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## A health economics perspective on behavioural responses to climate change across geographic, socio-economic and demographic strata

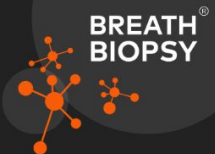
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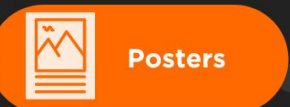
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## PERSPECTIVE

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9 July 2024Josephine Borghi<sup>1,2,\*</sup>  and Michael Kuhn<sup>1</sup><sup>1</sup> International Institute for Applied Systems Analysis, Laxenberg, Austria<sup>2</sup> London School of Hygiene & Tropical Medicine, London, United Kingdom

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**Keywords:** health economics, climate change, behaviour, health financing, resilience, incentives, lifecourse**Abstract**

This perspective examines the relationship between climate change, health outcomes, and behavioural responses across the life course. It identifies three primary channels through which climate change impacts behaviours which in turn affect health: increased morbidity driving healthcare demand and accessibility, reduced productivity and income affecting health care investments, and combined health and economic risks shaping migration patterns, dietary choices and human capital investment across the life course and generations. Climate-induced changes in behaviours exacerbate existing health-related and socio-economic vulnerabilities. While climate-related shocks elevate demand for healthcare services, disruptions in infrastructure hinder access, especially for the poorest, widening health inequities. Loss of income and disrupted employment further compound health and economic risks, pushing vulnerable communities towards informal care options and impoverishment tied to health expenditures. Increased health and economic risks are associated with migration affecting healthcare access and health outcomes. They also influence dietary choices, with health consequences. Finally, deteriorating prospects of leading a long, prosperous and healthy life may induce individuals to reduce their time horizon and assign lower values to long-term survival, impacting human capital investments across the life course and generations. Again, these impacts are prone to exhibit a social gradient with vulnerable individuals being more likely to give up on striving for a healthier life. Effective policies must integrate climate, health, and socioeconomic factors, considering long-term behavioural responses and their health and socio-economic implications. Adapting health financing mechanisms to account for climate risks and incentivise resilience-building behaviours within health and social care systems is essential for protecting health across the life course, and avoiding widening inequities.

**1. Introduction**

Climate change impacts health acutely through shocks such as extreme heat, floods, landslides or storms, translating into injury-related death and disability, or through slower onset processes such as drought and gradually rising temperatures that tend to foster chronic disease [1]. In addition, it increases the risk of epidemics and mental ill-health [1]. Climate-related mortality presents a substantial economic burden, accounting for a large component

of the social cost of carbon (SCC) [2]. Consequently, climate mitigation strategies carry significant health co-benefits [3].

In understanding climate effects on health and potential adaptation strategies, it is important to consider the behavioural responses to climate change and their knock-on effects for health over the life course, and how these differ across socio-economic groups and geographies. In this article we focus on three channels of behaviour change: (1) morbidity as a driver of increased demand for health care;

(2) reduced capacity to engage productively in market and non-market activities increasing vulnerability and reducing capacity for adaptation and care seeking; (3) elevated medical and economic risk impacting decision making with regard to migration, diets and human capital investments, with feedback on health. We also consider how health and social policy can mitigate behavioural effects which have negative effects for health and health systems.

## 2. Short- and long-term behavioural impacts

### 2.1. Morbidity effects on care seeking behaviour

Both extreme weather events and the more gradual climate impacts on health will lead to changing patterns of health care need and demand. The health consequences of climate change can increase healthcare demand globally, with reported rises in hospitalisations associated with heat [4], precipitation [5], floods [6] and hurricanes [7] especially in poor or less developed areas [8]. However, at the same time, disruption to service provision and barriers to access due to damaged infrastructure [9, 10] or constrained drug supply chains [11], can limit service uptake, exacerbating health loss. Climate induced healthcare access barriers are generally more acute among poorer groups, living in rural/remote areas [12], and in countries with resource constrained healthcare systems. Altered patterns of health care demand may persist over time [13] due to ongoing health need, or access constraints, and/or longer-term behavioural changes of individuals in regard, e.g. to their propensity to invest in health and human capital, as outlined further below.

### 2.2. Responses to work-related impacts and loss of income

Climate change leads to productivity decline and a reduction in labour supply world wide [14] with greatest impacts in vulnerable informal working contexts [15]. In subsistence agricultural communities in low income countries, reduced crop production and loss of arable land can push small holder farmers towards lower income activities [16]. Deteriorating employment prospects and incomes can make it increasingly difficult for individuals to meet rising healthcare needs [17]. At the same time, climate change can escalate the user cost of healthcare in settings which lack universal health coverage schemes, with research across African countries showing a 0.42% increase in out-of-pocket expenditures for healthcare for a 1% increase in the level of CO<sub>2</sub> emissions [18]. In combination, reduced income and increased out-of-pocket expenses increase the risk of impoverishment and may shift demand from formal to less effective informal care provision, as observed in Zambia [17], with detrimental long-run implications

for health beyond those immediately related to climate impacts.

### 2.3. Migration

Both gradual onset climate change and extreme events can induce migration, much of which occurs within low and middle income countries [1, 19]. Reductions in agricultural productivity is a key driver of migration [20], together with reduced habitability, food and water insecurity, and power outages [21]. Often migration patterns are selective [20, 22] and biased towards the outmigration of the wealthy, the educated or of men seeking alternative employment [17] increasing the economic and health-related vulnerability of those left behind [22]. Conversely, those displaced may face constraints to healthcare access in host communities [23]. Longer waiting times, challenging administrative systems, or stigma can also limit demand for health care among climate migrants [21].

### 2.4. Nutrition and dietary choices

Climate change can disrupt food supply chains, production and transportation, impacting the quantity, quality and affordability of food available, hence influencing dietary choices, with health consequences [24]. Drought, floods and other climate extremes have been found to lead to malnutrition in low income countries [25]. Heat has also been found to reduce exclusive breastfeeding rates in low and middle income countries, with negative health and environmental outcomes [26]. Undernutrition in early life can have lifelong effects on overweight, obesity, and/or non-communicable diseases [26], increasing vulnerability along an individual's lifecourse and across generations. Conversely dietary choices to reduce emissions [27], like shifts towards plant-based diets, and aquatic foods [28], can have health co-benefits, improving bodyweight control, cardiovascular health and diabetes prevention and treatment [29]. However, such actions at the individual level require both awareness [30] and the means to access a healthy and climate friendly diet, which differ across socioeconomic groups. Furthermore, in Africa and Asia where there is heavy reliance on small farms for the supply of meat produce, shifts to plant-based diets could negatively impact livelihoods [31].

### 2.5. Long term impacts and human capital investment

Climate shocks, such as flooding and heatwaves, lead to losses in physical and mental health as well as cognition both in the short and long term [32–34]. The effects on cognition, in particular, illustrate the scope for a vicious cycle of behavioural feedback with regard to reduced capacity for health protecting climate adaptation strategies [34]. The locus of behavioural responses lies with prime-age individuals, deciding either for themselves or on behalf of

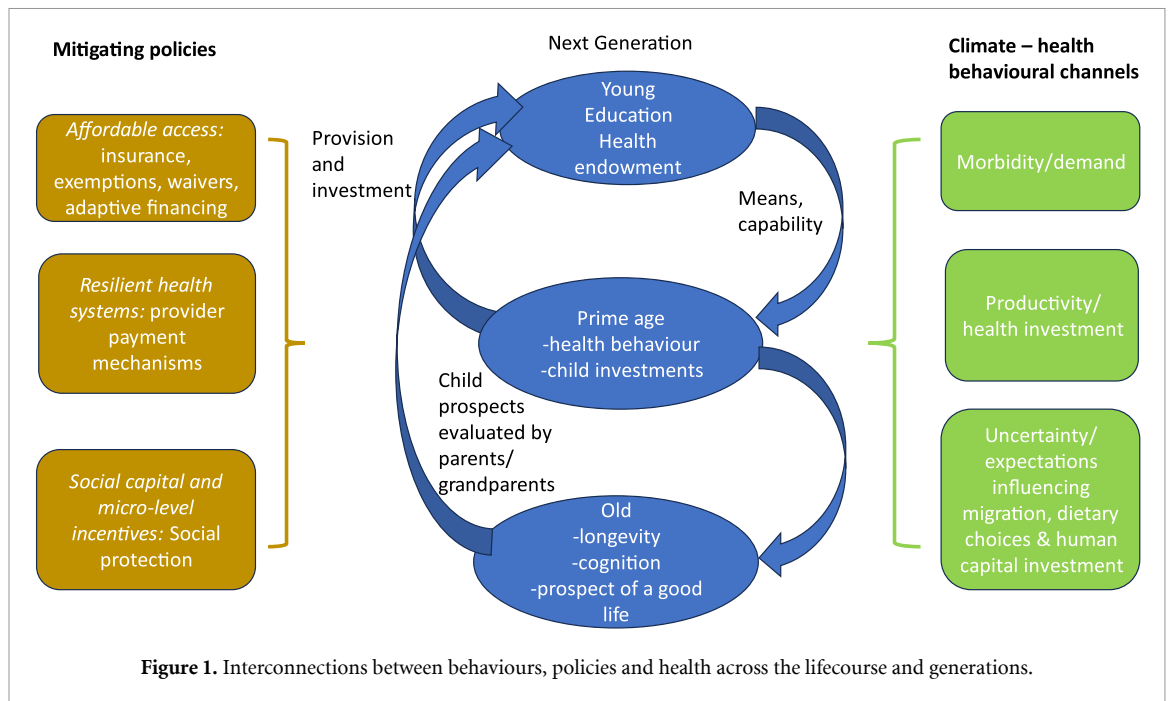


Figure 1. Interconnections between behaviours, policies and health across the lifecourse and generations.

dependent children and elderly members of the family (figure 1). Adverse early childhood health effects translate into lifelong consequences [35], and the resulting loss in capability compromises an individual's future means to adapt to climate change [36]. At the same time, declining prospects of living a healthy and prosperous life into advanced age, may reduce peoples' time horizon and ultimately their valuation of life and survival [37]. This may erode the incentive to invest in health and education [38], while a higher (exogenous) mortality risk and deteriorating life circumstances may boost risk seeking behaviours with negative health impacts [39, 40]. Parental investment in child health and the resulting 'value of progeny' may be impacted similarly, whereby the incentive to invest into the human capital of children with a view to making them resilient and able to adapt may be offset by a tendency towards rather encouraging children towards an early supply of labour if future prospects are bleak. This is borne out by the negative impact of high HIV prevalence on schooling rates [41]. While the evidence on the long-term impacts of climate change on human capital investments is still limited by the lack of long-term follow-up studies to large-scale climate events, the evidence relating to infectious diseases (HIV, malaria), early childhood disease, and pollution impacts suggest the potential for such effects, as these exposures imply similar changes to the (opportunity) costs and returns to human capital investments. With the underlying trade-offs clearly described by modeling studies [37], there is a continued need for empirical research into the impact of climate change on long-term human capital strategies at the individual level and development strategies at the societal level.

## 2.6. Behavioural response inequities

Exposure to climate hazards is greatest in low and middle income countries, however, in all countries vulnerabilities, in terms of disaster preparedness, are highest among the poorest communities with lower education levels [32, 42] and among women and children [43, 44]. Over time, socio-economic disparities in the behavioural responses to climate risks and potential for adaptation may exacerbate these inequities within and across countries [45]. Within countries, more affluent segments of the population with greater capability to adapt and better prospects, may respond to climate threats by boosting their resilience and investing in health and human capital for themselves and their children. Conversely, vulnerable individuals and communities, lacking means and prospects, may prioritise immediate consumption and engage in excessive risk-taking. While social capital is able to cushion such detrimental behavioural impacts, again there is a strong socioeconomic gradient to it [32]. At the country level, low and middle income countries will experience the greatest impacts in terms of healthcare need and livelihood losses, whilst having the least capacity for adaptation. This may trigger a downward spiral, which may worsen still if climate impacts in high income countries erode their capacity or willingness to provide support.

## 3. Implications for health and social policy

To address climate risks to health and the related behavioural responses, efforts to strengthen health and social protection systems are needed that recognise and address the underlying inequities of

climate impacts and adaptive capacity within and across countries. Financing, as a key function of health and social care systems, can create incentives and the economic means for climate adaptive behavioural responses which minimise detrimental health impacts, especially for the most vulnerable.

Where climate change restricts access to critical resources, including health care services, adaptation strategies at the macro-level system are needed to address these constraints. Flexible public financial management systems can enable timely adjustments to meet arising needs [46]. On the demand side, uptake of health insurance can ensure needed care is affordable and mitigate climate-related morbidity and mortality [47], especially among the economically vulnerable. However, as those worst impacted may be least able to pay premiums, subsidies may be needed to support their enrolment. Exemptions and waivers schemes to ensure access to health care for those impacted by climate hazards have also proven effective in facilitating continued and even improved access to care [48, 49].

Where behavioural responses are linked to changes in risk perceptions, micro-finance [50], cash transfers [51] or adaptive social protection [52] may help to alleviate pressures in the wider socio-economic context, boosting social capital, and reducing the vulnerabilities that lead to migration, risk taking and disinvestment in human capital. Cash transfers together with family and workplace oriented policies can also be used to promote desired behaviours such as exclusive breastfeeding [53]. At the same time, social protection schemes which support alternative livelihoods can help offset the economic losses among smallholder farmers due to shifts to plant-based diets. Targeting such policies towards women and children can be especially effective in maintaining family health and driving economic development [54].

Reshaping the provision of healthcare to meet arising healthcare needs [55], and reduce climate-related health risks, and their knock on effects is also necessary. To this end, adjustments to healthcare provider payment mechanisms can incentivise adaptation strategies within health facilities that reduce health system vulnerabilities to climate change, and minimise disruption to service provision. For example, results-based financing or performance incentives can be adjusted to induce preventive/risk reduction action [56]. At the same time, (spare) capacity should not be merely viewed as a drag on cost effectiveness but rather as a means to enable resilience of the healthcare system to large-scale climate shocks. Finally, health benefit packages should be revisited to ensure climate-related health service needs are covered.

Re-allocation of financing for health from high-income-high-emission countries to low income countries will be needed to support adaptation

strategies that promote behaviours that improve health. To that end, population health should become an integrative part of loss & damage schemes. In evaluating policy options it will also be important to take account of the full economic costs of inaction accounting for the negative knock-on consequences of poorer health in terms of the accumulation of human capital, innovation, social trust and other drivers of economic prosperity [55].

## 4. Conclusion

Understanding the complex relationship between climate change, health, and behaviour across the life course and between socio-economic groups is critical for developing fair and effective health and social adaptation policies to mitigate adverse climate impacts within and across countries. To this end, further empirical research to quantify and value behavioural impacts across the life course, across socio-economic communities is needed for countries and regions globally. Policy options need to address the nexus of climate, health and socioeconomic risks on the one hand and of climate adaptation, mitigation and health preserving behaviours on the other, taking full account of socio-economic, demographic and spatial heterogeneity. Adaptations to health financing to account for climate risks, in line with One Health, can help incentivise behavioural responses to build resilience and protect health across the life course especially among the most vulnerable.

## Data availability statement

No new data were created or analysed in this study.

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