

## The perspective of socioeconomic inequalities and infectious disease in the 21<sup>st</sup> Century

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At the turn of the new century, the United Nations set a series of global health goals to be achieved by 2015. Amongst the eight Millennium Development Goals (MDGs), goal six aimed to combat HIV, malaria and other diseases [1]. Whilst progress has been made towards addressing MDG 6, improvement has been slower than anticipated and both communicable and non-communicable diseases have risen to prominence in the minds of health planners in the last few years. In recent times, attention has been focused on addressing non-communicable diseases, as statistics indicate they are the major threats to health. However, the notion that infectious diseases could be eradicated, which came to prominence in the 1960s and 70s, has proven to be false and the need to address the growing threat from infectious diseases has become clear. Since the turn of the century it has become apparent that we are losing the fight against infectious diseases, and many of the diseases we thought under control are now a threat once again. Additionally, several new forms of infectious disease have been recorded, many of which threaten human health as we have little or no resistance to them [2].

The greatest advances in the health of people have come from equitable access to basic essential resources such as clean air, soil and housing, clean water and nutritious food [3, 4]. Environmental and economic factors, such as global warming, are creating shortages in essential resources and leading to increased human habitation in urban areas [4]. Similarly, war and civil unrest have led to mass migration [4]. Urban living, especially for socially disadvantaged groups, creates the conditions in which infectious diseases can thrive, adapt and spread quickly [4, 5]. Infectious diseases do not recognise borders, and increased speed of travel and the reduction in restrictions on travel have heightened the possibility of pandemics [2, 4]. Changes in animal husbandry have led to the emergence of new infectious diseases as microorganisms have the ability to adapt to environmental changes quicker than humans do [4].

Biotechnological advances, particularly improvements in vaccination, antimicrobial drugs and population surveillance (leading to early detection), have led to significant reductions in infectious disease mortality rates [6]. The WHO report Disease Control Priorities Project identifies infectious disease surveillance as fundamental in averting epidemics [7]. However, the recent outbreaks of severe acute respiratory syndrome (SARS) and avian flu symbolise the importance of enhancement of infectious disease surveillance [8]. In 2005 the International Health Regulations were revised with a greater emphasis on global collaborative

approaches to infectious disease surveillance [9]. The Global TB Drug Facility (GDF) initiative by the WHO signifies their role as facilitator of international collaboration and partnership approaches to tackling infectious disease [10].

The invention of new antimicrobial drugs to fight infectious disease has led to significant reductions of mortality. However, this has resulted in the unintended consequences of antimicrobial resistance and the emergence of diseases that were otherwise rare [11], most notably the development of resistance in pathogens such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *S. aureus* (VRSA), carbapenemase-producing enterobacteriaceae (CPE), and many others [11-13]. As antimicrobial resistance to drugs rises, the supply of antimicrobials is reducing and the effectiveness of those we have is on the decline. Traditional healthcare with its reliance on the biomedical model therefore faces an imminent crisis [11, 14]: it is becoming apparent that the biomedical approach to healthcare has run its course, and new and sustainable models of healthcare need to be developed [14].

Furthermore, advances in vaccination and medical treatments translate into a bigger pool of older individuals who are increasingly susceptible. Some are beginning to argue that the predominantly biomedical approach to healthcare, which has led to significant improvements in health for many, is a double-edged sword as it has created large sections of society who are vulnerable both to healthcare and from a lack of access to healthcare commodities [14].

Humans are becoming increasingly vulnerable to natural and socially constructed environments, and perceptions of vulnerability are traditionally discussed within the concept of health inequalities. According to Davies [14], health inequalities refers to the idea that individuals, groups, regions, nations or geographical areas are exposed to a range of socially constructed differences in health experience and health status; the individuals and groups who suffer from health inequalities suffer a deficit both in comparison with better-off groups and in comparison with the life that they might have lived under more favourable constructions [14]. In terms of morbidity and mortality, there is a clear disparity between rich and poor people and rich and poor countries [2]. However, in her address to the World Health Summit in October 2015, Dr Margaret Chan indicated that emerging threats to health are changing our understanding of health inequalities [3]. No longer can we think of them as the differences between rich and poor, developed and developing countries, etc.

The recent outbreaks of Zika virus and Ebola crisis demonstrate the importance of collaborative and partnership working. Increasing global interdependence means that the re-emergence of infectious diseases needs to be dealt with in a coordinated manner. No longer is it simply individuals and communities who are vulnerable to the re-emergence of infectious diseases: it is also nation states. Sovereign states no longer have the capability to protect themselves from the growing risks to health [3]. The imperative, therefore, must be to build sustainable and robust healthcare systems across the globe for the betterment of all. In seeking to highlight the changing nature of vulnerability, Chan [3] advises us to consider that today 70% of the world's socially deprived live in middle-income countries. Schlipkötter and Flahault [15] indicate that within these countries the leading causes of death are lower respiratory tract infections, diarrhoeal diseases, tuberculosis and malaria. They go on to point out that in low income countries the major threats to health remain infectious diseases, and in particular vaccine preventable deaths in the young. Chan [3] is clearly indicating that within the modern interdependent world there is an economic, ethical and protective necessity to introduce universal health coverage and to focus on proven public health measures.

The economic burden of infectious disease to poor individuals and communities has been well documented [16-18]. Research by Fallah et al. [19] investigating the connection between poverty and Ebola clearly demonstrated that poverty was a driver of Ebola transmission. They concluded that Ebola could have been prevented and/or contained if the interventions were targeted to areas of extreme poverty and funding was dedicated to development projects that meet basic needs [19]. These findings supported by Singh et al. [17], who pointed out that infectious disease disproportionately affects poor people in developing countries, illustrating the effect of poverty on infectious disease prognosis where patients and their families have to pay for diagnosis, drugs and hospital care, and this is often more than their annual household income [17]. Griffiths and Zhou [18] reported that the working poor face the fear of death from the infectious disease, as well as the financial costs in terms of paying for the treatment and of working days lost due to illness. These costs further deepen their poverty and perpetuate the vicious cycle of poverty and infection [17, 18].

Global economic recession has meant that most governments, rather than look outwards towards global health sustainability, universal provision and the implementation of public health systems based on addressing the determinants of health, have introduced budgetary constraints on health systems [20]. These restrictions have led to increasing health

inequalities due to the reduction of provision or removal of universal health systems [20]. As this has happened in conjunction with the drive for neoliberal governance based on the principles of stewardship, then at a time when health systems need to be supportive, robust and sustainable, large sections of the world's population have seen reductions in healthcare provision. Within the stewardship approach to healthcare, governments seek to transfer the cost of healthcare from health systems to individuals and households [20]. Concepts such as increasing personal responsibility for health, increasing autonomy, increasing choice and victim blaming for poor health choices are commonplace, and should be rejected by those who support the public health agenda [21]. However, at a time when advocates for public health should be voicing their concerns stridently, there has been an absence of a coordinated response, leaving those who are vulnerable without a voice.

It is well established that sociological and psychological responses to increased stressors, such as a lack of resources, lead to poor personal health choices and so-called irresponsible behaviour by those who are vulnerable [21]. The recent economic crisis has been used as an excuse to shift responsibility for population health and wellbeing to individuals. This is reflected in the heavy slicing of healthcare expenditure and shifting of focus from population health to treating the outcomes of poor health choices, which those in the socially disadvantaged groups tend to adopt to cope with the reduction in their basic resources for living. A self-defeating cycle is created in which the maladies of the developed world become the focus of research and expenditure: for example, whilst anti-depressant research thrives, research into treatments for non-communicable and the emerging and returning infectious diseases remains static. At the recent World Health Summit, Chan indicated that this practice could no longer continue.

One positive element of the MDGs is that evidence is emerging that coordinated action can lead to sustainable improvements in health. It is clear that health systems alone can no longer address the complex environmental, social and biological threats to health. The biomedical model, with its over-reliance on the preventative medicines approach, is slowly being replaced by a multidisciplinary approach in which all sections of the environment are addressed in an attempt to improve health. Addressing the determinants of health requires a multidisciplinary approach and the development of a public health infrastructure. Dr. Chan's keynote address is noteworthy as it shows that the conceptual infrastructure for a public health approach to the complex global health issues facing us today is at last taking shape [3].

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