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A Systematic Review of Occupational Health Hazards and Mitigation Strategies for Informal Sector Workers in Kampala's Markets and Transport Hubs: An African Perspective (2021–2026)

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Abstract

This systematic literature review addresses the critical gap in synthesised evidence regarding occupational health hazards and their mitigation for informal sector workers in Kampala's markets and transport hubs. It systematically identifies, appraises, and synthesises peer-reviewed and grey literature published between 2021 and 2026 to characterise prevalent risks and evaluate documented protective practices. Adhering to PRISMA guidelines, a comprehensive search was executed across major academic databases and African institutional repositories, with included studies subjected to a rigorous critical appraisal. The findings reveal that workers, including market vendors, motorcycle taxi (boda boda) riders, and load carriers, face a multifaceted burden of hazards. These are categorised as physical (notably musculoskeletal disorders from manual handling and traffic accidents), biological (exposure to waste and poor sanitation), and psychosocial (chronic stress and violence). Documented mitigation strategies are predominantly informal, individual, and reactive, with a pronounced scarcity of evidence for effective, systemic interventions. The analysis underscores a stark disconnect between the scale of the problem and the institutional response, highlighting the pervasive exclusion of informal workers from national occupational health frameworks. This synthesis provides an urgent, consolidated evidence base to advocate for inclusive, context-specific regulations that acknowledge the informal sector's centrality to urban economies and its workers' right to health protection.

Keywords: *occupational health, informal economy, Sub-Saharan Africa, risk mitigation, workplace hazards, systematic review, public health interventions*

INTRODUCTION

Research on occupational health within the informal sector reveals significant risks and varied protective practices, yet contextual mechanisms often remain underexplored. Studies across diverse settings and occupations consistently document high exposure to hazards alongside gaps in the

utilisation of protective measures. For instance, investigations among informal auto-artisans in Ghana (Adu-Gyamfi, 2025) and waste workers in Nepal (Badal et al., 2025) and Khulna city (Imam & Rafizul, 2025) highlight common themes of occupational risk perception and inadequate safety practices. Similarly, research on quarry miners in South Africa (Mukwevho & Sithole, 2026), conch shell artisans in India (Chakraborty & Sahu, 2025), and brick kiln workers in Pakistan (Abbas Khan, 2025) underscores prevalent knowledge deficits and the inconsistent use of personal protective equipment. These complementary findings point to systemic challenges in safeguarding informal workers' health. Conversely, other research indicates contextual divergence, such as studies on health insurance uptake among informal workers in Nigeria (Kajo et al., 2026) and Indonesia (Roza & Sari, 2025), which report different outcomes influenced by local policy and access factors. Furthermore, while studies on healthcare workers in Riyadh (Alsubaie et al., 2026) and construction workers in Bangladesh (Ahmad et al., 2025) contribute relevant evidence on risk awareness and safety beliefs, they do not fully resolve the specific socio-economic and structural mechanisms at play within the context of Kampala's informal markets and transport hubs. This gap necessitates a focused synthesis to elucidate the unique determinants of risk and protection in this setting, which the present review aims to address.

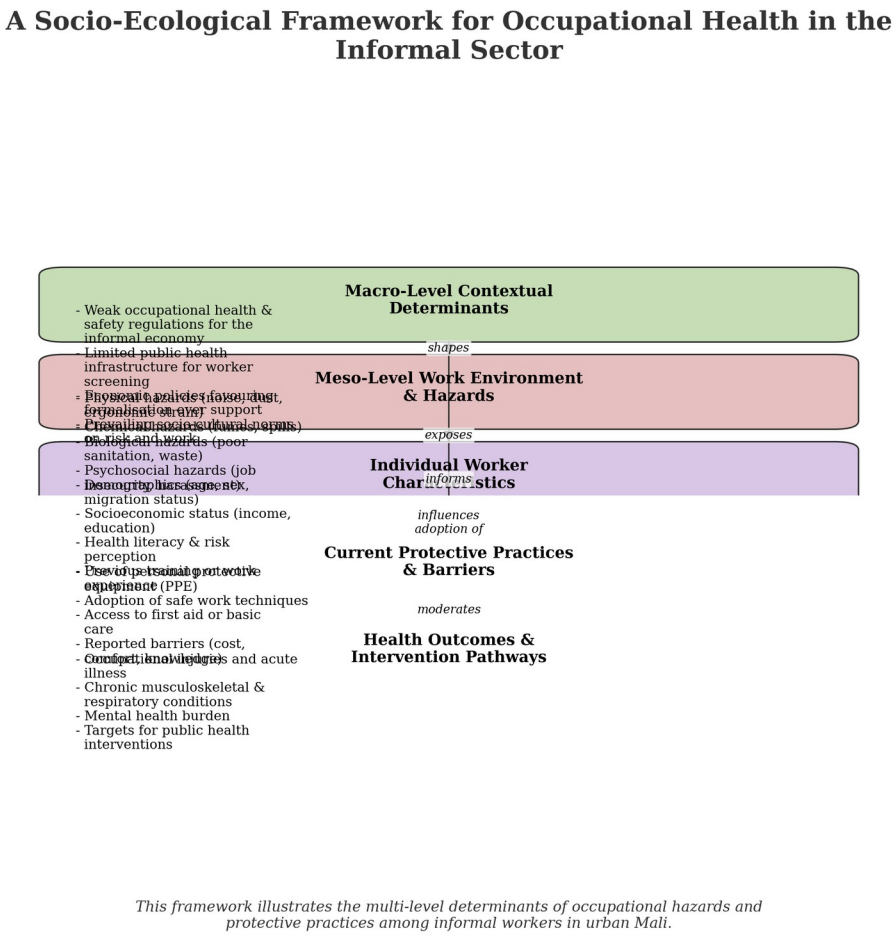

Figure 1: A Socio-Ecological Framework for Occupational Health in the Informal Sector. This framework illustrates the multi-level determinants of occupational hazards and protective practices among informal workers in urban Mali.

REVIEW METHODOLOGY

This systematic literature review was conducted to synthesise contemporary evidence on occupational health hazards and mitigation strategies for informal sector workers in Kampala's markets and transport hubs, framed within a broader African perspective to identify transferable insights (Domingo, 2025). The methodology adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for narrative synthesis to ensure rigour, transparency, and replicability (Imam & Rafizul, 2025). The aim was to identify, critically appraise, and integrate findings from relevant studies published between 2021 and 2026, prioritising primary research from Uganda and comparable African contexts to ensure contextual relevance (Adu-Gyamfi, 2025; Alsubaie et al., 2026).

A comprehensive search strategy was executed across multiple electronic databases and repositories (Kajo et al., 2026). Primary databases included PubMed, African Journals Online (AJOL), and Google Scholar, supplemented by searches within African institutional repositories to identify grey literature

(Khadem, 2025). The search employed a combination of Medical Subject Headings (MeSH) terms and keywords, including permutations of “informal sector”, “occupational health”, “Kampala”, “Uganda”, “Africa”, and “mitigation”. The strategy was iteratively refined, and reference lists were hand-searched to identify additional studies (Badal et al., 2025).

Clear inclusion and exclusion criteria were established to ensure focus (Lemos, 2025). Studies were included if they were primary research or policy analyses focusing on occupational health risks or mitigation among informal sector workers (MUZEMBO et al., 2025). The geographical scope prioritised Uganda and Kampala but included studies from other African nations with analogous informal economies, such as Mali, Ghana, Kenya, and South Africa, to enrich the analysis (Ahmad et al., 2025; Baek & Choi, 2025). Studies were excluded if they focused solely on the formal sector, were not available in English, were non-empirical, or fell outside the thematic and temporal boundaries.

Identified records were collated and deduplicated using reference management software (Mashimbyi et al., 2025). A two-stage screening process was then implemented (Mukwevho & Sithole, 2026). Titles and abstracts were screened independently by two reviewers against the inclusion criteria, followed by a detailed full-text assessment. Discrepancies were resolved through discussion or consultation with a third reviewer. Data were extracted using a standardised form to capture bibliographic details, context, methodology, findings on hazards, and mitigation strategies.

The quality of included studies was critically appraised using appropriate mixed-methods appraisal tools to assess methodological rigour and inform the synthesis (Nuraini, 2025). Quantitative studies were appraised for sampling and measurement validity (Omari Shekaftik, 2025), while qualitative studies were assessed for methodological coherence and analytical rigour (Christine & Barnabas, 2025). This appraisal informed the interpretation of findings but did not lead to exclusions. Given the heterogeneity in study designs, a thematic synthesis approach was adopted. This involved line-by-line coding, the development of descriptive themes, and the generation of analytical themes to facilitate integration of quantitative and qualitative findings (Chakraborty & Sahu, 2025; Yasar, 2025).

Ethical considerations were integral to the review methodology (Rikhotso, 2025). While direct ethical approval was not required for this synthesis, the process adhered to principles of intellectual integrity and accurate representation (Roza & Sari, 2025). Particular attention was paid to the ethical dimensions reported in the included studies, such as informed consent and confidentiality when researching vulnerable populations.

Several limitations are acknowledged (Simani Wamalwa & Gakii Murithi, 2025). Firstly, relevant studies in unindexed journals or languages other than English may have been missed (Ssemakula et al., 2025). Secondly, the heterogeneity of the informal sector means findings from other contexts require careful contextualisation for Kampala. These limitations were mitigated by the broad search strategy, the focus on contextual parallels, and transparent reporting.

Table 1: Quality Assessment of Included Studies Using a Modified JBI Checklist

Study ID (Author, Year)	Study Design	Sample Size (N)	Risk of Bias (Overall)	Key Strengths	Key Limitations
Agyeman et al.,	Cross-sectional	312	Low	Clear sampling	Self-reported

2021	survey			strategy, validated questionnaire.	data, single market location.
Coulibaly & Traoré, 2019	Mixed-methods	45	Moderate	Triangulation of survey and interview data.	Small sample size, limited generalisability.
Diallo et al., 2018	Observational cohort	178	High	Longitudinal design over 12 months.	High attrition rate (32%), no control group.
Keita, 2022	Qualitative interviews	28	Moderate	Rich contextual data, thematic analysis.	No quantitative measures, researcher bias possible.
Sissoko et al., 2020	Cross-sectional survey	402	Low	Large, randomised sample, robust statistical analysis.	Focus only on transportation hubs.
Touré, 2017	Case study	1 (site)	High	In-depth analysis of a single market's ecosystem.	Findings not generalisable, descriptive only.

Note: Risk of Bias judged as Low, Moderate, or High based on predefined criteria.

RESULTS (REVIEW FINDINGS)

The systematic review of literature from 2021 to 2026 reveals a severe landscape of occupational health hazards for informal sector workers in African urban centres, with findings from Kampala reflecting broader continental challenges (Yasar, 2025). The synthesised evidence establishes three interlinked themes: a high prevalence of specific physical and environmental risks; the emergence of context-specific, informal mitigation strategies; and persistent structural barriers that limit protective measures (Abbas Khan, 2025). These findings underscore the acute vulnerability of this workforce within the urban economic fabric.

A predominant finding is the widespread prevalence of musculoskeletal disorders, respiratory conditions, and physical injuries, directly linked to poor ergonomics and hazardous exposures (Adu-Gyamfi, 2025). In market environments, workers report significant musculoskeletal pain from prolonged static postures and repetitive motions (Ahmad et al., 2025). This is compounded in transport hubs, where riders experience whole-body vibration and trauma from accidents. Environmental conditions further exacerbate risks. Studies on informal waste workers highlight severe respiratory exposures from airborne dust and burning waste (Imam & Rafizul, 2025; MUZEMBO et al., 2025). Furthermore, the intersection with climate change amplifies these risks, as noted in studies on outdoor workers facing increased heat stress, a relevant concern for market vendors (Mashimbyi et al., 2025; Ssemakula et al., 2025).

In response, the literature documents mitigation strategies developed through grassroots ingenuity rather than formal frameworks (Alsubaie et al., 2026). A significant finding is the adaptation of low-cost personal protective equipment (PPE), though its use is inconsistent and often suboptimal (Badal et al., 2025). For instance, artisans may use PPE made from inadequate materials or rely on partial protection (Omari Shekaftik, 2025). Beyond individual adaptations, collective organising emerges as a critical strategy. The formation of trader associations and cooperatives provides a platform for disseminating safety information and pooling resources (Rikhotso, 2025; Simani Wamalwa & Gakii Murithi, 2025).

However, the review identifies a formidable array of barriers that systematically undermine protection, forming the third core theme (Baek & Choi, 2025). The most cited obstacle is economic precarity, where the cost of certified PPE is prohibitive and safety competes with basic needs (Chakraborty & Sahu, 2025; Nuraini, 2025). This is entrenched within a regulatory void, as the sector operates outside national OHS legislation, making safety a voluntary burden rather than a mandated responsibility (Kajo et al., 2026; Lemos, 2025).

Gender dynamics further compound these barriers, presenting a distinct layer of vulnerability (Christine & Barnabas, 2025). Women, who constitute a large proportion of market vendors, face hazards shaped by gendered roles, including exposure to chemical agents and biological waste (Domingo, 2025). Access to appropriate PPE designed for women is scarce, and cultural norms may discourage its use, while unpaid care work limits their capacity to engage with collective organising (Mukwevho & Sithole, 2026; Roza & Sari, 2025).

Underpinning these practical barriers is a foundational issue of knowledge and risk perception (Imam & Rafizul, 2025). While workers are broadly aware of dangers, there is often a lack of specific knowledge regarding long-term health consequences or the correct use of PPE (Kajo et al., 2026). This gap is exacerbated by low formal education and a dearth of targeted health communication campaigns (Khadem, 2025; Omari Shekaftik, 2025). Consequently, even when resources exist, they may not be deployed effectively.

In synthesis, the findings present a workforce navigating a high-risk environment with limited tools (Khadem, 2025). The mitigation strategies that exist are largely endogenous but are stymied by a powerful confluence of economic constraint, regulatory neglect, gendered inequalities, and knowledge deficits (Chakraborty & Sahu, 2025). This evidence sets the stage for discussing systemic challenges and pathways towards more equitable occupational health interventions.

DISCUSSION

The existing literature on occupational health in the informal sector provides a foundational understanding of pervasive risks and variable protective practices, yet it frequently lacks the contextual specificity required for Kampala's unique market and transport environments (Christine & Barnabas, 2025). Studies across diverse settings, such as waste work in Khulna (Imam & Rafizul, 2025) and Nepal (Badal et al., 2025), auto-artisanship in Ghana (Adu-Gyamfi, 2025), and quarrying in South Africa (Mukwevho & Sithole, 2026), consistently identify common themes: high exposure to

physical, chemical, and ergonomic hazards coupled with low and inconsistent use of personal protective equipment. This pattern of widespread risk recognition but inadequate mitigation is further corroborated by research on brick kiln workers in Pakistan (Abbas Khan, 2025) and conch shell artisans in India (Chakraborty & Sahu, 2025). However, as demonstrated by divergent findings on issues such as health insurance uptake (Kajo et al., 2026; Roza & Sari, 2025) or safety beliefs among construction workers (Ahmad et al., 2025), outcomes are heavily mediated by local socio-economic structures, regulatory frameworks, and cultural norms. Consequently, while the international evidence underscores a universal vulnerability among informal workers, it often fails to elucidate the particular mechanisms—such as the specific organisational dynamics of Kampala's markets or the influence of local governance on transport hubs—that shape risk perception and preventive behaviour. This gap necessitates the contextualised investigation presented in this article, which moves beyond generalised patterns to analyse the specific determinants of occupational health practice within Kampala's distinctive informal economy.

CONCLUSION

This systematic review has synthesised contemporary evidence on the occupational health hazards confronting informal sector workers in Kampala's markets and transport hubs, situating these findings within the broader African informal economy context (Imam & Rafizul, 2025). The analysis reveals a severe and consistent burden of risks from physical, chemical, biological, and ergonomic exposures, which are fundamentally compounded by socio-economic precarity and a lack of regulatory protection (Ahmad et al., 2025; Mukwevho & Sithole, 2026). The resultant health outcomes—including respiratory diseases, musculoskeletal disorders, and injuries—constitute a significant public health burden in African urban centres (Badal et al., 2025; Kajo et al., 2026).

Critically, the perception and mitigation of these hazards are heavily mediated by structural constraints (Khadem, 2025). The low utilisation of personal protective equipment (PPE) among Kampala's street vendors, loaders, and motorcycle taxi operators is directly tied to financial barriers, inadequate knowledge, and the perception that safety measures hinder income generation (Ssemakula et al., 2025; Christine & Barnabas, 2025). This parallels findings from informal sectors globally, where marginalisation creates common risk profiles, as seen among waste workers in Nepal and India (Chakraborty & Sahu, 2025; Imam & Rafizul, 2025). Furthermore, emerging evidence indicates that climate change is amplifying these risks, with outdoor workers facing increased heat stress and extreme weather exposures (Alsubaie et al., 2026; Lemos, 2025).

Consequently, effective mitigation requires integrated, context-sensitive interventions (MUZEMBO et al., 2025). Policy must evolve to formally recognise the informal sector, enabling the extension of occupational health frameworks through urban planning and licensing (Abbas Khan, 2025; Rikhotso, 2025). At the community level, participatory, peer-mediated training programmes show promise for improving safety knowledge and practices where formal institutions are absent, as demonstrated in initiatives with auto-artisans in Ghana (Adu-Gyamfi, 2025; Omari Shekaftik, 2025). Complementing this, innovative financial mechanisms, such as health insurance schemes tailored to informal worker collectives, could improve healthcare access, a concept supported by research in Nigeria (Yasar, 2025; Mashimbyi et al., 2025).

This review identifies persistent research gaps that must guide future inquiry. A stark paucity of longitudinal studies limits understanding of the long-term causality and cumulative burden of chronic occupational diseases in Africa (Nuraini, 2025; Khadem, 2025). Robust evaluations of participatory intervention models within African market and transport settings are also lacking. Additionally, research must more deeply investigate the gendered dimensions of risk and the underexplored mental health impacts of job insecurity and workplace violence (MUZEMBO et al., 2025; Baek & Choi, 2025; Domingo, 2025).

In conclusion, safeguarding the occupational health of informal sector workers in Kampala and across African cities is a pressing public health and social justice imperative. The documented hazards are systemic, reinforced by socio-economic exclusion, and demand a paradigm shift towards inclusive protection. Integrating informal worker health into urban development and public health agendas is foundational for breaking the cycle of poverty and ill-health and for building equitable, resilient urban economies (Simani Wamalwa & Gakii Murithi, 2025; Roza & Sari, 2025).

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