Slum Management Analysis Using Bibliometric Analysis

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ABSTRACT

The presence of slum areas has emerged as a critical issue, sparking extensive debates across various sectors. Slum settlements, characterized by substandard living conditions due to factors such as high building density, inadequate infrastructure, poor sanitation, and health risks, pose significant challenges for urban management. This study aims to analyze government policies addressing slum settlements and evaluate building rehabilitation policies to tackle these issues effectively. Utilizing bibliometric analysis and VOSviewer, the research explores trends and developments in slum area management worldwide. The findings highlight that slum formation is often rooted in cultural and socio-economic realities, especially in developing countries, where urbanization and migration lead to overcrowding in cities. Slums reflect a harsh reality for impoverished populations striving for better living conditions. Addressing slums requires multi-sectoral collaboration involving governments, private sectors, and communities, supported by well-defined legal frameworks and sustainable urban planning. Key insights from the bibliometric analysis, based on 196 articles from Scopus, reveal increasing academic interest in slum management from 2013 to 2023, focusing on themes like governance, sustainability, pollution, and urban development. Results from VOSviewer indicate clusters of keywords such as "sustainable development," "population density," and "environmental quality," emphasizing the need for comprehensive strategies. Effective slum management involves equitable access to resources, economic empowerment, and social justice. This research underscores the necessity for innovative policies, such as integrating renewable energy and water-sensitive urban design, to rehabilitate slum areas sustainably.

Keyword: Slum Area, Management, Policy

INTRODUCTION

The rapid population growth inevitably leads to various challenges in developing countries, such as traffic congestion, poverty, increased crime rates, and the emergence of slum areas. Accelerating population growth significantly impacts the surrounding environment, particularly regarding settlement issues, includiing the rise of slum areas. The failure of urban settlement development is closely related to urbanization issues, limited urban land, and ineffective urban development programs, which contribute to the formation of urban slum areas. The Indonesian Government Regulation No. 88 of 2014 on Housing and Settlement

Management aims to achieve the objectives of housing and settlement management, including the prevention and improvement of slum housing and settlements for communal benefit (Wijaya, 2016). One approach to addressing slum settlement issues is through collaborative governance. Collaborative governance, in this context, involves the government, private sector, and community (Sulaiman, 2021).

Slum settlements are defined as housing environments with substandard living conditions characterized by extremely high building density in limited areas, vulnerability to social and environmental diseases, poor building quality, inadequate infrastructure, and conditions hazardous to residents' lives and livelihoods. Factors contributing to slum settlements include urbanization, infrastructure inadequacies, socio-economic issues, urban spatial planning, and limited urban land (Fitria & Setiawan, 2014). These factors significantly influence government programs in addressing these challenges. Comprehensive programs must be developed to reduce poverty, increase community income, improve environmental conditions, create employment opportunities, enhance community participation in development, and strengthen civil society.

The increasing population growth also drives demand for primary needs, particularly housing, which triggers the emergence of slum settlements (Wimardana, 2016). Slum areas, often chaotic and disorganized, are prevalent in urban settings. They are marked by high unemployment, high crime rates, demoralization, emotional instability among residents, poverty, low incomes, low purchasing power, unsanitary and unhealthy conditions, and inadequate public facilities. Residents are often migrants from rural areas working as laborers (Surya et al., 2020). The Indonesian Law No. 11 of 2011 on Housing and Settlement Areas defines slum settlements as housing that has declined in quality as a place of residence. Article 28H, Paragraph 1 of the 1945 Constitution of the Republic of Indonesia states: "Every person shall have the right to live in physical and spiritual prosperity, to have a home, and to enjoy a good and healthy environment, and shall have the right to receive medical care." This underscores that living in habitable housing is a fundamental right that the government must guarantee (Ervianto & Felasari, 2019).

Addressing slum settlements requires collaboration across multiple sectors, mobilizing resources and budgets from national, provincial, city/district, and village levels, as well as involving private sectors, universities, and other concerned groups through integrated programs. Municipal and district governments are also expected to collaborate in improving settlement quality to achieve slum-free cities (Harpinsyah & Darmansyah, 2022). Slum areas, with low socio-economic conditions and inadequate environmental infrastructure, often portray the government's inability to provide essential services to its citizens (Akbar, 2018). These areas emerge due to unplanned development that fails to align with economic growth, leading to poverty and adverse impacts on social and physical environments (Putra & Andriana, 2017). Despite continuous efforts, urban slum areas persist and expand, creating ongoing debates over effective solutions (Subekti et al., 2021).

Urbanization, a natural phenomenon associated with economic development and improved living standards, significantly influences slum formation. It affects urban transportation, housing, environmental health, public infrastructure, labor sectors, urban economy, and spatial planning (Tjiptoherijanto, 1999). This study focuses on policies addressing slum settlements, particularly rehabilitation policies. Previous studies discussing policy measures have often overlooked building rehabilitation efforts. This study aims to bridge this gap by exploring building rehabilitation as a means to address slum settlements. Housing rehabilitation programs aim to create decent housing that meets technical criteria (Resa et al., 2017). Slum settlements arise from socio-cultural realities reflecting the struggles of the urban poor seeking better living conditions, often resulting in slum areas (Cardoso et al., 2022). They are typically densely populated, located in unclean urban fringes or alleyways, and represent a broader urban issue (Palutturi et al., 2021).

Residents of slum areas form socio-cultural environments that may resist interventions, negatively impacting their welfare. For instance, cleaner rivers and reduced slum areas in Yogyakarta could create job opportunities and enhance tourism, benefiting the surrounding environment (Hawa et al., 2023). Poor water management in slums necessitates implementing Water-Sensitive Drainage (WSD) systems, which optimize rainwater use and ensure alternative water sources (Halomoan et al., 2024). An integrated approach to slum area improvement requires a legal framework to guide stakeholders. Without a proper network model, achieving slum settlement improvement and enhancing community welfare is challenging.

Addressing the complexities and dynamics of slum area management demands a penta-helix collaboration among government, private sector, communities, academia, and media. Policymakers must also engage stakeholders in broader urban development initiatives. Establishing regional regulations and policy frameworks ensures shared understanding and alignment among stakeholders (Zubaidah & Pratama, 2023). Rebuilding efforts should prioritize slum quality improvement policies with clear timelines and resources. Strategic planning for slum areas must align with national development goals to support sustainable development and enhance current and future societal welfare (Ragheb & El-Ashmawy, 2021).

RESEARCH METHODS

Bibliometric analysis is a widely used method that combines statistical and mathematical approaches to map research themes through bibliometric analysis (Utami & Karlina, 2022). This approach involves implementing precise procedures to analyze various research topics, resulting in new insights beneficial for the development of science and technology. The main purpose of bibliometric analysis is to explore trends, identify relationships among journals, and summarize emerging research topics (Tamala et al., 2022). This study employs bibliographic analysis to identify trends in research on slum areas. The initial step involves collecting data from scientific journals indexed in Scopus that are relevant to the research theme.
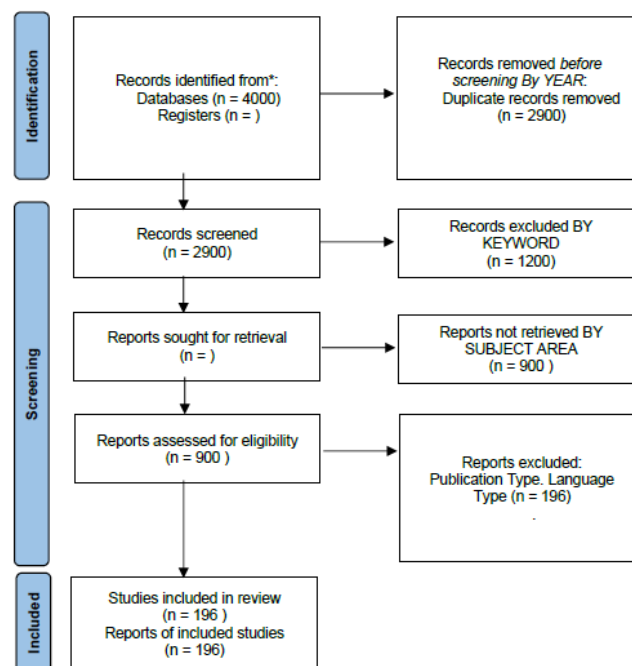

Figure 1. Identification of studies via databaes and registers
Source: Author, 2024

It is important to note that the data for this study was obtained from the Scopus database. The next step involves using the VOSviewer software to process the data collected in the previous stage (Sarjana, 2022). VOSviewer was selected for its ability to visualize and analyze trends in the form of bibliometric maps (Fauziah, 2022). In this case, bibliometric analysis was used to examine recent publication trends. Data from 196 publications, retrieved from Scopus up to 2023, was analyzed using keywords such as management, urban area, urban population, slums, rural area, government, waste management, urbanization, rural population, urban slums, and policy. After obtaining the data, it was downloaded in RIS format for processing using VOSviewer. The data was processed with VOSviewer to generate visualizations, including terms, items, clusters, occurrences, and relevance. This process facilitated a deeper understanding of the relationships and trends within the dataset, providing insights into the development of research themes in the context of slum areas and their associated topics. Through bibliometric mapping, the study offers a comprehensive overview of the current state of research and highlights key areas for further exploration.

RESULTS AND DISCUSSION
1.   Rapid Development of Slum Settlements in Urban Areas of Developing Countries
        The growth of slum settlements occurs more rapidly in urban areas of developing countries compared to urban areas in developed countries. In general, the emergence of slum settlements begins with urban areas that are neglected and unregulated. These areas lack fundamental infrastructure facilities for the community. Characteristics of such areas include living conditions that do not meet standards in terms of facilities, health, education, cleanliness, safety, population density, poverty, and other factors. Several factors influence the formation of slum settlements, including economic inequality, dense populations, migration, housing shortages, poverty, unemployment, and planning policies that do not align with actual conditions. Inefficient management of settlements exacerbates issues of livability and environmental quality, which are further worsened by slum areas (Kumari, 2022).

        From the discussions presented in the previous sections, it is evident that slum settlements pose a significant issue for developing countries. Slum areas are a persistent problem in major cities, particularly amidst industrial and technological advancements, especially in urban areas with large industries. In brief, slum settlements can be defined as areas of poor quality for habitation. One of the primary causes of slum areas is urban migration, where impoverished individuals move to cities in search of better livelihoods. Additionally, slum settlements can be considered substandard if they lack proper water management. Over time, the publication of research or studies related to slum settlement management has increased, involving governments, institutions, publications, and numerous authors examining or researching slum area management. Research conducted by (Surya et al., 2021) highlights the impact of rapid metropolitan development on economic growth, including massive urbanization, energy resource scarcity, slum settlements, and environmental degradation.

        Slum areas, predominantly inhabited by urban poor communities, require increased economic productivity through empowerment processes. The study emphasizes that community empowerment must be accompanied by the use of renewable energy, institutional capacity strengthening, and community participation to contribute to economic productivity and environmental quality improvements, aiming for sustainable slum settlement management. To achieve sustainable slum settlement management, several strategic steps are necessary, including:
a. Equity, ensuring equal access to housing, infrastructure, and economic resources for all members of society.
b. Supporting the economy of the urban poor, aimed at improving welfare.
c. Social justice, focusing on enhancing economic productivity.

The study further explains that the effects of economic empowerment, institutional capacity strengthening, and renewable energy usage on improving environmental quality have a determination coefficient of 78.5%. The role of renewable energy in urban development, including slum areas, is highlighted as requiring government policy support and active participation from both the community and private sectors. Sustainable urban development aims to establish a city service structure that efficiently utilizes space and effectively distributes energy services, emphasizing three main aspects:

a. Ensuring economic growth stability by restructuring production systems to conserve energy resources.
b. Social sustainability, ensuring equitable distribution of wealth and social services.
c. Environmental sustainability, preserving a safe and comfortable environment while minimizing emissions through renewable energy usage.

The study also emphasizes that optimizing energy resource utilization to support economic growth and urban development requires efficiency and effectiveness in management. Furthermore, optimizing renewable energy usage for regional development requires strategic prioritization of programs in the short, medium, and long term. These efforts are closely related to slum settlement management, with the ultimate goal of creating habitable living environments for the community. From the discussions above, it is clear that there is a growing trend in publications on the topic of Slum Area Management among both communities and academia.

Additionally, slum areas are a common issue faced by countries worldwide, particularly developing nations. Studies on slum settlement management from 2019 to 2023, as indexed by Scopus, indicate a consistent increase in research output. Using analysis from VOS Viewer, keywords such as development, governance, sustainability, pollution, climate change, urban development, groundwater, slum settlement, sustainable development, land use, environmental quality, water quality, water supply, density, population density, and rural areas are identified as interrelated topics. This research underscores the importance of ongoing government efforts to reduce slum settlements by collaborating with various stakeholders, including the community.

2.   Data Analysis

In the search conducted, there were 196 journal publications sourced from Scopus, producing diverse data ranging from 2013 to 2023. Given the numerous research journals published by various authors, each naturally offers different perspectives, content, and substance. Therefore, this study is designed to analyze and categorize the data obtained based on several aspects, including:

a. Year of Publication – Examining trends and shifts in research focus over the years.
b. Data Sources – Identifying the primary sources used in the studies.
c. Authors – Highlighting key contributors and their contributions to the field.
d. Affiliations – Identifying institutions associated with the research.
e. Countries with the Most Publications – Analyzing the geographic distribution of the research output.
f. Document Types – Classifying the publications into articles, reviews, conference papers, and other formats.
g. Research Fields – Determining the academic or scientific disciplines covered by the research.
h. Research Funding Sponsors – Identifying the organizations and institutions funding the studies.

This analysis provides a comprehensive overview of the research landscape, helping to understand the development, focus areas, and resources associated with publications on slum settlement management.
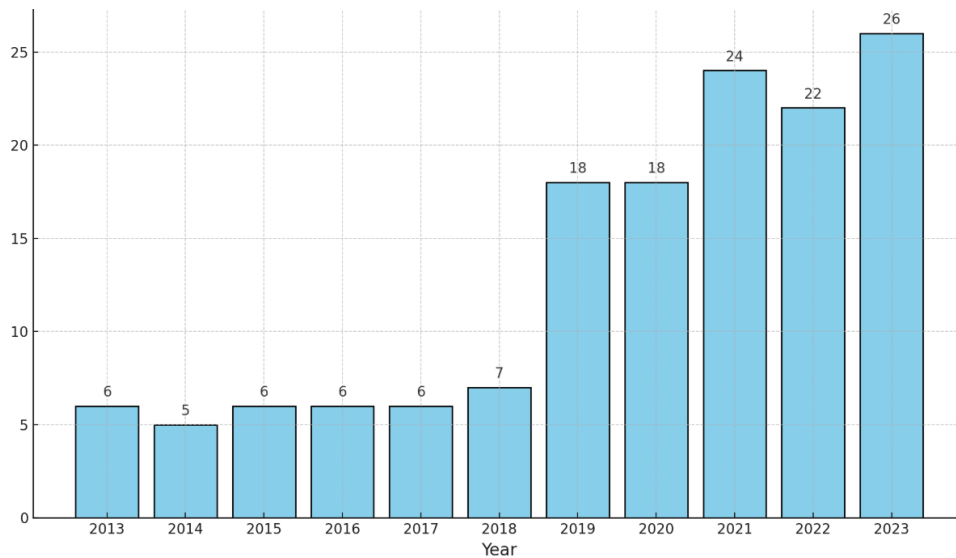
Figure 2. Publication by years
Source: Author, 2024

Figure 2 illustrates the trend of publications related to slum area management studies over the past 11 years, showing a general increase. In 2013, studies on slum area management were documented in six publications. However, this number decreased to five in 2015. From 2015 to 2017, the number of documents increased again, reaching six. A significant rise occurred in 2019 and 2020, with 18 documents published. This upward trend continued in 2021, with 24 publications recorded. Nevertheless, in 2022, the number of documents decreased slightly to 22. In 2023, the trend reversed with a further increase, reaching 26 publications.
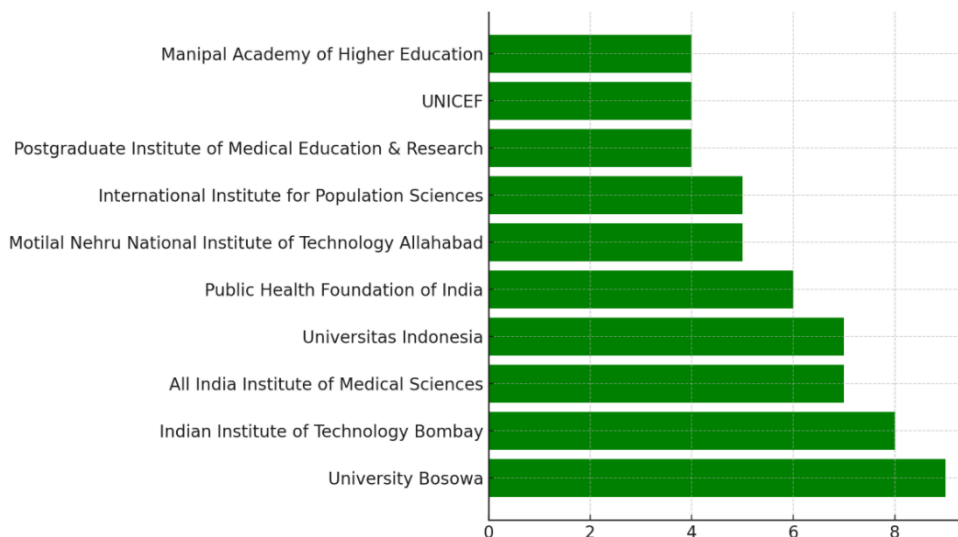
Figure 3. Publication by Affiliation
Source: Author, 2024

Figure 3 illustrates the publication by affiliation in studies on slum area management. Each affiliation presents ideas on slum areas from different perspectives. University Bosowa focuses on slum areas in Indonesian cities (Surya et al., 2021b), contributing a total of 9 documents. Meanwhile, the Indian Institute of Technology Bombay explores ideas from cities in India (Bardhan et al., 2015), also with a total of 9 documents.
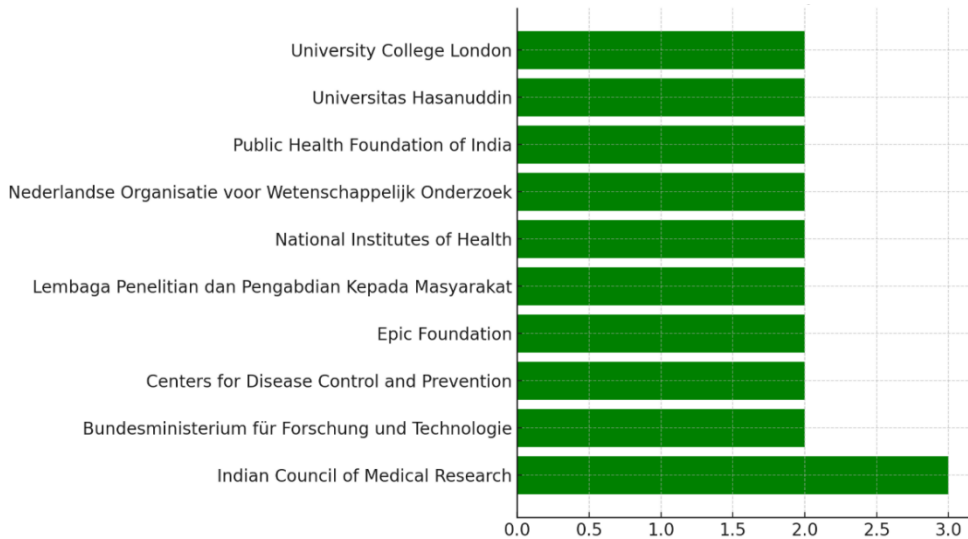
Figure 4. Publication by Funding Sponsor
Source: Author, 2024

Figure 4 illustrates that publications by funding sponsors contributed ideas related to studies on Slum Area Management. Among the total funding sponsors, each provided perspectives on slum area management from different viewpoints. The Indian Council of Medical Research contributed ideas related to slum areas in Asian countries (Pandey et al., 2023), with a total of three documents over the past 11 years. This is followed by other funding sponsors, each contributing two documents on slum area management.
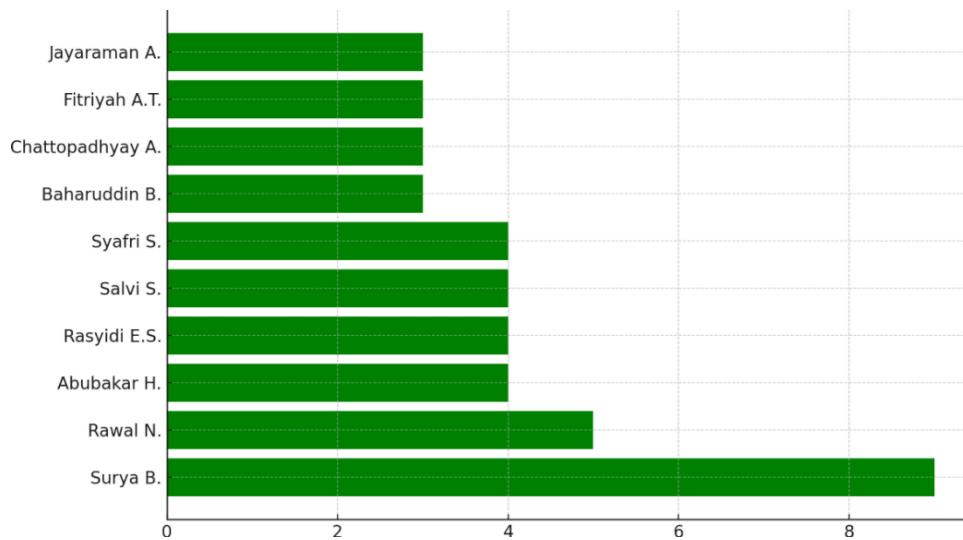
Figure 5. Publication by Author
Source: Author, 2024

Figure 5 presents the publications by authors on studies related to Slum Area Management. Each author provided perspectives on slum areas from different viewpoints. Surya contributed ideas on slum area management, specifically in cities in Indonesia (Surya et al., 2020), with a total of 9 documents. Meanwhile, Rawal N. explored slum areas in India and Bangladesh (Rawal, 2019). Next to Figure 6 illustrates the publications by subject in studies on Slum Area Management. Each subject offers perspectives on slum area management from different angles. Medicine emerges as the most frequently discussed subject related to slum area management, with a total of 70 documents. This is followed by Social Sciences, which

accounts for 49 documents on the topic. Environmental Sciences ranks third, with 38 documents addressing slum area management.
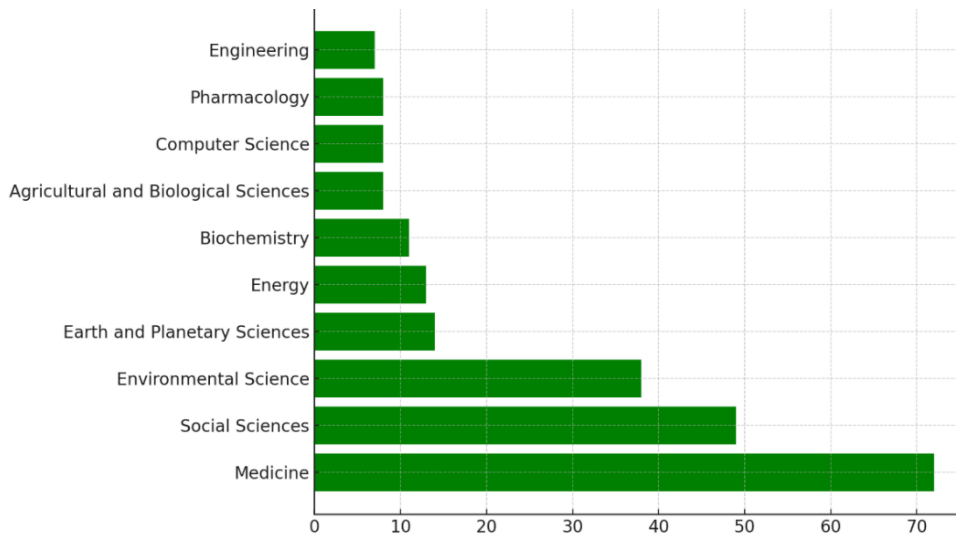

Figure 6. Publication by Subject
Source: Author, 2024

Figure 7 highlights the publications by country in studies on Slum Area Management. Over the past 11 years, India has been the leading contributor, with 108 documents addressing slum area management. This is followed by Indonesia, which has produced 37 documents on the topic. The United Kingdom ranks third, with 11 documents, followed by other countries.
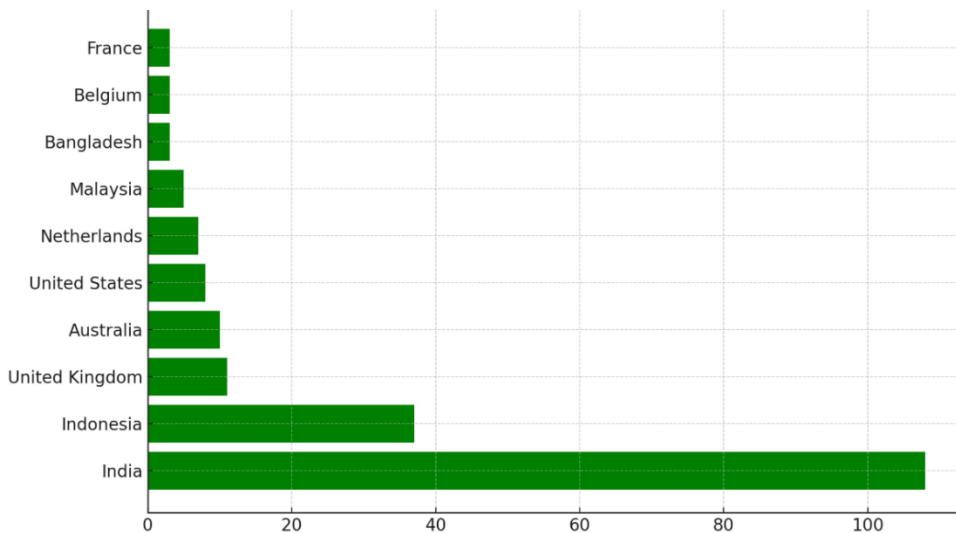

Figure 7. Publication by Country
Source: Author, 2024

Figure 8 presents publications by sources on Slum Area Management over the past 11 years. During this period, the most frequently cited source is Sustainability Switzerland, with 9 publications. In contrast, the least cited sources over the past 11 years include Environment Development and Sustainability, BMC Public Health, BMC Infectious Diseases, and the Asian Pacific Journal of Cancer Prevention, each with 2 publications. This is due to the fact that Sustainability Switzerland has a broader focus on sustainability-related issues, including urban development and management, which aligns closely with slum area management studies. Meanwhile, the other sources, such as Environment Development and Sustainability, BMC Public Health, BMC Infectious Diseases, and the Asian Pacific

Journal of Cancer Prevention, have more specialized scopes, which may limit the frequency of publications directly related to slum area management.
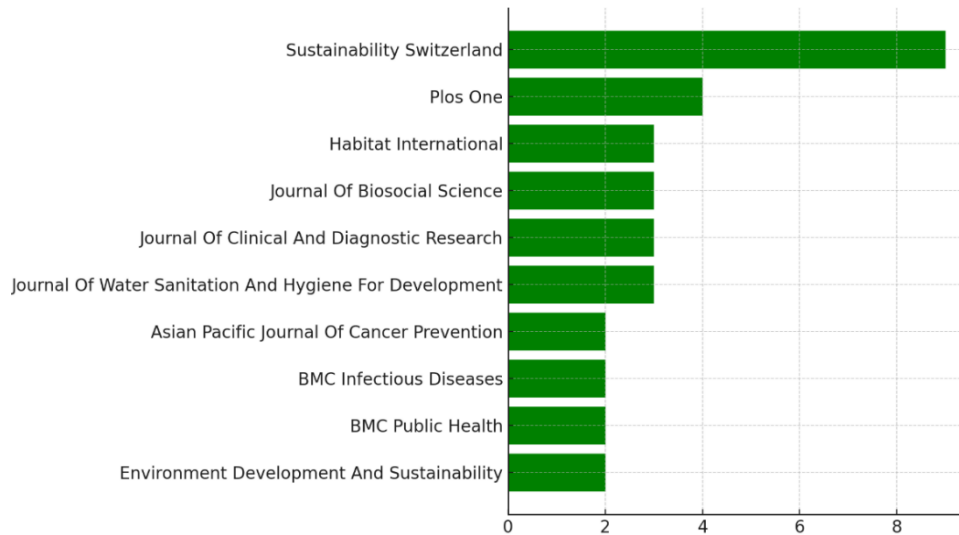

Figure 8. Publication by Sources
Source: Author, 2024

In the image above, the colors represent different clusters. Cluster 1 (red) consists of SME (Small Medium Enterprise), Sustainability, Documentation, Urban Development, Sustainable Development, Slum Settlement, and Development. Cluster 2 (green) includes Indonesia, Water Supply, Pollution, Urban Slum, and Rural Area. Cluster 3 (blue) comprises Governance, Climate Change, Knowledge, Barrier, and Term. Meanwhile, Cluster 4 (yellow) consists of India, Density, Violence, and Prevalence.
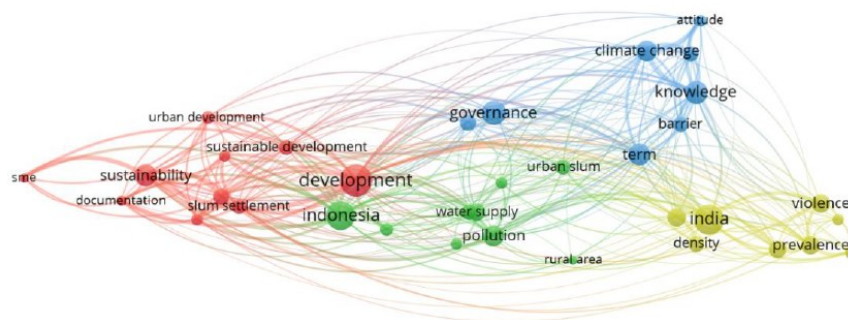

Figure 9. Network Visualization
Source: VOSviewer, 2024

These clusters are formed because each group of terms is thematically or contextually related based on their usage in literature or research. This can be explained as follows:
a. Cluster 1 (Red): This cluster encompasses terms related to development, particularly in the context of urban development and sustainability. Terms such as sustainable development, slum settlement, and documentation highlight a focus on development strategies, including sustainability and documentation, within specific regions.
b. Cluster 2 (Green): This cluster contains terms related to geographic contexts, particularly Indonesia, where issues such as water supply, pollution, urban slum, and rural area are

prominent. It emphasizes the interconnectedness between geographical location and developmental challenges associated with environmental and urbanization concerns.

c. Cluster 3 (Blue): This cluster centers around governance, which is associated with climate change, knowledge, barrier, and term. It reflects the challenges and obstacles in knowledge management and its impact on climate change governance.

d. Cluster 4 (Yellow): This cluster includes terms related to India, focusing on density, violence, and prevalence. It highlights social and demographic issues, particularly in densely populated areas such as India.

The clustering based on colors illustrates thematic relationships among the terms analyzed in the research or literature. Each cluster highlights distinct research focuses based on geographical regions (Indonesia and India), major themes such as sustainability and governance, and specific issues like urbanization, environmental challenges, and social problems.

Table 1. Clustering Word View

Cluster	Item	Number of items
Cluster 1	Community Participation, Development, Environmental Quality, Observation, Slum Settlement, SME, Sustainability, Sustainable Development, Urban Development	10
Cluster 2	Groundwater, Indonesia, Land Use, Pollution, Population Density, Rural Area, Urban Slum, Water Quality	9
Cluster 3	Attitude, Barrier, Climate Change, Governance, Knowledge, Participant, Participation, Term	8
Cluster 4	Association, Cost, Density, India, Month, Patient, Prevalence, Violence	8

Source: Author, 2024

The color codes represent different clusters, while the table highlights keywords or frequently occurring terms. Clustering is utilized to provide insights and an overview of bibliometric groupings, whereas mapping offers a comprehensive depiction of slum area management. The clusters are distinguished by specific colors: Cluster 1 (red) includes terms such as community participation, development, environmental quality, observation, slum settlement, SME, sustainability, sustainable development, and urban development. Cluster 2 (green) focuses on groundwater, Indonesia, land use, pollution, population density, rural areas, urban slums, and water quality. Cluster 3 (blue) encompasses attitude, barriers, climate change, governance, knowledge, participants, participation, and terms. Lastly, Cluster 4 (yellow) comprises association, cost, density, India, month, patient, prevalence, and violence. These clusters collectively provide a detailed perspective on slum area management and its associated themes.

The overlay visualization Figure 10 from the VOSviewer image highlights a shift in research focus related to the variable "development" over the years. From 2018 to 2020, most publications concentrated on issues such as slum settlements, urban development, and sustainability, reflecting concerns about urban challenges and the need for sustainable development. However, between 2021 and 2023, the research focus expanded to include topics like SME (Small and Medium Enterprises), Indonesia, barriers, and violence. This shift indicates a growing interest in local contexts, with Indonesia becoming a prominent focus for development discussions. The exploration of barriers points to an interest in understanding challenges in implementing development initiatives, while the inclusion of violence suggests a focus on the social impacts and inequalities related to development. Additionally, the emphasis on SMEs highlights strategies for fostering inclusive and sustainable economic growth. These changes may be attributed to evolving global and local policies, the impacts of the COVID-19

pandemic on economic and social systems, and increasing global awareness of social issues such as inequality and conflict. This visualization reflects the dynamic nature of research themes as they adapt to shifting global and local priorities in development.
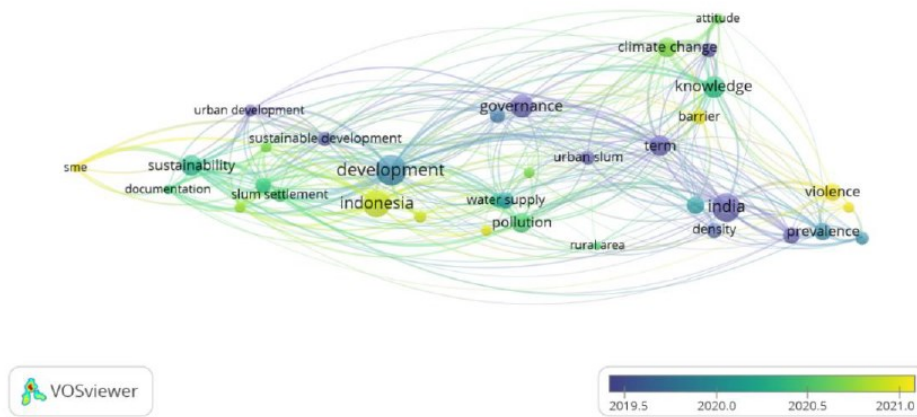

Figure 10. Overlay Visualization
Source: VOSviewer, 2024

Figure 11 above represents a term map based on bibliometric analysis, where the intensity of the color indicates the frequency of discussion on specific topics. The most prominent topics, highlighted with the brightest colors, are Indonesia, Development, and India, signifying that these themes are dominant and frequently discussed in related research or publications. Other topics, such as Climate Change, Governance, and Knowledge, are also relatively prominent but appear less intense compared to the main themes. On the other hand, topics with less vibrant colors, such as Sustainability, Slum Settlement, or Water Supply, indicate areas that are less frequently addressed. This suggests that while the primary focus of research is centered around Indonesia, Development, and India, there is room for further exploration and discussion of the less highlighted themes in future studies.
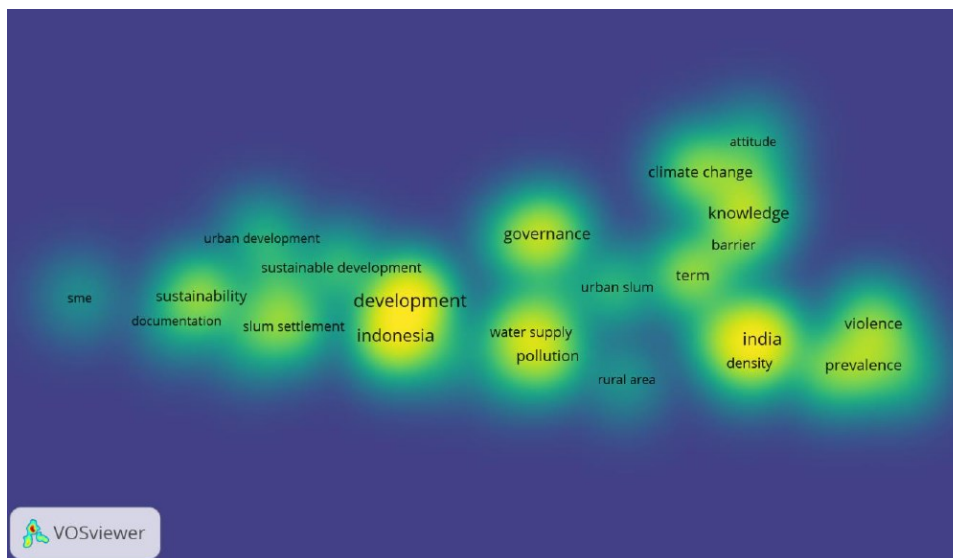

Figure 11. Density Visualization
Source: VOSviewer, 2024

The VOS Viewer analysis shows that the topic of slum area management is associated with several interconnected keywords such as development, governance, sustainability,

pollution, climate change, urban development, groundwater, slum settlement, sustainable development, urban slum, land use, environmental quality, water quality, water supply, density, population density, and rural area. This is due to the complexity and interconnection of various aspects involved in managing slum areas. This topic encompasses multiple dimensions, including governance, sustainability, environmental impacts like water quality and pollution, as well as land use planning. Additionally, issues such as climate change and population density play a significant role in slum area management, particularly in urban and rural regions. The interconnectedness of these keywords reflects that slum area management is not only a local issue but also a global challenge that involves social, economic, and environmental factors.

CONCLUSION

Based on the findings, slum settlements essentially stem from the cultural realities of a country, representing the issues faced by millions of poor individuals migrating to cities in search of better living conditions. Furthermore, this study utilized a bibliometric analysis method to evaluate research progress. A total of 196 articles were retrieved from the Scopus database, with the latest publication date up to 2023. After obtaining the data from Scopus, the next step was downloading it in RIS format for processing using VOSviewer. The data processed through VOSviewer included Network Visualization, which comprises clusters, items, and the number of items. Additionally, the data from VOSviewer provided Density Visualization, explaining terms where the color intensity in the visualization indicates the dominance of each term based on their occurrences and prevalence.

suggestions can be proposed for further research. First, research development can be achieved by incorporating other databases such as Web of Science or PubMed to enrich the data and produce more comprehensive results. Additionally, other software tools like Biblioshiny or Pajek can serve as alternatives to validate the results of bibliometric analysis and offer new perspectives on the processed data. Furthermore, subsequent research should delve deeper into the local context of each country to generate solutions that are more specific and applicable to the needs of the local community.

Research should also involve interdisciplinary collaboration across fields such as sociology, architecture, urban planning, and public policy to provide more holistic solutions. The results of this research can be utilized to support government policies or non-governmental organizations (NGOs) in designing data-driven programs to address slum settlement issues effectively. Moreover, increasing public awareness through education about the importance of habitable environments and active participation in urban planning should be prioritized as a long-term solution. With these steps, research on slum settlements is expected to have a more significant impact, both theoretically and practically.

and suggestions for improvement. Finally, the author expresses heartfelt gratitude and hopes that this study will be beneficial to all.

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