Climate Change and Social Determinants of Health: Innovating Climate Policy

Sabrina Dekker, ICCG
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Abstract

Research has shown that human health is being adversely impacted by climate change. As such governments are faced with the task of devising policy that simultaneously addresses the impacts of climate change on the environment and human health. To understand the challenges facing governments, the complex relationship between the social determinants of health, climate change and human health is discussed. The objective is to provide a ‘new’ framework from which policy on climate change and human health can be developed and maximize effectiveness; as the social determinants of health consider health as a product individual lifestyle choices and the external factors that shape choices.
Introduction

The environments in which people live play a role in their health, as such, changes to their environments will influence their health, positively or negatively. Climate change has been a negative influence on the environment, and human health is being adversely affected by it. Moreover, research conducted by the WHO and other research bodies such as the Lancet\(^1\) has shown that climate change adversely impacts human health in numerous ways; from contributing to the re-emergence of diseases, to the spread of infectious diseases and increased mortality. The mechanisms by which climate change impacts human health are as diverse and complex as the impacts. There is no clear casual pathway between a climate change impact, such as air pollution and a health issue such as asthma; rather it is a series of pathways. Climate change impacts, namely, air pollution and air quality, extreme temperatures, extreme weather, and rising sea levels and flooding, do not express themselves independently of each other. There are complex and interconnected relationships between each for example high temperatures increase the concentration of pollutants in the air thereby degrading air quality. Consequently, the relationship between climate change and health is complex; moreover the range of factors that influence health are complex too. Thus, the challenge now, is innovating current climate policy and plans so that they address the health impacts of climate change. One means by which to achieve this is through the social determinants of health (SDH), which have played a role in shifting the focus of health policies to poverty reduction, sustainability and livelihood improvement the causal factors associated with health outcomes\(^2\). Sustainability is one shared agenda with climate policy, there are more\(^3\). This paper looks firstly looks at the SDH, their relationship to climate change, and finally, their value and role in mitigating the health impacts of climate change through policy.

Social Determinants of Health

The social determinants of health are the factors that influence an individual’s health and well-being over the life course. There are three categories under which the SDH are classified: individual lifestyle factors, social and community network, and general socioeconomic, cultural and environmental conditions\(^4\). Life style factors are the age, sex and constitutional (inherent) factors that are unique to individuals. The social and community networks are characterized by a single determinant, social inclusion/exclusion. General socioeconomic, cultural and environmental conditions consist of the following determinants: agriculture and food production, education, work environments, living and working conditions, unemployment, water and sanitation, health care services, and housing\(^5\). The categories and determinants are not exclusive of each other, rather the factors that shape the determinants are fluid, interacting and influencing each other. The SDH listed here are not an exhaustive list. Depending on the geographical location of individuals the determinants of health may include additional factors. For example, Mikkonen and Raphael\(^6\) conducted research on the SDH in the Canadian context, additional determinants included in their research were: aboriginal status, race, social safety net, disability. Thus depending on where one is living the determinants of their health will vary. However, there is one factor that plays a dominant role in determining the health status of an individual from birth, income\(^7\). Statistics have shown that a child born into an impoverished household with little to no income already has a

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\(^1\) WHO, 2008; WHO, 2013; Rydin et al, 2012; Marmot, 2005; Blas et al, 2008
\(^2\) Ritsatakis, 2012; Forde and Raine, 2008; Friel, et al. 2008
\(^3\) Friel, et al. 2008; Galvao et al, 2009
\(^4\) Putnam and Galea, 2008; Mikkonen and Raphael, 2010; WHO 2008; WHO, 2013
\(^5\) Mikkonen and Raphael, 2010; WHO 2013; Blas et al., 2008
\(^6\) (2010)
\(^7\) Mikkonen and Raphael, 2010; WHO 2008; Crawford et al. 2010; WHO 2013
lower life expectancy than a child born into a household that has a stable income. This is correlated to the individual’s and family’s ability to purchase basic necessities required for a decent quality of life from stable housing, nutritious food, to the ability to send children to school and receive an education.

Income and financial status are not constant over the life course and there are numerous external factors that will influence one’s income level: economic crises, wars, changes in labour force/market demands. As with income, other SDH fluctuate over the life course. Regardless of these fluctuations, it has been shown that ‘negative’ determinants adversely affect human health and well-being. To further clarify, the SDHs span a spectrum, from negative to positive, when the determinants are in a negative state, they are detrimental to human health. In order to understand how determinants can influence health outcomes over the lifecycle one can look at how income or economic opportunity shapes health outcomes.

Figure 1 Social Determinants of Health

The ability of an individual to access secure and stable employment plays a significant role in the ability of individuals to maintain their physical and mental health through the purchase of healthy foods and access to physical activities. Employment that is fraught with instability and insecurity tends to lead to poor mental health outcomes, such as depression and anxiety, which can have compounding effects on physical health. Research has shown that depression contributes to the highest number of sick days. As anticipated, a fluctuating income or lack of income adversely affects the purchasing power of individuals/families; forcing the prioritization of income expenditure, such as purchasing cheap foods with low nutritional value. It also contributes to another determinant, poverty. Figure 2. highlights probable outcomes when access to income and employment are stable or unstable.

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8 WHO, 2008; WHO, 2013
9 Friel, et al. 2008; Marmot, et al., 2008; Forde and Raine, 2009
10 Hutton and Menne, 2008; Mikkonen and Raphael, 2010; WHO 2008; Crawford et al. 2010; WHO 2013
11 Berger, 2013; Bias, et al., 2008
12 WHO, 2013; Barton, 2009; Grady and Goldblatt, 2012
13 WHO, 2008; Marmot, 2005
14 Grady and Goldblatt, 2012
Poverty is well known to have a negative impact on health outcomes, it is credited with being “a cause of much of the global burden of disease”. The causes and mechanisms of poverty interact with each other and feed into the ‘cycle of poverty’ that traps individuals. However, it is primarily an issue of “access”, access to: stable employment, affordable and safe housing, education, food and water and healthcare. The level access to these basic needs depends on where one lives. For example, the urban poor in Mumbai face different challenges from the urban poor of New York City. However, in both cities, those with precarious incomes face the risk of falling into the cycle of poverty and vulnerability. A cycle which is further perpetuated when climate change impacts are considered.

Climate Change’s impact on the social determinants of health

The SDH provide a means by which to understand the impacts of climate change on health and society; and provide insights on how policy can mitigate negative health outcomes. Discussed here are how the four key climate change impacts influence the social determinants of health: extreme temperatures, air quality and pollution, rising sea levels and flooding, and extreme weather and natural disasters.

While the SDH are in and of themselves issues of access to income and employment, stable housing, nutritious food, safe living environments and other basic needs. Climate change compounds these access issues. Beginning with extreme temperatures, either heat or cold, there are numerous pathways by which human health can be impacted. Food and water supplies are the most adversely affected by temperature, resulting in damaged crops, low yields, and drought. Shortages lead to rising food costs which tend to adversely affect lower income groups, thereby impeding their access to nutritious food and consequently setting the stage for malnutrition. There is a tightening cyclical impact.

Each of the three remaining impacts of climate change exert similar impacts; as, they are interrelated. Decreased air quality and pollution are known to contribute to respiratory and cardiovascular disease which affect an individual’s ability to work. Thus, contributing to the cycle of vulnerability. However, while extreme temperatures and air quality and pollution tend to

16 WHO, 2013; Rydin et al, 2012; Barton, 2009
17 Grady and Goldblatt, 2012
19 Stephenson et al, 2013; Grady and Goldblatt, 2012; Ritsalakis, 2012
20 Berger, 2013; Grady and Goldblatt, 2012
21 Berger, 2013; Grady and Goldblatt, 2012
adversely impact individuals in the lower income groups more so than higher income groups it is rising sea levels and flooding, and extreme weather events, that impact all income groups\(^\text{22}\). Both of these climate change impacts adversely affect physical infrastructure from roads to buildings. Their immediate impacts on people are death and physical injury. In their aftermath the costs for reconstruction are high, and their social costs in terms of wellbeing are even greater (and poorly understood)\(^\text{23}\). For example, death or injury of the primary breadwinner can result in negative outcomes, beginning with loss of income necessary for sustaining basic needs. Which again contributes to the cycle of poverty and poor health, for individuals and families. However the SDH are not limited to individuals and have impacts on broader systems and communities.

**Table 2. Climate Change Impacts on the Social Determinants of Health**

<table>
<thead>
<tr>
<th>Social Determinants of Health: General socioeconomic, cultural and environmental</th>
<th>Climate Change Impact on SDH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture and Food Production</td>
<td>Decreased food yields, contributing to malnutrition, rising food costs</td>
</tr>
<tr>
<td>Education</td>
<td>This is a complex relationship; Lack of education can result in behaviors/practices that perpetuate climate change, while climate change affecting families can result in the early withdrawal of children from school. Other indirect causal pathways</td>
</tr>
<tr>
<td>Work Environments</td>
<td>Unsafe working conditions, loss of employment, risk of death and injury</td>
</tr>
<tr>
<td>Living and Working Conditions</td>
<td>Quality of buildings; safety; hazards; working hours, other indirect impacts</td>
</tr>
<tr>
<td>Unemployment</td>
<td>Indirect, loss of income reduces the purchasing power of individuals and households.</td>
</tr>
<tr>
<td>Water and Sanitation</td>
<td>Salination of water, compromised sanitation systems, spread of disease</td>
</tr>
<tr>
<td>Healthcare services</td>
<td>Impeded, stressed during times of emergency response</td>
</tr>
<tr>
<td>Housing</td>
<td>Loss of housing, damage to housing</td>
</tr>
</tbody>
</table>

To gain an understanding of the complex relationship between climate change, the SDH and human health at the broader level of society; one can look at the effects of climate change on the food supply chain, namely the production and distribution of wheat. Once wheat is grown and harvested by farmers it is processed into flour, then distributed to various consumers to produce various food products for consumption. Suppose that during the growing season there is a flood or drought or an extreme weather event that results in low or no yields. This sets off a chain reaction, beginning with a negative impact on the income of the farmer, thus affecting his livelihood. This also impacts the mill that grinds the wheat into flour. Flourmill owners are forced to look elsewhere for wheat, perhaps a destination further off, resulting in increased transportation costs that add to the costs of the wheat/flour, which in turn raise the costs of the consumer who is turning the flour into a product for sale. At this stage consumers/producers who are using the wheat/flour are faced with two options; raise the cost of the product to cover the increased transportation costs or lay off workers. Both are negative outcomes impacting livelihoods along the supply chain. Moreover depending on the location of this flourmill the out of work—workers may be forced to change their household income expenditures to accommodate for the lost income. Depending on the prioritization of needs, children may be withdrawn from school and forced to work, and families may choose to purchase food products with low nutritional value. Assuming that a producer of a

\(^{22}\) Berger, 2013; Grady and Goldblatt, 2012  
\(^{23}\) Tol, 2009; Berger, 2013; Grady and Goldblatt, 2012
good values the employees and chooses to raise the price of their product, consumers of the product may choose to not purchase the product and find a substitute, which will still have prolonged negative impact on the workers. However, if the good is a necessity, then consumers may have to adjust their consumption patterns, which may have negative health outcomes. A short term climate event can have far reaching effects; a series of climate events can have a lasting impact on individuals and whole populations.

The example demonstrates the complex relationship between climate change and the SDH. Acknowledging this, the next consideration is how can policy mitigate these impacts. Marmot highlights a critical issue with current policy, which is focused on deprivation. For example policy focuses on providing clean water and medical services to poor communities to mitigate negative health outcomes. While these interventions may work they miss the social causes, such as the cultural and community influences that enable poverty or other conditions to persist, also known as the causes of the causes. This is where education, a SDH, plays a key role in policy interventions.

People need to understand why a policy is being implemented and how it impacts their livelihoods. It is not enough to provide a sanitation system without educating people on how to maintain the system, or at a basic level, how to treat water so that it is safe for consumption. The challenge for policy makers now is developing policy that addresses climate change, and human health simultaneously, the SDH provide the bridge.

Common Ground: Overlapping Policy Agendas

“Climate change, urbanization, rural development, agriculture and food security are intertwined determinants of population health and health equity” – Galvao et al. 2009.

The focus of climate change policy and health policy stemming from the social determinants of health are similar in their objectives, as illustrated in figure 3. Climate change policy is focused on the mitigation of adverse impacts on the environment through actions that increase the resilience of the environment. Embodied in the objectives of the policies are protection of the environment in its current state and its sustainable management for present and future needs. While recognizing the need for economic growth that will support the demands of a growing population:

Health policy based on the social determinants of health is focused on the prevention of ill health. This is achieved through the identification, mitigation and prevention of causal factors that impact human health. Traditionally, health policy responds to immediate issues. However, the social determinants have added a sustainability dimension that acknowledges that health policy is more effective when the long run is considered. Finally, there is the objective of growth from the social perspective; namely the growth healthy populations and communities.

Considering the objectives alone, it is evident that there is a common ground between climate change policy and health policy based on the social determinants of health specifically, mitigation, sustainability, and growth (illustrated in figure 3 below). Further research conducted by the WHO’s commission on the social determinants of health calls for integrated policy to simultaneously address these two pressing issues for humanity. Galvao et al reiterated and supported the recommendations made by commission emphasizing the following to link action by actors in the climate change and health fields:

24 2005
25 Marmot, 2005
26 Marmot, 2005
27 Friel, et al., 2008; Galvao et al, 2009; Marmot et al, 2008
28 Friel, et al., 2008; Galvao et al, 2009; Marmot et al, 2008
29 (2009)
1. “Ensure that economic and social policy responses to climate change and other environmental degradation take into account health equity.”

2. “Widespread recognition of the disruption and depletion of the natural environmental system.”

3. Acknowledging “the inescapable evidence of climate change and environmental degradation have set clear limits to a future based on the status quo and are prompting and increasing global willingness to do things differently.”

4. Consideration of “the health impact of agriculture, transport, fuel, buildings, industries and waste strategies concerned with adaptation to and mitigation of climate change.”

5. “More analysis of the relationship between social determinants of health, environmental change and health inequities... to inform policy and practice.”

The commission completed their work in 2008 and progress on their recommendations has been slow. With the release of the IPCC Fifth report on climate change and again the emphasis of anthropogenic causes; there is a need to take action. But what level of government has the capacity to create policy that will affectively and simultaneously address health and climate change? International organisations have set the stage providing recommendations, and national governments are committing politically to implement recommendations. But is that sufficient and does it address the issues of access and cyclical problems inherent in the SDH and exasperated by climate change? Further, recommendations at the international and national levels are broad and tend to neglect the local context, which is where the impacts of climate change on health are the greatest. Local governments are consequently tasked with localizing global policy; to meet the local contexts.

A subsequent paper will look further at the role of local governments in creating policies and plans that mitigate the health impacts of climate change. Briefly, local governments have the greatest potential for integrating policy and developing innovative policies that will see positive sustainable outcomes. Central to this is their ability to create an environment for collaboration on policy. Further, local governments have an intimate knowledge of the local context, specifically in relation to the SDH and climate change, they know the health status of the local population. This is key in the development of policy, as population health can serve as indicator of the success of climate change policy that integrates the SDH. Granted, there are challenges with selecting appropriate health indicators and linking them to climate change, but this is where the SDH can direct and connect policy to appropriate indicators and measures.

30 WHO, 2008; Galvao et al, 2009
31 Friel, et al., 2008; Galvao et al, 2009; Marmot et al, 2008
32 Friel, et al., 2008; Galvao et al, 2009; Marmot et al, 2008; Grady and Goldblatt, 2012; Stephenson, et al., 2013
33 Marmot, 2005
34 Friel, et al., 2008; Galvao et al, 2009; Marmot et al, 2008; Grady and Goldblatt, 2012; Stephenson, et al., 2013; Ritsatakis; 2012
Conclusions

It is evident that climate change has an impact on human health. While it is a challenge to identify the exact casual pathways that link climate change to negative health outcomes, as they are infinite and complex, the impacts cannot be ignored. All stakeholders, must work collaboratively to create policies that will mitigate the vulnerabilities to human health that are posed by climate change. As such the SDH provide a starting point from which innovative and active policy can be developed to mitigate climate change and improve human health simultaneously.

The SDH provide a viable means by which to understand the broader implications of climate change’s impact on human health. They provide the big picture and the probable ways that an adverse impact of climate change can result in negative health outcomes, not just at the point of impact. Further, the SDH bridge health policy and climate change policy, and potentially reforms the way policy on climate change and health is developed. Climate change policy is more than reducing greenhouse gas emissions and pollution with broad transportation policies; and health policy is more than reducing asthma rates and incidence of cardiovascular and respiratory diseases through physical exercise promotion. The SDH highlight interconnections between GHGs, respiratory diseases and their broader social and economic implications. A policy based on research into the causes related to the SDH would acknowledge the economic and social losses stemming from sick days related to respiratory illnesses; then look for viable options such as tax incentives for employers to initiate cycle to work schemes for employees.

Ultimately the social determinants of health provide a framework for creating policy that simultaneously address climate change and human health. However, while income as a determinant may have greatest impact on health outcomes it is education that will determine the success of any policy. As such while policy makers must engage and invest in research to understand the causal pathways between climate change and human health. While implementation of policy must include education on why and how policy is intended to work and its impacts for individuals in the broader context of their community.
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