Global Climate Change: Implications for Public Health in Developing Countries

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Abstract

This study looks at the relationship between the effects of changes in the environment and public health, with a particular focus on global warming and developing countries. Through this, the current effects of climate change are explored and with projections of the situation exacerbating in the future, an analysis into the possible ways of adapting to avert an impending disaster is carried out. Furthermore, it looks into how immediate action by health services worldwide and in particular the British National Health Service (NHS) can not only fulfill a moral obligation, but also reap many short term benefits for the health of its users.

Introduction

The relationship between one’s environment and health has been understood as far back as the days of Hippocrates and beyond and forms a cornerstone in the modern study of public health. As time has progressed, other things which have begun to factor into this include economic development and population growth, urbanization as well as land and fresh water allocation, which all demonstrate a delicate interplay with climate (1).

The aim of this study shall be to explore the relationship and interplay between environments and health in societies. I will then go on to see how considerations of this nature can go on to improve public health in third world countries. Of particular interest, is the role of climate change in the developing world and what impact this is likely to have for generations to come.

Climate change

What is climate change?
Climate change has been defined as: “the long-term alteration in the average weather conditions for a particular location”. It has become synonymous with the term “Global Warming” as one of its chief effects on the planet has been the acceleration of the rate at which the planet is beginning to warm up. The idea of climate change through the emissions of greenhouse gasses was proposed by Swedish Scientist Svante Arrhenius in what was later dubbed “The Greenhouse Effect”. The whole idea behind this is that after centuries of industrialisation, the release of gases such as carbon dioxide into the atmosphere creates a blanket over the atmosphere whereby no heat in the form of infra-red radiation is able to escape, very much like a greenhouse (2,3).

The natural process by which natural ‘sinks’ on earth, such as seas and forests, which absorb emissions cannot keep up with the rate at which emissions are being released. This is made worse by the fact that deforestation has increased massively over the past century as demands for agricultural land and cattle rearing have sky rocketed.

Although the earth has been naturally warming up since the end of the ice age, the fears now are from the accelerated rate at which they are taking place, which is the fastest rate of change in 30,000 years (4).

As the world has industrialised and we have progressed into the 21st century, largely due to booming populations and aided in large part by the successes of healthcare, we are confronted by an ever augmenting danger of climate change. It is so serious an effect that many including Richard Hornton, editor of the Lancet has described it “as pressing a concern to public health as tobacco control and obesity” and “the most serious threat to human health and well being in the 21st century” (5,6).

The Lancet- UCL report published in 2009 sent shockwaves throughout the medical community highlighting that rising temperature worldwide will begin to increase the incidence of diseases such as malaria, skin cataracts and heart related illnesses as well. Already statistics show that it claims some 300,000 lives a year (7). This is through a variety of problems arising from increased emissions, the most prominent of which are explained below:

Air pollution
One of the effects of air pollution will be reduced episodes of cold due to warmer winter that results in
decreased incidences of colds. Furthermore, the emissions of nitrogen and sulphur dioxide have been long shown to lead to various health conditions such as the exacerbation of asthma and other lung diseases, as well as an increase in the prevalence of pollution enhanced microorganisms, by upwards of 50%.

As the climate becomes warmer, it is also expected that the growing season will also be lengthened thus increasing the levels of pollen known to also exacerbate asthma as well as hay fever (8).

**Infectious Disease**

Vector borne diseases such as those carried by insects are known to be profoundly affected by temperature and rainfall and typically exhibit seasonal patterns to which changes in temperature and rainfall are very well documented. A common example of this is the malaria parasite which shows alterations due to temperature and rainfall, as well as other year-to-year factors which can be partly affected by climate. Studies verified along a large base of historical malarial surveillance data suggest that climate change will cause a 5-7% increase in the population at risk in the African continent through an expansion into higher altitudes. Added to this, it is thought that climate change is likely to lengthen the transmission in many parts of the continent, causing a 16-28% increase in the total number of person-months of exposure (9).

The disease numbers however may decrease in areas where significant decreases in precipitation is projected for example in the Amazon and regions of Central America, however this will be at the expense of many other negative factors that are set to disrupt people’s lives (8).

It is common in both high and low income countries to see that the incidence of diarrhoeal diseases increases significantly. There is now a significant body of research that has been carried out into the relationship between the El Nino climatic cycle, increased temperatures and the association with malaria in coastal areas of Bangladesh (8).

**Childhood Pneumonia**

Although responsible for over 17% of childhood deaths worldwide, Childhood pneumonia remains one of the most overlooked vector borne diseases and is seldom mentioned in the context of climate change. Respiratory infections generally follow seasonal patterns with occurrences being more common in the winter months. However, this can be quite different in the setting of a tropical environment where more deaths are associated with the rainy season where it comes about as a result of a lower respiratory-tract infection. An example of this is in the Gambia, West Africa where the incidence of clinical pneumonia in children was 243 persons in the warmer dry season and 160 persons in the cool dry season, compared to 409 persons in the wet season. This is likely to be exacerbated with poorer harvests and the increased risk of malnutrition since it is thought that 44% of pneumonia deaths in children under 5 are caused by undernourishment (10).

**Mental Health**

Disorders related to anxiety and depression are likely to come about as a result of distress resulting from displacement and other economic losses, which are likely to persist for well over a year after the flooding has started (1).

**Malnutrition**

Furthermore, the issue of diets is another point of concern. Crop failures as a result of droughts are already being seen across the Sahel in Africa. As a result, 2010 saw a famine in Mali that could soon evolve into an increasingly difficult humanitarian disaster to handle.

**Conflict**

In 2010 UNESCO released a report that warned of dire consequences in the 21st century for countries as the scramble for water resources begins. Already, the civil conflict in Sudan that has claimed up to 200,000 lives is said to be rooted in the desperate scramble for this precious commodity as different ethnic groups attempt to battle the extended and punishing drought that has hit the Sahel region. Further concerns can be seen across the Middle East, where the past decade has seen two recurrent droughts along the crucial Tigris-Euphrates river basin and brought the governments from diplomatic spats to the verge of serious conflicts. Should this in any way worsen, the medical community may need to prepare for further more humanitarian disasters brought on as a result of a war for resources (11).

**Current Costs**

Even today, whilst it is developing countries that have benefited and continue to benefit disproportionately from industrialisation, the fact remains that underdeveloped countries (of GDP < $6000/year) will continue to shoulder much of the burden of climate change. Significant proportional changes are expected in countries at the edge of the Falciparum...
Malaria in the edge of current distribution. Estimates suggest that by the year 2000 climate change may already be causing something in the region of 150,000 deaths worldwide representing 0.3% of deaths worldwide. Furthermore, it accounts for 5.5 million lost Disability Adjusted Life Years or 0.4% of the annual total. This is only likely to increase considering the current level of socio-economic adaptation and the victims will disproportionately be children in developing countries.

In spite of this, a considerable amount of uncertainty remains with the scientific community as to whether many statistics are simply mere speculation. More should be done to study many more climate models as well as probability distributions relating climate change with a wide range of climatic and socio-economic environments as well as more careful validation of pattern in the present or recent past.

**Discussion**

The issue of climate change is something that we understand and is far beyond the realm of speculation and among the vast majority of scientific is accepted as a modern reality. However, with soaring energy demands forecast for the 21st century as a result of booming populations in the developing world, Public Health may prove to be a victim of its own success. Over the past century the world’s population has grown over four fold whilst energy consumption grew 12-fold. With the world population set to hit 9 billion by 2050, unless these issues are addressed as a matter of urgency, they show no signs of abating. The WHO is already initiating a program against climate change through various activities such as “Protecting Health from Climate Change” as a theme for its conferences in recognition of the threat global warming poses to greater society.

As a priority, developed and developing countries alike should cast a new light on their unfettered exploitations of cheap fossil fuels and their own reductions should be proportional to allow poorer countries to work towards much lower emissions and help work towards more equal levels of emissions. The way this can efficiently and effectively be carried out is through a process of surveillance. Surveillance is defined as: “The systematic collection analysis and interpretation of health data and timely dissemination of these data to policy makers and others”. It is through this data that governments can draw up effective policies with a view to preventing disease though measuring progress, impact and efficacy of preventive efforts already in place. It usually works in a three way process encompassing trained and skilled manpower, a proper and effective channel of information flow and an effective feedback system. As many low income countries develop stronger economies, it is expected that the health sector that has for long been a neglected one will take greater precedence in national budgets. A recent study by the International Monetary fund (IMF) suggests that countries should aim for around 12% of GNP to be set aside for the sake of Public health and in order to meet international development goals. However, as this is extremely challenging for many systems to meet, a bench marks of 5% GNP has been set with a view to at least meeting targets set for 1981. In 2001 the WHO recommended that low-income countries should work towards raising this by an additional 2% GDP by 2015, considering current trends of economic growth. Consequently, much research is being carried out by these bodies with a view to discovering how these economies can optimally develop their healthcare systems with the meagre increase in funding that is projected (9).

As one of the largest contributors to public sector emissions (at 25%), the NHS also has an obligation to work towards reducing the countries overall emissions. This can be through a variety of ways including increased efficiency in energy bills which also promises to reap significant long term savings, which are crucial in this age of austerity. The Sustainability Capital Fund was announced in January 2007 for precisely this reason, with a view to assisting the NHS in meeting a target of 15% energy efficiency or the equivalent of 0.15 million tonnes of carbon by the end of 2011. So far it is reported that these efforts have been largely fruitful with over 70% of the initial mandatory target of 55-65 gigajoules/100m² already met which has surpassed the level of many EU countries. Other important considerations are in drug procurement which is responsible for about 22% of NHS emissions. This makes the issue of rational drugs use, avoiding polypharmacy and ensuring compliance a much more pressing issue. It is not only in the interests of reducing wastage, but may also decrease the unnecessary carbon interventions of repeated investigation of over-monitored patients which places a significant burden in terms of travel, time buildings and use for disposable equipment (10).

What’s more, Public Health and Environmentalism share much common ground. A prominent example of this is red meat, the excessive consumption of which has proven to lead to increased risk of heart disease, prostate and colorectal cancer. However, the rearing
of beef has also been attributed to increased methane emissions contributing to the greenhouse effect whilst also being a chief contributor to deforestation (11).

Furthermore, if we were to put a particular focus on the third world then we will find innovative solutions such as energy efficient cookers that can not only deliver benefits with regards to environmental emissions, but can substantially cut indoor air pollution responsible for breathing difficulties. In addition to this, a recent publication by the WHO has demonstrated that the benefits of reducing the energy use in the housing sector are much higher than those caused by the power industry. Nevertheless, by reducing external air pollution, the benefits can be vast. Recent studies have shown that by replacing all the cars in the U.S with hydrogen cells which are emit far less pollution, a further 3700-6400 lives can be saved annually while urban air pollution worldwide accounts for a much more staggering number at 800,000 deaths per year globally.

By building an infrastructure which lends much more emphasis on efficient resource generation and by encouraging more sustainable modes of transport, we can help avoid a further 1.9 million deaths. Energy generation through things such as Photo-voltaics and, thermal and wind power have been mentioned as advantageous, hydropower is less desirable mainly because of lakes created increase the likelihood of Vector Bourne diseases as well as the issue of displacing populations (9).

In India there have been suggestions of the creation of a special “Department for the Collaborative Research in Climate Change” which they envisage to be a cross sectional interdisciplinary body that will bring various global industries from pharmaceuticals, to food suppliers and vector bionomics, to collaborate and cross fertilise ideas and help solve these impending challenges (12).

Conclusion

There is very little doubt that climate change induced by centuries of uncontrolled human activity is likely to form one of the greatest challenges to public health in the 21st century. Its impact is likely to be far reaching, affecting everything from food supplies to skin diseases. It is unfortunate that relatively, the developing world has been the least to benefit from the accelerated pace of industrialisation, and it will be dealing with the brunt of the consequences to come. Implementing strategies to combat climate change can not only deliver long term benefits for health services worldwide, but also immediate benefits. This is demonstrated by measures to curb the consumption of red meat, whereby reduced consumption not only means reduced greenhouse gases which result from animal rearing, but also reduced incidence of a myriad of health conditions including heart disease, prostate and colorectal cancer. Additionally, as many countries worldwide try to weather out budgetary deficits left after the recent financial crisis with healthcare costs, climate change could further highlight the need for efficiency.

However, no country will be able to go it alone. In order to be successful, a concerted multilateral effort is needed encompassing a wide variety of organisations whether they be involved in health activities or otherwise. Compromises and sacrifices will need to be made from all states, but especially from the developed world which has responsibility towards helping poorer nations develop more sustainable economies and civilian infrastructure.

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