



Climate Variability and Changing Patterns of Schistosomiasis in Inland Tropical Water Systems

Elias Tsegaye*

Department of Epidemiology, University of Nottingham, Nottingham, United Kingdom

DESCRIPTION

The persistence and expansion of schistosomiasis in inland tropical regions have been closely linked to shifts in local climate conditions and water-use patterns. This parasitic disease, caused by blood flukes of the genus *Schistosoma*, has historically been associated with predictable transmission cycles in areas where human contact with freshwater is common. However, in recent years, changing weather patterns have disrupted those cycles, complicating control efforts and introducing the infection into areas that were previously unaffected.

In regions dependent on rivers, lakes, and irrigation schemes for domestic and agricultural purposes, transmission has traditionally followed seasonal rainfall. In such areas, increased water levels during rainy periods expand the habitat of freshwater snails that serve as intermediate hosts. However, increasingly erratic rainfall, prolonged dry spells, and sudden flooding events are altering snail population dynamics. These environmental changes affect both the density and the spatial distribution of host species, which in turn influences the timing and intensity of human infections.

For example, prolonged droughts may initially reduce water contact and temporarily lower transmission, but as people congregate around fewer water sources, the intensity of exposure increases in those concentrated areas. The buildup of human waste and debris in shrinking water bodies further contaminates the environment, allowing the parasite to remain viable and continue its life cycle despite lower overall water volume. Conversely, unexpected floods can spread infected snails to new locations or flush them into water channels that reach previously unexposed communities.

Human behaviors shaped by environmental stress also contribute to transmission. When agricultural production is disrupted by climate variability, more people turn to fishing, sand collection, and informal irrigation work to support their families. These activities often involve prolonged exposure to contaminated water. In some communities, shared bathing sites,

washing areas, and children's recreational activities in streams are routine practices, increasing daily contact with the water and raising infection risk.

The construction of dams and large-scale irrigation projects has further influenced the ecology of transmission. While intended to support agriculture and generate energy, such infrastructure often leads to slower water flow and the formation of canals and reservoirs conditions that support the breeding of snail hosts. In areas downstream from dams, communities frequently report higher rates of schistosomiasis, particularly among school-aged children. Water resource development projects have not consistently included disease mitigation measures in their design, contributing to the re-emergence or intensification of infections.

Access to health services and diagnostic tools remains limited in many of the affected inland regions. While national deworming campaigns have made strides in reducing infection rates among children, follow-up and treatment of adult cases are frequently neglected. Adults engaged in high-risk occupations often remain untreated and serve as reservoirs of infection. This imbalance hampers progress toward long-term control and increases the chance of reinfection among treated children. Additionally, fluctuations in disease burden due to climatic influences make it difficult to plan interventions based on historical data alone.

CONCLUSION

Community engagement remains a critical part of reducing transmission. Efforts to discourage water contact or promote protective behaviors often meet with limited success unless alternatives are provided. For many households, there are no safe or practical substitutes for bathing, washing, and working in local water sources. In such cases, public health messaging must be accompanied by efforts to improve infrastructure, such as the installation of protected washing stations, the provision of safe water for irrigation, and the development of sanitation facilities that prevent contamination of natural water bodies

Correspondence to: Elias Tsegaye, Department of Parasitology and Tropical Medicine, Blue Highlands University, Bahir Dar, Ethiopia, E-mail: etsegaye@bhu-et.org

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