



Environmental Change and Disease Emergence: Insights from the Gilgel Gibe I Hydroelectric Dam

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Environmental and ecological transformations are increasingly recognized as key drivers of infectious disease emergence and transmission. Hydroelectric dams, while essential for economic development and energy production, can significantly alter local ecosystems, influencing vector habitats, zoonotic interfaces, and disease dynamics. This study examines how the Gilgel Gibe I Hydroelectric Dam contributes to environmental changes that may reshape infectious disease risks among human and animal populations. An exploratory qualitative study was used. Data were collected through observational checklists, key informant interviews, focus group discussions, and secondary data review. The DPSEEA framework was applied to analyze the complex interactions between environmental change, ecosystem disruption, and health outcomes, by focusing on vector ecology and zoonotic disease pathways. The dam provides important socioeconomic benefits, including renewable energy generation, fisheries, and ecotourism. However, it has also driven significant ecological disruption, including land-use change, habitat modification, and increased human–animal–environment interactions. These changes have created favorable conditions for vector proliferation and disease transmission, evidenced by increased malaria incidence and animal diseases such as trypanosomiasis. The absences of buffer zones, weak environmental governance, and limited community engagement have intensified exposure risks. Local perceptions indicate dissatisfaction due to loss of livelihoods and inadequate compensation, further complicating adaptive responses. Hydroelectric development can act as a catalyst for environmentally driven infectious disease emergence by altering ecological and transmission dynamics. Strengthening integrated surveillance, cross-sectoral collaboration, and ecosystem-based management is critical to mitigate health risks and support sustainable development within a One Health framework.

