

The Lancet Countdown on Health and Climate Change

Policy brief for Colombia

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Introduction

Climate change poses a significant health threat to Colombian people, including through heat stress, extreme climate events such as floods and heatwaves, and increased transmission of vector-borne diseases. Colombia has seen rapid urbanisation over the past 30 years, with almost 40 million people (around 80 percent of the population) now living in urban areas.¹ Such significant change further exacerbates people's vulnerabilities to climate change due to a lack of climate-resilient infrastructure in cities and potential exposure to tropical diseases.² While greater urbanization has brought important economic benefits, it has also imposed major challenges such as providing access to clean water, sanitation, housing, sustainable transportation, supporting social cohesion, and the protection of natural spaces. These aspects are aligned directly and indirectly with different Sustainable Development Goals (SDGs), such as Goal 11 (sustainable cities and communities), 3 (health and wellbeing), 6 (water and sanitation), and 7 (sustainable energy). Failure to meet these goals harms individuals and society.

Climate change-induced environmental changes, alongside greater urbanisation and migration, has increased the suitability for specific vector organisms which carry disease. Colombia ranks third highest for the number of dengue cases in Latin America and the Caribbean (LAC), a primarily urban disease for which the climate suitability is growing worldwide. During the first seven months of 2022, 37,240 cases were reported – a rate of 105 cases per 100,000 inhabitants – 53%

higher than for the same period of 2021.³ Rates of dengue infection are expected to increase as areas become more suitable for disease-carrying mosquitoes in a warmer climate, and if the challenges of urbanisation remain unaddressed. Higher demand for health-care services is anticipated from increased morbidity and mortality associated with these vector-borne diseases, which will harm lives, livelihoods, and the economy.⁴

In addition, some urban areas have high levels of air pollution which causes poor health. For example, mortality attributed to outdoor and indoor air pollution in 2019 was estimated at 29.33 per 100,000 inhabitants (almost 13,000 deaths) with more than 80% of these premature deaths related to urban outdoor air pollution.⁵

Green spaces and other nature-based solutions could offer cost-effective and innovative approaches to address Colombian cities' climate change-related challenges. This 2022 *Lancet* Countdown policy brief for Colombia analyses three indicators: climate suitability for infectious disease transmission, costs of the health impacts of air pollution, and urban green spaces. These topics reflect the serious health threats that Colombia will face in the years ahead and emphasise the importance of the development of urban green spaces to help communities, especially vulnerable ones, adapt to the adverse health effects of climate change.

Recommendations

1

Increase investment in Vector Control Programmes (VCP) and strengthen governance and local management to address the proliferation of vector-borne diseases. Investment is needed to increase capacity for disease and vector surveillance, prevention, and control and to facilitate multi, inter- and intra-sectoral actions and collaboration to scale-up the use of successful WHO approved tools.

2

Allocate funds to measures that will help deliver Colombia's National Determined Contribution (NDC) and maximise the associated health gains. Priority measures include reducing the dependency of the transport sector on private road vehicles and improving access to public transport and active travel which will help reduce greenhouse emissions, reduce air pollution, increase physical activity of local populations, and ultimately improve overall health. Paving roads and reducing forest fires would also help reduce the amount of particulate matter, particularly $PM_{2.5}$, bringing associated health benefits. Interventions should prioritise those urban areas which are disproportionately affected by particulate matter because of dust from unpaved roads and heavy traffic.

3

National and local governments should scale up the urban green spaces coverage and improve the quality of those greenspaces that already exist, in line with current legal frameworks and policies that ostensibly encourage the development of greenspaces in cities. Urban green spaces are urgently needed to improve the quality of life of residents, especially in large and medium sized cities and to provide adaptation to climate change impacts.

Vulnerability to insect-borne diseases

Climate change is increasing the geographic extent of areas that are suitable for the transmission of certain infectious diseases including dengue, chikungunya, and Zika viruses which are carried by mosquitoes that are sensitive to changes in their environment. Globally, reported cases of dengue have increased 30-fold in the past 30 years, and have become endemic in Latin America, with most cases in Brazil, Mexico, and Colombia.^{6,7} Dengue cases are reported in more than 66% of Colombia's 1,122 municipalities,⁸ and are concentrated in urban centres, reflecting that dengue viruses thrive in crowded human populations in the tropics.⁹ Surveillance for dengue is carried out across the country, though prevalence in rural areas is low. Other vector-borne diseases which are reported include malaria, leishmaniasis and yellow fever, mainly from rural areas.

The 2022 global *Lancet* Countdown report tracks changes in the climate suitability for the transmission of infectious diseases (**indicator 1.3**). National data for Colombia shows that the climate suitability for dengue transmission increased by 35% for the mosquito species *Aedes aegypti* when the decade 2012–2021 is compared to 1951–1960. In parallel, the length of the dengue transmission season increased by 37% during this time, with an average of more than two extra months of transmission season each year as a result of increased temperature and changes in rainfall.

In agreement with the increased climate suitability and a rapidly growing urban population, Colombia has seen a substantial increase in the burden of dengue in recent years. In the four decades from 1971 to 2010 there were 12 dengue epidemics in the country, leading to

more than one million cases of dengue (almost 31,000 cases annually), and 7.4% of these cases involved severe dengue. In comparison, in just ten years between 2011 and 2021, almost 85,000 cases annually were reported.^{10,11} The burden of dengue in Colombia is estimated at 83.88 disability-adjusted life years (DALYs) per million inhabitants for endemic years such as 2011 and 2012.¹ Prevention and control strategies cost US\$131.7 million in 2012, illustrating the importance of reducing the number of reservoirs for disease carrying vectors and tackling climate change to control health costs.

In Colombia, the Ministry of Health and Social Protection coordinates dengue vector control programmes centrally, and these are implemented by local health secretariats who have limited resources to meet the new challenges posed by climate change, urbanisation, migration, and population growth. There are clear roles for other government departments such as planning, housing, and water to reduce the development of breeding sites for disease-carrying vectors.

Investment is needed to strengthen governance and local management to address the proliferation of vector-borne diseases. The capacity of programmes must be increased to identify local needs and develop clear, meaningful, and ecologically viable solutions for disease and vector surveillance, prevention, and control and to facilitate multi-, inter- and intra-sectoral actions and collaboration to scale-up the use of successful WHO approved tools.

Costs of premature mortality due to ambient air pollution

Air pollution is one of the most harmful environmental health threats, causing respiratory and cardiovascular illness, strokes, lung cancer, premature deaths and impacts maternal and child health, all of which have wider societal and economic effects. According to the UN Environment Programme, in 2019 Colombians were exposed to an average level of particulate matter PM_{2.5} of 22 µg/m³ a year, 4.4 times above the World Health Organisation (WHO) guidelines.

Premature deaths from ambient air pollution affect lives, livelihoods, and economies. The 2022 global *Lancet* Countdown report estimates that, in 2020 alone, 4,500 deaths were directly linked to anthropogenic

small particulate matter air pollution (PM_{2.5}). The transport sector was the biggest single contributor, accounting for 1,100 of these deaths (**indicator 3.4**). The monetised value of the years of life lost attributable to anthropogenic ambient PM_{2.5} amounted to US\$2.5 trillion, equivalent to 2.9% of world gross domestic product (GDP) in 2020 (**indicator 4.1.4**). The monetized value of PM_{2.5}-related mortality in the Americas accounted to 0.8% of GDP, while in Colombia it was equivalent to 0.96% of GDP, or the average income of almost half a million Colombian people. Though the monetised value in Colombia is somewhat smaller than other LAC countries such as Brazil, Chile,

¹ DALYs are the sum of the years of life lost due to premature mortality, and the years of healthy life lost due to disability resulting from dengue disease.

Paraguay or Peru, air pollution disproportionately affects vulnerable populations, deepening inequalities in an already unequal country.¹²

Particulate matter in Colombian cities can mainly be traced to combustion from diesel and petrol vehicles, industry, forest fires, and unpaved roads.¹³ Building on data from the IEA, the 2022 global *Lancet* Countdown report shows that 94% of the energy used for road travel in Colombia comes from fossil fuels, with the remainder covered by biofuels which also contribute to air pollution (**indicator 3.3**). Minimising road travel and shifting towards public transportation and active travel can therefore not only help prevent 1,100 deaths annually, but would also promote more equitable access to transportation, reduce the greenhouse gas emissions associated with road travel, and deliver major health benefits through increased physical activity and healthier lifestyles.

Regulation and legislation are urgently needed to reduce urban air pollution through mechanisms such as investing in public transport infrastructure and promoting its use, promoting safe active travel, and reducing other sources of air pollution through interventions such as paving roads and reducing forest fires. These interventions would help Colombia meet its nationally determined contributions (NDCs) and should be prioritised for those urban areas which are disproportionately affected by particulate matter because of dust from unpaved roads and heavy traffic.

Urban green spaces as a sustainable solution to climate change

Urban green spaces have also been shown to have reduced particulate matter concentrations in comparison to places with less vegetation.¹⁴ In addition, urban green space can help absorb greenhouse gas emissions and reduce urban heat exposure, while increased exposure to urban greenness has been shown to provide benefits to physical and mental health. Despite these benefits, according to **indicator 2.2.3** of the 2022 global *Lancet* Countdown report on urban green space, of the nine Colombian cities included, only three (Ibagué, Bucaramanga and Pereira) have moderate levels of green spaces measured with the Normalised Difference Vegetation Index (NDVI).ⁱⁱ In large cities, such as Bogota, Medellin and Cali, the levels of green spaces are very low or low.

Given that approximately 80% of the Colombian population live in medium and large-scale cities, limited access to green spaces is a concern. Having high quality, safe green spaces in urban areas has important benefits for mental and physical health. For example, greater accessibility to green spaces across urban areas for all citizens reduces inequalities by enabling more people to use such areas for physical recreation, social contact and to increase access to nature, which supports health and well-being. Green spaces also reduce the impacts of flash flooding and heatwaves while maintaining urban biodiversity and are associated with better levels of socioeconomic development and reduction of health inequities.¹⁵

TABLE 1: URBAN GREEN SPACES IN COLOMBIAN CITIES OVER THE PAST 10 YEARS

City	Year/Level of greenness			
	2010	2015	2020	2021
Barranquilla	Very low	Low	Low	Low
Bogota	Very low	Very low	Very low	Very low
Bucaramanga	Low	Moderate	Moderate	Moderate
Cali	Very low	Low	Low	Low
Cartagena	Very low	Very low	Very low	Very low
Cúcuta	Low	Very low	Low	Low
Ibagué	Low	Moderate	Low	Low
Medellín	Low	Low	Low	Low
Pereira	Moderate	Moderate	Moderate	Moderate

Source: **Indicator 2.2.3** of the 2022 global *Lancet* Countdown report

ⁱⁱ This indicator uses information from the 2022 global *Lancet* Countdown report. Urban green spaces are calculated using remote sensing and demographic data. The normalized difference vegetation index (NDVI) calculates the ratio of the differences between near infrared radiation and visible radiation to the sum of these two measures. For further details see the report.

The benefits of achieving a larger number of green spaces are directly associated with the fulfilment of SDG target 11.7.ⁱⁱⁱ Colombia has a National Public Space Policy (CONPES 3718 of 2012), which emphasises the importance of having protected green spaces especially in urban areas. However, to date, most cities do not meet the recommended number of green spaces per 1000 individuals. However, Colombia does not monitor the number of available green spaces.

Urban green spaces are urgently needed to improve the quality of life of residents, especially in large and medium-sized cities and to provide adaptation to climate change impacts. Given the availability of a legal

framework and policies that ostensibly encourage the development of greenspaces in cities, national and local governments must scale up the number of green spaces per 1000 individuals and improve the quality of those that already exist. Despite the clear benefits of urban green spaces, these need to be planned carefully with appropriate species of plants to avoid creating breeding grounds for vectors.¹⁶

Conclusion

With a prominent and growing urban population, Colombia must address health risks which are exacerbated by climate change. In the years ahead, it is crucial that Colombia take steps to build capacity in health systems to deal with the high number of vector-borne disease

cases, implement strategies to decrease air pollution with a focus on vulnerable populations, and lastly, increase the number and quality of urban green spaces.

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ⁱⁱⁱ By 2030, provide universal access to safe, inclusive, and accessible, green, and public spaces, in particular for women and children, older persons and persons with disabilities

Organisations and acknowledgements

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THE LANCET COUNTDOWN

The *Lancet* Countdown: Tracking Progress on Health and Climate Change is a multi-disciplinary collaboration monitoring the links between health and climate change. It brings together lead researchers from 43 academic institutions and UN agencies in every continent, publishing annual updates of its findings to provide decision-makers with high-quality evidence-based recommendations. For its 2022 assessment visit <https://www.lancetcountdown.org/2022-report/>

THE LANCET COUNTDOWN SOUTH AMERICA

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.

FACULTAD DE ECONOMÍA UNIVERSIDAD DE LOS ANDES

The Department of Economics at Universidad de los Andes was founded in 1948 and it is recognized not only for its superior academic standards, but also for its presence and contribution to solving national problems through the research done at the Centre for Studies on Economic Development – (CEDE) and the Centre for Studies on Safety and Drugs (CESD). The Department seeks to contribute to the sustainable development of Colombia through the training of professionals who are able to understand and analyse the national economic environment from a global perspective, the advancement of economic sciences through research and the application of knowledge in economics. It is recognized among the top five faculties of economics in Latin America.

CENTRE FOR SUSTAINABLE DEVELOPMENT GOALS FOR LATIN AMERICA AND THE CARIBBEAN

The Centre was founded in September 2018, the SDG Center aims to become a think tank and research centre on the Sustainable Development Goals (SDGs) in alliance with universities of excellence, governments, and civil society organisations in the region. Its purpose is to serve as a platform for the dissemination of knowledge and to contribute to the training of the next generation of leaders in sustainable development. In addition, it also seeks to contribute from the experience of the region to global discussions of the SDGs, as well as to design and lead an SDG research agenda for the region. The Centre's approach to development is pluralist and fosters debates with multiple perspectives and approaches. These with the objective of tackling the global challenges on sustainable development, always aligned with the principle of academic excellence. The Centre conducts research on topics related to SDG 1, 2, 3, 10, 13 and 15.

SALUD POBLACIONAL FUNDACIÓN SANTA FE DE BOGOTÁ

The division of Population Health of Fundación Santa Fe de Bogotá (<https://www.fsfb.org.co/wps/portal/fsfb/inicio/saludpublica>) was created in 1972 and it is a transdisciplinary research unit dedicated to the development of public health research and intervention projects to generate knowledge seeking to influence Colombia public health policy. Research is oriented to achieve results in an efficient, effective and sustainable manner, working hand in hand with communities and members of different sectors in the following six thematic areas: infectious diseases, mental health, food security, sexual and reproductive health, maternal and child health and healthy lifestyles and chronic diseases and three cross-sectional areas: health economics, digital health and public policy advocacy.