NIJAMSS Page: 20-26

NEXUS INTERNATIONAL JOURNAL OF APPLIED SCIENCE, MEDICAL AND SOCIAL SCIENCES

Critical Review
Volume: 01
Issue : 01

Open Access | www.nijamss.org | Vol. 1, Issue 1, May 2026 | Paper No. 004

BEYOND DISEASE CONTROL: AN INTEGRATED HEALTH-EQUITY FRAMEWORK FOR PSYCHOLOGICAL, PHYSICAL AND SOCIAL RISKS IN KENYA'S URBAN INFORMAL SETTLEMENTS

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Thematic Area: Urban Health, Environmental Health and Social Equity | Manuscript Type: Critical Narrative Review

Article Received: 3rd May 2026, Published on: 31st May 2026

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ABSTRACT

Urban informal settlements concentrate health risks that are commonly studied in isolation even though residents experience them simultaneously. This critical narrative review examines the interaction of psychological, physical and social risks in Kenya's urban informal settlements and develops an applied framework for integrated health-equity action. Evidence was synthesised from peer-reviewed scholarship, World Health Organization guidance, UN-Habitat reports, Kenyan policy documents and development-programme materials. Current global estimates indicate that approximately 1.16 billion people live in slums or informal settlements, while recent urban-health guidance identifies inadequate housing, water and sanitation, unsafe mobility, air pollution, violence, food insecurity and weak access to services as interacting determinants of illness. In Kenya, overcrowding, insecure tenure, flooding, waste accumulation, unstable livelihoods, gender-based violence and limited financial protection shape a syndemic pattern in which mental distress, communicable diseases, injuries, malnutrition and non-communicable diseases reinforce one another. The review finds that fragmented disease-specific responses are poorly matched to this multidimensional risk environment. Effective action requires settlement upgrading, resilient water and sanitation systems, integrated primary and mental health care, financial protection, violence prevention, climate adaptation, social protection, secure tenure and meaningful community participation. The paper proposes a four-layer Urban Informal Settlement Health-Equity Framework linking household vulnerability, neighbourhood exposures, service-system capacity and structural governance. It concludes that health improvement depends not only on delivering clinical services but also on changing the social, environmental and institutional conditions that generate unequal exposure and unequal recovery.

KEYWORDS: Urban informal settlements; health equity; mental health; environmental health; social determinants; primary health care; Kenya.

I. INTRODUCTION

Urbanisation can improve access to employment, education, services and social networks, but its health benefits are distributed unevenly. Informal settlements emerge where housing markets, land administration, infrastructure investment and social protection fail to meet the needs of rapidly growing urban populations. UN-Habitat's latest estimates indicate that approximately 1.16 billion people, about one quarter of the global urban population, live in slums or informal settlements. These communities are not inherently unhealthy; rather, health risks arise from avoidable conditions such as overcrowded housing, unsafe water, inadequate sanitation, insecure tenure, environmental pollution, violence and exclusion from public investment.

WHO's 2025 urban-health guidance emphasises that urban health is shaped by decisions across housing, transport, food systems, environmental management, emergency preparedness and social policy. Health services alone cannot offset repeated exposure to contaminated water, flood hazards, air pollution, food insecurity and unsafe work. The 2025 World Report on Social Determinants of Health Equity similarly confirms that health inequities are driven strongly by access to power, money, resources and the conditions in which people are born, grow, live and work.

Kenya's urban informal settlements demonstrate these interacting pressures. Nairobi settlements such as Kibera, Mathare and Mukuru include dense residential areas with highly variable access to drainage, sanitation, waste collection, safe energy, transport and formal health care. Residents also possess important strengths, including social networks, community organisations, informal economies and local knowledge. A rigorous health-equity analysis

must therefore avoid portraying communities only through deficit and instead identify both structural risks and community capabilities.

A. Problem Statement

Public-health interventions in informal settlements often target individual diseases or immediate emergencies without addressing the environmental and social systems that repeatedly generate illness. Waterborne disease control may proceed without drainage improvement; mental-health services may be offered without violence prevention or income protection; and clinical outreach may expand while unaffordable care, insecure tenure and hazardous housing remain unchanged.

The central problem is the absence of sufficiently integrated policy and implementation frameworks linking psychological distress, physical exposures, social disadvantage and institutional exclusion. These risks interact rather than accumulate independently. Flooding can contaminate water, destroy income, interrupt treatment, displace households and increase anxiety at the same time. Similarly, violence can produce injury, trauma, lost earnings, school interruption and avoidance of public spaces or health facilities. Fragmented responses therefore underestimate the compounded nature of vulnerability.

B. Aim, Objectives and Research Questions

The aim of this review is to critically examine the interconnected psychological, physical and social risks affecting residents of Kenya's urban informal settlements and to develop practical recommendations for integrated, equity-centred action.

i. Analyse psychological risks, including chronic stress, anxiety, depression, trauma, substance-related harm and the effects of violence and insecurity.

ii. Examine physical and environmental risks associated with housing, water, sanitation, waste, air pollution, flooding, occupational hazards, communicable disease and non-communicable disease.

iii. Evaluate social and structural determinants, including poverty, insecure work, food insecurity, gender inequality, disability, exclusion from services and insecure tenure.

iv. Explain how risks interact to create compounded and intergenerational vulnerability.

v. Propose an applied multi-sectoral framework for prevention, primary health care, settlement upgrading, climate resilience and community accountability.

The review asks: How do psychological, physical and social risks interact in Kenyan informal settlements; which institutional gaps sustain these risks; and which combined interventions are most likely to improve health equity?

II. MATERIALS, METHODS AND TECHNICAL PROCEDURES

A. Review Design

A critical narrative review was undertaken to integrate evidence from urban health, environmental health, mental health, social epidemiology, housing, climate resilience and health policy. This design was selected because the research problem concerns interacting systems and policy mechanisms rather than a single intervention effect.

B. Evidence Sources and Selection

Sources included peer-reviewed literature and official documents from WHO, UN-Habitat, the World Bank, the Government of Kenya and related institutions. Priority was given to recent 2024-2026 materials on urban health, social determinants, climate risk, housing and informal-settlement upgrading, while foundational studies were retained where they clarified long-standing mechanisms. Documents were included when they addressed health risks, service access, social determinants, community participation, environmental exposure or policy responses relevant to urban informal settlements.

C. Analytical Framework

Evidence was coded under four interacting layers: household vulnerability; neighborhood and environmental exposure; health and social-service capacity; and structural governance. Outcomes were organized into psychological health, communicable disease, non-communicable disease, injury, nutrition and access to care. Interventions were assessed for preventive reach, equity, community participation, implementation feasibility and potential to reduce repeated exposure.

D. Quality Assurance and Limitations

Official sources were used for current global and policy estimates, while peer-reviewed studies were used to interpret mechanisms and lived experience. Triangulation reduced reliance on isolated statistics. However, informal-settlement population estimates vary because boundaries, definitions and enumeration methods differ. Evidence from

one settlement should not automatically be generalised to all settlements, and the review does not produce new prevalence estimates.

III. RESULTS AND TECHNICAL FINDINGS

A. Psychological and Psychosocial Risks

Psychological distress in informal settlements is shaped by chronic and repeated stressors rather than by a single exposure. Income insecurity, overcrowding, eviction risk, violence, hazardous work, bereavement, food insecurity and uncertainty about basic services create sustained stress. Depression, anxiety and trauma-related symptoms may be worsened by stigma, limited specialist services and the cost of care.

Mental health and social conditions are bidirectional. Distress can reduce employment participation, adherence to treatment, caregiving capacity and social engagement, while poverty and violence increase psychological risk. Women, adolescents, people with disabilities, migrants and survivors of violence may face additional barriers. Effective mental-health action therefore requires integration with primary care, violence response, social protection, schools, youth services and community organizations.

B. Physical and Environmental Risks

Poor-quality housing and infrastructure affect health through multiple pathways. Crowding increases the opportunity for transmission of respiratory and other infectious diseases. Unsafe water and inadequate sanitation increase exposure to diarrhea and enteric infections. Blocked drainage and unmanaged waste create flood, injury and vector risks. Indoor and outdoor air pollution contributes to respiratory and cardiovascular disease, while unsafe electrical connections, fires and structurally weak buildings create injury hazards.

Climate change magnifies these exposures. UN-Habitat's World Cities Report 2024 identifies informal settlements as among the urban areas most exposed to climate impacts. Floods can combine sanitation failure, displacement, livelihood loss, school interruption and health-service disruption. Heat exposure is intensified by dense built environments, limited shade and poor-quality materials. Kenya's 2026 Climate Change and Health Strategy further recognizes the increasing frequency and duration of extreme weather events and the need for climate-resilient health systems.

C. Social and Structural Determinants

Social determinants determine who is exposed, who can obtain care and who can recover. Informal employment often provides limited income security, occupational protection or paid sick leave. Food prices and unstable earnings affect dietary quality and treatment adherence. Insecure tenure discourages household investment and can exclude residents from infrastructure programmes. Women and girls may face unpaid care burdens, unsafe sanitation facilities and gender-based violence, while persons with disabilities may encounter inaccessible housing, transport and health services.

Participation is a health determinant because residents who are excluded from planning have limited influence over infrastructure location, service standards and risk-reduction priorities. WHO's 2024 policy work on partnerships and participation notes that meaningful participation is especially important in informal settlements, where residents are frequently excluded from decisions that shape their health.

D. The Syndemic Interaction of Risks

The evidence supports a syndemic interpretation: social disadvantage and environmental exposure intensify multiple health problems that then reinforce one another. For example, a household affected by flooding may lose income, experience contaminated water, face temporary displacement and develop psychological distress. Illness then produces additional treatment costs and lost work, increasing debt and food insecurity. This feedback cycle explains why isolated clinical interventions often achieve limited or temporary impact.

Table 1. Interacting risks and likely health pathways in urban informal settlements

Risk domain	Illustrative exposure	Immediate effect	Longer-term pathway	Equity concern
Psychological	Violence, insecurity, eviction threat and chronic financial stress	Fear, sleep disturbance, anxiety and trauma symptoms	Reduced functioning, harmful coping and poor treatment adherence	Women, youth and violence survivors may face greater exposure and barriers
Housing and WASH	Crowding, contaminated water, inadequate toilets and drainage	Infection, injury and loss of privacy or safety	Recurrent disease, missed work or school and household expenditure	Tenants and the poorest households have least control over conditions
Climate and environment	Flooding, heat, air pollution and unmanaged waste	Displacement, respiratory symptoms, injury and service interruption	Asset loss, repeated exposure and chronic disease	Hazard-prone land is often occupied by residents with fewer alternatives

Risk domain	Illustrative exposure	Immediate effect	Longer-term pathway	Equity concern
Livelihoods and food	Informal employment, unstable earnings and food-price shocks	Food insecurity and delayed care	Malnutrition, debt and chronic stress	Women-headed and disability-affected households may have lower buffers
Service access	Distance, cost, stigma, poor quality and weak referral	Delayed diagnosis and interrupted treatment	Preventable complications and distrust	Undocumented, migrant and marginalised groups may be excluded

E. Health-System and Governance Gaps

i. Fragmented mandates across health, housing, water, sanitation, environment, transport and social protection agencies.

ii. Insufficient settlement-level data and the risk that city averages conceal severe local inequality.

iii. Uneven primary-care readiness, referral capacity, medicine availability and mental-health integration.

iv. High direct and indirect costs of care, including transport, lost work and diagnostic expenses.

v. Limited continuity between emergency response and long-term upgrading or prevention.

vi. Participation processes that consult residents without giving them influence over budgets, design or monitoring.

vii. Climate adaptation plans that do not always reach the most exposed neighbourhoods.

F. Current Policy and Programme Opportunities

Kenya has important policy opportunities through primary health care reforms, community health systems, universal health coverage, urban upgrading and climate-health planning. The Second Kenya Informal Settlements Improvement Project aims to expand basic services, tenure security and institutional capacity in participating settlements. Community-led climate adaptation in Mukuru and other settlements demonstrates how residents can generate local risk data, prioritise infrastructure and support implementation.

The policy challenge is to connect these initiatives. Settlement upgrading should include health-impact assessment, mental-health and violence-prevention considerations, disability access, climate resilience, livelihood protection and monitoring of distributional equity.

IV. DISCUSSION AND APPLIED IMPLICATIONS

A. Why Fragmented Interventions Underperform

Disease-specific programmes are necessary but insufficient where the same household is repeatedly exposed to unsafe housing, poverty, violence, environmental hazards and unaffordable care. Clinical treatment may restore health temporarily, but preventable exposure produces recurrent illness. Similarly, infrastructure projects can fail to improve health if services remain unaffordable, unsafe for women, inaccessible to persons with disabilities or poorly maintained.

Integrated action does not require a single institution to perform every task. It requires shared objectives, interoperable data, joint planning, clear accountability and financing that follows settlement-level priorities.

B. The Urban Informal Settlement Health-Equity Framework

The proposed framework has four layers. The household layer addresses financial security, nutrition, safety, mental health and care access. The neighbourhood layer addresses housing, water, sanitation, drainage, waste, air quality, transport, public space and climate hazards. The service-system layer addresses primary care, community health, referral, surveillance, social services and emergency preparedness. The structural-governance layer addresses tenure, urban planning, participation, financing, regulation and accountability.

Table 2. Urban Informal Settlement Health-Equity Framework

Framework layer	Priority risks	Core interventions	Lead sectors	Suggested indicators
Household	Food insecurity, financial stress, violence and delayed care	Social protection, financial protection, survivor support and household outreach	Health, social protection, labour and community organisations	Catastrophic spending, food insecurity, care delay and violence-response access
Neighbourhood	Unsafe water, sanitation, housing, waste, flooding and pollution	In-situ upgrading, drainage, WASH, waste systems, safe energy and public space	County government, utilities, housing, environment and residents	Service reliability, flood exposure, waste collection and housing safety

Framework layer	Priority risks	Core interventions	Lead sectors	Suggested indicators
Service system	Limited PHC, weak mental-health care, fragmented referral and poor surveillance	Integrated PHC, community health, mental-health task sharing and digital referral	Health ministry, counties, facilities and community health units	Service readiness, continuity, referral completion and treatment coverage
Structural governance	Insecure tenure, exclusion, fragmented mandates and weak accountability	Tenure protection, participatory planning, joint budgets and public monitoring	National and county government, civil society and development partners	Resident representation, budget execution, grievance resolution and equity audits

C. Primary Health Care and Mental Health Integration

Primary health care should provide an accessible platform for integrated prevention, screening, treatment and referral. Community health promoters can support household risk identification, continuity of care, health education and referral, but they require supervision, supplies, fair remuneration and functional receiving facilities.

Mental-health integration should include brief screening, psychological first aid, evidence-based counselling, referral for severe conditions and strong safeguarding pathways for violence. Task sharing can improve access, but it must not become a substitute for investment in specialist support and emergency services.

D. Settlement Upgrading as a Public-Health Intervention

Upgrading water, sanitation, drainage, roads, lighting, waste systems and housing safety can reduce exposure across several diseases simultaneously. WHO's RISE case study demonstrates the value of water-sensitive, in-situ approaches that combine environmental improvement with health, equity and climate resilience. Upgrading should minimise involuntary displacement and protect livelihoods, rental affordability and social networks.

E. Data, Monitoring and Community Accountability

Routine health information systems should be combined with settlement-level environmental, social and service data. Participatory mapping and community-led monitoring can identify unregistered service gaps and hazard hotspots. Indicators should be disaggregated by settlement, sex, age, disability and socioeconomic vulnerability, while privacy protections are maintained.

Table 3. Priority policy actions for Kenya

Priority action	Immediate step	Medium-term system reform	Expected health-equity gain
Integrate PHC and mental health	Introduce screening, counselling and referral in community and primary-care services	Finance multidisciplinary teams and specialist backup	Earlier care, reduced stigma and improved continuity
Accelerate health-sensitive upgrading	Prioritise drainage, WASH, waste, lighting and access routes in high-risk zones	Embed health-impact and climate-resilience standards in upgrading	Reduced infectious disease, injury and climate exposure
Improve financial protection	Identify vulnerable households and reduce point-of-care barriers	Align UHC purchasing with informal-settlement access and quality	Less delayed care and catastrophic expenditure
Prevent violence and improve safety	Strengthen survivor-centred referral, lighting and safe sanitation	Coordinate health, justice, education and social protection systems	Reduced injury, trauma and gender inequity
Strengthen livelihood and food security	Link vulnerable households to social protection and nutrition support	Promote secure work, childcare and resilient local food systems	Lower stress, malnutrition and harmful coping
Institutionalise community participation	Use resident committees and participatory mapping for project design	Give communities formal roles in budgets, monitoring and grievance systems	Greater trust, relevance and accountability
Build settlement-level data systems	Combine health, environmental and social-risk dashboards	Create interoperable county data and equity review mechanisms	Earlier detection and better targeted investment

F. Limitations and Future Research

Available evidence is uneven across settlements and often based on cross-sectional studies, making causal interpretation difficult. Population denominators and settlement boundaries are uncertain, while residents facing the greatest exclusion may be underrepresented in surveys. Future studies should use longitudinal, participatory and mixed-methods designs; evaluate combined upgrading and health interventions; and examine differential outcomes by gender, disability, age, migration and tenure status.

V. CONCLUSION AND RECOMMENDATIONS

Health risks in Kenya's urban informal settlements are produced by the interaction of psychological distress, physical exposure, social disadvantage and institutional exclusion. Residents face a double injustice: greater exposure to hazards and fewer resources for prevention, treatment and recovery. These risks cannot be addressed sustainably through isolated disease programmes.

The most effective pathway is an integrated health-equity approach combining resilient settlement upgrading, strong primary and mental health care, financial and social protection, violence prevention, climate adaptation, secure tenure, community participation and accountable urban governance. Clinical care remains essential, but long-term improvement depends on changing the conditions that repeatedly create illness.

Recommendations

i. Adopt settlement-level health-equity plans jointly owned by county health, housing, water, sanitation, environment and social-protection departments.

ii. Prioritise in-situ upgrading of drainage, water, sanitation, waste, lighting, safe access routes and climate-resilient housing while preventing harmful displacement.

iii. Integrate mental-health screening, counselling, violence response and referral into primary health care and community health services.

iv. Expand financial protection and design UHC purchasing arrangements that address the direct and indirect costs faced by informal-settlement residents.

v. Strengthen food security, livelihood protection, childcare and social-protection linkages for highly vulnerable households.

vi. Give residents formal roles in risk mapping, priority setting, budget monitoring, implementation oversight and grievance resolution.

vii. Develop interoperable settlement-level health, social and environmental dashboards and publish equity-focused performance reviews.

viii. Require health-impact, gender, disability and climate-resilience assessments for major urban infrastructure and upgrading projects.

ix. Invest in longitudinal research that evaluates combined structural and health interventions rather than isolated programme outputs.

VI. DECLARATIONS

Ethics Approval and Consent to Participate

This article is based on published literature and publicly available policy documents and did not involve direct participation by human subjects.

Funding

The author received no specific grant from any public, commercial or not-for-profit funding agency for this study.

Conflict of Interest

The author declares no conflict of interest.

Data Availability

All evidence used in this review is available from the cited publications and institutional documents.

Author Contribution

Dr. Daniel A. Otwori conceptualised the paper, conducted the evidence synthesis, developed the applied framework and prepared the manuscript.

AI and Digital Tool Disclosure

Digital tools were used for language refinement, document formatting and reference organisation. The author reviewed the manuscript and accepts responsibility for its accuracy, interpretation and originality.

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