CLIMATE CHANGE AND HEALTH CONSEQUENCES IN PAKISTAN: IMPLICATIONS OF RISING SUMMER TEMPERATURES AND GLACIAL FLOOD RISKS

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Maham Zahid
PhD Scholar,
Khyber Medical University, Peshawar
: +92-345-
: zahidmaham487@gmail.com

Climate change is increasingly recognized as one of the most significant global threats to human health in the 21st century. While its impacts are global, low- and middle-income countries bear even more adverse effects. Pakistan is among the countries most vulnerable to climate and has witnessed rising temperatures, erratic monsoon patterns, glacial melting in the northern regions, and recurrent flooding phenomena in recent years.[1] These environmental changes pose profound public health challenges, including heat-related illnesses, infectious disease outbreaks, food insecurity, and displacement-related health crises. Pakistan‘s summers are becoming increasingly extreme due to climate change. Projections suggest that the country may experience temperature increases exceeding the global average, potentially exceeding 5°C under high-emission scenarios.[2] This warming trend is already evident through recurrent heatwaves affecting major urban centers such as Karachi, Lahore, and Islamabad. Heatwaves pose serious health risks, particularly for vulnerable populations, including outdoor laborers, the elderly, children, and individuals with chronic diseases. Heat stress can lead to dehydration, heat exhaustion, heatstroke, cardiovascular complications, and increased mortality. In countries like Pakistan, where access to electricity, cooling infrastructure, and healthcare may be limited, these risks are amplified.[3] Beyond direct heat exposure, rising temperatures worsen air pollution and ground-level ozone formation, further exacerbating respiratory illnesses such as asthma and chronic obstructive pulmonary disease. Climate change is also associated with increased cardiovascular and respiratory morbidity, as well as mental health effects due to environmental stress and disaster exposure.[4] The public health implications of hotter summers are therefore multifaceted, affecting not only acute health outcomes but also healthcare systems that may struggle to manage surges in heat-related emergencies.

Pakistan is home to one of the largest concentrations of glaciers outside the polar regions, located within the Hindu Kush, Karakoram, and Himalayan Mountain ranges. Rising temperatures accelerate glacial melt, increasing the formation of unstable glacial lakes that may suddenly burst, causing catastrophic flash floods. Recent extreme heat in northern Pakistan has accelerated glacier melting and triggered destructive floods and landslides, resulting in loss of life, infrastructure damage, and displacement of communities.[5] These glacial lake outburst floods (GLOFs) are becoming more frequent due to climate warming. Combined with intense monsoon rainfall, they significantly increase the risk of flash flooding in downstream regions. Studies suggest that climate change has increased rainfall intensity in Pakistan by approximately 50-75%, further amplifying flood risk.[6] Flood disasters have become a recurring phenomenon in Pakistan. The catastrophic floods of 2022 alone affected approximately 33 million people and caused widespread damage to homes, healthcare facilities, and agricultural land. Such events illustrate the growing intersection between climate change and public health emergencies.[7] Flooding produces a cascade of health consequences extending far beyond immediate injuries and fatalities. Stagnant water and disrupted sanitation systems promote the spread of waterborne diseases such as cholera, diarrhea, and typhoid. Flood conditions also facilitate the proliferation of vector-borne diseases, including malaria and dengue fever, which are already endemic in Pakistan.[8]

In Pakistan, climate change poses a multifaceted threat to public health through extreme heat, glacial melt, and flooding. Accelerated glacial melt in the north and intensified monsoon rains increase flood risks, straining healthcare systems and destabilizing socioeconomic structures. Addressing these health risks demands urgent adaptation strategies: early warning systems, resilient healthcare infrastructure, enhanced disease surveillance, and community awareness programs. Climate-informed urban planning, water management, and environmental conservation are also critical. Rising temperatures escalate heat-related illnesses and deaths, while glacial melt and intense rainfall exacerbate infectious diseases, food insecurity, displacement, and mental health challenges. Integrating climate resilience into national health planning is essential as Pakistan faces increasingly hotter summers. Strengthening healthcare systems, improving disaster preparedness, and investing in climate adaptation are vital for safeguarding population health, making climate action a public health imperative for Pakistan and other vulnerable nations.

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