N1 from the pig, to human beings may occur in some remote location that, in the past, would have only led to a localized outbreak in an isolated village – an event which ultimately burned itself out, thus preventing the disease from spreading beyond the confines of that locale. Today, because of globalized connectivity, such insularity or isolation no longer exists to the extent it once did, and a localized outbreak of a disease in a remote area is more likely to spread to more populated areas and therefore have a much greater potential for global impacts (for a detailed discussion of these aspects of globalization and SARS, see Ali & Keil, 2006, 2008). Such recent developments highlight how changing relationships of humans with the *natural* environment have implications for the spread of disease in a globalized world. Specifically, the cross-over phenomenon focuses

attention on how increasing intervention in nature renders less and less of the world as "untouched natural habitats" (Kaplan & Kaplan, 1989). This has direct implications for disease spread in the contemporary era, as seen not only in the case of the SARS Coronavirsus but also for other diseases. For example, increased suburbanization has resulted in greater human encroachment in formerly untouched wilderness areas and this has led to increased exposure to the tick which causes Lyme disease. Another example relates to how development pressures that result in deforestation effectively open up corridors for mosquito vectors that transmit various diseases, most notably malaria, to humans.

If globalization is indeed a sort of underlying "master process" in today's world, then, just as rationalization has influenced other major societal developments such as capitalism, democracy, bureaucracy, and science, globalization would likewise be expected to have an influence on major developments in the contemporary era that qualitatively distinguish the character of life today from that of the past. I contend that this is indeed the case. In recent times, the collective effects of the types of transformations noted above may be seen in developments that characterize the contemporary epoch, including the advent of new forms of networks (e.g., virtual communities of interest based on Internet technologies); new institutional configurations such as those related to transnational social movements, subpolitics, and issues related to scalar politics (Keil & Ali, 2007); new forms of society-nature relations as the world reflexively confronts issues such as global transboundary environmental problems and emerging diseases; new vulnerabilities to threats, as complex interconnections and nonlinear developments resulting from the interplay of the technological, ecological, and social factors, lead to various types of disasters (Ali, 2008); and new forms of governance, particularly in relation to issues evolving from a crisis politics (Keil & Ali, 2007), such as those involving social control and security under the influence of capitalism (Ali & Keil, 2010; Hooker & Ali, 2009). Many of the effects of these transformations identified above may in turn be thought of in terms of other (constitutive) sub-processes that fall under the auspices of globalization, namely, urbanization, neoliberalization, and securitization. In what follows, I will discuss how the master process of urbanization and its associated sub-processes are relevant to understanding the origin, spread, and response to infectious disease threats in the contemporary era. For the sake of illustration, the case of SARS will be used as the primary empirical referent throughout these discussions.

Urbanization, the Built Environment, and Infectious Diseases

The United Nations (2007) has noted that, as of the year 2008, more than half of the world's population will live in cities. This development has important implications for the spread of infectious diseases. In order for a disease outbreak to be sustained, the host population of humans must be large enough, and dense enough, for the pathogen, especially a virus, to remain in circulation. That is, to survive, the virus must be able jump to another host before the first host succumbs to the disease. Without a living host, the virus cannot multiply, as it essentially requires the cellular machinery of the human host to reproduce itself. Cities, with

a large number of people (i.e., hosts) and crowded conditions, are therefore well-suited to the survival needs of the virus. Further, the physical environment of the city itself, with its infrastructure and transportation patterns that serve to open up new avenues for spatial diffusion and proliferation, enhances the suitability of the city for the virus. Notably, cities serve as points of concentration for pathogens arriving via a variety of networks – food, water, air, waste distribution networks. In a sense, due to the very nature of the built infrastructure, cities are connected entities and it is these connections that serve to make human beings vulnerable to infectious diseases. This influence of the built environment was seen in several ways during the SARS outbreak. First, a community outbreak among 300 residents of the Amoy Gardens apartment complex in Hong Kong was found to have occurred because of transmission of the virus through a vertical sewage pipe that connected washrooms directly above one another (Ng, 2008). Second, the spread of SARS was found to be mostly nosocomial in nature, that is, limited to spread within the hospital system. The built environment of the hospital was therefore critical in channeling the disease spread in certain directions. Third, the international spread of SARS was clearly dependent on air travel (Bowen & Laroe, 2006), therefore implicating the built environment of airports as connecting hubs. Notably, the spread of SARS illustrated how the location of major hubs in certain types of cities – that is, those referred to as "global cities" – was instrumental in spreading the disease through the global city network of connections between Hong Kong, Toronto, and Singapore (Ali and Keil, 2006). Indeed, another dimension of "globalization" concerns the linkages between global cities, that is, those cities that act as the command and control posts of the global economy. Global cities integrate the world economy by connecting together various types of flows required to keep the world economy going, including information, communications, labor, capital, and commodities. Although global cities' research has recognized the significance of these types of flows, SARS has revealed that the spread of infectious diseases represents another type of connective flow that can arise in the network of global cities (see Ali & Keil, 2008).

Neoliberalization and Infectious Disease Flow

The process of neoliberalization is based on an ideology that emphasizes the minimization, or complete elimination of state intervention in the provision of goods and services (i.e., the economy), with the ultimate aim of expanding the free market and free trade with the concomitant protection of private property rights. As such, neoliberal policies and activities often promote privatization of state functions, including outsourcing and downloading of state functions to private agencies; and the elimination of environmental, industrial, trade, and health regulations that are viewed as costly barriers to privatized profit maximization. Although these are all matters of a political nature that seem distant from issues related to disease flows, neoliberalization in fact has had a direct impact on infectious disease flows by influencing those health and economic policies and regulations that ultimately have a direct impact on the channeling of these flows through the environment. Two examples will help illustrate this point.

Elsewhere I have described how an outbreak of *E. coli* O157:H7 in the year 2000 in the rural town of Walkerton, Ontario, was related to the neoliberal policy of the Ontario Government, known at the time as the "Common Sense Revolution" (Ali, 2004). The outbreak emerged as the outcome of several policy changes that dramatically influenced the flow of this particular bacterium. *E. coli* O157:H7 originates in the gastro-intestinal tract of livestock and persists in the fecal matter spread as fertilizer on agricultural land in the area. This was found to be origin of the bacteria that entered the town's drinking water supply, contaminating the water, and leading to the outbreak. The contamination event occurred during a time in which drinking water management in the province was being deregulated and privatized. In practice, this meant that the provincial government agencies and laboratories that were responsible for the testing of samples from municipal drinking water supplies were being downsized and faced heavy staff cuts. In fact, such provincial government services had just been privatized at the time of the outbreak, and rural municipalities, such as Walkerton, with a sparse population, and therefore a weak tax revenue base, simply could not afford regular privatized water testing (a monitoring function previously performed by the provincial government). In part, and as a consequence of these developments, the contamination of the drinking water was not detected in a timely fashion, and once detected, efforts to curb the flow of the pathogen were hindered by a lack of resources resulting from budget and staff cuts.

As part of the services provided by governments, public health is an important area that is subject to neoliberal policies. In several ways, the outbreak of SARS in Toronto illustrates how such policies influenced the trajectories the viral flows (Ali & Keil, 2009; Salehi & Ali, 2006; Sanford & Ali, 2005). Tracking the path of the virus through the process of contact tracing is the first step before public health actions, such as the social distancing methods of isolation and quarantine, can be taken. Contact tracing involves the process of identifying all those that are infected or possibly infected by a disease agent. This is accomplished by asking infected persons to list all of the people they had been in contact within a previous period of time. Through follow-up with those identified, it could be determined if the contacts were infected, and those found to be infected would be quarantined or isolated, to break the chain of transmission and contain the outbreak. In the case of Toronto, the ability to engage in contact tracing was hampered through budget cuts to public health, as transfer payments to the municipality by the province for public health had been dramatically reduced over the preceding years (Salehi & Ali, 2006). This had a number of consequences for the response to the SARS outbreak. First, the number of public health officials needed to engage in the laborious process of contact tracing was limited, because of reduced personnel in the Toronto Public Health agency (*ibid.*). The hospital personnel available to combat the disease was also severely limited, particularly in terms of the surge capacity required during the time of an outbreak – a significant problem, as many hospital workers had to self-quarantine as a safety precaution, because of the possibility of infection. Furthermore, reduced spending on public health had a direct impact on the technological infrastructure required to track the virus, particularly in relation to the technical capacity required for the collection,

processing, and communication of epidemiological and clinical data across different locations. The province's mandatory information system for the surveillance of reportable disease was found to be very outdated, and the 14-year-old system was not able to support the quarantine management functions required for the management of SARS cases during the outbreak. Although a plan had been proposed by the provincial Public Health Branch in previous years to update the system, the proposal was not approved for funding by the government, forcing Toronto Public Health to develop its own software tools to track SARS cases and contacts (Naylor, 2003). Before this software tool was developed, Toronto Public Health was forced to maintain records on paper charts and maps, using color-coded Post-It notes (Basrur, Yaffe, & Henry, 2004). The city's chief medical officer of health remarked that this was like using 19th century tools to fight a 21st century disease (Naylor, 2003).

The limitations of and constraints on the ability to curb the flow of SARS due to the influence of neoliberal policies are perhaps most pronounced with reference to the weakening of the frontline field response, especially as it related to nursing work and surge capacity during the outbreak. To deal with the reduced amount of funds available to remunerate nurses, hospitals were forced to adopt certain strategies such as the casualization of health care work, whereby Ontario employers were not obliged to pay benefits to part-time (i.e., "casual") workers. In this context, the nursing labor force in Ontario has become highly "casual" (Nuttall-Smith, 2003; Perkel, 2002). Such circumstances increased the potential for inter-hospital spread of the SARS, because many nurses were forced to work at multiple jobs at multiple locations to earn a full-time wage equivalent. Fortunately, perhaps due to the directive that nurses only work at one site during SARS (Burcher, 2003), only one case of inter-institutional transmission was documented (Naylor, 2003). However, such restrictions further constricted the available pool of nurses (Hall et al., 2003). The casualization of nursing labor has several other implications for the ability to respond effectively to a disease outbreak. First, since casual workers are paid on an hourly basis, a latent incentive may be created for casual work nurses workers to continue to work while ill, thus increasing the potential for disease spread (Naylor, 2003). Second, casualization may lead to an attenuation of a sense of workplace community and a reduced awareness of infection control protocols, both essential for frontline workers faced with an outbreak situation (Naylor, 2003). Third, the nursing shortage meant that 4 to 5 patients were assigned to one nurse but it was soon recognized that this was a potentially dangerous ratio that could lead to enhanced disease transmission (Loutfy et al., 2004).

In sum, neoliberalization, as manifested in fewer regulations and enforcement activities aimed at containing disease spread, has indirectly yet significantly contributed to the ways in which infectious diseases may spread, although the adoption of this political program is by no means the only factor contributing to the nature of contemporary disease spread. Thus, the point being made here is that disease spread is a complex and multifaceted phenomena that involves both biophysical and socio-political factors, yet the latter tend to be neglected in conventional epidemiological accounts, thus producing an incomplete story of a very complicated process.

Securitization and Infectious Disease Flow

Social control has always been an important aspect of infectious disease and this is reflected by the fact that the state has adopted specific control strategies at various points in history to deal with various diseases. Citing the work of Michel Foucault, Sarasin (2008) relates, for example, that an *exclusion* orientation was adopted in the Middle Ages, when lepers were forced into colonies located at the periphery of the town. In contrast, an *inclusion*-oriented response to the plague was pursued by the state in the 17th century, whereby those infected were not expelled to outside the city but rather sequestered to an area *within* the city – a social control orientation based on a strategy that was in line with the newly influential liberal ideology of the time (i.e., respect for individual rights). Sarasin goes on to note that Foucault observed that a different strategy was adopted to deal with smallpox in the 18th century, namely, a security-orientation in which statistics were collected to differentiate areas of high risk from those of low risk, knowledge which, in turn, was used in conjunction with targeted immunization programs.

Clearly, social control measures still exist today to deal with infectious disease threats, as mentioned above for the contact tracing and social distancing methods used to deal with SARS. Social control, however, has also led to tension with other governance issues with which the state is involved – primarily, ensuring economic growth. In this context, there has long been a tension between public health and economic interests, because public health strategies based on the curtailment of human movement also prevent those activities necessary for trade and commerce. It was for this very reason that, for example, the imposition of quarantine on incoming ships in European city-state ports during the Middle Ages was met with resistance from the merchant class (Banta, 2001). Notably, such tension still persists today as evidenced by the fact that travel advisories issued by the World Health Organization (WHO), warning travelers not to travel to SARS-affected areas such as Toronto, were met with disapproval by Canadian officials who feared grave economic consequences to the hospitality, tourism, and other sectors of its domestic economy. Protection against public health threats has increasingly been recognized as a precondition for the stabilization of economic activity. In this light, security measures may be somewhat begrudgingly tolerated by state actors. This toleration of security measures may have intensified to an all-encompassing embrace since the events of September 11, 2001. This is seen, for instance, by a renewed emphasis on issues of surveillance, vigilance, and security that now play a prominent role in a state of affairs informed by a crisis politics referred to as the "new normal" (Hooker & Ali, 2009). Within the "new normal" worldview, public health and terrorism issues have become conflated, under the mantle of "national security." This may be illustrated by considering several examples in which public health has become securitized. The explicit recognition of public health as a security issue may be seen, for example, in a report developed for the US Central Intelligence Agency that framed the threat of new infectious diseases as a threat to the nation (CIA, 2003). A second illustration of this recognition is the publication of a special issue of the political affairs journal *Foreign Affairs* (2005: 84(4) July/August) dedicated to the issue of new and emerging diseases as threats to security.

Finally, a third indication of the significance of this issue is seen in the development of Canada's first national security policy: "Securing and Open Society," in which public health emergencies figure prominently (van Wagner, 2008). It has been noted that in a post-9/11 era of the "new normal," a focus on bioterror and infectious diseases as security threats has led to a renewed interest in traditional social control measures associated with national security, such as border control and intelligence capabilities (King, 2002, 2004). Examples of the adoption of such measures can be seen by considering the national and international response to the spread of SARS.

At the most fundamental level, securitization is based on the ability to differentiate the threat from the non-threat and to classify things accordingly. Securitization therefore explicitly involves a sorting process. Similar to contact tracing procedures, the surveillance techniques on which securitization is based are predicated upon sorting and monitoring practices, which today involve advanced digital technologies. Usually these surveillance technologies are located in places such as airports, where a homogeneous flow of people is to be differentiated into streams of possible threats versus non-threats. Since the airport represents a site of considerable sorting and re-sorting of disparate populations across national borders, it is no surprise that surveillance plays a critical role in contemporary airport operation. Clearly, in the post-9/11 era airport surveillance in the service of "security" has intensified, as indicated by the introduction of ever more pervasive surveillance technologies, including the increased use of detention centers, closed-circuit television cameras, global positioning systems, iris-recognition security, intermodal traffic interchanges, as well as through the embedding of data codes on airline tickets that digitally enscribe what the passenger is doing and predict other actions that the passenger may take (Dodge & Kitchin, 2004). Still further indications of the extent to which the post-9/11 "state of emergency," or the exception has become the "rule" are revealed by considering just a few of the many recent state initiatives aimed at "securing" airports. One example involves the "nationalization" of airport security, with the Department of Homeland Security taking charge of implementing standardized systems of person and baggage securitization. A second example is the US government's Total Information Awareness program that integrates and co-ordinates various types of data from private and public sources, including those from biometric technologies that are able to recognize humans at a distance, as well as the mapping of people's multiple connections across their social networks. A third example is provided by the passenger profiling systems known as Computer Assisted Passenger Pre-screening or CAPPS (now Secure Flight), that gathers comprehensive information about a passenger with the ostensible aim of enabling officials to make informed judgments and risk measurements about that passenger's propensity to become a threat (Bennett, 2004).

It was in this context of enhanced surveillance that the WHO "recommended" that airports in SARS-affected areas adopt certain monitoring practices, including temperature screening of departing and transiting passengers, the provision of information leaflets to travelers, exit questioning, and the completion of a mandatory health declaration form by passengers (Ali & Keil, 2010; Bowen & Laroe, 2006). Notably, the issuing of these recommendations violated an important principle of the long-held Westphalian political order, namely the principle of state sovereignty – that is, the view that the nation state

holds the exclusive right to govern domestically in an autonomous manner free from external influence. Although these recommendations appeared to be voluntary, in effect they were not because, if the nation state did not adopt the WHO recommendations, then the travel advisories would remain in place, thus having a continued desultory economic impact on SARS-affected cities. The issue and persistence of the travel advisory represented ways of ensuring compliance of the nation state to WHO demands and, according to David Fidler (2004), illustrates a new form of public health governance (which he refers to as post-Westphalian). Yet, it should be noted that despite all this controversy over the imposition of such surveillance and monitoring initiatives at airports, it is questionable, or at least not clear, whether such measures actually succeeded in decreasing the spread of this infectious disease. Especially in light of the fact that almost no cases of SARS were identified through such airport screening strategies, despite the considerable amount of resources deployed in such initiatives (Naylor, 2003).

Concluding Remarks

Over the last quarter century, with intensified globalization, significant changes have occurred in the relationships not only between human beings, but between human beings and nature (including their relationship to physical space and time). Space-time compression, for instance, has important implications for the genesis, spread, and response to infectious diseases. As such, the increased speed of travel, a greater degree of human migration, intensified urbanization, and increasing human encroachment on untouched natural habitats have all enhanced the potential for pathogens to spread internationally in very short periods of time. Furthermore, interaction with other aspects of social change such as urbanization, neoliberalization, and securitization has collectively led to a situation of new vulnerability to disease spread, as new opportunities and pathways are opened up as unintended consequences of these interactions.

It is important to note that the spread of infectious diseases is one example in a set of problems that will probably become increasingly prominent as globalization processes continue to unfold in the future – specifically, I refer here to those developments that involve the crossing of geographic boundaries. Thus, in common with other transboundary problems, such as environmental pollution, international terrorism, and international trade in narcotic drugs, the management of infectious disease spread is challenging, because programs and policies aimed at disease containment necessarily implicate a myriad of other issues that have been discussed in this paper. These include issues related to the ability of sovereign states to govern autonomously, border regulation, the tension between ensuring free trade while protecting public health, and balancing the rights of the individual versus those of the collective. How such moral, political, economic, legal, and social issues are resolved will undoubtedly have significant implications for the battle against the threats of new and (re)emerging diseases – threats that show no sign of abating in the near future, due to increasingly profound human impacts on the environment.

Finally, in terms of the contribution that the approach I have developed here may have for the advancement of people-environment studies more generally, I believe that by focusing on the types of broader, socio-political issues that I have raised, and by situating them within the context of globalization, a more critical and less reductionist approach that more accurately captures the numerous nuances and subtleties of disease transmission in contemporary conditions may be developed.

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