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## An Overview of What Global Health Is

The state of health in the world varies enormously from one area to another and cannot be traced back to a simple diagram. On the one hand, there have been significant improvements over the decades: the average global life expectancy since 1960 has increased from just over 50 to over 71; smallpox has been wiped out and the number of deaths from measles, 871,000 in 1999, rapidly fell to an estimated figure of 12,000 in 2012: one of the undeniable successes of those vaccinations which today are erroneously opposed by sectors of the population. At the same time, the inequalities in the health field are also greater than in the past: there are more than 7 billion people in the world, but only 1 billion can expect to lead a long and healthy life. Whilst the life expectancy of a child born in Japan is 84, that of a child born in Swaziland is only 40; the maternal mortality rate is about 500 every 100,000 births in south-Saharan Africa and less than ten in many European countries.

Unlike in the past, health problems are no longer confined within the individual countries. The SARS epidemic, which started in China in 2002 and rapidly spread all over the world, recorded 8422 cases and 916 deaths in 29 different countries in 8 months. The emissions of CO<sub>2</sub> in the United States and China may be causing an increase in floods in Bangladesh. This means that control programmes, to be effective, have to be global, but it also means that the relations between health and the economic and political trends of globalisation are much more than superficial.

Global health, an expression that has now entered common use to refer to the specific problems linked to globalisation, has been defined by the United States Institute of Medicine as all those “health problems, issues, and concerns

that transcend national boundaries, may be influenced by circumstances or experiences in other countries, and are best addressed by co-operative actions and solutions.”

The concept of global health is connected with another important phenomenon, that of the so-called epidemiological transition, or the continuous process according to which some diseases decline (many infectious diseases and those caused by malnutrition) and others spread (chronic “non-communicable” diseases). Although infectious diseases are still a major public health problem, non-communicable diseases are becoming the main cause of death also in low-income countries. Underlying these transformations there are biological, environmental, social, cultural and behavioural factors; furthermore, different stages of transition can coexist in the same community.

When the ranking of the main causes of death at global level is considered, the diseases that are more common in low-income countries are found in the fourth (lower respiratory infections), the sixth (HIV/AIDS) and the seventh (diarrhoeal diseases) positions (2012 WHO statistics). All the other causes of death—together with the risk factors traditionally referred to affluent societies (obesity, little physical exercise, high blood pressure, smoking and unbalanced diets)—have also become important in the rest of the world. Coronary diseases are the cause of 17% of deaths in high-income countries and of 11% of those in lower-middle income countries, and in both they ranked first as the cause of death in 2012.

According to many indicators, including health, there is a general convergence of the countries in the world (see <http://ourworldindata.org/data/economic-development-work-standard-of-living/human-development-index/>). Inequalities themselves tend to be greater and greater within countries rather than across countries (Bourguignon 2012).

## Economy and Health

The influenza A (H1N1) epidemic in 2009 was one of the phenomena most clearly linked to globalisation: it started from pig farms first in the United States and then in Mexico, but soon took on global dimensions; defined a “pandemic”, by early 2010 it had already caused at least 18,000 deaths. One interesting aspect for the theories in this book is that the H1N1 pandemic was also taken as a model by economists to describe the crisis of liquidity triggered off when the speculative bubble of the US real estate market burst. From then on, the epidemic spread of some infectious diseases, especially in the light of

the mechanisms of contagion, has become a paradigm for economists wishing to describe financial crises.

Certain economic phenomena have been parallel to infectious epidemics, but the point is that both can be described with similar models, usually describing a localised crisis that rapidly spread all over the world. For example, as early as 1997, the devaluation of the Thai baht had given rise to a progressive destabilisation of the markets in South-East Asia, which then spread to Latin America, then Russia and finally to the United States, in exactly the same way as an epidemic. This crisis had coincided with the spread of another epidemic virus, the H5N1, known as the bird flu virus and which had also started in South-East Asia.

The most complete theorisation of the convergence of epidemiological and econometric models was made by Andy Haldane of the Bank of England in 2009, when he compared the outbreak of the SARS epidemic in Guangdong (China) in 2002 with the bankruptcy of Lehman Brothers in 2008. Both episodes had some structural characteristics in common, which could be described with equations and which were the consequence of the “stress of a complex, adaptive network”.

From these metaphors which brought together the economy and epidemiological models, there also came suggestions for repairing actions, in which the strategic regulation of the markets was compared to actions of public health. In particular, the theoretical physicist Robert May, well known for his work with the epidemiologist Roy Anderson of Imperial College, proposed an ecological approach to reform the banking system: in ecosystems characterised by complex interactions, the bonds that connect different species (e.g. men, birds and pigs) can trigger off moments of severe instability; similarly, mergers and perturbations in the financial system can spark off uncontrollable chain reactions.

## **Converging Trends: The Quest for a Minimal State, Misconceptions on Science, Fragmented Research**

Together with the theories of the free market, a minimalist conception of the State has spread, implying that the State should interfere as little as possible with citizens' choices and decisions. When the (Republican) Mayor Bloomberg legislated on the portions of sugary drinks and prohibited trans-fatty acids in New York, criticism was poured on him by the defenders of

individual freedom. To govern the rapid changes in technology and in the models of distribution and consumption, strong public institutions are necessary, but they have never been so discredited and unpopular as today. Today, strong international bodies are needed even more than national states: the agencies that represent public health ought to be more incisive than the WTO (World Trade Organization) when it is a question of legislating on products that are harmful for health like smoking. Research ought to be more incisive than the capacity of industry to confuse public opinion and orient its behaviours. Unfortunately, conflicts of interest have become a central component on the scene of relations between science, technology and politics.

Alongside the discredit of the public sector, we are also witnessing the spread of harmful anti-scientific prejudices, such as the opposition to vaccinations. The extreme cases of recrudescence of poliomyelitis in Nigeria and in Pakistan a few years ago—due to the prejudice according to which the Americans were alleged to be vaccinating Muslim populations to weaken them—showed how obscurantism and disinformation cause damage which can spread like wildfire. However, even in Western countries conservative movements such as the Tea Parties and other “alternative” movements are promoting anti-scientific and harmful opinions.

Another phenomenon that has to be taken into consideration is the fragmentation of scientific research. Human footprint on the Planet has now reached such an extent that we cannot afford research that is unstructured and motivated by pure scientific curiosity. In one of the chapters of this book, we will examine what the consequences of climate change can be (and to a great extent will be) on health: these consequences are too complex to be left to competition between researchers who study some aspects of them in a fragmentary fashion. Naturally, there are also some praiseworthy examples of cooperation and coordination on a very wide scale, in particular thanks to private foundations such as the Bill and Melinda Gates Foundation or the GAVI Alliance (Global Alliance for Vaccines and Immunisation). The latter is a very interesting model of public–private cooperation and is helping take vaccinations to children in poor countries all over the world (<http://tinyurl.com/ljx5mpm>).

The changes in the technologies at our disposal today and therefore in behaviour and lifestyles are often faster than the capacity of scientists to study their consequences. In the past 30 years, there has been a revolution in the food sector and the production of food has now reached a very high level of industrialisation, yet the epidemiology of chronic diseases still uses old tools and deals with single nutrients rather than the changed models of consumption. The new technologies of communication, from computers to smart

phones, have spread more quickly than any other technology in the history of humanity, but research is still focused on a less central topic such as the presumed carcinogenic effect of electromagnetic fields whilst we have little concrete data on the cognitive and behavioural impact of these new technologies.

Even in the cases where research has investigated important topics, its translation into public health measures is opposed by powerful defensive reactions, especially from industry. For a cause of disease that we know almost everything about by now, cigarettes, global public health has to reckon with resistance by the WTO and its call for a free market, a point that we will develop extensively.

In a constantly changing scenario, dictated by the increasing speed of trades, the role of the State and central institutions as a guarantee for citizens needs to be empowered.

## Political Crisis, Health Crisis

The economic crisis has led to a lowering of the living standards of millions of people and it has been accompanied by an even deeper crisis of politics, with players who often have little credibility or are corrupt. There are signs of a deterioration in the state of health not only in the countries more directly hit by the crisis (Greece) but also in economically strong ones such as the United States. We cannot rule out that in the future many of the conquests in the health field may be eroded and that we will see a worsening of the state of health of large sectors of the population. The health crisis could be outlined through mechanisms which are not too dissimilar from those that led to the economic collapse: (1) the concentration of capitals in a small number of large corporations (in particular pharmaceutical); (2) a finance-based economy even in the health field, with the propensity to disinvest from the least profitable sectors; (3) sacrificing stable and political institutions that can have both a global and a local impact (as in the case of finance with Bretton Woods and with the guarantee systems that emerged from the Second World War, as explained later); and (4) the growing pressure on States to take on measures limiting expenditure and not to hinder investments and consumption, even though they may be harmful for health.

The victory against smallpox in the past was possible thanks to the strong collaboration between the World Health Organization (WHO) and the individual countries: today this pact risks fracture, to the detriment of other diseases.

## Health in a Global World

One of the most visible effects of the three concomitant pressures of the free market ideology, of the economic crisis and of globalisation is the increase in the gap between social classes. It is also clear based on simple health indicators such as mortality. In general, men die earlier than women, but in both genders people with higher levels of education have a far longer life expectancy than the others (for Europe, see Gallo et al. 2012). In addition, in the past few years, the social gap in the most developed countries has widened for many of the health indicators even though it has narrowed for others (Bleich et al. 2012).

These simple observations raise important questions, including theoretical ones, which have not yet received clear answers. Does globalisation improve or worsen the state of health of populations? At the level of population, does health have elasticity, or in other words, does it resist the forces that threaten it, or not? And where is the “point of breakage”?

Health in the more developed countries improved extraordinarily between the end of the Second World War and the 1970s and 1980s. After that the *rate* of improvement slowed down (though life expectancy itself always increased in high-income countries), whilst rapid improvement has moved towards Brazil, Russia, India and China (grouped together under the acronym BRIC). It is likely that the extension of such improvement to Africa, in particular sub-Saharan, will follow with a certain delay. There is a clear parallelism between the time trend of economic indicators and that of the health macro-indicators, in particular of life expectancy. In other words, when the wealth of countries increases, the conditions of health in them also improve. What are the mechanisms underlying this relationship is still unclear, as a debate based on the seminal 1975 paper by Samuel Preston made clear (Bloom and Canning 2007). Preston examined the relationship between life expectancy and income in three different decades, the 1900s, 1930s and 1960s: in each decade the association between the two measures held true. Also more recent research shows that the income–life expectancy relationship still applies and continues to move upwards. One interesting aspect of the debate on Preston’s paper concerns the possibility of a health-to-wealth causal relationship, i.e. not only wealth can lead to better health, but also the reverse may happen, through increased productivity: this could have great repercussions on our idea of health as a common good.

Other indicators, however, show less obvious trends and sometimes without clear explanations. We will deal mainly with these: the obesity and diabetes epidemic that is affecting almost the whole world, the unforeseeable effects of

climate change and the dominant industrialisation of the production of food and its consequences for health. We will also try to understand, for the time being only from the theoretical point of view (due to a lack of empirical data), whether any of these phenomena can leave a trace on our epigenetic, rather than on our genetic, make-up. A whole chapter will be devoted to this aspect which today is central in medicine.

## **Three Exemplary Cases: Nauru, Greece and Bangladesh**

### **Obesity in Nauru: A Story of Early Globalisation**

Obesity is a dramatic reality in the Pacific islands, where very high rates of diabetes are also recorded. The changes in style of diet have certainly played a role, but the story is more complex than that. One almost textbook example is the small island of Nauru, with its only 10,000 inhabitants. The island became unexpectedly rich during the 1970s, thanks to the discovery of an enormous deposit of guano which was exploited to sell phosphates, used as fertilisers. The per capita income of the islanders increased dizzyingly, becoming one of the highest in the world by the end of the decade.

The increase in wealth was associated with many major social changes, whilst the excessive mining of phosphates was translated into a loss of farmable land. The consequence of all this was that the islanders' diet underwent a radical change, and the traditional consumption of fish and vegetables was replaced by a Western diet based on imported products. In addition, the islanders, having stopped farming and fishing, adapted to a sedentary lifestyle.

It did not take long for the consequences on health to appear. In 1975, the prevalence of diabetes had exceeded 30%, and in 2007, Nauru still had one of the highest rates of diabetes in the world, according to the data of the International Diabetes Federation. Unfortunately, the rapid exhaustion of the reserves of guano and a very poor financial management led Nauru to bankruptcy, and today the inhabitants have to cope with an epidemic of obesity and diabetes from a poor country's perspective. Three-quarters of the hospital beds are occupied by diabetic patients or with complications due to diabetes and there are only ten doctors on the island.

The story of Nauru is exemplary of how globalisation can affect many low-income countries. There are all the elements of an announced tragedy: the increase in wealth linked to exhaustible primary resources, the tendency to

make risky financial investments, the destruction of the traditional economy (agriculture and fishing), the inclination to spend money on superfluous consumer goods and purely of prestige (such as powerful cars on an island where there is only one road), the drastic reduction in physical activity and the import of industrially processed foods replacing traditional food. It must therefore not come as a surprise that in this sort of “laboratory” the effects on the state of health appeared more quickly than elsewhere.

With regard to the import of industrially processed food, the term “spam” comes from a brand of tinned meat made with meat off-cuts, which was widespread in the Pacific (in particular on Hawaii) in the period after the Second World War, and which contributed to the epidemic of obesity that appeared there. The term then took on a metaphorical meaning in the world of communication, apparently due to a famous Monty Python programme in which Spam was a constant but unwanted ingredient in every dish in a “low-cost” restaurant.

## **Greece: The Health Effects of Economic Crisis**

Greece is an involuntary “workshop” for studying the effects of the recent economic crisis, also due to the speed with which it appeared: between 2008 and 2010, male unemployment rose from 6.6% to 26.6%, and youth unemployment from 19% to 40%, whilst industrial production dropped by 8%.

In 2011, the editor of “The Lancet”, Richard Horton, launched an appeal for the publication of data on the consequences of the economic disaster on health and the answers came in a series of articles in 2013 and 2014 (Karanikolos et al. 2013; Kentikelenis et al. 2014) based on current data available at the European Community and on bespoke investigations.

Thanks to the information collected in two random samples of 12,346 and 15,045 people, interviewed respectively in 2007 and 2009, and using the reports from medical institutions and non-government organisations, the authors of a paper (Kentikelenis et al. 2011; see also Karanikolos et al. 2013) recorded an increase in recourse to hospitals of 24%, although this coincided with a 40% cut in hospital budgets; an increase of 14% of those who described their health as “bad” or “very bad”; and an increase in suicides of 17% and a soar in violence and murders. Even more worrying are the increased use of heroin (+ 20% in 2009) and the number of HIV-positive people (+ 52% in 2011 compared to 2010), as well as sharp growth of other infections in the first 7 months of 2011.



Although in Greece the trend of many of the health indicators is negative, the crisis has also had positive effects, such as a reduction in the consumption of alcohol and drunken driving, likely due to there being less money available.

According to another study, although from the start of the crisis in Greece the mortality rates had decreased overall, from 2011 the mortality of those over 55 years of age increased and one-third of this increase has been attributed to the austerity measures and more specifically to reduced access to health care (Vlachadis et al. 2014). The mortality rate has not increased (not even in particular age groups) in any Western country since the early twentieth century; the only exception was Russia after the collapse of the Soviet Union. However, how legitimate it is to attribute the changes in Greece to the austerity policies is not clearly documented.

There are other studies that suggest a far less negative result than that described by Vlachadis and his colleagues. For example, a paper used data from the European Union Statistics of Income and Living Conditions to compare trends in self-rated health in Greece and Ireland before and after the crisis with trends in a “control” population (Poland) that did not experience a recession (and had health trends comparable to both countries before the crisis). There was no significant change in self-rated health in Greece or Ireland following the onset of the financial crisis. However, a comparison with the control population suggested an increase in the frequency of poor health in Greece, with the effects most pronounced for older individuals and those living in high-density areas. There was apparently no effect of the financial crisis on the frequency of poor self-rated health in Ireland. The comparison is a very early one but leads to an interesting consideration: Ireland was able to get through the crisis without cutting pensions and other segments of the Welfare State in spite of the strong decline in salaries, which might explain the lower impact of the crisis particularly amongst the elderly population. Another interesting observation from the political point of view concerns Iceland: whilst rejecting the economic orthodoxy that advocated austerity, this country invested in social protection instead, apparently with very few adverse health effects of the crisis (Karanikolos et al. 2013).

Evidence is expected to continuously accrue on the impact of the economic crisis and austerity in Greece. Recently, an article in *The Lancet* reported that funding of public hospitals has been cut by more than 50% since 2009. Public health spending shrank to 4% of GDP by the end of 2015, compared with an European Union average of 6.9%. The impact on health care seems to be devastating according to this paper (Karamanoli 2015).

The economic crisis and depression may have long-lasting impacts. For example, one common observation is that people tend to stop making

investments for their health which in the long term would have had great benefits, such as dental care and eating fresh fruit and vegetables.

## The Case of Bangladesh

Bangladesh is often quoted as a country-laboratory because it is characterised by at least three changes typical of globalisation and linked to health: massive migration (mainly male) to wealthy countries such as Dubai and Qatar, vulnerability with regard to climate change and the recent spectacular reduction of infant mortality. Bangladesh is a “laboratory” for studies on global health also due to the demographic peculiarities, as it has half the inhabitants of the United States in an area equal to that of Florida, i.e. an extraordinary population density.

The first two phenomena (migration and climate change) correspond to the concept of global health—as we have defined it—because they are changes which transcend national borders and need to be tackled by joint international action. Migration has significant consequences for the work of doctors, nurses and public healthcare specialists in the developed countries: migrants, who in increasing numbers are fleeing from poverty, war or the effects of climate change (such as drought or flooding), have specific health problems, which are often difficult to identify and diagnose. The consequences of migration on mental health are particularly important. The high frequency of anxiety and depression amongst migrants can be attributed—along with other reasons—to their difficult economic conditions, to the awareness of the expectations generated in families by migration and to the cultural differences with the host country. A systematic review of literature shows rates of depression equal to 20% amongst migrant workers and 44% amongst refugees, which are very high values if compared with the average rates of the population in general (Lindert et al. 2009). The number of migrants in the world has increased from 150 million in 2000 to 244 millions in 2015 (1 every 33 people).

As far as climate change is concerned, according to the fifth report of the Intergovernmental Panel on Climate Change (IPCC) there is a high probability (or high confidence, according to the terminology of the IPCC) that the marine and coastline ecosystems of southern and south-eastern Asia will be affected by an increase in the level of the sea and that more than one million individuals will be at a risk of flooding in the coming decades. Climate change will also probably have serious consequences on agriculture and on the quality of water and, overall, massive effects on the state of health.

The direct effects on health (which appear in a few hours or days) are linked to the physical risks due to the floods, cyclones and some acute-onset infectious diseases such as cholera. The indirect effects (medium- and long-term, measurable in weeks, months or years) are due mainly to changes in the level of productivity of agriculture and the quality of food and to migration by large sections of populations, as a consequence of the scarcity of water or conflicts for possession of the land. The causal relationship of indirect effects with climate change is less obvious than for the direct effects.

Communicable diseases are amongst those most sensitive to climate change. The risk of malaria is related to the variability of the climate, exasperated in recent years by the cycles of “El Niño” in Asia, Africa and South America. Cholera epidemics are also favoured by changes in the quality and temperature of water, which increase the proliferation of the vibrio (Lara et al. 2009). Shrimp farming, which requires high levels of salt in the water, has developed rapidly in Bangladesh and has become a flourishing industry for export, but further worsens the ecological situation as it means that freshwater (in the fields previously used to grow rice) is replaced by briny water which facilitates the proliferation of the vibrio. As Ronald Labonté, an expert on the effects of globalisation, has said, “Today shrimps are competing with men” (Labonté et al. 2009).

The difficulty of doing research in real scenarios of climate change is illustrated precisely by the example of the intrusion of saltwater in the coastline areas of Bangladesh. In recent decades, the salinity of the surface and deep waters has reached levels never previously observed. Seawater has penetrated for over 100 km through tributary canals of large rivers, and now the problem of salinisation of freshwater affects millions of people and 800,000 hectares of arable land. The problem arouses serious concern as severe effects of salinisation have been reported in that area, in particular an increase in the frequency of cases of hypertension and gestosis (pre-eclampsia) during pregnancy (Vineis and Khan 2012; Khan et al. 2011; see also the film at <http://tinyurl.com/phtte6q>).

Although many of the factors are specific to Bangladesh, climate change is obviously the consequence of global changes. The Bangladeshi contribution to the emissions of CO<sub>2</sub> is almost irrelevant with respect to that of developed nations, but this country could be one of the first and main victims of climate change.

Coming to the good news, the rapid decrease in infant mortality has made Bangladesh an undisputed leader although a rapid improvement has also been

observed in other low-income countries such as India.<sup>1</sup> The ambitious Millennium Development Goals (MDG), established by the United Nations in 2000, which aimed at obtaining significant successes in the state of health of poor countries by 2015, have been partly achieved, especially regarding infant mortality (fourth goal) and maternal mortality (fifth goal). In Bangladesh, great successes were obtained from as early as its independence (1971) thanks to skilfully coordinated local actions. Today, the number of children per woman and infant mortality are comparable to those of many affluent countries.

These examples from a “model” country show how crises and improvements live side by side in the era of globalisation.

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<sup>1</sup> For this I recommend the interesting video by Hans Rosling available on “Gapminder”: <http://tinyurl.com/mdpl33r>