Brief

Climate change impacts on health:
Nepal assessment

January 2025

Climate Centre

Introduction

Nepal is highly vulnerable to the impacts of climate change due to a combination of political, geographic and social factors. This vulnerability is especially pronounced in densely populated and haphazardly urbanized areas, as well as in critical river valleys such as the Kathmandu Valley. Nepal's climate-related challenges have a direct and profound effect on public health. They increase risks from extreme weather events, deteriorating air quality and climate-sensitive diseases, which disproportionately affect already vulnerable populations.

Historically, the main climate-related challenges Nepal has experienced are flash floods and landslides, but now there is an increasing incidence of drought and heat exposure (World Bank Group, 2022). Urban areas are highly susceptible to flooding, extreme heat and water scarcity. Poverty and migration are significant factors that exacerbate climate-sensitive health conditions.

The aim of this report is to understand how interconnected factors exacerbate the health impacts of climate change, particularly for vulnerable populations. Building on the 2021 *Climate Change Impacts on Health and Livelihoods: Nepal Assessment*, it aims to inform effective responses to protect the health of those most at risk. It offers recommendations to strengthen humanitarian efforts within the International Red Cross and Red Crescent Movement and through collaboration with external stakeholders. This review is the result of a close collaboration between the Nepal Red Cross Society, the Finnish Red Cross and the International Federation of Red Cross and Red Crescent Societies (IFRC), with technical support from the Red Cross Red Crescent Climate Centre.

1. Climate hazards and variability

Nepal's climate is highly diverse due to its geographical range, with the high Himalayan mountains in the north and the low-lying Gangetic plains in the south (USAID, 2017) resulting in climates that range from alpine to subtropical (Karki *et al*., 2016). The monsoon circulation dominates the rainfall pattern (Kansakar *et al*., 2004), with most precipitation occurring between June and September.

Temperatures will continue to rise: Over the past decades, temperatures have been increasing and the number of cold days and nights has decreased significantly (MoFE, 2018; WBGCCKP, 2020). Temperatures are projected to continue to rise significantly, with as many as 19–27 additional hot days per year by 2045, particularly during the dry months. The highest warming is expected in the high mountains and western regions (MoFE, 2019).

Rainfall may be more erratic: While rainfall has generally decreased in recent decades (WBGCCKP, 2020), precipitation in the mountains is increasingly falling as rain rather than snow, accelerating glacial melt (USAID, 2017). Rainfall is likely to increase in the future throughout the country, particularly in the central and western regions. Winters are projected to be drier, while summers (with the monsoon) will be wetter (MoFE, 2019).

Extreme events will be more frequent and severe: The frequency of extreme rainfall events has increased, leading to more flash floods and landslides (Karki *et al.*, 2017). Hydrological droughts, particularly over longer timescales (12 months or more), have also become more severe and frequent (Dahal, 2016). Monsoon flooding is projected to increase threefold (WBGCCKP, 2020), and risks of glacial lake outburst floods (GLOFs) will be heightened due to rapid glacial retreat (Dube, 2014). The last GLOF event in 2024 caused the disappearance of Thame village in the Khumbu region (HRRP, 2024). Western Nepal experienced an unprecedented 624mm of rain in a single day in July 2024, the highest recorded rainfall in the country's history (IWMI, 2024).

2. Whose health is most at risk?

Low-income households and urban populations

Nepal's 2023 revised poverty line indicates that one-fifth of the population lives in poverty, with the provinces of Sudarpaschim (34.2 per cent) and Karnali (26.7 per cent) having the highest rates. The provinces of Madhesh (25.1 per cent) and Lumbini (22.8 per cent) have the largest numbers of people living in poverty (ADB, 2024). Nepal's economy is reliant on agriculture (employing 62 per cent of the labour force). It is thus highly vulnerable to climatic shocks such as droughts, floods and landslides, particularly in the western and terai regions (Neupane *et al.*, 2022).

Socio-economic disparities, reduced intake of nutritious foods and reliance on ultra-processed products worsen nutritional gaps (MoHP, 2022b). Floods and heavy rainfall events correlate with increased malnutrition cases in districts like Morang, Bajura, Kaski and Sarlahi. According to the 2024 Global Hunger Index, 5.7 per cent of Nepal's population is undernourished; almost a quarter of children under five are stunted, 7 per cent are wasted and 2.7 per cent die before age five.

Since the earthquake in 2015, peri-urban areas have expanded into urban agglomerations, often converting farmland into urban environments (Bhattarai *et al.*, 2023). The urban planning of major cities in Nepal falls short in terms of public health infrastructure, with inadequate waste management systems and poor sanitation creating ideal conditions for vectors to breed (IFRC, 2023).

Women

Women often bear greater risks and burdens from climate change due to poverty, displacement, limited access to healthcare and the impact of traditional roles, responsibilities and cultural norms (UNCC, 2023). In Nepal, women face unequal power relations and gender-based barriers due to its patriarchal society (ADB, 2010). Gender-based inequalities – compounded by caste, ethnicity, class and geography – further disadvantage Dalit, indigenous and Madhesi women, as well as those in rural areas, who struggle with poverty, illiteracy and limited access to healthcare and education.

Men's migration for work leaves women responsible for household and caregiving tasks, increasing their climate vulnerability and restricting their mobility due to social norms (Danish Institute for International Studies, 2024). In rural Nepal, women handle climate-sensitive tasks like farming and collecting firewood and water, increasing their exposure to climate impacts (MoHP, 2022a). Despite these responsibilities, many lack decision-making power (Sherpa *et al.*, 2021). Women in urban slums face additional health risks, including exposure to gender-based and sexual violence (UN Women, 2024). Climate change exacerbates issues regarding access to reproductive services, menstrual hygiene management and sexual violence (Women Deliver, 2021).

3. How will health be affected by climate change?

Extreme weather events and mortality

In Nepal, multiple hydrometeorological extreme events occur every year (such as landslides, cold waves, heatwaves, wildfires and floods). Nepal experiences an estimated 500 disaster events annually, which has been increasing as the changing climate affects the frequency and intensity of natural hazards (Bhandari, 2015; Shrestha, 2019). Climate change is expected to exacerbate inland flooding, putting an estimated 200,000 additional people at risk of river floods each year (WHO, 2016). Under a high emissions scenario, annual heat-related deaths in Nepal are expected to increase from 4 per 100,000 people to as many as 53 per 100,000 people by 2080 (WHO, 2016).

Air pollution

Another critical aspect is air pollution by fine particulate matter ($PM_{2.5}$ – inhalable particles with diameters of 2.5 micrometres or less). These pose serious health risks – contributing to heart disease, asthma, low birth weight and increased mortality – as well as reducing visibility. In 2023, Nepal's average $PM_{2.5}$ levels were 8.5 times WHO's annual guideline value, placing Nepal among the eight most polluted countries globally (IQAir, 2024). Pollution shortens average life expectancy by 3.4 years. In ten districts in southern Nepal the impact is even greater, with life expectancy reduced by up to 5.1 years (EPIC, 2024).

Vectorborne diseases

In 2022, Nepal experienced its most significant dengue outbreak to date, with almost 55,000 cases reported across all 77 districts. From June to December 2023, Nepal recorded more than 51,000 dengue cases (IFRC, 2023). This marked the first time dengue cases occurred in consecutive years, breaking the typical two-year cycle observed in previous decades (*ibid.*). Dengue transmission is highly sensitive to rising temperatures, which speed up the development cycle of the *Aedes* mosquito, the primary vector for the disease (Liu *et al.*, 2023). Increasing temperatures in Nepal pose a risk of vectorborne diseases such as dengue becoming endemic in highland areas where they were previously uncommon.

Waterborne diseases

Diarrhoeal diseases (including cholera, gastroenteritis and typhoid) are endemic in Nepal, and are among the top five infectious diseases recorded in hospital admissions (Bhandari, 2015). Incidence has been rising (though associated mortality has been decreasing) with increasing temperatures and rainfall, especially during the rainy summer season (Karki *et al*., 2010; Bhandari, 2015; NMICS, 2019). The effect of climate change on the incidence of diarrhoeal diseases is more pronounced in the mountain and hill regions, which are warming faster than the terai region (NHRC, 2016). Children under the age of five are particularly vulnerable to diarrhoeal diseases during the rainy months of June and July, and especially in the mid-western and far-western regions (Bhandari, 2015).

Mental health

In Nepal's mountainous communities, which rely heavily on farming, climate impacts like droughts can pose a significant challenge to mental health and well-being, leading to increased stress and anxiety as well as disrupted social connections and potential displacement (Dhimal, 2021; Rauniyar, 2024).

4. Recommendations to national and international actors

- **Make locally led action the foundation of addressing climate-sensitive health risks.** It is essential to strengthen the role of community health workers, female community health volunteers and Nepal Red Cross Society volunteers in reaching the most at-risk and vulnerable populations, especially women. By enhancing their capabilities, these local actors will be better equipped to understand health risks related to climate change, identify those most at risk and develop sustainable solutions. This includes supporting initiatives such as community-based surveillance and anticipatory actions, allowing these local actors to manage climate adaptation efforts and safeguard community health over the long term.

- **Scale up climate-smart programming and preventative health activities.** These initiatives need to adopt an early warning, early action approach to preparedness that accounts for multiple hazards, and prioritize risk-informed early action programming. Existing programmes that are climate-smart (especially for climate-sensitive diseases, namely infectious diseases borne by vectors, water, air and food) can systematically integrate medium- and long-term climate information to anticipate, prepare for and reduce health impacts in high-risk areas. This can be achieved by working in close collaboration with national hydrometeorology services and health authorities for projections based on historical weather and health data.

- **Act urgently to address the health consequences of heat and air pollution in urban planning.** A long-term approach to urban planning that focuses on heat mitigation and reducing air pollution is crucial for addressing heat-related health risks. This will provide a strong foundation to deal with immediate and future challenges. The Nepal Red Cross Society and partners can play a pivotal role by promoting the integration of climate-smart adaptations into programmes that target urban populations, ensuring communities are better equipped to face rising temperatures and associated health impacts.

- **Keep the intersectionality of health vulnerabilities at the centre of action.** Women and low-income households, among the most at-risk groups, require sustainable and effective responses to reduce climate-related health risks. By designing, analysing and utilizing high-quality gender equality data – disaggregated by sex, age and other relevant local factors – programmes can be tailored to individual needs, ensuring no one is left behind and creating solutions that are equitable and inclusive for all.

- **Address the burden of climate change on mental health.** Strengthening the development and implementation of mental health and psychosocial support programmes is imperative. By prioritizing this focus, the Nepal Red Cross Society and partners can ensure mental health needs are met, providing the necessary support to help communities cope with the challenges posed by climate change impacts.

- **Ensure dialogue between civil society and government on the Health National Adaptation Plan (HNAP) to highlight community-level perspectives and climate–health linkages.** Community-based data and case studies linking health to climate change contribute to the HNAP process and enhance its implementation at national and subnational levels. Engaging with multiple government agencies can break silos and strengthen adaptation programmes, while community engagement and participation in planning and outcome monitoring will support sustainable, long-term actions.

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