

Three Climate and Health Lessons from Nepal Ahead of COP28

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Perched on the southern slope of the Himalayas, between two massive greenhouse gas-emitting countries—India and China—is Nepal. Nepal is a low-income, landlocked nation in South Asia and one of the nations that are most vulnerable to climate change because of its fragile mountainous ecosystems, climate-sensitive topography, strong reliance on natural resources, and constrained capacity to address climate variations and extreme weather events. It has a population of 30 million people and is divided into three main geographic regions, each with distinct characteristics based on elevation and topography: the Terai Region, Hilly or Hill Region, and Mountain or Himalayan Region. Both the Global Climate Risk Index (for weather-related events like floods and heat waves) and the INFORM risk index (for humanitarian crises and disasters) have placed Nepal on the high-risk list (Asian Disaster Preparedness Center and United Nations Office for Disaster Risk Reduction, 2019).

Climate change, a multifaceted phenomenon driven by surging fossil fuel use, has irreversible impacts on humans, animals, and nature. Those entities are already enduring harm, and in South Asia, climate change is increasingly being acknowledged as a serious pervasive public health issue facing the region (World Bank Group, 2021; Levy and Patz, 2015; Das et al., 2013; Nepal Climate Vulnerability Study Team, 2009). Compared with regions of very low vulnerability, mortality is 15 times higher in highly vulnerable regions because of floods, storms, and droughts (Intergovernmental Panel on Climate Change, 2023). Nepal experiences avalanches and glacial lake outburst floods, while the middle Hilly Region is challenged by landslides and debris flows and the southern Terai is impacted by seasonal flooding associated with monsoons and complex river systems.

A significant number of people have become impoverished because of devastating floods in these areas, which viciously reduce agricultural production and cause food shortages—leading to nutrition-associated diseases. Precipitation increases and flooding also exacerbate income

inequality between countries and within countries. The effect in countries with high agricultural sector reliance such as in South Asia is projected to reinforce and exacerbate existing disparities (Lindersson et al., 2023; Palagi et al., 2022). With ongoing planetary warming, scholars estimate 75 percent of Himalayan glacial ice will be lost by 2100 (International Centre for Integrated Mountain Development, 2023). More than 80 percent of the Nepali population is estimated to be at risk from environmental dangers worsened by the effects of climate change (Asian Disaster Preparedness Center and United Nations Office for Disaster Risk Reduction, 2019). Agricultural and massive development initiatives in neighboring countries further stress climate action strategies.

Despite the country's minimal contribution to emissions globally and its unjust burdens experienced due to the transboundary nature of climate change, Nepal has much to teach other countries about collective climate action. Ground-level observations of numerous communities in Nepal have produced a fundamental framework of identified and anticipated changes in the country that guide adaptation and local implementation efforts to address the climate crisis (Bartlett et al., 2009). Their action, built on community leadership and regional cooperation, offers three simple lessons for other countries striving to create healthier, more just environments where all people can thrive.

Prioritize Global Population Health in the Climate Crisis

Extreme weather events adversely impact sanitation, water quantity and quality, injury risk, communicable disease transmission, exacerbation of noncommunicable diseases, and health outcomes notably related to parent-child health (Neupane et al., 2022; Romanello et al., 2022; Romanello et al., 2023; Ebi et al., 2021; Watts et al., 2019). Disruptions in air and ground transportation and supply chains, as well as health services, frequently amplify morbidity and mortality, especially in rural or underserved areas with al-

ready reduced access (Lindersson et al., 2023; Ebi et al., 2021). Acute and chronic climate-related stressors disproportionately impact the physical and mental health, well-being, and economies among population groups already suffering from structural discrimination. One specific group with barriers to well-being is for women and girls with specific reproductive and nutritional needs, risk of violence, and mental health impacts (Desai and Zhang, 2021). Increased mobility of people globally, with dynamic fluxes in populations, is an additional challenge to national, regional, and international interventions.

In Nepal, individuals from the Dalit community (a socially excluded group), Indigenous populations, and local communities living in environmentally fragile mountain regions are at heightened risk from the repercussions of climate change. They experience a range of climate-related difficulties, including unpredictable rainfall, flooding, extended periods of drought, landslides, and outbreaks of waterborne diseases. These groups are primarily economically and socially disadvantaged and largely rely on marginal lands for their sustenance. Consequently, they are disproportionately affected by extreme weather events amplified by climate change.

According to the 2011 census, the Nepal population comprises 125 caste and ethnic groups, including 63 Indigenous populations, 59 castes (constituting 15 Dalit castes), and three religious groups. Indigenous nationalities (Adivasi Janajati) constitute 36 percent of the total population. Tharu and Chepang are Indigenous, ethnic communities of Nepal that are under-resourced, with reduced access to health care and other fundamental services (Pokharel, 2015; Subba et al., 2014). These factors have inevitably contributed to socioeconomic disparity and associated burdens of infection and disease.

Tharu, an ethnic group native to Terai, makes up 5 percent of the total population of Nepal. Their major source of income is subsistence farming, primarily as landless tenant farmers. Chepang—an Indigenous Tibeto-Burman community residing across the districts of Chitwan, Makwanpur, Dhading, and Gorkha—constitutes 0.23 percent of Nepal's population. The Chepang stand very low on the Human Development Index and are classified under “highly marginalized,” based on economic indicators. Most of them live in sheds made of tree branches, and subsistence agriculture is their main livelihood. A survey revealed that 90 percent of this population lives below the poverty line, earning around \$50 annually (United Nations Resident and Humanitarian Coordinator's Office, 2012). Although no longer a nomadic tribe, the Chepang have largely preserved their unique identity by maintaining Traditional Knowledge systems and continuing to practice animism.

Learn from Past Infectious Disease Outbreaks

Over half of human pathogenic diseases are expected to worsen due to climate change, with vector-borne and waterborne diseases being the greatest proportion (Mora et al., 2022). Academic literature has identified several gaps at the intersection of climate change and infectious diseases, and has articulated building “human capacity in data management, integrated surveillance, and leadership” as essential global responses to address short- and long-term threats (Hess et al., 2020). Poor sanitation and hygiene practices amplify health risks and are strongly associated with the acquisition and transmission of life-threatening but preventable diseases, such as cholera, dengue, diarrheal illnesses, dysentery, gastroenteritis, hepatitis A, typhoid, polio, and tuberculosis—and emerging illnesses such as COVID-19 (Adams et al., 2022; Tome et al., 2022; Mishra et al., 2015).

In Nepal, climate change has caused a surge in the national burden of infectious diseases; notably, dengue in older adults is of great concern (Dhimal et al., 2021; Tuladhar et al., 2019; Rai, 2018). There has been a consistent pattern of dengue epidemics in Nepal, occurring in 2010, 2013, 2016, 2017, 2019, and 2022. The 2022 epidemic was the largest in terms of its severity and spatial distribution, with 54,784 reported cases recorded from all 77 districts in seven provinces.

Dengue outbreaks usually occur every two to three years and align with rainy seasons and mosquito breeding season (Ministry of Health and Population and Department of Health Services Epidemiology and Disease Control Division, 2022). Total reported dengue cases in Nepal were 17,992 in 2019 and 37,131 in 2022. The largest outbreaks occurred in 2019 in the Sunsari District (3,431 cases), followed by the Chitwan District (3,402) in 2019; in 2022, the Sunsari and Chitwan Districts reported 1,291 and 127 cases, respectively, with high-risk areas being densely inhabited with multiple social factors that complicate disease outbreaks, transmission, and testing (Ministry of Health and Population and Department of Health Services Epidemiology and Disease Control Division, 2022).

In slums and peri-urban areas, for example, people are impacted by potentially dangerous environmental exposures, and that threat is combined with poor sanitation and weak infrastructure. Complications of dengue—such as life-threatening hemorrhage, stroke, and encephalopathy/encephalitis—occur (Pandian et al., 2023; Trivedi and Chakravarty, 2022; Simmons et al., 2012). As of November 2, 2023, the Nepal Ministry of Health and Population reported 44,084 confirmed dengue cases and 20 deaths (Government of Nepal Ministry of Health and Population, 2023).

Craft and Urgently Implement Climate and Health Policies Guided by Scientific Evidence

In 2022, the United Nations (UN) General Assembly passed a resolution for “the human right to a clean, healthy and sustainable environment” (United Nations, 2022). Just weeks ahead of the UN Framework Convention on Climate Change 28th session of the Conference of the Parties (COP28), Secretary-General António Guterres visited Nepal to witness the widespread environmental effects from warming firsthand.

There is a need to advance action-oriented research and transformative innovation to reduce the human risks from environmental degradation and climate change, particularly for communities that are most vulnerable—at the scale and urgency required. Importantly, there is also a need to correct the historic global imbalance in climate and health research and strengthen research capacity in resource-constrained settings. The recent World Health Organization’s Research for Action on Climate and Health 2035 agenda and its Alliance for Transformative Action on Climate and Health are much-needed initiatives, along with COP28’s hosting of the first-ever Health Day in Dubai. However, collective efforts centered on health to date have fallen short.

COP28 will be a crucial time for decisionmakers to create and implement actionable priorities based on their values. There will be every opportunity to choose the health and well-being of individuals and populations that suffer the most and to address their needs through multinational solutions that commit to phasing out fossil fuels and building climate resilience.

The government of Nepal developed and initiated a National Adaptation Plan 2021–2050, which prioritizes climate change as a current and growing human rights threat. The plan aligns with Intergovernmental Panel on Climate Change reports, UN Sustainable Development Goals, and the Sendai Framework for Disaster Risk Reduction. A recent Water for the World country plan, created with the government of Nepal—a priority country—and the United States Agency for International Development, outlines water and sanitation priorities and policy opportunities to expand the reach of and leverage information system platforms.

Citizens also have expressed a desire action, with results from a survey of the Tanahun District demonstrating that only 8.9 percent of respondents felt the government was doing enough to address climate change (Mishra et al., 2015).

The climate crisis—a development, public health, and equity opportunity—could transform global development and redefine population health for Nepal and other low-income countries. Many global solutions exist to reduce potential health harms due to climate change. The World Bank Group

has shared examples of energy and facility-level changes, recognizing that health system resilience is community resilience (World Bank Group, 2017). Other salutogenic efforts include expanding nature-based solutions; addressing health costs and climate adaptation; expanding education and risk perception; strengthening health care facilities; increasing collaboration and a movement around specific underserved populations (e.g., people in unsafe housing conditions); expanding global public health climate research; implementation of national policies reflecting partnerships with communities; promoting growth through new energy investments and technologies; early warning systems; and water, sanitation, and hygiene interventions (Mukherjee et al., 2022; Wolf et al., 2022; Bikomeye, et al., 2021; Darjee et al., 2021; Poudyal et al., 2021; Ebi et al., 2020; Inter-agency Task Force on Financing for Development, 2020; Paudel and Pant, 2020; World Health Organization, 2023; Gurung et al., 2021; Government of Nepal, 2018; Cosic et al., 2017; Tanaka, 2009).

During COP28, there will undoubtedly be attention and headlines written on the largest economic players; yet we challenge stakeholders to seek out practical global health and equity solutions from countries, such as Nepal, that have been impacted the most. These countries have been leveraging their local human potential, maximizing the talents and diverse skill sets of community members and available resources during and after the times of greatest need. Such a communal approach—guided by past lessons, science, and love for each other—may be the leadership we need.

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