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Mapping Global Research on School Feeding: A Bibliometric Analysis of Academic and Nutritional Outcomes

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Abstract: School feeding programs (SFPs) represent a critical intersection between educational advancement and public health, offering dual benefits that address child nutrition and academic performance. Despite the growing global emphasis on SFPs, the research landscape remains fragmented, with limited synthesis of publication trends, thematic evolution, and scholarly influence. This study conducts a comprehensive bibliometric analysis using data retrieved from the Scopus database to map the intellectual structure, collaboration networks, and thematic progression of research on school feeding and its academic and nutritional outcomes. A total of twenty relevant documents were analyzed using Biblioshiny and VOSviewer software to assess publication patterns, citation metrics, co-authorship networks, and keyword co-occurrence. The findings reveal a steady increase in publications between 2022 and 2025, with Ethiopia, Brazil, and Ghana emerging as the most influential contributors. Addis Ababa University and the Federal University of Rio Grande do Norte were identified as leading institutions in this domain. Thematic mapping highlighted core research areas such as "school meals," "child nutrition," and "academic performance," alongside emerging topics like "food insecurity" and "dietary intake." Despite the increasing scholarly attention, gaps persist in longitudinal evaluations, cross-regional collaborations, and integration of psychosocial and sustainability dimensions. The study underscores the need for more interdisciplinary and context-specific research to strengthen evidence-based policymaking. By providing a comprehensive overview of the global research landscape, this bibliometric analysis contributes to a deeper understanding of how school feeding programs influence both educational and nutritional outcomes, supporting future directions in policy and academic inquiry.

Introduction

School feeding programs have emerged as a critical intersection of educational policy and public health, offering multifaceted benefits that extend beyond mere nourishment. This study conducts a comprehensive bibliometric analysis using the Scopus database to map the intellectual landscape, research trends, and scholarly impact of school feeding initiatives on academic performance and nutritional outcomes globally.

The research on school feeding and its impact on academic and nutritional outcomes was grounded in several key theoretical frameworks. The Human Capital Theory posited that investments in children's health and education, such as school feeding programs, would enhance cognitive development and long-term productivity (Becker, 1993). The Maslow's Hierarchy of Needs theory provided a psychological perspective, suggesting that basic physiological needs like hunger must be met before learners can focus on higher-level academic tasks (Maslow, 1943). Additionally, Ecological Systems Theory emphasized the influence of environmental factors—including school and community interventions—on child development and well-being (Bronfenbrenner, 1979). These theories collectively shaped the academic discourse and guided empirical inquiries into how school feeding programs influence both learning outcomes and nutritional status.

School feeding programs (SFPs) had increasingly been implemented in low- and middle-income countries as a strategic response to food insecurity, malnutrition, and to enhance educational outcomes (Wang et al., 2020; Jomaa et al., 2011). There had been a growing interest in bibliometric and systematic reviews aimed at mapping the research landscape and assessing trends and scholarly impact in this area (Wang et al., 2020). Studies had progressively shifted focus toward evaluating both academic outcomes, such as enrollment, attendance, and achievement, and nutritional outcomes, including anthropometric indicators and micronutrient status (Jomaa et al., 2011; Mohammed et al., 2023). A significant body of literature had emerged debating the effectiveness of universal versus targeted provision, with universal programs highlighted for their potential to reduce stigma and promote equity (Bliznashka et al., 2024; Tamiru et al., 2024). However, the quality and scope of evidence remained inconsistent; while many studies demonstrated improved enrollment and attendance, findings on long-term academic and nutritional benefits were often mixed due to methodological limitations (Jomaa et al., 2011; Mohammed et al., 2023; Wang et al., 2020). The effectiveness of SFPs had also been found to vary greatly depending on local context, infrastructure, food quality, and coverage, limiting the generalizability of results (Tamiru et al., 2024). Moreover, persistent resource constraints such as inadequate funding, underpayment of staff, logistical inefficiencies, and weak monitoring systems had undermined program implementation (Tamiru et al., 2024; de Dieu et al., 2023). Language and data limitations had also restricted comprehensive analysis, as many reviews only included English-language publications, potentially excluding important regional research (Bliznashka et al., 2024). Operational challenges such as poor meal quality, lack of supply chain integration, and infrastructure deficiencies had further complicated program delivery (Tamiru et al., 2024). In addition, the measurement of program impact had lacked consistency, underscoring the need for rigorous, theory-based, and long-term evaluations to inform policy and draw causal inferences (Jomaa et al., 2011). Concerns around equity also persisted, as targeted programs sometimes stigmatized recipients, while universal programs, though socially inclusive, were harder to sustain financially (Bliznashka et al., 2024). Finally, the literature had identified key research gaps, particularly in the understanding of SFPs' psychosocial impacts, long-term academic achievements, and their effects across diverse sociocultural contexts (Wang et al., 2020; Jomaa et al., 2011).

Despite the growing body of research highlighting the role of school feeding programs (SFPs) in enhancing child nutrition and academic performance, there remains a lack of comprehensive

analysis mapping the evolution, trends, and gaps within this field. While individual studies have assessed the impacts of SFPs on enrollment, attendance, and nutritional status, the global research landscape remains fragmented, with limited synthesis of how scholarly attention has developed over time and across regions. This fragmentation hinders the ability of policymakers, practitioners, and researchers to build upon existing evidence effectively. A bibliometric analysis using the Scopus database is therefore justified to systematically evaluate the volume, influence, collaboration networks, and thematic focus of research on school feeding. By identifying key contributors, publication trends, and areas of under exploration, this study will provide critical insights into the structure and progression of the academic discourse, ultimately supporting more informed, evidence-based decision-making in education and public health policy.

Literature Review

School feeding programs have been widely studied for their impact on both nutritional status and academic performance. Several studies have evaluated the impact of School Feeding Programs (SFPs) on students' academic performance and nutritional outcomes across various countries. Suarez Castro et al. (2023) assessed a Colombian SFP and found positive effects on both academic performance and short-term nutritional status (BMI-for-age) among primary school students. Similarly, Alcantara & Frontreras (2024) reported significant improvements in students' nutritional indicators and Grade Weighted Averages, reinforcing the link between nutrition and academic success. In the Philippines, Lacuarin et al. (2022) demonstrated that the School-Based Feeding Program (SBFP) integrated with the Gulayan sa Paaralan Project led to notable BMI improvements and better academic results. Gahite (2024) also found that the SBFP significantly enhanced students' learning outcomes and academic performance, with a "Very High" implementation level contributing to improvements in creativity and communication. Salazar (2022) noted a positive impact of the Addis Ababa School Feeding Program on academic performance and attendance, although no significant correlation was observed between BMI-for-age or height-for-age Z-scores and academic scores. Meanwhile, Mideksa et al. (2024) highlighted mixed outcomes from SFPs in Ethiopia, citing poor food quality and financial constraints as limiting factors. Katiso et al. (2021) recommended the implementation of SFPs in Wolaita Sodo town to enhance adolescents' nutritional status and academic outcomes through targeted interventions that improve cognitive functions.

Other studies further support the academic benefits of school feeding initiatives. DEMERIN (2023) emphasized that well-managed programs positively influence learners' academic performance by ensuring food safety and nutrition. Although Metwally et al. (2020) found no significant nutritional changes between intervention and control groups, their study showed that school feeding strongly predicted academic achievements, especially in visual memory and auditory vigilance. Барнабас et al. (2024) reported improved enrollment and attendance due to SFPs, although academic performance did not show significant changes, likely due to sample size or program duration. Zenebe et al. (2018) found significant improvements in nutritional status and reduced dropout rates, while Zeru et al. (2018) recommended initiating school meals to address high malnutrition levels and support educational outcomes. In Ghana, John (2024) observed enhanced attendance and performance among beneficiaries of daily school meals. Mohammed et al. (2023) highlighted improved academic performance from feeding programs, though without assessing nutritional impacts. Egede (2021) linked improved eating habits from feeding initiatives to better academic achievement in rural areas. Lastly, Nsabimana & Mugiraneza (2024) found a moderate positive correlation between feeding programs and mathematics performance, suggesting possible nutritional influence, although direct nutritional data was not measured.

According to Jauhar et al. (2025), such programs are positively associated with cognitive function and academic outcomes, largely due to the provision of adequate nutrition. A diet rich in both macro and micronutrients is essential for cognitive development, while poor nutritional status

negatively affects children's cognitive abilities and school achievements. Appiah (2024) supports this view, emphasizing that improved nutritional status enhances cognitive functions and concentration, which in turn leads to better academic performance. By alleviating hunger, school feeding programs also boost student attendance and engagement, contributing significantly to educational progress in Ghana. Similarly, Njumwa and Solomon (2024) argue that the availability of resources for school feeding programs is crucial for improving pupils' academic outcomes, with positive implications for their nutritional status as well. Demilew and Nigussie (n.d.) note that school feeding programs help prevent thinness among students, a key indicator of under nutrition, which is closely linked to academic performance. This underscores the importance of implementing such programs, especially in schools lacking adequate nutritional support. In crisis settings, Chol et al. (2024) demonstrate that school feeding programs not only address learners' nutritional needs but also improve enrolment and academic performance, particularly in emergency-prone areas like Twic East County, South Sudan. Matemba and Sulu (2024) further highlight how enhanced nutritional status through feeding programs contributes to better health and cognitive function, thereby reducing absenteeism, increasing participation, and fostering greater enrollment and retention rates. Tablante and Cadorna (2021) report that School-Based Feeding Programs significantly rehabilitate the nutritional status of beneficiaries, increase classroom attendance, and improve health behaviors. These improvements correlate with higher academic performance, including decreased dropout rates, increased promotion, and reduced repetition over a three-year period. Baldago et al. (2024) also confirm that school feeding improves both nutritional support and reading performance among Grade IV pupils, with effective program management playing a key role in academic success.

Abizari et al. (2014) suggest that while school feeding programs improve energy and nutrient intakes, they do not always result in measurable changes in nutritional indicators or academic performance, implying that cognitive and academic improvements depend on actual nutritional outcomes. Jomaa et al. (2011) agree that school feeding positively affects nutritional status and academic performance by enhancing energy intake and micronutrient levels, improving enrollment and attendance, and yielding consistent benefits in arithmetic achievement, although effects on literacy remain unclear. Tabunda et al. (2016) highlight that malnutrition is associated with poor academic outcomes, high absenteeism, and dropout rates. Their study finds that School-Based Feeding Programs aim to reverse these trends by improving nutritional status among elementary pupils, with positive feedback from both students and teachers. Obembe et al. (2024) focus on Nigeria's National Home-Grown School Feeding Programme, noting its potential to improve nutritional status, although its direct effect on academic performance remains unassessed. Kwabla et al. (2018) emphasize that childhood malnutrition detracts from academic aptitude. Although school feeding programs are designed to address this, their impact remains inconclusive, warranting further evaluation. Bouchefra et al. (2024) stress the influence of nutritional status—especially obesity—on academic performance, suggesting that targeted school feeding initiatives could improve health and educational outcomes. Maijo (2018) finds that school feeding programs enhance academic performance through improved attendance and examination scores, although they do not directly address nutritional outcomes. Ahmad et al. (2022) explore the link between malnutrition and poor academic performance among children from lower socioeconomic backgrounds, arguing for school feeding as a strategic intervention to bridge this gap.Awojobi (2019) supports the positive role of the Ghana School Feeding Programme in enhancing both nutritional status and academic performance, citing increased enrolment and retention. However, the study also notes variability in health outcomes due to inconsistent meal quality. Adrogué and Orlicki (2013) analyze Argentina’s in-school feeding initiative, finding partial academic gains, particularly in Language scores, while highlighting its limited impact on home-based nutritional deficits. Bukari et al. (2015) provide evidence from the Garu-Tempane District, establishing a

causal link between improved nutritional status from school feeding programs and enhanced academic performance, especially in food-insecure regions.

Chepkwony et al. (2013) indicate that the SFP positively influences academic achievement among Early Childhood Development (ECD) children in both public and private schools in Kenya, suggesting a link between improved nutritional status and enhanced academic outcomes. Similarly, Ibok (2021) asserts that SFPs enhance academic performance by addressing hunger, thereby improving concentration and learning ability, although this study does not directly explore the nutritional status of pupils in relation to academic outcomes. Lu and Dacal (2020) report that school-based feeding programs significantly improve both physical growth and academic performance, using indicators such as body mass index and general weighted averages before and after program implementation. Though not centered on school feeding, Akubuilo et al. (2020) emphasize that nutritional status is a critical factor influencing IQ and academic performance, suggesting that enhanced nutrition may boost educational outcomes for primary school children. In the context of Tanzania, Chaula (2015) found that SFPs positively influence academic performance, mainly through increased enrolment and attendance, though the study does not specifically address nutritional status.

In Ethiopia, Assefa (2019) focuses on how SFPs impact academic performance, particularly attendance rates, without directly examining the nutritional aspects. Deepthi (2017) found that India's SFPs improved nutritional status and academic outcomes, boosting enrolment and completion rates, though statistically significant anthropometric improvements were not observed for either gender. In contrast, Leão et al. (2018) raise concerns about the nutritional adequacy of school feeding menus, indicating that poorly planned meals may adversely affect student growth and learning, thereby undermining the right to adequate food.Further supporting the nutritional benefits of SFPs, Fatema et al. (2023) observed a lower prevalence of stunting and underweight among SFP participants, implying a potential link between improved nutrition and academic performance, although this connection is not explicitly analyzed. Finally, Nkhoma et al. (2013) demonstrate that the Malawian SFP enhances nutritional status—evidenced by increased mid-upper arm circumference (MUAC)—and improves academic performance through better cognitive outcomes, especially in tasks like reversal learning, when compared to non-SFP schools.

Objective

The objective of this study is to conduct a comprehensive investigation into the publication trends and patterns within the field of school feeding programs, with a particular focus on their academic and nutritional dimensions. Specifically, the study seeks to identify the most influential authors, institutions, and countries contributing to this domain, thereby elucidating the intellectual structure and scholarly networks that shape the evolution of research in this area. Additionally, it aims to highlight critical research gaps and underexplored themes that warrant further academic inquiry. Through this bibliometric analysis, the study endeavors to provide an evidence-based overview of the global research landscape on school feeding programs, thereby informing future scholarship and guiding policy formulation toward enhancing educational attainment and nutritional well-being among school-aged children.

Research Methodology

Bibliometric analysis is a quantitative research method used to assess and map scholarly literature through measurable indicators such as publication volume, authorship, citation patterns, and keyword occurrences. It enables researchers to identify key trends, influential authors, collaborative networks, and emerging themes within a research domain. This methodology is widely applied in library and information science, health research, and policy studies to evaluate the development and diffusion of scientific knowledge over time.

In this research, the topic chosen was school feeding and its dual impact on academic performance and nutritional outcomes. The data were obtained from www.scopus.com, one of the largest and most trusted databases for scientific publications.

To carry out the bibliometric analysis, the process involved several steps: determining appropriate keywords, filtering search results, and downloading data. The selected keywords were "school feeding"**,** "academic performance"**,** and "nutritional outcomes", which were entered in the TITLE-ABS-KEYfield of the Scopus database to capture publications that address both educational and health dimensions of school feeding programs. No filters were applied in order to ensure a comprehensive dataset.

Search results were downloaded in two formats: CSV and RIS. The CSV file contained bibliographic metadata such as title, authors, affiliations, publication year, source, abstract, and keywords, while the RIS file included detailed reference information, including citation data. These files formed the basis for the subsequent analysis.

Data Source

The data used for this study were derived from two curated CSV files that contain bibliographic metadata of journal articles focused on school health, nutrition, and related policy themes. These records were originally exported from a reference management system, ensuring structured and detailed entries. The files included essential fields such as author names, article titles, publication year, journal names, keywords, abstracts, digital object identifiers (DOIs), and citation notes. The dataset spans publications from 2022 to 2025, representing recent contributions to the field.

Data Collection

We used the following terms to do a search on the Scopus website, taking into consideration that this website contains research that is considered to be valid: TITLE–ABS–KEY (school feeding) AND TITLE – ABS – KEY (academic performance). Twenty documents were received by us. Then we save the document from Scopus in the form of a file with the extension.csv following this step. All bibliographic entries were screened and merged into a single dataset. Duplicate records were identified and removed to avoid data redundancy.

Data Analysis

The data analysis for this study employed a systematic bibliometric approach, integrating both quantitative and visualization techniques to evaluate the structure, development, and scholarly impact of research on school feeding programs. Two specialized software tools—Biblioshiny, an R-based web interface of the *bibliometrix* package, and VOSviewer—were utilized to perform complementary analyses, each providing distinct yet interconnected insights into the bibliometric landscape.

Results

Figure 1: word cloud

The word cloud illustrates the central themes in the scholarly literature concerning school feeding programs. The most prominent terms include "human," "child," "adolescent," "school feeding," "school," "humans,"and"article,"indicating that much of the research is focused on human subjects, particularly children and adolescents, in the context of school-based nutrition interventions. Terms like "food security," "meals," "nutritional status," "academic achievement," and "cross-sectional study" suggest a strong emphasis on how school meals impact both nutritional outcomes and educational performance. Other notable terms such as "controlled study," "malnutrition," "dietary intake, "and" coronavirus disease 2019"point to methodological diversity and contextual factors influencing recent research, include the impact of COVID-19. This word cloud effectively highlights the multidisciplinary and policy-relevant nature of the field.

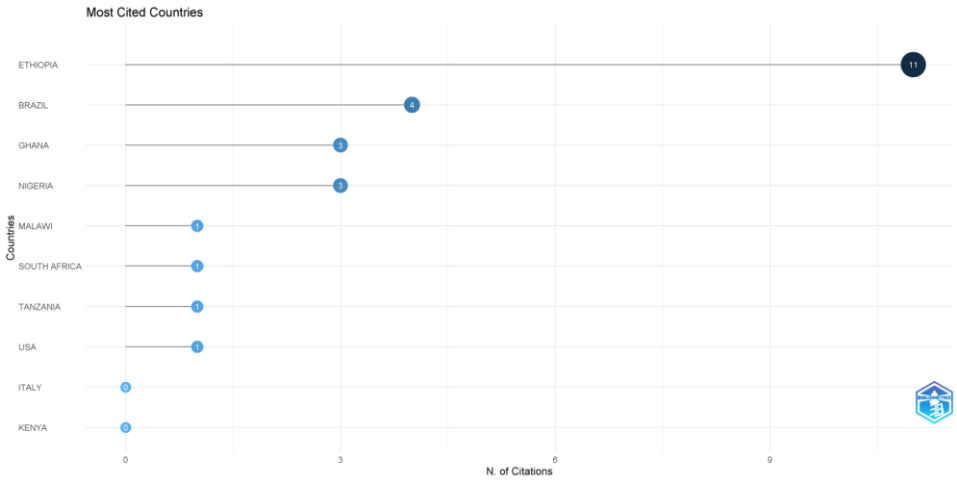

Figure 2: Most cited Countries

This figure titled "Most Cited Countries" displays the number of citations received by scholarly articles on a specific topic, likely related to school feeding and nutrition, categorized by country. The bar plot shows citation impact per country, providing insight into which nations are contributing most influentially to the academic discourse.

The figure highlights Ethiopia as the most cited country in the field, with 11 citations, indicating a significant contribution and influence in research related to school feeding or nutrition. Brazil follows with 4 citations, while Ghana and Nigeria each have 3 citations, reflecting moderate levels of scholarly impact. Countries like Malawi, South Africa, Tanzania, and the USA each have 1 citation, suggesting emerging or limited citation impact. Italy and Kenya, despite being part of the dataset, have no citations, implying either limited research output or lesser influence in this specific domain. This distribution indicates that African nations, particularly Ethiopia, are at the forefront of impactful research on this topic.

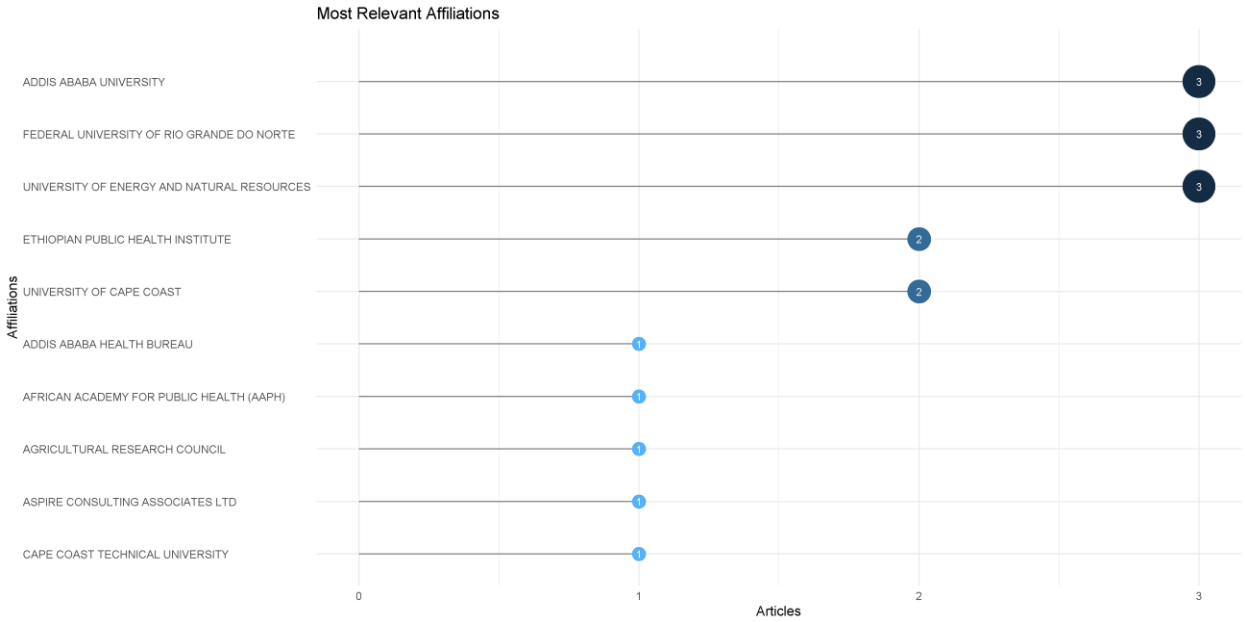

Figure 3: Most Relevant Affiliations

Figure 3 titled "Most Relevant Affiliations" presents a bar chart highlighting the academic and research institutions that have contributed the highest number of publications in the domain of interest—likely school feeding and nutrition programs.

The figure identifies the most active institutions in publishing research related to school feeding. Addis Ababa University (Ethiopia), Federal University of Rio Grande do Norte (Brazil), and the University of Energy and Natural Resources (Ghana)each lead withthreepublications, indicating their pivotal roles in advancing knowledge on this subject. Following them are the Ethiopian Public Health Institute and the University of Cape Coast (Ghana)with two articles each, reflecting a strong national research commitment in Ethiopia and Ghana. Several other institutions, including the Addis Ababa Health Bureau, African Academy for Public Health (AAPH), and the Agricultural Research Council, each contributed one publication, showing broader but less frequent engagement from other stakeholders. This distribution reveals a geographically diverse collaboration in school nutrition research, with a strong representation from African and South American institutions.

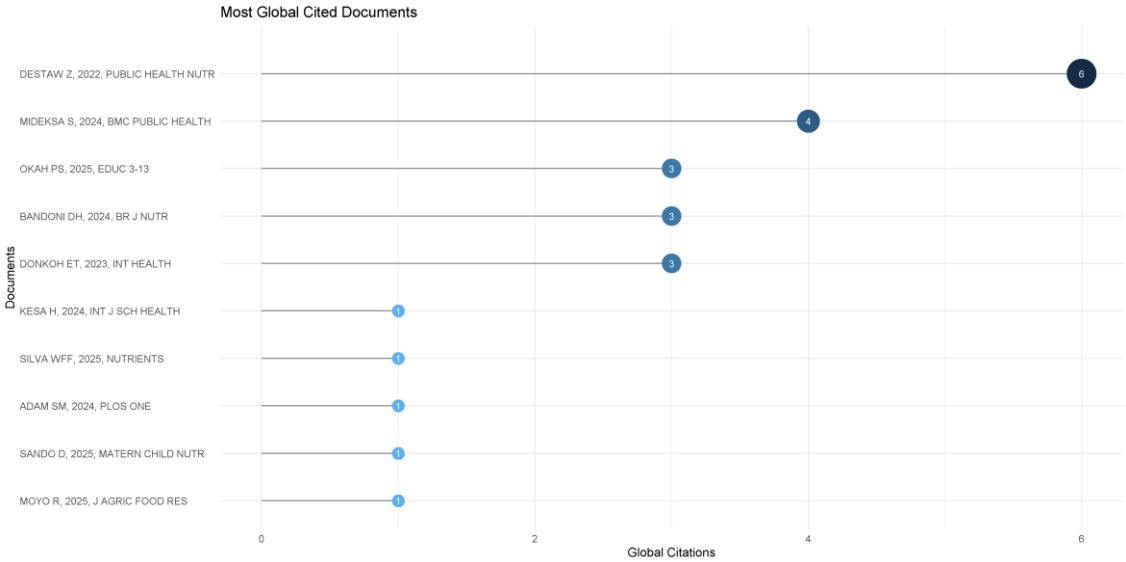

Figure 4: Most Global Cited Documents

Figure 4 titled "Most Global Cited Documents" displays a bar chart ranking the top scholarly documents in the domain (likely school feeding and nutrition) based on their number of global citations. It reveals which individual publications have had the greatest impact in terms of being referenced by other studies.

The most cited document globally is Destaw Z., 2022, in *Public Health Nutrition*, which has received 6 citations, indicating its high impact and recognition within the research community. This is followed by Mideksa S., 2024, in *BMC Public Health* with 4 citations, and three other publications—Okah PS (2025), Bandoni DH (2024), and Donkoh ET (2023)—each receiving 3 citations. These studies are likely foundational or highly relevant within the research theme.

Other documents listed, including works by Kesa H (2024), Silva WFF (2025), Adam SM (2024), Sando D (2025), and Moyo R (2025), have received 1 citation each, suggesting their potential growing relevance or recent publication status.

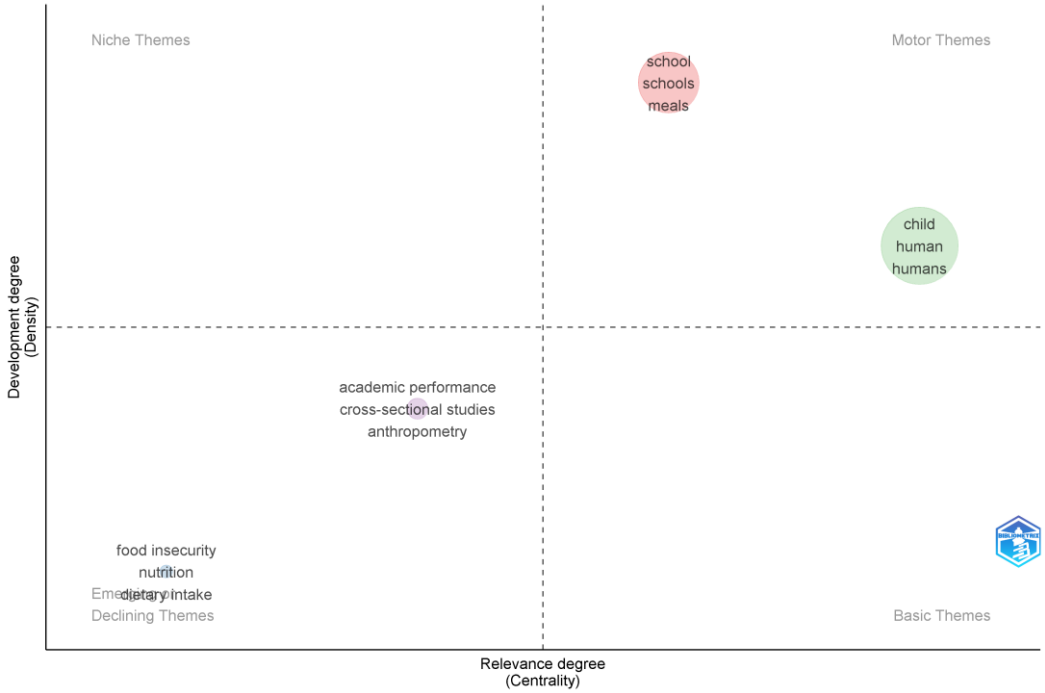

Figure 5: Thematic Map

The thematic map presented in the figure categorizes the research themes related to school feeding and its academic and nutritional impacts based on two dimensions: development degree (density)andrelevance degree (centrality). The upper right quadrant, representing motor themes, includes clusters such as "school," "schools," and "meals," indicating these are both highly developed and central to the research field. These themes are driving the research agenda and show strong internal development and external relevance.

In the lower right quadrant(basic themes), "child," "human," and "humans"emerge as foundational and frequently occurring concepts. While they are central to the research domain, their internal development is relatively low, suggesting they are widely used but less specialized or theoretically advanced.

The lower left quadrant identifies emerging or declining themes, such as "food insecurity,""nutrition," and "dietary intake." These topics currently have low centrality and density, implying either a nascent or diminishing focus in recent literature. This signals potential areas for renewed attention or innovation in future research.

The central bottom quadranthouses"academic performance," "cross-sectional studies," and "anthropometry," reflecting themes of moderate development and lower relevance. These may represent supporting or background areas that are methodologically important but not the primary drivers of research in this domain.

Overall, the map demonstrates that while core discussions are well-developed around school-based meal programs, there is opportunity for further exploration in linking these programs more robustly with nuanced nutritional outcomes, educational metrics, and food security concerns.

Figure 6: Trend Topics

Figure 4 titled "Trend Topics" illustrates the evolution and frequency of key terms used in the scholarly literature over time—specifically between 2024 and 2025. The bubble size represents term frequency, while the position on the timeline indicates when the terms appeared most prominently.

The trend topic analysis shows that foundational terms such as "human," "child," and "humans" had high frequency (indicated by large bubbles) and appeared prominently in the literature around 2024. These terms reflect the demographic focus of the research on school feeding—primarily children and human health.

More recent trends in 2025 show a shift in focus toward implementation and program-related terms such as "school feeding," "school meals," and "article". Although these terms have slightly lower frequency than the foundational terms, their positioning indicates growing research interest in intervention strategies, policy, and publication trends.

This suggests a transition from demographic analysis to applied research on school-based nutrition programs and their impact.

Figure 7: Co-authorship network visualization

Figure 7 presents a co-authorship network visualization created using VOSviewer, illustrating the collaborative relationships among authors in the selected body of literature. Each node represents an individual author, and the size of the node corresponds to the author's publication frequency or prominence within the dataset. Lines connecting nodes indicate co-authorship links, while clusters of similar colors represent groups of authors who frequently collaborate. For instance, distinct clusters such as the red, green, and blue groups reflect localized collaboration networks, with authors like *mannara c*, *njue lg*, and *teshoma ms* showing strong intra-group connections. Some authors, such as *donkoh et* and *adjei d*, appear centrally positioned within their clusters, suggesting potential bridging roles between researchers. The spatial separation between clusters implies relatively limited collaboration across groups, highlighting opportunities to foster greater interdisciplinary or cross-institutional research efforts. Overall, the figure provides insights into the structure and dynamics of academic collaboration within the research area.

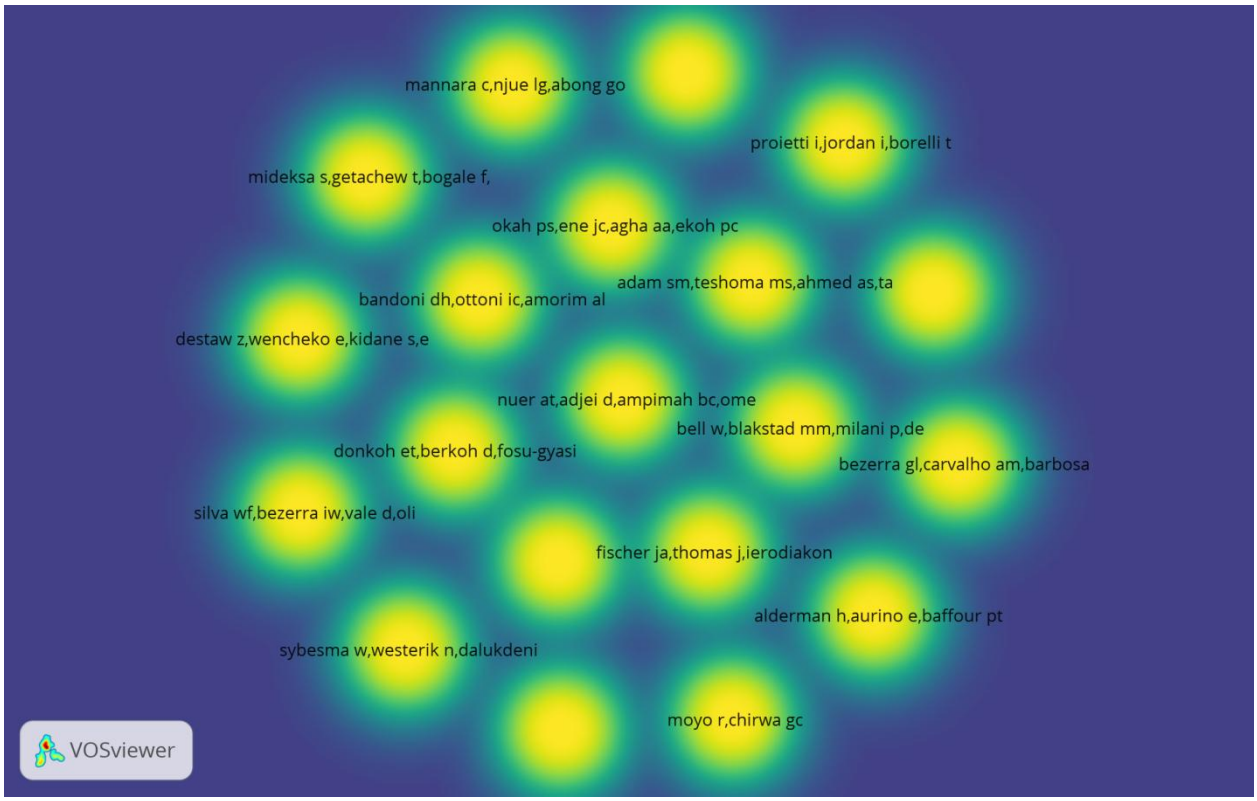

Figure 8: Co- authorship density visualization

Figure 8 displays a co-authorship density visualization created using VOSviewer, illustrating the concentration and collaborative intensity among researchers in the analyzed dataset. In this map, each label corresponds to an individual author, while the color intensity (from blue to green to yellow) indicates the **density of co-authorship links**—with yellow representing areas of higher collaboration intensity. Dense clusters are seen around authors such as *donkoh et*, *bandoni dh*, *teshoma ms*, and *adjei d*, indicating these individuals are central to collaborative networks within the field. Conversely, authors such as *sybesma w*, *moyo r*, and *proietti i* appear in less dense regions, suggesting fewer or more isolated co-authorship links. The visualization highlights not only the key contributors and collaboration hubs in the field but also reveals opportunities for strengthening interdisciplinary or inter-institutional collaboration by connecting currently isolated authors or clusters.

Conclusion

This study presents a rigorous bibliometric analysis of the global research landscape surrounding school feeding programs and their impact on academic and nutritional outcomes, drawing on data from the Scopus database. The findings underscore the central role that school feeding programs play in advancing educational access and child health, particularly in low- and middle-income countries. Using visualization tools such as VOSviewer and Biblioshiny, this analysis has highlighted key trends, influential authors, leading institutions, and dominant research themes, offering valuable insights into how the field has evolved in recent years.

Despite the considerable growth in scholarly interest, the analysis revealed several gaps and challenges that persist in the implementation and study of school feeding programs. Notably, methodological inconsistencies, regional disparities, and language biases limit the generalizability and applicability of many findings. Furthermore, operational issues—such as funding shortages, poor infrastructure, and fragmented data systems—continue to undermine program effectiveness. The lack of standardized impact assessments and long-term studies further complicates the ability

to draw causal inferences about the relationship between school feeding and improved learning outcomes.

Moving forward, a more interdisciplinary and globally inclusive research approach is essential. Future studies should prioritize theory-driven, context-specific, and longitudinal analyses that explore not only academic performance and nutrition but also psychosocial development, equity, and sustainability. Strengthening cross-border collaborations, diversifying data sources, and investing in robust monitoring and evaluation frameworks will be key to unlocking the full potential of school feeding programs. By addressing these research and policy gaps, the global community can better leverage school feeding as a strategic tool for educational success and public health advancement

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