World Health Organization

Developed in collaboration with the Municipality of Quito's Metropolitan District

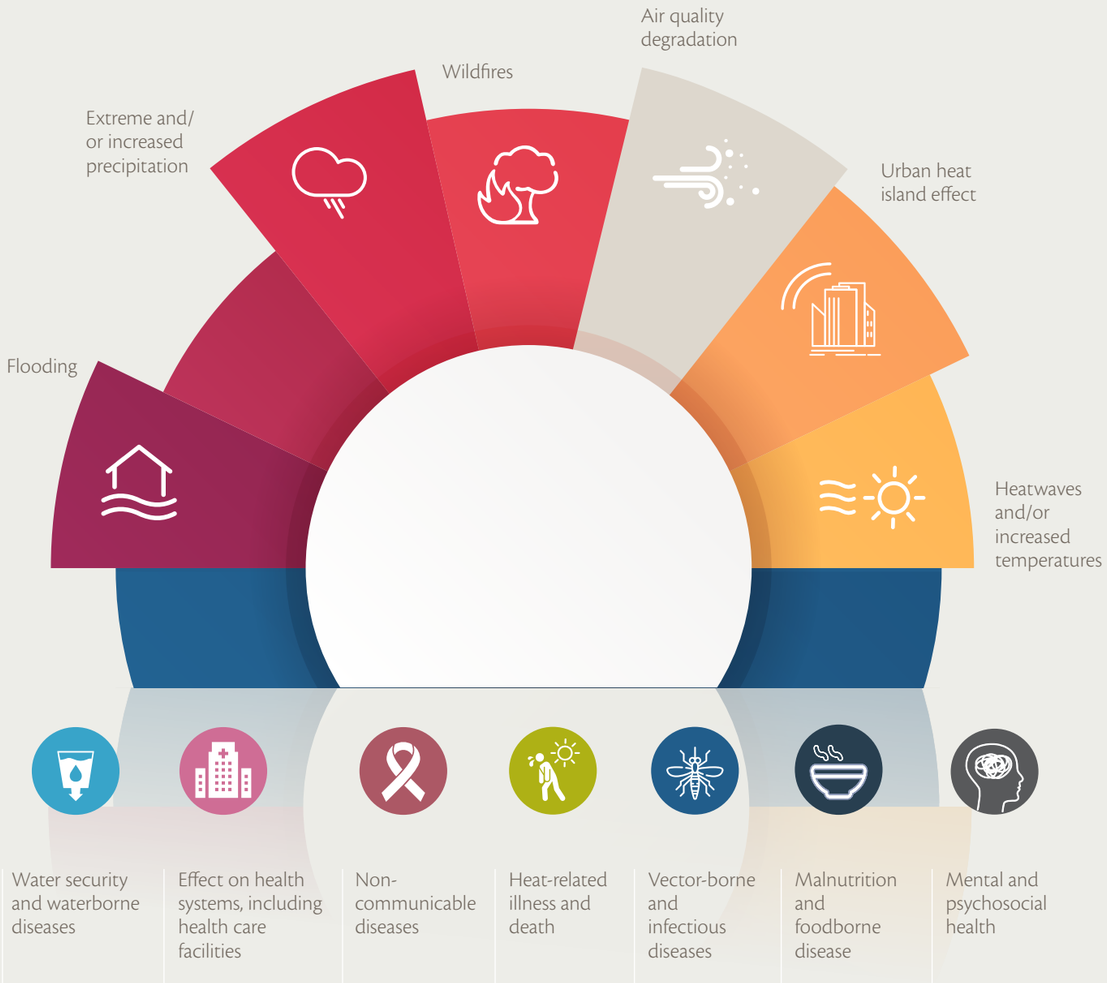
2022

HEALTH AND CLIMATE CHANGE URBAN PROFILE

Quito

This World Health Organization (WHO) health and climate change urban profile presents a snapshot of key climate hazards, climate-sensitive health risks, and the potential health benefits of climate change adaptation and mitigation. The profile does not provide comprehensive information on all climate hazards, vulnerability factors or health risks but rather provides examples of some immediate risks based on available evidence and reported priorities and initiatives. Outlined in this profile are opportunities to promote policies and projects that protect the climate and environment while having large immediate health benefits at a local level.

Climate hazards and health risks *(1, 2)*



Health and development indicators

2.6 million

In 2017, Quito had a population of 2.6 million living in an area of about 423 000 hectares *(2)*. Approximately half of the population is under the age of 29 years old *(2)* (based on INEC National Institute of Statistic and Census, 2010).

21.6%

In 2018, 21.6% of children under 5 years old were chronically malnourished. Malnutrition is largely driven by high rates of poverty. In 2019, 26.2% of Quito's population was living in poverty according to Unsatisfied Basic Needs *(3)*.[1]

79%

Seventy-nine per cent of the population do not have quality public spaces available to them *(2)*.[2]

0.3%

In 2018, approximately 52.2% of the population used public transport but only 0.3% of trips in Quito were made by cycling and 15.3% by walking *(5)*.

[1] The Unsatisfied Basic Needs - Necesidades Básicas Insatisfechas (NBI) is a measure of non-monetary poverty that considers a set of indicators related to household characteristics in relation to basic structural needs (housing, education, health, public infrastructure, etc.) *(4)*.
[2] Quality public spaces were evaluated using criteria that included: safety; suitability for recreational, sporting or cultural activities; promoting social cohesion.
[3] Under a under a high-emissions pathway (RCP8.5), compared with 2016.
[4] Under a high-emissions pathway (RCP8.5), compared with a 2012 baseline.

Evidence to support

Wildfires

- Drought, in combination with extreme heat, drives a fire season that lasts an average of 12 weeks *(6)*. In July 2020 alone, 21 forest fires occurred in the province of Pichincha, with a loss of 453,20 Ha *(7)*.
- Between 2001 and 2020, Quito lost 5.8 kha of tree cover, which resulted in an average of 153 kt CO_2e being released into the atmosphere annually *(6)*.
- Wildfires also emit other pollutants, such as carbon monoxide and fine particulate matter, and can raise ground-level ozone levels. These seriously impact air quality and increase the health risk of cardiovascular disease, respiratory illnesses and some cancers *(8, 9)*.

Flooding and/ or extreme precipitation

- Between 1960 and 2010, the amount of precipitation increased by 13%, and it is expected to reach 16% by 2040 *(10)*.[3] Days with intense rain are expected to rise from 16 days (1981-2005) to 31 days (2018-2040) *(10)*.
- Flooding and landslides pose a threat to critical infrastructure and could interrupt the water supply and medical services *(10)*.
- Flood events have been shown to precipitate mental health issues such as anxiety, depression and insomnia *(11)*.
- Overflow of sewage systems from heavy rain increases the risk of waterborne and foodborne diseases *(10, 12)*. During 2018, 24 082 cases of water- and food- borne diseases were registered at the national level and 5767 in the province of Quito alone *(13)*.

Heatwaves and increased temperatures

- Between 1960 and 2010, average annual temperature in Quito increased by 1.1°C and is expected to increase, by 2.3°C between 2012 and 2070 *(7, 10)*.[4]
- Heatwaves are perceived by the inhabitants of Quito as the most notable effect of climate change *(12)*. Between 1995 and 2005, Quito experienced an increase of six heatwaves a year, with the heatwave tendency expected to increase *(10)*.[5]
- Quito's location near the equator exposes individuals, particularly outdoor workers, to extreme ultraviolet (UV) radiation. In 2019, 44% of the days of the year exceeded a UV index of 11, considered the most harmful *(14)*.
- Increasing temperatures and extreme heat events have already limited water supplies, exposing individuals to preventable health risks, such as increased heat-related illnesses and diarrhoea *(10)*.
- The city also faces an urban heat island effect[6] with temperature differences of up to 3°C in the city centre *(15)*.

Air pollution[7]

19.8 µg/m³ mean annual $PM_{2.5}$ *(16)*[8]

In 2018, the annual average for PM2.5 concentration in Quito was 19.8 µg/m3, almost four times higher than the WHO recommended level of 5 µg/m3 *(16)*.

Drivers of air pollution

Quito's main air pollutants ($PM_{2.5}$ and PM_{10}) are emitted mainly by combustion sources, such as vehicles, open burning, forest fires, industry, and sedimentary particles, which are the principal cause of respiratory diseases *(5)*.

Smog

Quito's geographical characteristics contribute significantly to air pollution. High levels of luminosity resulting from its location near the equator and lack of oxygen due to altitude affect the generation of smog *(5)*.

BreatheLife City[9] - ✓

Quito is a member of the BreatheLife global campaign to mobilize cities to protect health and the planet from the effects of air pollution.

[5] Under an intermediate (RCP4.5) and high-emissions pathway (RCP8.5).
[6] An urban heat island (UHI) is an urban area in which the most outstanding feature is the significant temperature differential with respect to its surrounding areas, due to the presence of buildings, roads and other elements of the anthropized space and human activities *(15)*.
[7] Many of the drivers of climate change, such as inefficient and polluting forms of energy and transport systems, also contribute to air pollution.
[8] $PM_{2.5}$ refers to fine particulate matter of diameter of 2.5 µg or less, which poses some of the largest health risks.
[9] The BreatheLife network and global campaign is a collaboration between WHO, the Climate and Clean Air Coalition, the United Nations Environment Programme, and the World Bank.

Emissions

Net zero target – ✓

Target date: carbon neutral by 2050[10]

Renewable energy target – ✓

Target date: 90% renewable electricity by 2023[11]

Climate and health commitments

Climate change assessments and plans	Completed?	Health included?
Climate risk and vulnerability assessment	✓	✓
Adaptation plan	✓	✓
Mitigation plan	✓	✓

Climate change and health targets and initiatives	
Clean water	100% of the population will have access to clean drinking water and its supply will be guaranteed from 2050 *(10)*.
Global Covenant of Mayors	✓
Resilient Cities Network	✓
C40 Cities	✓
ICLEI– Local Governments for Sustainability	✓

Adaptation and mitigation actions

Green space

- To combat heat and rejuvenate the city, Quito is implementing several green infrastructure plans to create eco-efficient neighbourhoods (e.g. the 'Red Verde Urbana' (the Urban Green Network), a system of green corridors that will generate spatial links between natural conservation areas, natural urban green spaces and recreational spaces) *(10, 17)*. By 2023, Quito plans to consolidate 5 km of the Urban Green Network *(10)*.
- The city is focussing on implementing nature-based solutions. In the neighbourhood San Enrique de Velasco, a targeted nature-based project includes tree planting, the creation of urban gardens, green corridors, and the regeneration of creeks and green roofs *(10, 17)*. By 2030, Quito aims to increase the average green space area to over 20 m^2 per inhabitant *(12)*.

Water management

- Under the city's Water and Sanitation Master Plan (2010–2040), a Stream Recovery Plan was launched in 2015 to ensure the maintenance of the natural conditions of streams, reducing the risk of landslides, avalanches or floods. A flood-mapping exercise was completed to develop hazard maps, and an early warning system was introduced to report predicted extreme precipitation events *(10, 12)*.
- By 2050, 50% of the surface water sources for Quito (77 550 ha) will be under a sustainable conservation or land-use regime that considers climate change scenarios *(12)*. Recovery and intervention actions include active restoration strategies, enrichment of the vegetation cover, and complete elimination of threats/stressors *(12)*.

Transportation

- Quito's network for atmospheric monitoring provides high-quality online information accessible to the public *(18)*. To improve air quality, the city is transitioning to electric vehicles. In 2017, the city adhered to the C40 Fossil-Fuel-Free Streets declaration and committed to renew the bus fleet with electric buses until 2025, to achieve the goal of zero emissions by 2030 *(5)*. Low-emission zones have been established, such as Quito Historical Centre, where traffic restrictions only allow public transport and taxis with zero-emission technology *(18)*.
- The city is also focusing heavily on improving active transport opportunities by adding bike lanes and widening pavements (18). BiciQuito is the city's public bicycle system, containing 150 available bikes, according to the Secretary of Mobility of the Municipality of Quito.

Benefits to health

Green space

- Implementing green infrastructure could lead to positive health outcomes. For example, the green corridors planted in Medellín since 2016 have reduced the urban heat island effect, lowering the average city temperature by 2°C in the first three years, while a further decrease of between 4 and 5°C is expected after 28 years *(19)*. Each of the 30 green corridors, which cover 65 hectares, can absorb 161 tonnes of CO_2 per year for the initial phase of the vegetation's life (19). Benefits such as those observed in Medellín can be expected from Quito's green infrastructure initiatives.

Water management

- Improving water, sanitation and hygiene (WASH) services could prevent at least 9% of the global disease burden, such as through a reduction of incidences of diarrhoea and vector-borne diseases *(20)*. The enrichment of vegetation cover can mitigate flood risk and improve community safety, with short- and long-term positive impacts on public health *(21)*.

Transportation

- A study in Quito demonstrated that a five-year city-wide vehicle emission control programme led to a significant decrease in the level of carbon monoxide in the environment. This resulted in a reduction in incidences of respiratory disease by 46% and a reduction of carboxyhaemoglobin levels in children by 92% *(22)*.
- Upgrading thirty per cent of Quito's bus fleet with electric buses would improve air quality by reducing $PM_{2.5}$ by an estimated 11.4% in the intervention areas and by 1.2% throughout the city. Estimated health benefits would include: 6.5 premature deaths avoided per year, +3 days of life expectancy per citizen, and 7.3 hospital admissions avoided per year *(23)*.

[10] Quito aims to reduce its ecological footprint by 5% every year, starting in 2019 *(5)*.
[11] In 2023, 90% of energy should come from renewables (hydro) *(12)*.

City zoom-in

Urban agriculture

Since 2002, Quito has had a participatory urban agriculture programme which works along the entire food chain and promotes the production, processing, marketing and distribution of healthy organic food from urban and peri-urban gardens in Quito. The programme has advanced food security, job creation, income generation, environmental management, social inclusion, and gender equity. It provides technical assistance as well as capacity building. For its achievements in improving local access to healthy food for vulnerable groups, it received the Future Policy Silver Award in 2018 *(24)*.

Calls for action

Financing

Increase funding for climate change adaptation and mitigation action that will protect health. Strengthen capacity for accessing funding streams through international fundings mechanisms, the private sector, and other sources.

Community engagement and partnership

Promote spaces or citizen participation and co-responsibility in tackling climate change *(17)*.

Governmental leadership

Institutionalize climate change governance in the Municipality of the Metropolitan District of Quito and strengthen the technical working teams to be able to effectively implement actions *(17)*.

References

1. Análisis de Riesgos Climáticos. CAP Distrito Metropolitano de Quito; 2020 (http://www.quitoambiente.gob.ec/images/Secretaria_Ambiente/Cambio_Climatico/plan_accion_climatico_quito_2020/200528_C40_CRA_Quito%20(2).pdf, accessed on 24 March 2022)
2. Resilient Quito: resiliency strategy – Municipality of the Metropolitan District of Quito. Quito: Mayor of Quito; 2017 (https://resilientcitiesnetwork.org/downloadable_resources/Network/Quito-Resilience-Strategy-English.pdf, accessed 15 November 2021).
3. Información sobre pobreza Quito Como Vamos 2020. Quito: Quito Como Vamos; 2020 (https://quitocomovamos.org/wp-content/uploads/2021/05/2.POBREZA.pdf, accessed 25 March 2022).
4. Compendio Estadístico 2012 [online database]. Quito: Instituto Nacional de Estadísticas y Censos; 2012 (http://www.ecuadorencifras.gob.ec/institucional/home, accessed 14 November 2021).
5. Barriga M. EV Readiness Assessment. Berlin: Wuppertal Institute; 2018 (https://www.uemi.net/_files/ugd/de12cd_84181d770af94577bc9b665413e34c6c.pdf, accessed 15 November 2021).
6. Global Forest Watch [online database]. Washington DC: World Resources Institute; 2020 (https://www.globalforestwatch.org/dashboards/global, accessed 15 November 2021).
7. Informe de Situación – Incendios Forestales. Servicio Nacional de Gestión de Riesgos y Emergencias; 2020 (https://www.gestionderiesgos.gob.ec/wp-content/uploads/2020/08/Informe-de-Situaci%C3%B3n-No-3-Incendios-Forestales-04082020.pdf, accessed 24 March 2022)
8. Quito, a city in the middle of a firebelt. In: World Rainforest Movement [website]; 2018 (https://wrm.org.uy/articles-from-the-wrm-bulletin/section1/quito-a-city-in-the-middle-of-a-firebelt, accessed 15 November 2021).
9. Prüss-Üstün A, Wolf J, Corvalán CF, Bos R, Neira MP. Preventing disease through healthy environments: a global assessment of the burden of disease from environmental risks. Geneva: World Health Organization; 2016 (https://apps.who.int/iris/handle/10665/204585, accessed 24 March 2022).
10. Plan de Acción de Cambio Climático de Quito. Quito: PACQ; 2020 (https://gobiernoabierto.quito.gob.ec/wp-content/uploads/documentos/quitoparticipa/dmq/Presentaci%c3%b3n%20Asamblea%20de%20Quito.pdf, accessed 22 November 2021).
11. Alatrista CB. Salud mental en desastres naturales. Revista Psicológica Herediana. 2014;6(1–2) (https://doi.org/10.20453/rph.v6i1-2.2066, accessed 15 November 2021).
12. CDP Open Data Portal [online database]. London: CDP; 2021 (https://data.cdp.net, accessed 6 September 2021).
13. Ministry of Health of Ecuador, Weekly Epidemiological Gazette No. 52; 2018, (https://www.salud.gob.ec/wp-content/uploads/2013/02/GACETA-GENERAL-S52.pdf, accessed 05 May 2022)
14. Quito Metropolitan District Air Quality Report 2019. In: Secretary of Quito's Municipality for Environment [website]; 2019 (http://www.quitoambiente.gob.ec/index.php/informes#informe-calidad-del-aire-2019, accessed 16 December 2021).
15. Evaluación estratégica de medidas para reducer la Isla de Calor Urbana en la ciudad en Quito. C40 Cities (https://88f84eeb-89a2-497e-8780-c82be89d7824.filesusr.com/ugd/b7992f_199a8af781e84a2884a3fa44906a1c90.pdf, accessed 1 December 2021).
16. WHO Air Quality Database: Update 2022 (https://www.who.int/data/gho/data/themes/air-pollution/who-air-quality-database, accessed 05 May 2022)
17. Executive Summary – Quito's Climate Action Plan 2020. Quito: Mayor of the Metropolitan District of Quito; 2020 (https://cdn.locomotive.works/sites/5ab410c8a2f42204838f797e/content_entry5c8ab5851647e100801756a3/60abdae7cc0a6f00a610736d/files/Executive_Summary_PACQ2020_ENG.pdf, accessed 22 November 2021).
18. Environmental Secretariat of Quito. Quito, Ecuador is taking strong actions to improve air quality. In: International Day of Clean Air for Blue Skies [website]. Washington DC: UNEP; 2020 (https://www.cleanairblueskies.org/story/quito-ecuador-taking-strong-actions-improve-air-quality, accessed 22 November 2021).
19. C40 Cities, Nordic Sustainability, Realdania. Cities 100 (2019 edition): 100 solutions for climate action in cities. Copenhagen: Realdania; 2019 (https://realdania.dk/publikationer/faglige-publikationer/cities100-2019-edition, accessed 22 November 2021).
20. Prüss-Üstün A, Bos R, Gore F, Bartram J. Safer water, better health: costs, benefits and sustainability of interventions to protect and promote health. Geneva: World Health Organization; 2008 (https://apps.who.int/iris/bitstream/handle/10665/43840/9789241596435_eng.pdf, accessed 11 December 2021).
21. Cheng JJ, Berry P. Health co-benefits and risks of public health adaptation strategies to climate change: a review of current literature. Int J Public Health. 2013;58:305–311. (https://link.springer.com/article/10.1007/s00038-012-0422-5, accessed 11 December 2021).
22. Estrella B, Sempértegui F, Franco OH, Cepeda M, Naumova EN. Air pollution control and the occurrence of acute respiratory illness in school children of Quito, Ecuador. J Public Health Pol. 2019; 40:17–34 (https://doi.org/10.1057/s41271-018-0148-6, accessed 12 December 2021).
23. C40 Cities. Benefits of Urban Climate Action: C40 Cities Technical Assistance Report – Quito. London: C40 Cities; 2019 (https://www.c40.org/wp-content/uploads/2022/02/Quito-%E2%80%93-Upgrading-the-Municipal-Bus-Fleet-from-Diesel-to-Electric-English.pdf, accessed 23 November 2021).
24. Quito's participatory urban agriculture programme. In: Future Policy [website]; 2021 (https://www.futurepolicy.org/global/quito-agrupar, accessed 23 November 2022).

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LEGEND

Key climate hazards


Flooding


Sea-level rise


Extreme and/ or increased precipitation


Heatwaves and/ or increased temperatures


Drought


Urban heat island effect

Air quality degradation

Key health risks


Heat-related illness and death


Injury and death from extreme weather events


Malnutrition and foodborne disease


Mental and psychosocial health


Non-communicable diseases


Respiratory illness


Vector-borne and infectious diseases


Water security and waterborne diseases


Zoonoses


Effect on health systems, including health care facilities