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A bibliometric assessment of global relocation research to inform climate-induced disaster risk reduction in Mount Elgon, Uganda

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Abstract

This study examines how disaster-induced relocation is represented in global academic literature, with a particular focus on Uganda's Mount Elgon region, where recurrent landslides and floods continue to intensify under changing climatic conditions. Although relocation is widely framed as a disaster risk reduction strategy, its implementation frequently reproduces vulnerability when community perspectives remain marginalised. The analysis draws on a bibliometric dataset derived from the Web of Science, which yielded 993 records, of which 971 were retained for final analysis after deduplication and data cleaning. The findings reveal a strong concentration of scholarly output in the Global North, with limited representation from regions most affected by climate-induced displacement. While Makerere University emerges as a leading contributor among Global South institutions, this prominence reflects a combination of locally grounded scholarship and participation in internationally led collaborative research. Publication counts, therefore, capture institutional visibility within global knowledge networks, but do not uniformly indicate epistemic leadership or theory generation. Thematic mapping identifies key intersections between relocation, mental health, resilience, and community participation, yet locally embedded perspectives on identity, culture, and post-relocation trajectories remain weakly integrated. The results position relocation as a socio-political process embedded in livelihoods, cultural identity, and psychological well-being, rather than a purely spatial intervention. Advancing equitable and contextually grounded relocation strategies requires a clearer recognition of the Global South as both a site of empirical observation and an active agent in knowledge production, supported by stronger South–South and balanced international research partnerships.

Keywords Bibliometric analysis · Climate-induced relocation · Disaster risk governance · Global South · Mount Elgon

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1 Introduction

Environmental hazards and their consequent disasters constantly threaten many communities, endangering lives and livelihoods in hazard-prone regions [2, 7, 45]. Repeated disasters in the Mount Elgon region of Uganda, particularly rainfall-driven (landslides, mudslides, and floods), have displaced thousands and caused extensive damage to critical infrastructure [11, 33, 40, 44]. Disasters of note are the 2007 and 2010 floods, repeated landslides in Bududa District (2011–2013), and the recent landslide on 28 November 2024 in Bulambuli District, which killed 28 people and left more than 100 missing [39]. Climate-induced disasters are expected to worsen as the effects of climate change intensifies [56]. Anticipatory action is urgently needed to reduce the loss and damage from such disasters.

Relocation has often been adopted to reduce loss and damage caused by disasters in some parts of Mount Elgon. However, this approach has shaped this study's view of relocation policies, particularly regarding community consent, the adequacy of resettlement support, and the long-term sustainability of relocated communities [62]. Relocation, in theory, makes perfect sense as moving people out of harm's way lowers their risk of danger. In practice, however, relocation is a profoundly complex and often challenging process. It disrupts social networks that are vital in rural contexts, the way of life that provides livelihoods to communities, and cultural attachments to the land that define most African rural communities. When relocation plans are poorly designed or forced on communities without genuine participation, they can create new vulnerabilities rather than reduce risk [30].

Despite repeated relocation efforts, many people in the Mount Elgon region of Uganda refuse to move away from their ancestral land and continue to face known and persistent threats [5, 47]. Furthermore, even among those relocated, many have eventually returned to their original homes [61]. From the perspective of policymakers, especially at the national level, this resistance is often dismissed. It is seen as either ignorance or defiance [48]. However, treating non-compliance as ignorance or defiance is a profound oversimplification of the tough decisions and challenges vulnerable communities face. People's decisions are shaped by a complex interplay of socio-cultural, economic, historical, and emotional realities. When these realities are ignored, relocation schemes tend to collapse, forcing relocated populations to either return to high-risk areas or face new forms of vulnerability in resettlement sites [61].

Despite the complexity and recurring challenges of relocation in Mount Elgon, there is limited integration of local experiences (attachment to place, cultural identity, psychological effects, and livelihood concerns) into national or global policy frameworks. These deeper community dimensions remain underexplored in academic literature. Moreover, while the relocation discourse is growing, there is no comprehensive mapping of how knowledge about disaster-induced relocation is globally structured, who is producing it, or how Mount Elgon's experiences align with or diverge from global discourses.

With this background, it is essential to understand the global dynamics that shape the discourse on disaster-induced relocation. The challenges surrounding relocation in Uganda's Mount Elgon region prompted a broader literature review to examine how relocation is addressed in global disaster risk reduction (DRR) and whether the existing knowledge base reflects the lived realities of affected communities, including those in Mount Elgon. A bibliometric analysis was conducted to achieve this objective. The bibliometric method was chosen because it provides a systematic and replicable way to uncover who contributes to global relocation research, which themes dominate, and where key knowledge gaps exist. Specifically, this research sought to:

1. Provide a global overview of disaster-induced relocation literature as a DRR measure.
2. Identify the dominant discourses and thematic clusters, and
3. Locate Uganda's contributions within the global knowledge landscape, particularly those concerning Mount Elgon.

This helps reveal whether Uganda is primarily the subject of research, an active agent producing knowledge or both, and to what extent global literature engages with community-rooted aspects. The study responds to calls for more equity in knowledge production and application, especially in the Global South. The findings aim to inform

relocation policy in Uganda by identifying insights and good practices from other contexts and flagging the persistent underrepresentation of socio-cultural dimensions. As a country prone to natural hazards and to internal/external conflicts that contribute to forced migration, documenting Uganda's experience is relevant. It provides rich, context-specific evidence to inform international relocation discourse, particularly for other countries facing similar risks.

2 Overview of Mount Elgon

Mount Elgon is located in Eastern Uganda containing eleven districts see Fig. 1. Mount Elgon provides a highly suitable empirical setting for examining environmental hazards and climate-related mobility due to its long-standing exposure to recurrent landslides, high population density on steep and fragile slopes, and well-documented interactions between environmental hazards and people's livelihoods [31]. The area is characterised by persistent slope instability driven by intense rainfall, steep topography, and progressive land use change, particularly agricultural expansion into marginal lands [50]. These conditions have been consistently associated with increased landslide occurrence and risk exposure, making the region one of the most studied hazard-prone mountain landscapes in East Africa. The presence of state-led relocation initiatives further enhances its suitability as a case study, as it allows for critical assessment of resettlement as a disaster risk reduction strategy within a real-world implementation context [47]. In relation to global literature, the Mount Elgon case both aligns with and enriches dominant conceptualisations of environmental hazards. Globally, hazard research emphasises that disaster risk emerges from the interaction between environmental stressors and human vulnerability, particularly where land degradation and population pressure coincide. Mount Elgon reflects these dynamics, demonstrating how environmental change and settlement expansion jointly intensify exposure to risk. However, the case also highlights important contextual divergences. Unlike many generalized global models that frame relocation as a largely technical adaptation solution, evidence from Mount Elgon shows that adaptation and resettlement are deeply embedded in socio-cultural realities, including livelihood dependence on land and strong place attachment explaining why 259 people had returned to the risk areas by 2020 [68] see Fig. 1.

3 Methods and methodology

3.1 Bibliometric literature review

A bibliometric analysis was used to quantitatively examine the existing body of literature on disaster-induced relocation and reveal key patterns in research output, influential authors, highly cited works, and major thematic trends over time [17, 29, 36].

The bibliometric analysis highlights dominant perspectives, knowledge gaps, and the extent to which developing nations have been represented in existing research [28]. R-based bibliometric tools were used to analyse global research networks, and the workflow is presented in Fig. 2.

3.1.1 Data collection

The bibliometric dataset was compiled from the Web of Science (WoS), a widely recognised academic database [53]. This database was the only one considered in this study due to its strong metadata controls. Although the WoS database lacks representation of small regional journals and those considered "predatory" [6], it was deemed appropriate due to the quality of its peer-reviewed publications and its multidisciplinarity [53]. A targeted search was conducted using the following keywords: "Disaster-induced relocation" OR "forced relocation"

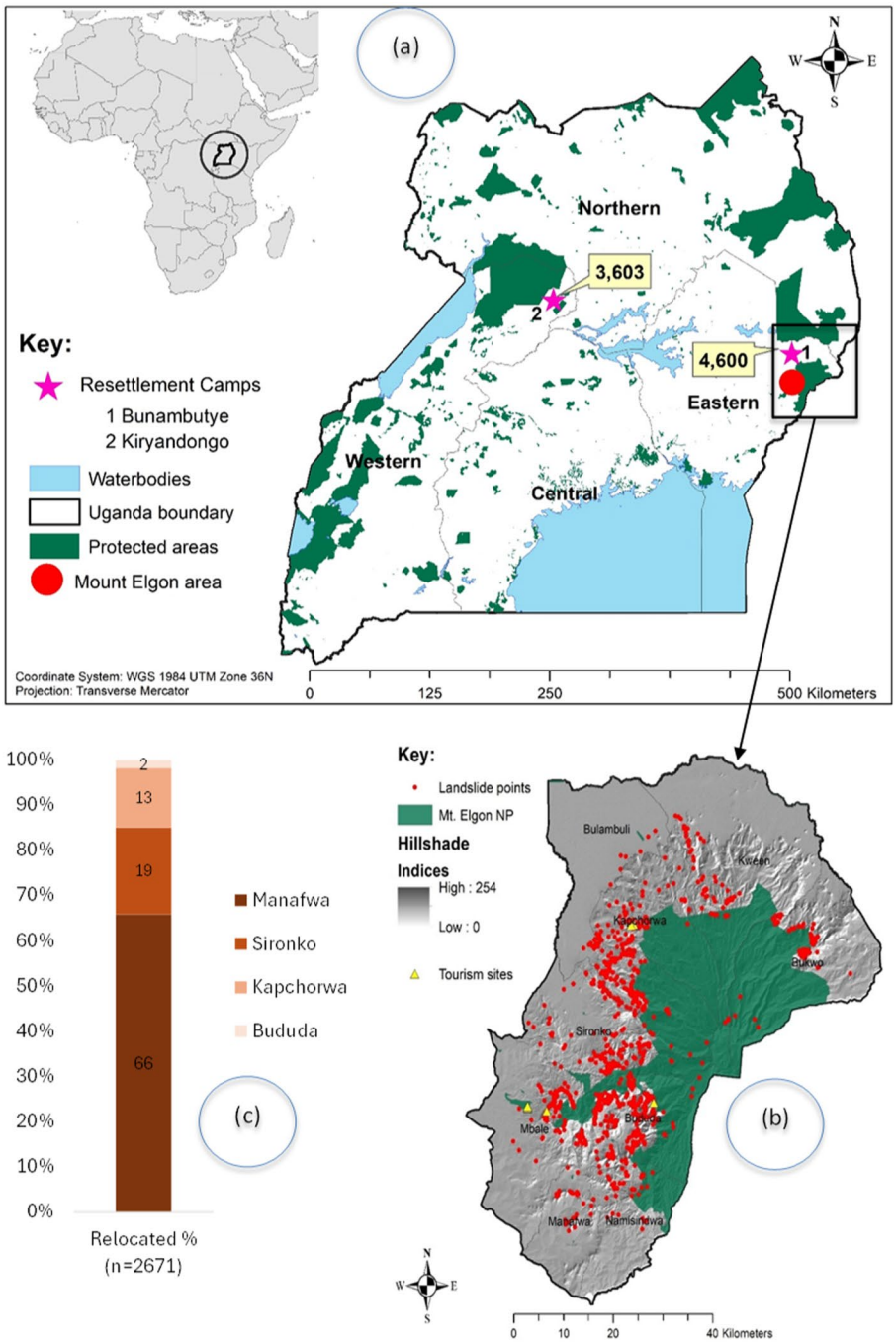


Fig. 1 **a** Location of Mount Elgon region in Uganda, and the major resettlement camps for people affected by landslides in the area. The size of the dot depicts the number of relocated people. Bunambutye resettlement site `has the highest number of victims compared to Kiryandongo (*Source* Internet sources by 2024). In figure **b** the map shows the districts that make up the Mount Elgon region and the recorded returnees by 2020 in graph (C) districts of Mount Elgon region with the highest number of relocated people by 2020 in graph (*Source* [68],accessed on 6/7/2025 via https://www.desinventar.net). Data on landslide features based on google earth inventory and Broeckx et al. [11]

OR "involuntary resettlement" OR "disaster resettlement" OR "post-disaster relocation" OR "resettlement in Uganda" NOT "cell" NOT "coastal" and NOT "several Web of Science Categories deemed not applicable in this study".

These keywords were carefully selected to capture the dimensions of disaster relocation. Initial queries identified keywords and categories to exclude from the literature search that informed the final search. The use of the terms such as "cell" and "coastal" as exclusion criteria was intended to exclude articles from the health sciences and from coastal studies, respectively. These were out of scope for this study, as it is non-medical and the Mount Elgon region is inland, with its own dynamics. After the careful use of Boolean operators to select the literature for review and their subsequent download, a total of n = 993 articles were downloaded for this study, and the

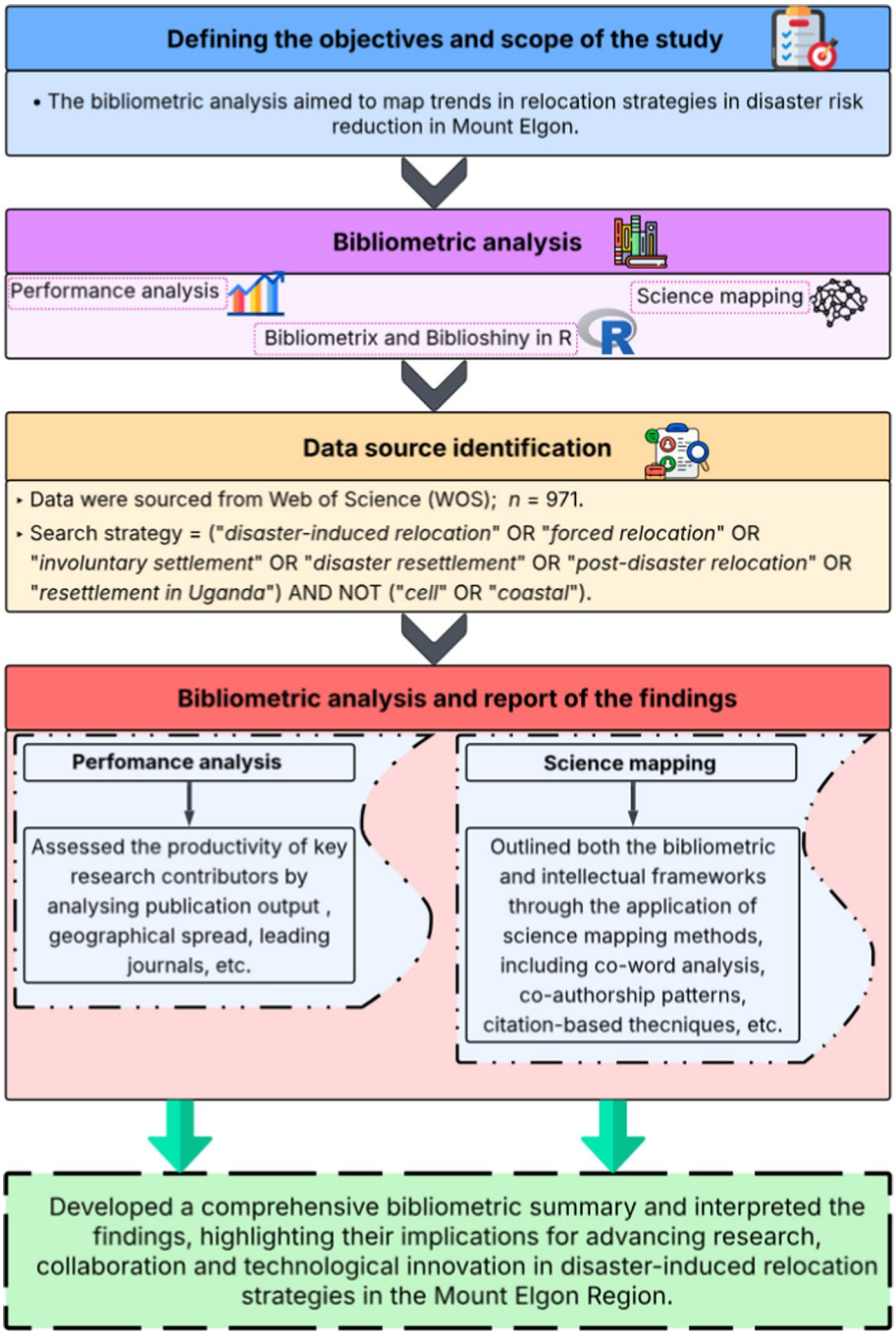


Fig. 2 Diagrammatic representation of the steps followed to implement the bibliometric analysis adopted from Donthu et al. [17]

query can be accessed at https://www.webofscience.com/wos/woscc/summary/7a515d75-a5fa-4c2a-a66c-03b71d9eaaa0-015c2c8c10/relevance/1. The dataset comprised peer-reviewed journal articles, conference proceedings, and review papers published up to 31 December 2024.

3.1.2 Data processing

The downloaded datasets were merged into a single BibTeX file for analysis in RStudio using the Biblioshiny package. Data pre-processing (cleaning and standardising metadata) was performed to ensure accuracy and consistency. Duplicate records were identified and removed earlier in the data collection stage, and keywords were

standardised [64]. In bibliometric analysis using R, duplicates are typically removed by identifying and excluding records with identical DOIs or titles. After the removal of duplicates, n = 971 articles were retained for this assessment.

3.1.3 Bibliometric analysis

A descriptive analysis used the Biblioshiny application in the R-bibliometrix package to extract key bibliometric indicators, providing insights into the landscape of disaster-induced relocation research [12]. The analysis covered scientific production by country, key affiliations, word clouds, co-word networks, and country collaborations. The results were visualised using images in Biblioshiny and graphs created in Excel.

3.1.4 Data visualisation and interpretation

The results from the bibliometric analysis were visualised using interactive dashboards, network maps, Excel graphs and thematic clustering graphs. The Biblioshiny dashboard offers interactive tables and citation metrics, while thematic maps illustrate keyword clustering and key research areas. Collaboration maps highlight global research networks, showcasing partnerships between authors and institutions across various regions.

4 Results and discussions

4.1 Geographic distribution of scholarly contributions

The data on global efforts to address disaster-induced relocation highlight significant contributions from countries such as the United States (n = 770), China (n = 595), and the United Kingdom (n = 213), as well as other Global North nations (Fig. 3. These countries have historically invested heavily in climate science and DRR [8]. This positions them at the forefront of global discussions and policy development regarding displacement caused by natural hazards. On the contrary, nations in the Global South, including those highly vulnerable to climate-induced disasters, contributed fewer publications to this growing body of research for the studied period (Fig. 2) [26]. With 63 research outputs, Uganda ranks relatively high among developing countries, indicating a growing commitment to understanding and addressing disaster-induced relocation. Although not as prominent as the

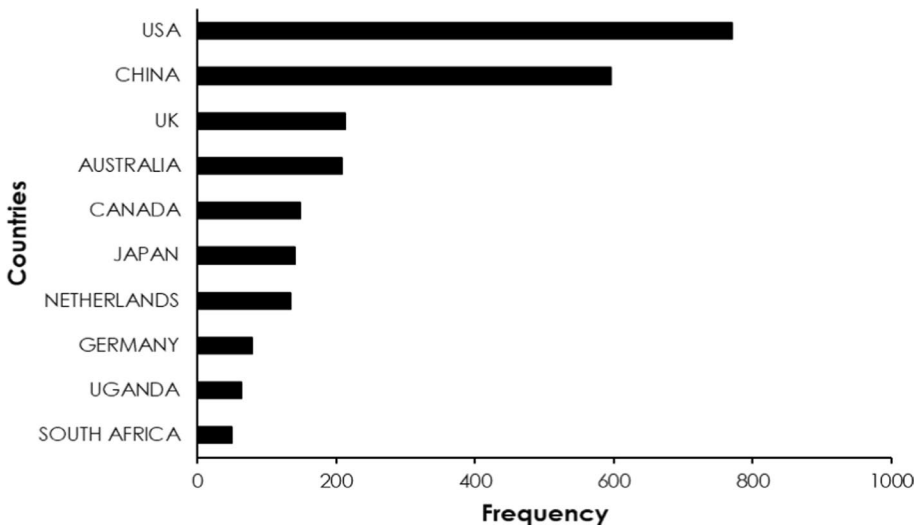


Fig. 3 The top ten countries with research output on disaster-induced relocation worldwide

leading countries of the Global North (Fig. 3), its contribution signals increasing engagement with this critical issue, especially given its exposure to recurrent natural hazards [18, 49] and regional instability [1, 27].

The distribution of literature outputs varied in the Global North and Global South nations (Fig. 4). Densely shaded regions in North America, Europe, and parts of East Asia indicate high volumes of literature output. Many sub-Saharan African, Latin American, and Southeast Asian countries had limited research output in the years studied (Fig. 3). This distribution mirrors global disparities in research funding [13], institutional capacity [66], and access to scientific publication platforms [14], among many other limitations. Despite the severity of climate-related disasters (due to resource limitations), the Global South still lags in producing knowledge about these lived experiences of disaster-induced relocation. As a result, this imbalance raises concerns about the perspectives and experiences of those who shape the global discourse on disaster-induced relocation and adaptation.

The growing importance of Uganda in disaster risk studies among nations in the Global South deserves attention. Its vulnerability to climate-related hazards has made disaster-induced relocation an urgent national priority [4]. Regional instability directly influences patterns of disaster-induced relocation. Armed conflicts in neighbouring South Sudan and the Democratic Republic of Congo continue to displace populations, increasing refugee inflows into Uganda and placing additional pressure on the country's already strained relocation systems [19]. This convergence of internal and cross-border displacement complicates national adaptation efforts and stretches institutional capacity.

In response, Uganda has intensified its alignment with the United Nations Sustainable Development Goals, especially those addressing climate action and displacement governance [43]. These efforts signal a strategic commitment to developing long-term, adaptive solutions within a highly dynamic context. Relocation has gained significant traction in recent national policy frameworks. For instance, disaster-induced relocation is no longer framed as an emergency response, but as a prominent aspect of broader climate adaptation and disaster risk management agendas [47]. This evolution reflects a shift from reactive, event-driven interventions to more systematic, anticipatory planning. It demonstrates intent to manage both domestic and regional displacement pressures in a structured, forward-looking manner.

However, increased policy focus must be matched with inclusive approaches that reflect the lived realities of affected communities. Effective relocation strategies require more than formal frameworks; they must incorporate locally embedded knowledge systems and respond to the specific social and cultural contexts of vulnerable populations. The current unevenness in global research outputs limits the visibility and influence of Global South experiences in shaping international policy. Strengthening Global North–South, South-South, and South-South-North collaborations through research funding and expanding publication access is crucial for making more substantial contributions to global dialogues [60].

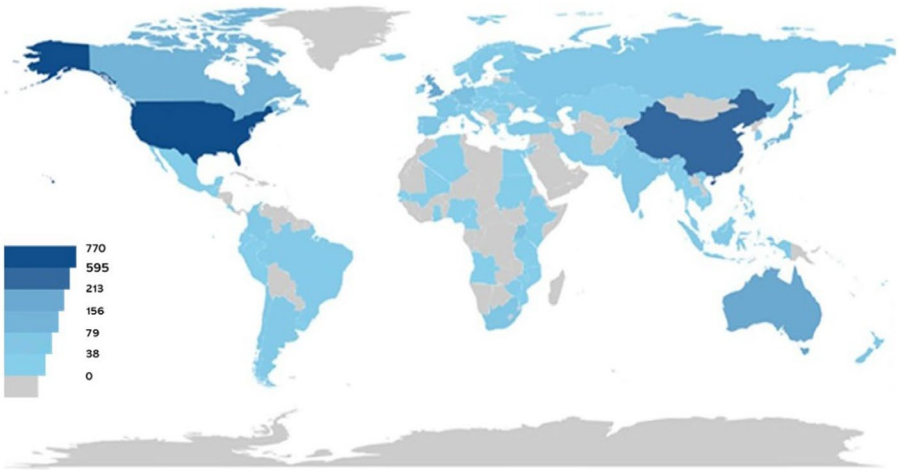


Fig. 4 Geographical distribution of global publications on disaster-induced relocation, with varying shades of blue indicating publication intensity (dark blue for high output, light blue for low output), and grey representing countries without recorded publications

4.2 Global scientific output trends over time

From 2003 to 2024, the annual publication trends reflect a clear and upward trajectory in global scholarly attention (Fig. 5). This trend can be broadly interpreted through three major phases:

1. An early foundational period (2003–2010),
2. A phase of moderate and sustained growth (2011–2018), and
3. An exponential surge in output beginning around 2019 and continuing to the present.

In the first phase (2003–2010), the number of articles remained relatively low and stable, fluctuating between 9 and 19 publications per year. This period represents the early years of research in this area. Climate-induced resettlement and migration were considered under broader migration topics. The limited number of publications may also indicate a broader lack of awareness and institutional recognition of climate-induced relocation as a distinct field of study within both policy and academic spheres. However, this gap hinders the development of evidence-based frameworks, perpetuates fragmented responses to displacement, and leaves vulnerable populations without equitable solutions grounded in global best practices.

From 2011 to 2018, the annual number of articles steadily increased, with a notable rise from 26 publications in 2011 to 47 in 2018 (Fig. 5). This steady growth indicates a maturing field that has drawn increasing interest from researchers across multiple disciplines [15]. Global policy instruments, including the Sendai Framework for Disaster Risk Reduction (2015), Sustainable Development Goals (2015), and successive Intergovernmental Panel on Climate Change assessments, have positioned climate-induced displacement as a central concern in disaster risk governance and sustainable development [52]. These frameworks catalysed research beyond engineering solutions, probing into the socio-political implications of relocation and the fragility of displaced populations [35]. Studies emerging from this policy shift examined how relocation affects access to services, community cohesion, and rights-based development in fragile settings.

The evidence reveals a persistent tension between intention and outcome. Relocation, even when motivated by protection from disasters, often undermines livelihoods, fractures cultural networks, and exacerbates existing inequalities when it is not designed with meaningful participation. From 2019 onward, scholarly attention intensified, with article output jumping from 34 in 2019 to 103 in 2020, before reaching 116 by 2024. This rapid escalation coincided with the COVID-19 pandemic, which heightened attention to vulnerability, mobility constraints, and fragilities in the public health system [23]. The crisis magnified structural inequalities, forcing researchers and policymakers alike to confront the heightened vulnerability of displaced populations. In this

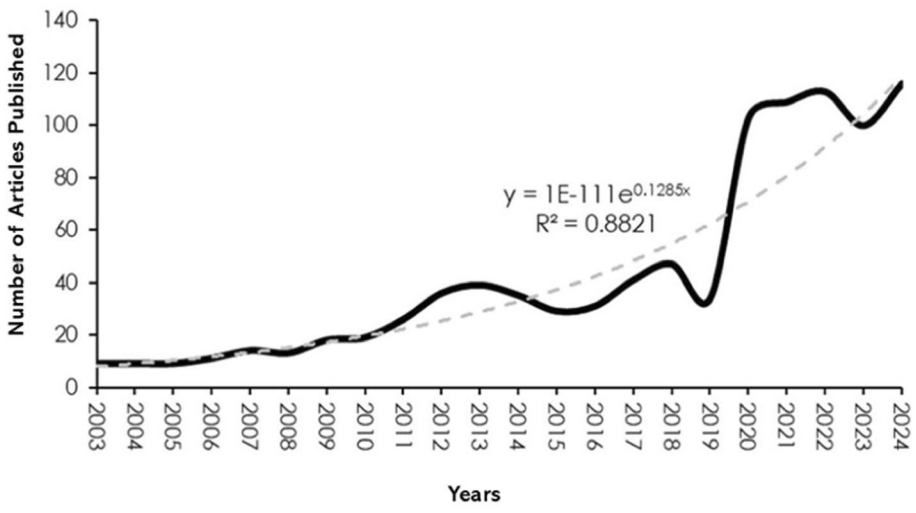


Fig. 5 The temporal trend of publications from 2003 to 2024 illustrates exponential growth in the past few years

context, climate-induced relocation was no longer peripheral; it had become a central issue. It became central to debates on justice, adaptive governance, and institutional preparedness during compounding shocks.

The COVID-19 pandemic increased focus on relocation studies for disaster risk reduction by highlighting community vulnerabilities, integrating health and disaster planning, and emphasising resilience and community engagement in decision-making [54]. At the same time as the pandemic, climate-induced disasters intensified, as shown by the increased frequency and scale of events such as wildfires, hurricanes, landslides, and floods [16]. This compelled many governments and researchers alike to take the growing risks seriously. During the period of mandatory lockdowns, many researchers had time to work on their manuscripts and interact with various online software, which increased their chances of publication [24]. Another driving force was the influx of funding from international donors and organisations focused on climate resilience [58]. This funding provided a significant boost to global research, sparking a wave of new initiatives and collaborations on an unprecedented scale.

Many donor-funded research projects in recent years have promoted multi-institutional approaches in project implementation, increasing collaborations between institutions. One key result for such projects is disseminating information through publications in top-tier journals. This has significantly improved the publication outputs in recent years. Moreover, the push to meet the 2030 Agenda on Sustainable Development heightened the urgency of the discourse on climate-induced displacement, which has become central to the global development agenda (Naser, 2020). Countries repeatedly hit by disasters, such as Uganda, become key case studies for researchers and policymakers alike.

The increasing prominence of Uganda case studies in global conversations and the stepped-up research efforts of institutions like Makerere University reflect their commitment to addressing these pressing challenges [9]. The increase in research is both theoretical and action-oriented, addressing existing and impending challenges. Studies are now designed to influence real-world policymaking by bridging the gap between high-level frameworks and on-the-ground realities. Examining the trends, the research field has undergone rapid evolution. What was once slow-growing is now a dynamic, cross-disciplinary body of work that injects fresh ideas into public debates. The increase in research after 2020 is therefore not coincidental but mirrors a global consensus that climate-induced relocation is one of the most urgent challenges. For Uganda, the timing could not be more opportune, as this current wave of research offers a unique opportunity to shape regional and global responses to DRR and human mobility.

4.3 Institutional leadership in relocation and disaster studies

The analysis of affiliations reveals a skewed geographic and institutional distribution of the scholarly output on disaster-induced relocation and related climate adaptation themes. Hohai University (n=49*)* and the University of Melbourne (n=41) are the leading global research contributors, demonstrating strong institutional commitments (Table 1). Hohai University's leading position mirrors China's state-directed investment in flood engineering and climate adaptation infrastructure. Australian institutions collectively dominate mid-table rankings, a pattern consistent with the Australian Research Council's sustained funding of disaster risk and humanitarian

Table 1 The top ten academic and research institutions contributing the most scholarly literature on disaster-induced relocation

Affiliation	Country	Articles
Hohai University	China	49
The University of Melbourne	Australia	41
Makerere University	Uganda	38
Harvard University	USA	31
The University of Queensland	Australia	29
Peking University	China	25
University of Groningen	Netherlands	22
Kyoto University	Japan	21
Macquarie University	Australia	21
La Trobe University	Australia	20

migration research, as well as their geographic proximity to Asia–Pacific disaster zones. Makerere University of Uganda ranks third with 38 publications, surpassing internationally renowned institutions such as Harvard (n = 31), Peking (n = 25), and Kyoto (n = 21) universities. The university continues to assert itself as a strategic centre of excellence in disaster research within the Global South [9]. Its visibility in disaster-induced relocation reflects more than just institutional productivity,it also signals a broader reconfiguration of where authoritative knowledge emerges. Surpassing several well-resourced institutions in the Global North in terms of research output, Makerere challenges dominant hierarchies in scholarly production. This prominence positions Uganda not only as a subject of international study but also as an active contributor to frameworks that foreground the priorities of communities most affected by climate-related disasters.

The university's academic strength lies in its disciplinary range, with public health, environmental science, and the social sciences forming a robust base for interdisciplinary inquiry [42]. This has proven essential in addressing the complex interactions between displacement, governance, health outcomes, and vulnerability. International partnerships, particularly through initiatives such as the Norwegian Programme for Capacity Development in Higher Education and Research for Development (NORHED) programme, have reinforced Makerere's research infrastructure. These collaborations have supported postgraduate training, facilitated transnational faculty exchanges, and provided sustained funding for policy-relevant research [41]. The result is a growing body of evidence that informs policy from the ground up. Research emerging from Makerere does not remain confined to academia. Through sustained engagement with government agencies, NGOs, and regional actors, it directly shapes relocation strategies, institutional responses, and resilience-building efforts in Uganda and beyond. Such embedded scholarship becomes vital in light of the systemic exposures revealed by recent global shocks, including the COVID-19 pandemic.

The observed publication counts require cautious interpretation, though. Institutional affiliation in bibliometric datasets does not automatically reflect the origin of conceptual development or epistemic leadership [25]. In several instances, output attributed to Makerere University may arise from collaborative research designs in which the institution serves as a co-authorship partner or an implementation node for externally led projects. This distinction matters because it separates geographical presence in datasets from substantive theory generation. At the same time, dismissing Makerere's role as purely instrumental would be analytically reductive. The university actively contributes to research framing, data production, and contextual interpretation, particularly through its embedded engagement with national policy processes and interdisciplinary scholarship [21]. The evidence, therefore, indicates a hybrid position in which the Global South operates simultaneously as a site of knowledge production and a locus of empirical observation. Interpretation of institutional leadership must therefore move beyond output counts and account for these layered roles in shaping disaster-induced relocation scholarship.

4.4 Key themes and research focus areas in the literature

Keyword frequency analysis revealed a multidisciplinary research landscape shaped by environmental stressors, population mobility, and socio-political governance. With "resettlement" ($n = 91$) emerging as the most frequently used keyword (Fig. 6), the data indicate that planned or reactive population movement in response to disasters and climate-related threats is the core concern of scholarly engagement in this field. Following resettlement, terms such as "migration" ($n = 64$), "relocation" ($n = 55$), and "vulnerability" ($n = 54$) reinforce the central focus on population displacement and the complex factors that trigger and shape human mobility. These terms highlight the interwoven nature of risk and human movement, in which disasters, environmental degradation, and socio-economic instability converge to compel or encourage relocation.

Notably, "adaptation" and "climate change" (both n = 51) rank highly, highlighting that much of mobility research is framed within the broader context of adaptation to climate change. This is closely aligned with the realities of the Mount Elgon region in Uganda, where climate-induced hazards, such as landslides and erratic rainfall, disrupt livelihoods and increase the need for strategic relocation measures [61]. How mobility is framed, either as a crisis or a survival strategy, significantly impacts how Uganda approaches DRR in the future.



Fig. 6 Word cloud illustrating the most frequently used keywords in the literature on disaster-induced relocation, with the font size representing the relative frequency of each term's occurrence

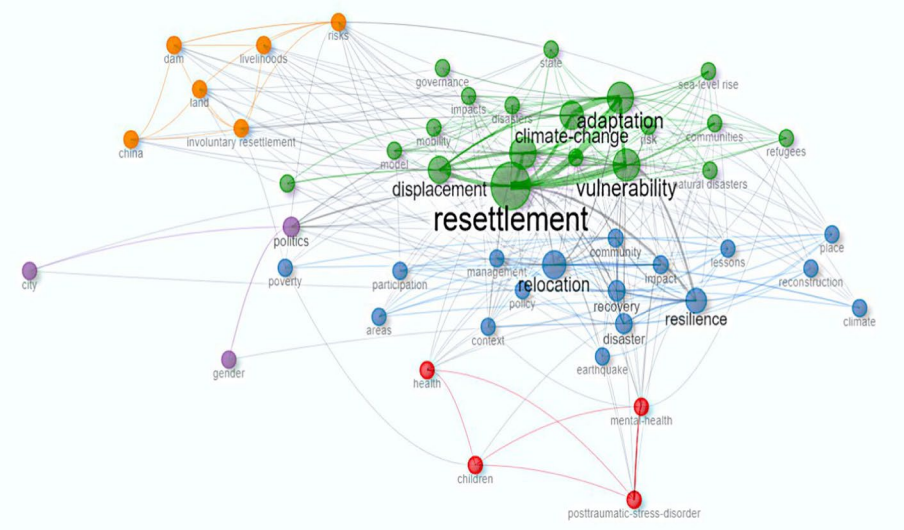


Fig. 7 Thematic map illustrating major clusters and interdisciplinary linkages in relocation research, highlighting conceptual groupings and the connections between key terms based on co-word analysis

The increasing frequency of terms like "displacement" (n = 50*)* and "resilience" *(*n = 43*)* in recent studies suggests that researchers are not only focusing on the movement itself but also on its aftermath. On the ground, many communities relocated from the Mount Elgon slopes have faced significant challenges. For instance, after the relocation, some people are often left without essential services such as education, healthcare, and employment, not to mention spaces that feel familiar and culturally significant [61]. This highlights why "resilience" is a recurring theme in the literature. Without integrating social protection and community empowerment into relocation strategies, these efforts can exacerbate people's struggles rather than alleviate them.

4.5 Thematic clusters and interdisciplinary linkages in relocation research

The co-word network (Fig. 7) of the top ten nodes in this bibliometric analysis reveals an evolving research landscape that supports rethinking relocation policies, particularly in vulnerable regions such as the Mount Elgon area. Two dominant thematic clusters emerged, illuminating the conceptual and practical intersections supporting

the global literature on disaster risk, relocation, and community well-being. As illustrated in Fig. 6, the first cluster (in red) centres on public and mental health, emphasised by frequent keywords such as health, mental health, children, and posttraumatic stress disorder. This cluster highlights the psychosocial impacts of disaster-induced displacement, with particular concern for vulnerable groups such as children and women. The prominence of these terms signals a growing scholarly recognition that relocation is not solely a physical or logistical process, but a profoundly human one, often associated with anxiety and social disruption [3].

There are several health concerns in the Mount Elgon region, including infectious diseases such as malaria, stress and anxiety, and malnutrition due to food insecurity [37, 65]. The long-term mental health challenges among relocated individuals when adapting to new environments are increasingly being reported [10, 69]. Findings from this study emphasise the need for Uganda's relocation policies to incorporate mental health support and culturally sensitive psychosocial interventions, particularly in post-disaster settings. The second cluster (in blue) is centred around disaster risk and community resilience, with key terms including relocation, resilience, disaster, community, impact, and risk (Fig. 7).

This cluster reflects the operational and policy-oriented discourse that frames relocation as a DRR strategy. Notably, contemporary studies reframe relocation beyond reactive displacement, instead conceptualising it as a proactive, adaptive measure integrated into systemic resilience-building frameworks [57]. However, critical gaps remain in reconciling policy rhetoric with local-level equity concerns, particularly regarding who bears the costs of 'resilience-building' in practice. Furthermore, it remains imperative to align relocation policies with long-term socio-ecological adaptation, rather than short-term hazard mitigation.

The high betweenness and PageRank values associated with "relocation" and "resilience" suggest their centrality as bridge concepts between disciplines (from disaster science to public health, urban planning, and humanitarian policy) (Table 2). This reinforces the understanding that effective relocation strategies must be multidimensional to minimise future risk and enhance community adaptive capacity [55].

For Mount Elgon, this implies a pressing need to rethink relocation from a siloed disaster-response approach to a holistic, resilience-oriented intervention. Research indicates that previous resettlement efforts in the region have faced challenges, including poor site selection for relocation, inadequate infrastructure at proposed sites, and a lack of genuine community involvement [61]. The centrality of "community" in the network emphasises the importance of participatory approaches, in which affected populations are involved in decision-making, ensuring that relocation sites are safe, culturally appropriate, and economically viable.

The intersection of these two clusters signals a converging discourse linking disaster resilience to human well-being. Relocation operates as the central conceptual link across the network, connecting disaster risk discourse in Cluster 2 with psychosocial outcomes in Cluster 1. The literature increasingly positions relocation as the process through which hazard exposure translates into mental health impacts, rather than treating displacement and psychological distress as separate analytical domains [22, 63, 69]. Forced movement disrupts social relations, erodes place attachment, and destabilises livelihoods, all of which constitute established drivers of anxiety, depression, and post-traumatic stress [67]. The co-occurrence of these themes reflects a clear conceptual shift. Scholars now examine relocation as an integrated socio-spatial and psychological process.

Table 2 Keyword centrality metrics from thematic network analysis in post-disaster relocation and resilience studies

Node	Cluster	Betweenness	Closeness	PageRank
Health	1	6.03	0.012	0.013
mental health	1	9.273	0.012	0.016
Children	1	1.828	0.009	0.008
posttraumatic-stress-disorder	1	3.947	0.011	0.012
Relocation	2	67.661	0.015	0.042
Resilience	2	54.727	0.014	0.039
Impact	2	10.735	0.013	0.02
Disaster	2	27.528	0.013	0.028
Community	2	21.829	0.014	0.026
Recovery	2	31.685	0.014	0.032

This convergence carries direct policy relevance. Interventions that prioritise spatial resettlement without embedded psychosocial support remain structurally incomplete within this analytical framing. This thematic entanglement is vital for Uganda's policy context. It calls for relocation policies that relocate people away from risk and into opportunities for safety, stability, psychological healing, and socio-economic growth [65]. Notably, the co-word network highlights gaps and opportunities for future research. For instance, although relocation and mental health are prominent, there is limited integration of these themes in localised studies from Africa. Bridging this gap can yield more context-specific relocation frameworks that address the structural and emotional dimensions of disaster-induced displacement.

4.6 Patterns of international collaboration and authorship

The collaboration data shows a highly interconnected global academic landscape (Fig. 8). However, the analyses also reveal a striking asymmetry in research collaborations, with Global North countries, particularly the United States, China, and the United Kingdom, forming dense, self-reinforcing networks. In contrast, Global South collaborations (i.e., across Africa and South America) remain peripherally connected (Fig. 8). Uganda's case, for example, demonstrates an increasing level of international engagement, but its collaborations are mostly with countries in the Global North, such as the USA, Norway, and China (Fig. 8). This disparity reflects a perpetuation of geopolitical hierarchies in knowledge production, where dominant actors preferentially collaborate, inadvertently marginalising regions that face the most acute climate displacement challenges yet possess vital place-based expertise.

The limited collaboration among countries in the Global South is largely attributed to structural barriers, including constrained budgets, inadequate infrastructure, and historically unequal access to research funding [38]. However, a growing consensus advocates transformative partnerships, not only stronger North–South collaborations but also South-South and trilateral (South-South-North or North–South-South) models to address pressing challenges such as climate change, displacement, and vulnerability [59]. Such frameworks could recalibrate power dynamics in knowledge production, grounded in the expertise of vulnerable regions while leveraging transnational resources to achieve equitable policy solutions.

While the global collaboration landscape shows notable progress in recent years, a critical imbalance persists. The connections between the Global North and South remain disproportionately weak, often replicating hierarchies rather than disrupting them, while collaborations between the Global South are critically underdeveloped. Closing this gap is essential to cultivating knowledge ecosystems that prioritise equity, not just in volume of collaborations, but in power-sharing, agenda-setting, and resource distribution. Addressing these collaborative asymmetries demands targeted intervention. Regional bodies such as the African Union and the Intergovernmental Authority on Development provide existing political architecture for formalising South-South disaster relocation research consortia [34].



Fig. 8 Global map of country-level research collaborations on disaster-induced relocation, with lines representing co-authorship links

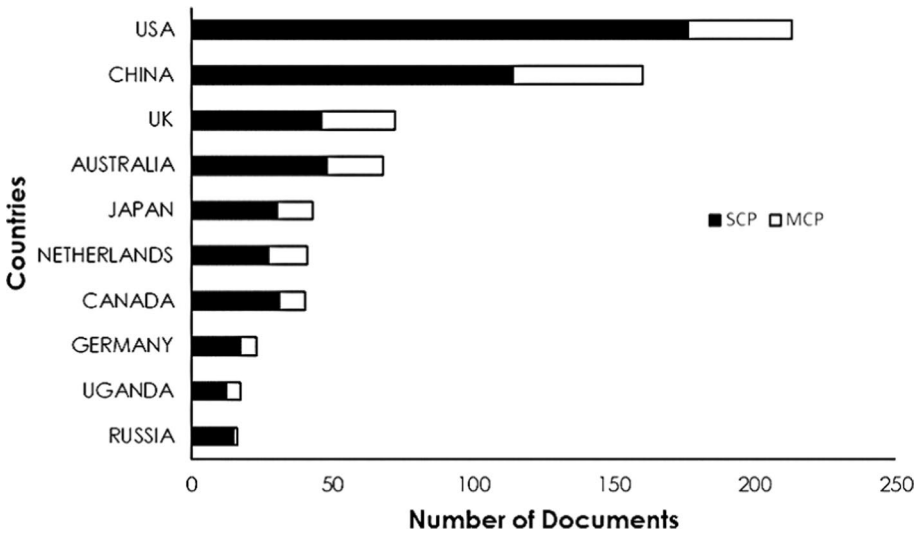


Fig. 9 The metrics of Single Country Publications (SCP) and Multiple Country Publications (MCP) showing the extent of international collaboration across countries

International funding mechanisms, including the Green Climate Fund and Global Environment Facility, should introduce explicit South-South collaboration requirements as grant eligibility conditions, structurally incentivising equitable partnerships rather than leaving them to emerge under resource-constrained conditions. Simultaneously, investments in open-access publishing, shared data infrastructure, and institutional connectivity across African universities would lower the transactional costs that currently suppress African research output [46]. The results of author collaborations further highlight the global dynamics shaping academic partnerships in disaster-induced resettlement, migration, and climate adaptation (Fig. 8).

The metrics of Single Country Publications (SCP) and Multiple Country Publications (MCP) provide insights into the degree of international collaboration by country (Fig. 9). Notably, countries like the USA (176 SCP, 37 MCP) and China (114 SCP, 46 MCP) lead both in volume and breadth of collaborative research (Fig. 9). This indicates that substantial international partnerships complement their robust internal research ecosystems. Similarly, the United Kingdom, Australia, and the Netherlands demonstrate high MCP ratios relative to their SCPs, reflecting an outward-looking approach and strong engagement in global research networks.

However, a key takeaway from the data is the relatively low MCP figures for countries of the Global South, particularly Uganda. With only 12 SCPs and 5 MCPs, Uganda's international collaboration remains limited compared to the countries in the Global North (Fig. 9). These trends mirror the asymmetries observed in the global research collaboration map, where countries in the Global North have dense, diversified collaborations among themselves and with a limited subset of countries in the Global South. Uganda's scholarly engagements, though indicative of growing academic visibility through partnerships with traditional research powers such as the USA, Norway, and China, reveal a persistent deficit in South-South knowledge exchange.

This imbalance perpetuates a fragmented epistemic landscape in which critical perspectives from regions with similar climate vulnerabilities remain underrepresented in shaping the discourse on relocation. For instance, Russia also exhibits a notably low MCP (1 out of 15), indicating insular research tendencies or limited integration into broader networks. On the contrary, countries like the Netherlands (14 MCP out of 27) and the United Kingdom (26 MCP out of 46) maintain almost half of their output through international co-authorships, reinforcing their role as academic connectors across regions. This disparity in MCP between the Global North and Global South highlights structural and systemic barriers that hinder broader collaboration, including limited access to funding and digital infrastructure, administrative hurdles, and geopolitical factors [20].

These challenges have historically marginalised the Global South in high-level academic discourse, despite the Global South being on the front lines of climate impacts. Closing this gap requires intentional steps to strengthen South-South, North–South, and South-South-North partnerships [32]. Leading institutions in Global South countries, such as Uganda, can strengthen South-South research collaborations by leveraging their expertise to

establish regional knowledge-sharing networks with institutions in neighbouring countries facing similar climate displacement challenges. At the same time, they must advocate for more equitable North–South-South partnerships to ensure that the priorities of the Global South guide joint research agendas and resource allocation. Such a thrust could enable local knowledge to flourish, rather than constantly relying on frameworks developed in the Global North.

When countries with similar climate and development challenges collaborate, the pace of learning and innovation increases [51]. Programs that foster regional research hubs, support scholar exchanges within the Global South, and create more opportunities for co-created research are key to making this happen. Institutionalising these cooperative models and embedding locally grounded knowledge into continental and global policy frameworks, countries in the Global South, such as Uganda, can play a transformative role in advancing more representative and equitable approaches to climate-induced displacement research and solutions.

5 Study significance

This study advances understanding of disaster-induced relocation, with important implications for the Mount Elgon region of Uganda, a site marked by chronic hazard exposure and contested relocation efforts. Through bibliometric analysis, the research reveals a globally uneven knowledge architecture. Countries in the Global North continue to dominate the field, producing the majority of peer-reviewed literature that shapes disaster risk reduction (DRR) policy and discourse. In contrast, nations in the Global South, including those bearing the brunt of climate-induced displacement, remain significantly underrepresented. This disparity mirrors entrenched disparities in research funding, infrastructure, and access to publications [8, 26].

Uganda is beginning to disrupt this imbalance. The country's growing scholarly footprint, particularly through Makerere University, suggests a transition from passive recipient to active contributor in the global discourse on relocation [9]. This shift reflects a more profound epistemological shift. Relocation, as the data and case analysis show, is not merely the geographic movement of populations from high-risk zones to safer areas. It is an upheaval that disturbs longstanding social ties and displaces cultural identities embedded in land and space [30, 61].

Effective DRR frameworks must therefore move beyond infrastructure and risk modelling. They require integration with psychological support, livelihood continuity, and community rebuilding that is sensitive to the local context. The study also reveals structural fragmentation in global research partnerships. While Uganda has cultivated strong collaborations with institutions in the Global North, connections within the Global South remain limited. This lack of intra-South engagement constrains opportunities for mutual learning and locally adaptive innovation. Strengthening these underutilised research networks is essential for building relocation strategies that reflect the lived realities of communities facing recurrent climate shocks.

This points to stronger trilateral models that link the Global North with multiple Southern partners to create more equitable frameworks for innovation and response [38, 59]. Uganda is located at the intersection of natural hazards and regional political instability. The bibliometric trends highlight an upsurge in global interest and a critical opportunity for Ugandan researchers and policymakers to assert more influence over DRR and relocation narratives. As relocation becomes embedded in national adaptation strategies, the evidence base provided by local institutions such as Makerere University can shape future regional and global frameworks.

The research's thematic clustering underscores the need to treat relocation as a structural and psychosocial intervention. Without support mechanisms, relocated communities face new vulnerabilities, sometimes worse than those left behind [37, 61]. The recognition that relocation is as much about recovery and emotional stability as it is about infrastructure is timely and overdue. This study critiques the global imbalance in disaster research and highlights Uganda's growing contribution. It calls for policy grounded in empirical realities, collaborative networks that reflect shared vulnerabilities, and relocation strategies designed around people. While more needs to be done to close research gaps and expand South-South partnerships, the groundwork laid here is a meaningful step towards a more inclusive and effective approach to disaster risk reduction.

6 Limitations

This study mapped the structure of disaster-induced relocation research methodologically, yet the analytical frame introduced important boundaries that require acknowledgement. The analysis relies solely on the WoS, selected for its well-organised and consistent metadata that support robust bibliometric analysis. Its strict indexing standards strengthen data quality. However, this strength also limits coverage. Journals from the Global South, especially those with a local or policy focus, appear less frequently, suggesting that some context-specific and practice-based knowledge, particularly from countries such as Uganda, may not be fully captured. Grey literature and non-English publications are also excluded, which further narrows the scope.

This limitation influences how the findings should be read. A broader understanding of the field would emerge from combining multiple databases that capture different parts of the knowledge system. The present study prioritises data consistency and analytical precision over wider coverage. This approach suits its focus on recent publication patterns. At the same time, the findings carry an important implication. The WoS includes journals that meet high publication standards and strong editorial requirements. Within this context, the visibility of Makerere University becomes especially meaningful. It signals a strong scholarly contribution grounded in local experience and policy engagement. This presence reflects growing recognition of Ugandan research within a highly selective global database.

Bibliometric methods reveal patterns in research outputs on a specific topic over time. They do not capture lived experience or the cultural meanings associated with relocation. The study, therefore, functions as a structural overview. It shows where knowledge concentrates and where gaps remain. Future research should build on this by combining bibliometric analysis with field-based and qualitative approaches, especially in regions that remain less visible in global publication systems.

7 Conclusion

This study explores how disaster-induced relocation is treated in academic literature, using a bibliometric lens to position the realities of Uganda's Mount Elgon region within global discourses on disaster risk reduction and human mobility. In doing so, it revealed whose voices dominate the narrative, whose experiences are marginalised, and how deeply entrenched imbalances shape the knowledge that informs relocation policy and practice. While nations of the Global North remain the most prolific contributors to relocation research, the emergence of institutions such as Makerere University as leading global voices signals a significant shift. The Global South is no longer merely a site of study but is becoming a source of critical scholarship. However, the analysis shows that much of the literature still treats relocation as a technical or logistical solution, with limited attention to the complex human dimensions that define its success or failure.

Issues of place attachment, psychological resilience, cultural identity, and local agency are often sidelined, despite their centrality in cases like Mount Elgon, where repeated relocation attempts have been met with resistance, return migrations, or new vulnerabilities. The bibliometric approach proved valuable in surfacing these patterns, highlighting where knowledge is produced, who collaborates with whom, and which themes are foregrounded. The thematic clusters revealed in the co-word networks, particularly those linking relocation with resilience and mental health, resonate strongly with Uganda's experiences. However, the findings also show that Uganda's collaborations are predominantly North-facing, and intra-Global South networks remain underdeveloped. This limits the possibility of building shared, contextually grounded strategies among countries facing similar challenges.

National disaster risk reduction agencies across East and Central Africa should therefore prioritise establishing formal inter-institutional research agreements and creating dedicated funding lines for joint relocation studies that draw on shared regional experience in hazard exposure and governance. Reframing relocation not as a neutral act of moving people from danger, but as a deeply social and political intervention, is essential. This study calls for

a paradigm shift away from relocation as a one-size-fits-all technocratic fix toward participatory, people-centred strategies embedded in local realities. Concretely, Uganda's Office of the Prime Minister and the Department of Disaster Preparedness should mandate community impact assessments prior to any relocation exercise, with assessment frameworks co-designed by affected communities, local government, and interdisciplinary research teams. These assessments must evaluate psychosocial readiness, livelihood continuity, and cultural compatibility of proposed relocation sites, not solely physical safety criteria.

Bridging the divide between dominant global narratives and lived community experiences will require more than academic inclusion. It demands a transformation in how research partnerships are formed, knowledge is valued, and policies are crafted. Future efforts must focus on deepening South-South and South-South-North collaborations, amplifying community-grounded research, and integrating underrepresented voices into global policy discussions. International climate finance mechanisms, including the Green Climate Fund and the Loss and Damage Fund established under the United Nations Framework Convention on Climate Change (UNFCCC), should establish dedicated grant streams for South-South relocation research partnerships, with disbursements contingent on meaningful community participation and open-access dissemination of knowledge.

As climate-induced hazards intensify and relocation becomes a more frequent policy response, the world cannot afford solutions that ignore the people they aim to protect. At the national level, Uganda's forthcoming revision of its National Adaptation Plan presents a concrete legislative opportunity to embed these principles, requiring that relocation be planned, rights-based interventions rather than emergency afterthoughts. This research lays the groundwork for rethinking relocation, not just as a physical shift, but as an opportunity to centre justice, dignity, and long-term resilience in disaster risk reduction efforts.

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