The Lancet Countdown on Health and Climate Change

Policy brief for Chile

2022



LANCET COUNTDOWN: TRACKING PROGRESS ON HEALTH AND CLIMATE CHANGE

Centro UC Políticas Públicas

LANCET COUNTDOWN: HEALTH AND CLIMATE CHANGE IN SOUTH AMERICA

Introduction

Previous *Lancet* Countdown policy briefs for Chile have focused on the impacts of climate change on population health and the co-benefits of mitigation and adaptation policies. In this 2022 edition, we focus on the impacts of heat on population health and the economic implications of heat for different sectors.

According to the Meteorological Office of Chile (Dirección Meteorólogica de Chile- DMC), the mean temperature in Chile has been increasing since 1961, and 2021 was the fourth warmest year since 1961. Of the 10 warmest years since 1961, eight occurred between 2012 and 2021. Extreme temperatures and heatwave events have become more frequent across the country, especially in the valleys from the central zone to the south (Dirección Meteorológica de Chile, 2021).

Extreme heat events are associated with higher mortality and morbidity, particularly due to circulatory and respiratory causes.[1] The health impacts of heat are compounded by individual and social vulnerability factors, such as age and underlying diseases at the individual level, and lack of preparation and response at community or national levels.

People older than 65 years are particularly prone to the health effects of extreme heat events. This might be associated with physiological responses to heat, but also with social factors such as social cohesion and support, isolation, and housing conditions.[2,3] Outdoor workers are also an important vulnerable group, especially those who work directly exposed to the sun (under no shaded or/and ventilated areas) and carry out heavy physical work.[4,5] Heat not only affect individual health and wellbeing of these workers but may also trigger cascading consequences in terms of economic losses, which in turn, might have repercussions on population health.

In Chile, there is a growing evidence base on the impacts of climate change on human health, however, there are still important gaps. The aim of this policy brief is to contribute to the national evidence by analysing the consequences of extreme heat on population health and the economic effects due to heat-related labour capacity loss. These two perspectives, health, and economic impacts, help us understand the systemic and interconnected nature of population health and wellbeing, as well as the multiple and cascading effects of climatic hazards.

Recommendations

1. Plan a national intersectoral policy to manage and reduce the risks of extreme heat on the population by improving the capacity to adapt and reduce social vulnerabilities at municipal, regional, and national levels.

2. Strengthen Primary Health Care as a core element of this national policy, facilitating an inter-sectoral response at all preventative levels. A heat and health national programme should be adopted with advanced nurse practitioners engaged as key managers of the programme.

3. Promote climate-smart labour laws that protect outdoor workers from extreme heat. Implement heat warning systems to advise workers and plan activities on days of extreme heat, as well as provide health and safety equipment for workers in the agriculture and construction sectors to protect against extreme heat and reduce its effects on health and labour productivity.

Heat-related mortality

Extreme heat may trigger different physiological reactions and symptoms that can lead to life-threatening conditions, such as fluid imbalances, kidney failure, heat exhaustion, heatstroke, and even death.[6] In general, people older than 65 years, outdoor workers, and people with underlying conditions (e.g., diabetes or hypertension) are particularly vulnerable to heat. In addition to these individual vulnerability factors, there are other systemic factors that can reduce or amplify the risk of negative health outcomes, such as the level of preparedness (or lack of) to cope with extreme heat events at local, regional, or national levels.

The Lancet Countdown indicator on heat-related mortality tracks heat-related mortality among people older than 65 years in Chile from 2000 to 2021. Estimates from the 202 global Lancet Countdown report show that the heat-related deaths of people older than 65 years in Chile have continuously increased from 2000 to 2021. Between 2017 and 2021, annual heat-related mortality of people over 65 was estimated to be 225% greater relative to the annual average of 2000-2004. In 2017-2021, there were, on average, 566 heat-related deaths per year in those over age 65, while in 2000-2004, this number was 174 heat-related deaths per year.

These changes in heat-related mortality over time are supported by the climatological data described by the DMC in terms of warm years and more frequent and intense extreme heat events in the country.[7]

[i]

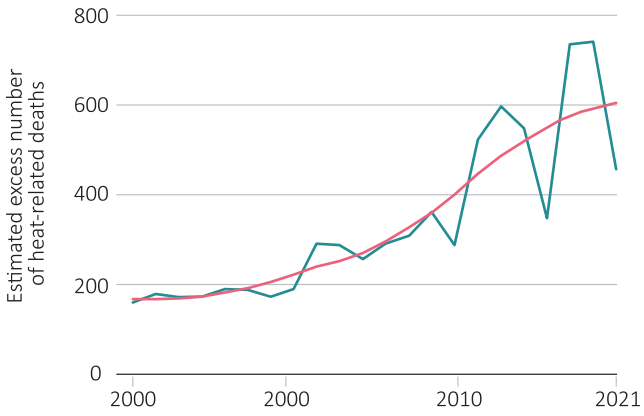


Fig 1: Heat-related mortality in Chilean adults over age 65, from 2000 to 2021. The red line represents a smooth trend from 2000 to 2021.

Loss of earnings from heat-related labour capacity reduction

Extreme heat may have multiple and cascading consequences on the health and wellbeing of the population. The direct effects on mortality were already presented in the previous section; however, other more complex effects are sometimes seen outside the health sector but are intrinsically linked to population health. A more systemic perspective of the consequences of extreme heat is related to labour capacity reduction and its economic impacts[8,9] which may affect the health and wellbeing across the population.

People working in the agriculture or construction sectors are especially vulnerable to the effects of extreme heat due to the direct exposure to the sun, high ambient temperatures, and heavy physical workload. In Chile, the agriculture and construction sectors constitute a significant proportion of the total economic activity, representing 6% and 9% of the total employment in 2021, respectively.[10] Consequently, it is important to analyse the extent to which extreme heat has affected workers' health and productive capacity and the consequent impacts on the national economy.

In Chile, data from the Lancet Countdown estimates that, as a result of heat exposure, 14 million potential hours of labour could have been lost each year, on average, between 2017 and 2021, almost twice the potential hours lost in 2000-2004.[ii] 78% of these losses would have occurred in the agricultural and construction sectors alone (Figure 2).

[i] The estimated number of deaths is obtained by using climate reanalysis data, mortality rate and life expectancy data from the Global Burden of Disease Study, and generalised exposure-response functions. For more methodological details, see the 2022 *Lancet* Countdown report.
[ii] Estimates of the loss of earnings that result from heat-related labour capacity loss are presented whereby data on lost work hours is combined with hourly wage data from the International Labour Organization (ILO). Manufacturing, agriculture, and construction sectors were analysed due to different indoor/outdoor exposures and the physical efforts required. For more methodological details, see the 2022 *Lancet* Countdown report.

The potential income loss associated with labour capacity reduction due to extreme heat measured as a percentage of the GDP tended to decrease from 1990 to 2000; however, from 2015 onwards, this percentage has increased mainly due to an increase in the construction sector. The potential income loss from agriculture substantially decreased from 1990 to 1995, remaining relatively constant afterwards (Figure 3).

In 2021, over 65% and 28% of the total potential income loss were in the construction and agriculture sectors, respectively. Overall, the potential income loss from labour capacity reduction due to extreme heat was nearly US$77 million in Chile, which is equivalent to almost 2.8 times the 2021 budget of the Secretary of Agriculture.[11]

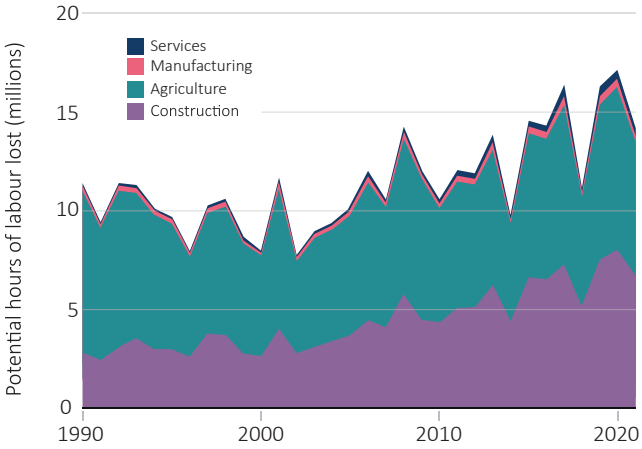


Fig 2: Potential labour lost due to heat-related factors in each sector, assuming all work is undertaken in the sun.

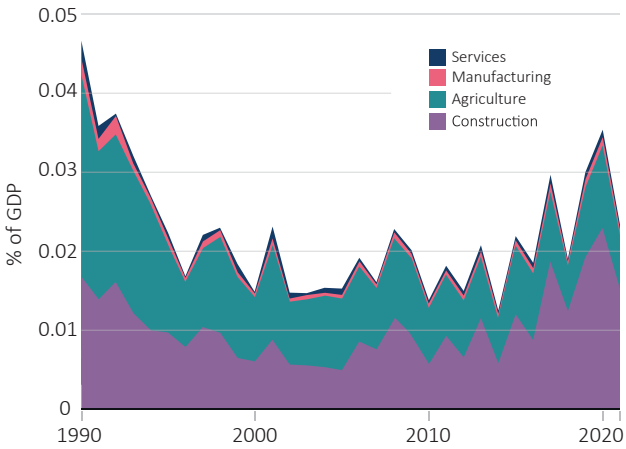


Fig 3: Potential loss of earnings from heat-related labour capacity reduction as a percentage share of GDP (earnings using CPI deflator), in Chile from 1990 to 2021.

Analysis and recommendations

Given the evidence on the health impacts of extreme heat, climatic projections, and national population projections for Chile, the direct and indirect adverse health impacts from heat exposure in Chile are likely to continue to increase. In order to protect Chilean populations from these risks, it is recommended that a national intersectoral policy framework be developed to reduce the risks of heat on Chilean population. This national policy might be associated with or derived from the National Policy for Disaster Risk Reduction 2020-2030. Some recommendations that might be included in this national policy are outlined below.

There is a clear need to promote the use of meteorological indicators, provided by the DMC, to inform early warning and response systems that can minimise the negative consequences on population health and economic sectors such as the agriculture and construction sectors. The agricultural sector usually relies on early warning of extreme temperatures and rainfall because of the potential crop losses associated with extreme weather events. In the health sector, early meteorological warnings are frequently used for and associated with extreme cold, such as the "Código Azul" plan; however, early warnings of extreme heat are less common. A national policy to prevent temperature-related mortality and morbidity should include a health early warning system for extreme cold and heat. One interesting example is the “Sistema de Alerta por Olas de Calor y Salud” lead by the National Meteorological Service of Argentina.[12]

Heat-related mortality of people above 65 years is expected to continue increasing; therefore, a national policy should improve the adaptive capacity and reduce social vulnerabilities at municipal, regional, and national levels. In order to promote health for all and increase climate resilience, one specific area to strengthen is Primary Health Care (PHC) as a core element and articulator of this policy, which would facilitate an intersectoral response at all preventive levels.

Healthcare workers at most primary health centres are key to this national policy because they already know where the vulnerable population is and what the population's conditioning health factors are. Therefore, a special heat and health programme, within the national policy, might help minimise the impacts of extreme events by implementing preventive and surveillance actions. In this regard, advanced nurse practitioners in PHC and environmental health can be key actors and leaders on the management and implementation of this programme, which would not only reduce the health impacts during extreme weather events, but also would strengthen public health and all the intersectoral efforts related to climate change adaptation.[13] (Nicholas et al., 2020).

Finally, employers must take action to protect workers in the agriculture and construction sectors. The potential negative impacts on the health and wellbeing of workers might be prevented through interventions that help minimise heat exposure or facilitate cooling. At workplaces, health and safety guidelines should be developed to help inform the implementation of interventions aimed at protecting the workforce from extreme heat. This guidance should include, for example, recommendations on improving the equipment used by workers in the agriculture and construction sectors to help reduce these impacts. Guidance should also be developed on using weather forecasts to plan activities (e.g., working in the shade or work-time shifting) in days of extreme heat to reduce adverse health outcomes from heat exposure on workers and help reduce productivity losses.[14]

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Organisations and acknowledgements

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THE *LANCET* COUNTDOWN

The *Lancet* Countdown: Tracking Progress on Health and Climate Change exists to monitor the links between public health and climate change, and the transition from health threat to opportunity. We are a global collaboration of over 300 leading experts from academic institutions and UN agencies across the globe, bringing together climate scientists, engineers, energy specialists, economists, political scientists, public health professionals and doctors.

Each year our findings are published annually in medical journal The Lancet ahead of the UN climate change negotiations. Our data makes clear how climate change is affecting our health, the consequences of delayed action and the health benefits of a robust response.

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The *Lancet* Countdown South America exists to promote research on health and climate change in the region, to encourage regional engagement on how climate change is affecting health across the continent, and challenge countries to respond in line with the evidence. It is the only academic centre in South America specifically researching climate change and health and is based at the Clima centre at Universidad Peruana Cayetano Heredia (UPCH) in Lima, Peru.

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