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Mapping School Health Nursing Models and Implementation Strategies in Low- and Middle-Income Countries: A Joanna Briggs Institute Scoping Review

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Abstract

Background

School health services provide an important platform for promoting child and adolescent health and improving educational outcomes. School nurses play a central role in delivering these services through health promotion, disease prevention, care coordination, and management of acute and chronic health conditions. However, the implementation of school health nursing services in low- and middle-income countries (LMICs) is challenged by workforce shortages, resource constraints, and limited policy and governance structures. Furthermore, evidence on school health nursing models and implementation strategies in LMICs remains fragmented.

Objectives

This scoping review aims to map and examine school health nursing models implemented in LMICs, particularly in primary school settings. It explores their characteristics, workforce and governance structures, implementation strategies, barriers, facilitators, outcomes, and evidence gaps to inform future policy, practice, and research.

Methods

PubMed/MEDLINE, Scopus, EBSCOhost, and Google Scholar were searched for studies on school health nursing models in LMICs. Two reviewers independently screened studies, extracted data, and assessed methodological quality. The search identified 590 records, of which 10 studies met the inclusion criteria after screening and full-text review.

Results

Ten studies from six LMICs were included. Three model types were identified: non-specialist workforce models, visiting nurse models, and integrated multi-sector programs. No study documented a permanently embedded school nurse model. Service delivery was predominantly limited to health education, with clinical services, reproductive health, and mental health components largely absent. Universal barriers included workforce shortages, funding dependency, and fragmented governance, while joint ministerial coordination and international partnerships emerged as key facilitators.

Conclusion

School health nursing in LMICs remains critically underdeveloped, with no evidence of sustainable nurse-led models in any included setting. Coordinated policy commitment, recurrent financing, and intersectoral governance are essential to advance nurse-integrated school health delivery in low- and middle-income countries.

1. INTRODUCTION

1.1 Global Importance of School Health Services

Schools are among the most extensive and sustained platforms through which health systems can reach children and adolescents [1]. Globally, approximately one-quarter of the population comprises school-aged children and adolescents, many of whom face significant health challenges, including infectious diseases, malnutrition, mental health disorders, injuries, and sexual and reproductive health concerns [1, 2]. These health conditions can adversely affect educational participation, academic performance, and long-term health outcomes.

Given the substantial influence of health on learning, development, and lifelong well-being, schools have increasingly been recognized as strategic settings for the delivery of health services and health promotion interventions. Recognizing the interdependence, the WHO Guideline on School Health Services recommends the implementation of comprehensive School Health Services (SHS), identifying schools as a critical setting for achieving equitable access to health care for children and adolescents [1].

Beyond the provision of health services, schools are increasingly viewed as environments that can actively promote health and well-being. The WHO's Global School Health Initiative, launched in 1995, formalized this recognition by promoting the Health Promoting Schools (HPS) approach, which conceptualizes the school not merely as an educational institution but as a setting for comprehensive health promotion encompassing curriculum, school ethos and environment, and engagement with families and communities [3]. Evidence indicates that well-designed school health programs contribute to improved health literacy, reduced absenteeism, enhanced academic achievement, early detection of health conditions, and healthier lifelong behaviors [1, 3, 4]. Furthermore, school health services support progress toward Universal Health Coverage and the Sustainable Development Goals, particularly SDG 3 (Good Health and Well-being) and SDG 4 (Quality Education), by addressing health inequities and promoting healthy development among young populations [4].

1.2 Role of School Nurses in Child and Adolescent Health

School nurses are central to the delivery of school health services and play a critical role in promoting the health, well-being, and educational success of children and adolescents [5]. The National Association of School Nurses (NASN) defines school nursing as a specialized practice of professional nursing that advances students' wellbeing, academic success, and lifelong achievement by facilitating positive responses to normal development, promoting health and safety, intervening in actual and potential health problems, providing case management, and building student and family capacity for self-management and advocacy. The Framework for 21st Century School Nursing Practice operationalizes this definition around five interlocking principles, namely care coordination, leadership, quality improvement, community and public health, and standards of practice, positioning the school nurse as both a direct care provider and a systems-level coordinator [6].

School nurses perform a wide range of functions, including health screening, management of acute and chronic conditions, health education, referral coordination, and safeguarding of children [7]. Evidence suggests that school nursing services contribute to improved health outcomes, increased school attendance, better management of chronic illnesses such as asthma and diabetes, and enhanced academic performance [6]. School nurses also play an essential role in safeguarding children, supporting immunization programs, responding to public health emergencies, and fostering healthy school environments. During recent public health crises, including the COVID-19 pandemic, school nurses were instrumental in disease surveillance, health communication, and implementation of infection prevention measures within schools [1]. Although these roles are well documented in high-income countries, they are equally relevant in low- and middle-income countries (LMICs), where school nurses can help bridge gaps in access to child and adolescent healthcare services [8].

1.3 Challenges of School Health Service Delivery in LMICs

Despite growing recognition of the importance of school health services, substantial challenges remain in their implementation across low- and middle-income countries (LMICs). Many LMICs face shortages of trained healthcare personnel, inadequate funding, weak health infrastructure, and competing public health priorities, which collectively limit the delivery of comprehensive school health programs [1, 9]. As a result, school health activities are often delivered intermittently by teachers or visiting health workers rather than dedicated school health professionals, leading to inconsistent service quality and coverage.

The availability and integration of school nurses vary widely across LMICs. Many countries lack formal school nursing policies, standardized service models, or clearly defined professional roles within school health systems. Additional barriers include high student-to-nurse ratios, limited training opportunities, weak intersectoral collaboration between health and education sectors, and urban–rural disparities, all of which constrain effective service delivery [10]. These challenges limit the capacity of school health programs to address emerging priorities such as mental health, non-communicable diseases, reproductive health needs, and broader health inequities.

1.4 Existing Evidence and Knowledge Gaps

The global literature demonstrates increasing interest in school health services and school nursing practices. Previous studies have examined the effectiveness of school-based health interventions, the impact of school nurses on student health outcomes, and the implementation of health-promoting school initiatives in various contexts [1, 6]. However, much of the existing evidence originates from high-income countries, where school nursing is relatively well established and supported by formal policies and professional frameworks.

In contrast, evidence regarding school nursing models and implementation strategies in LMICs remains fragmented and dispersed across different disciplines, countries, and programme contexts. Existing reviews have largely focused on specific health interventions, individual disease programs, or general school health initiatives rather than the organization, delivery models, workforce structures, and implementation approaches used by school nurses in resource-constrained settings. Consequently, there is limited understanding of how school nursing services are structured, the roles nurses perform, the contextual factors that influence implementation, and the strategies employed to overcome operational challenges in LMICs. Mapping the available evidence is therefore necessary to identify current practices, implementation approaches, and priority areas for future research and policy development. A scoping review is needed to systematically map existing models and identify key evidence gaps to inform policy, practice, and future research [11].

1.5 Rationale for the Scoping Review

Given the growing emphasis on school-based health services as a strategy for improving child and adolescent health, there is a need to understand better how school nursing services are organized and implemented in low- and middle-income countries. Variations in healthcare systems, educational structures, workforce capacity, and resource availability may influence the design and effectiveness of school nursing models across different contexts. However, the current evidence base remains fragmented, making it difficult for policymakers, practitioners, and researchers to identify effective approaches and implementation strategies.

A scoping review is particularly appropriate because it allows for the systematic mapping of diverse evidence, including different service delivery models, nursing roles, implementation strategies, facilitators, barriers, and contextual factors. Consistent with the Joanna Briggs Institute methodology, this review provides a comprehensive overview of the available literature, identify gaps in knowledge, and inform future research, policy development, and program planning related to school nursing services in LMICs.

1.6 Review Objectives

- To map and examine school health nursing models implemented in low- and middle-income countries (LMICs), particularly within primary school settings.
- To explore the characteristics, workforce structures, governance models, implementation strategies, and service delivery components of school health nursing models in LMICs.
- To identify reported barriers, facilitators, outcomes, and evidence gaps related to the implementation and sustainability of school health nursing models in LMICs.

2. METHODS

2.1 Study Design

This scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines (Appendix I). A scoping review approach was considered appropriate because evidence regarding school health nursing models in low- and middle-income countries (LMICs) is heterogeneous in terms of concepts, study designs, implementation approaches, and outcomes.

2.2 Eligibility Criteria

The review considered studies involving school-aged children, adolescents, school nurses, public health nurses, community nurses, teachers, school health personnel, and other stakeholders involved in school health service delivery. The concept of interest was school health nursing models, including nurse-led school health programs, school-based health services, implementation frameworks, workforce structures, governance arrangements, and service delivery approaches involving nursing or school health personnel. The review focused on studies conducted in low-, lower-middle-, and upper-middle-income countries as classified by the World Bank. School-based health programs implemented in primary, secondary, or mixed educational settings were eligible for inclusion. Quantitative, qualitative, mixed-methods, implementation, program evaluation, methodological, and policy-related studies published in English were included. Editorials, commentaries, conference abstracts, and studies lacking sufficient methodological detail were excluded.

2.3 Search Strategy

A comprehensive search strategy was developed based on key concepts related to school health services, school nursing, implementation models, and LMIC settings. ("School Health Services"[Mesh] OR "school health services" OR "school nursing" OR "school nurse*" OR "school health program*" OR "school health model*" OR "school-based health" OR "school-based healthcare" OR "school health intervention*" OR "school health framework*") AND (model* OR framework* OR program* OR intervention* OR implementation OR "governance structure*" OR "service delivery" OR "workforce configuration*" OR "nurse-led") AND ("Developing Countries"[Mesh] OR "low-income countr*" OR "middle-income countr*" OR LMIC* OR "developing countr*" OR "resource-limited setting*" OR "resource-constrained setting*") AND (child* OR adolescent* OR student* OR "primary school*" OR "elementary school*")

Electronic searches were conducted in PubMed/MEDLINE, Scopus, EBSCOhost databases, and Google Scholar. These databases were selected to ensure broad coverage of nursing, public health, educational, and interdisciplinary literature relevant to school health services.

2.4 Study Selection Process

All records identified through the search strategy were exported to reference management software for organization and duplicate removal. Following deduplication, citations were uploaded into the Rayyan software to facilitate the screening process. Two reviewers independently screened titles and abstracts against the predefined eligibility criteria. Articles considered potentially relevant by either reviewer were retrieved for full-text assessment. Full-text articles were independently reviewed by the same two reviewers to determine their eligibility based on the Population–Concept–Context (PCC) framework and the established inclusion and exclusion criteria.

Any disagreements arising during title and abstract screening or full-text review were resolved through discussion between the reviewers. Where consensus could not be reached, a third reviewer was consulted to make the final decision. Studies meeting all eligibility criteria were included in the final review and proceeded to data charting and synthesis.

2.5 Data quality and synthesis

Data was charted using a standardized extraction form developed in accordance with JBI guidance. Information extracted included study characteristics, country, income classification, study design, school setting, population, school health model type, workforce composition, implementation strategies, service delivery components, barriers, facilitators, and reported outcomes. Data charting was conducted independently by two reviewers, with disagreements resolved through discussion and consultation with a third reviewer when required.

Methodological quality of the included studies was assessed using appropriate JBI critical appraisal tools according to study design. Quality appraisal was conducted independently by two reviewers, with discrepancies resolved through consensus or consultation with a third reviewer.

Findings were synthesized descriptively using summary tables and narrative synthesis to map school health nursing models, implementation strategies, barriers, facilitators, and reported outcomes across LMIC settings.

3. RESULTS

3.1 Search Results

The literature search across PubMed, Scopus, EBSCOhost databases, and Google Scholar identified a total of 590 records. Following the deduplication process, 122 duplicate records were removed, leaving 468 records for title and abstract screening. After screening, 433 records were excluded because they did not meet the eligibility criteria. Consequently, 35 full-text articles were assessed for eligibility.

Following full-text review, 25 articles were excluded due to reasons such as the absence of a school health nursing model, lack of relevance to low- and middle-income country settings, insufficient reporting of implementation characteristics, or failure to meet the predefined inclusion criteria. A total of 10 studies were ultimately included in the final scoping review and underwent data extraction and synthesis.

The study selection process is presented in Figure 1 using the PRISMA-ScR flow diagram.

3.2 Characteristics of Included Evidence

The review included 10 studies published between 2010 and 2026 (Table 1). Evidence originated predominantly from lower-middle-income countries, with studies representing diverse geographical regions across Africa, Asia, and Latin America. Methodological approaches were heterogeneous and included qualitative studies, program evaluations, quasi-experimental interventions, cross-sectional surveys, and methodological research.

Most studies were conducted in primary school settings, although secondary schools and mixed educational settings were also represented. The identified models encompassed comprehensive school health programs, school health and nutrition initiatives, WASH-focused interventions, health literacy programs, school-based sexual and reproductive health services, and school nursing framework development initiatives.

The degree of nursing involvement varied considerably across studies. While several programs incorporated nurses as part of multidisciplinary teams or externally funded projects, only a limited number described direct nurse-led service delivery. Most school health activities were implemented through teachers, school health coordinators, community health workers, or multi-sectoral partnerships. This variability highlights the diversity of school health service delivery approaches and the limited integration of dedicated school nursing roles within LMIC school health systems.

Table – 1: Characteristics of Included Studies Examining School Health Nursing Models and School-Based Health Service Delivery Approaches in Low- and Middle-Income Countries (n = 10)

Author	Country	Study Design	School Level	Population	Model Type
Mohlabi et al., 2010 [12]	South Africa	Qualitative focus groups	Mixed school settings	100 participants	School health service delivery assessment
Kuponiyi et al., 2016 [13]	Nigeria	Cross-sectional survey	Primary schools	360 head teachers	Descriptive school health program assessment
Shrestha et al., 2019 [14]	Nepal	Qualitative interviews	Primary and secondary schools	32 key informants	School Health and Nutrition Program
Akiyama et al., 2020 [15]	Kenya	Longitudinal program evaluation	Primary schools	44 schools	Comprehensive School Health Program
Taware et al., 2021 [16]	India	Quasi-experimental pre–post study	Primary schools	Approximately 6,967 students	WASH IEC Edutainment Program
Ahmed et al., 2023 [17]	South Africa	Pilot program evaluation	Secondary schools	344 students	Nurse-delivered sexual and reproductive health service model
Muniz et al., 2023 [18]	Brazil	Methodological study	Technical education institution	Nurses and expert validators	School Nursing Guide development
Adomako Gyasi et al., 2024 [19]	Ghana	Qualitative study	Primary and junior high schools	116 stakeholders	School Health Education Program (SHEP)
Aivey et al., 2024 [20]	Bangladesh	Cluster non-randomized intervention	Primary schools	455 children	Health Awareness Program for Primary School Children (HAPSC)
Bhowmik et al., 2026 [21]	Bangladesh	Pilot quasi-experimental study	Secondary schools	134 students and 200 community participants	School Nurse-led Health Champion Model

3.2.1. Quality Assessment

Quality appraisal (JBI tools) showed moderate methodological rigor across the seven included studies, with "Yes" ratings ranging from 30–60%. Bhowmik et al. (2026) scored highest; Kuponiyi et al. (2016) showed the most "Unclear" ratings, largely due to underreported reliability and confounding control. Qualitative studies consistently lacked statements of researcher reflexivity. No study met all criteria, but all were retained, consistent with the scoping review's evidence-mapping aim (Figure 2).

3.3 Geographic Distribution of School Health Nursing Models

A total of ten studies were mapped to identify and classify school health nursing models implemented in low- and middle-income countries (LMICs), particularly within primary school settings. The synthesis revealed substantial heterogeneity in model design, workforce configuration, and level of nursing integration.

As illustrated in Figure 3, four major categories of school health models were identified (Figure 3). The most dominant were non-nurse-led models, including teacher-led school health inspections [13]. NGO-led edutainment interventions [16], and government school health programs with limited or absent nursing workforce integration [14, 19]. These models primarily relied on teachers, school coordinators, or non-clinical personnel for service delivery.

A second category included multi-sector school health program models, such as the Kenya Comprehensive School Health Program [15] Ghana School Health Education Program [19], and Nepal School Health and Nutrition [14]. These models were characterized by collaboration between ministries of health and education; however, they generally lacked embedded school nursing roles and were predominantly education-sector driven.

A smaller group of studies represented visiting or outreach nurse models, where registered nurses provided periodic school-based services without being permanently stationed within schools. These included school nurse visit programs in Bangladesh [20, 21] and a nurse-supported sexual and reproductive health (SRH) intervention in South Africa [17].

Only one study demonstrated a nurse-led clinical school health model, the South African SRH pilot [17], which included HIV testing, contraception provision, and sexually transmitted infection (STI) screening. Although this model demonstrated high service uptake, it was not sustained due to governance and policy discontinuity.

Finally, two studies contributed to framework or guideline development models rather than implementation, including a nursing school health guide in Brazil [18] and a national school health program evaluation in Nepal [14]. These provided conceptual and policy-level contributions without operational nurse-led delivery. Overall, the mapping highlights a critical gap in the LMIC evidence base: the near absence of permanently embedded school nursing models, with most systems relying on teachers, community health workers, or externally deployed nurses.

3.4 Types of School Health Nursing Models Identified

Across the ten included studies, three broad categories of school health service delivery models were identified, reflecting variation in workforce composition, level of nursing integration, and organizational structure. No study documented a permanently embedded, institutionally funded school nurse model.

Theme 1: Non-Specialist School Health Workforce Models

The most prevalent model type across the dataset relied on non-clinical personnel, primarily teachers, school health coordinators, or NGO field staff, as the primary delivery agents for school health activities. This pattern was documented in Nigeria [13], where teacher inspection constituted the predominant health activity; in India [16] where NGO-trained field staff delivered a single-session edutainment intervention, and in Ghana where School Health Education Program coordinators provided ad hoc health promotion in the absence of public health nurse involvement [19]. These models were characterized by minimal clinical capacity, reliance on education-sector personnel, and the systematic absence of registered nurses from direct service delivery.

Theme 2: Visiting and Outreach Nurse Models

A smaller but distinct category involved registered nurses providing periodic, school-based health services without permanent placement. In South Africa, the study deployed registered nurses on a fortnightly basis to deliver sexual and reproductive health services, including HIV testing, sexually transmitted infection screening, and contraceptive provision [17]. In Bangladesh, two studies positioned externally placed research nurses to conduct structured health assessments and health literacy sessions, supported by community health workers [20, 21]. While demonstrating the feasibility of nurse-led delivery, all three models were research-embedded or pilot-based, with no permanent nursing posts established.

Theme 3: Integrated Multi-Sector School Health Programs

A third category encompassed government-supported, multi-stakeholder programs coordinating health and education sectors without a dedicated school nurse role. The Kenya Comprehensive School Health Program represented the most structured example, combining Ministry of Health and Ministry of Education oversight, donor partnership, annual action planning, and a multi-component service checklist [15]. The Nepal School Health

and Nutrition Program similarly operated through inter-ministerial coordination, incorporating deworming, nutritional supplementation, and hygiene education [14]. The Ghanaian School Health Education Program nominally operated within this structure but was significantly constrained by governance fragmentation and resource deficits [19]. These models reflected comprehensive design intent but were consistently limited by weak intersectoral collaboration and the absence of an embedded nursing workforce.

Two additional studies contributed to framework development and situational analysis [12, 18], respectively, providing conceptual and barrier-mapping evidence rather than implemented service delivery models.

3.5 Workforce Configurations and Governance Structures

Workforce composition and governance arrangements varied substantially across included studies and were closely linked to program outcomes and sustainability.

The predominant workforce configuration across the dataset was the non-specialist model, in which teachers or school coordinators performed health-related functions without clinical training or supervisory nursing oversight. This arrangement was documented in Nigeria, Ghana, and India, and in each case was associated with limited-service scope, absence of clinical assessment, and reliance on health education as the sole delivery mechanism.

Nurse involvement was documented in four studies, though in all cases nurses were externally positioned rather than institutionally embedded. Visiting nurse arrangements were present in both Bangladeshi studies and in the South African pilot, where fortnightly nurse attendance enabled structured clinical activity including anthropometric assessment, blood pressure measurement, and sexual and reproductive health services. However, nurse-to-student ratios were not systematically reported across any study, and permanent nursing posts were not established in any included setting.

Governance arrangements were generally fragmented, with the majority of programs operating under the primary authority of ministries of education with limited health sector involvement. Joint Ministry of Health and Ministry of Education governance was documented only in Kenya and Nepal, and even in these contexts, intersectoral coordination was described as inconsistent. In South Africa, early termination of the nurse-led pilot by Department of Education officials illustrated the political vulnerability of nurse-integrated models operating without cross-ministerial policy protection. External donor funding underpinned implementation in Kenya (JICA), both Bangladeshi studies (JSPS KAKENHI), and India (NGO/CSR), introducing dependency risks that none of the studies had fully addressed at the time of reporting.

3.6 Service Delivery Components

Across the ten included studies, the composition of school health nursing models varied considerably, reflecting differences in national policy priorities, resource availability, and the maturity of program implementation. While all studies addressed some dimension of school-based health service delivery, the breadth and depth of services described ranged from comprehensive, government-resourced programs to minimal information, education, and communication (IEC) interventions delivered in the absence of clinical infrastructure. Table 2 summarizes the service delivery components documented across the included studies.

Table 2. Service Delivery Components of Included School Health Programs in Low- and Middle-Income Countries (n = 10)

Study	Clinical Health Services	Health Education Topics	Reproductive Health	Mental Health	Nutrition	Wash	Infrastructure
Mohlabi 2010 South Africa [12]	*Not reported (barrier study)*	*Not reported*	*Not reported*	*Not reported*	*Not reported*	Infrastructure gaps identified	Severe deficits; non-functional systems
Kuponiyi 2016 Nigeria [13]	First aid boxes (~91% schools); sick bay (14.4% public); drugs (63.3% public)	*Not reported*	*Not reported*	*Not reported*	*Not reported*	Handwashing basins (17.8% public; 30% private)	No infrastructure provided; widespread deficits
Shrestha 2019 Nepal [14]	Deworming, nutritional supplementation, anaemia treatment	Health knowledge; hygiene; nutrition; disease prevention	*Not reported*	*Not reported*	Nutritional assessment; micronutrient supplementation	Hygiene education included	Government programme; not detailed
Akiyama 2020 Kenya [15]	First aid training; referral register; deworming; immunisation monitoring	WASH; nutrition; disease prevention; gender; life skills; HIV/AIDS; disability	Yes — gender issues, ANC awareness, pregnancy prevention	HIV/AIDS counselling; peer support; life skills	Nutritional assessment; school gardens; micronutrient supplements	Latrine use, safe water, soap; core components	NUITM-supported toilets, water tanks, materials
Taware 2021 India [16]	None (IEC only)	Toilet etiquette; handwashing; nail hygiene; germ transmission; OD risks	*Not reported*	*Not reported*	*Not reported*	Primary focus: handwashing, sanitation, OD prevention	Posters only; no physical infrastructure
Ahmed 2023 South Africa [17]	HIV testing; STI screening; contraception; clinical assessment; referral (13%)	SRH: contraception, HIV/AIDS, STIs, pregnancy prevention, health rights	Yes — primary focus	Counselling included in SRH package	*Not reported*	*Not reported*	No dedicated infrastructure; school-based delivery
Muniz 2023 Brazil [18]	*Not reported (guide development)*	Physical activity; nutrition; mental health; social support	*Not reported*	Mental health strategies included (social support, well-being)	Nutrition strategies included	*Not reported*	*Not reported*
Adomako 2024 Ghana [19]	None documented (PHN visits absent)	Disease prevention; nutrition; hygiene; mental health; counselling	Mentioned (counselling); not core focus	Counselling referenced; not implemented	School feeding (inconsistent supply)	Attempted but weak; no reliable supply	Severe deficits; no functional WASH infrastructure
Aivey 2024 Bangladesh [20]	BMI measurement; health assessments (3 time points)	Nutrition/food; malnutrition awareness; eating behaviour; hygiene	*Not reported*	*Not reported*	Food pyramid; dietary literacy; BMI-based assessment	Hygiene education (secondary focus)	*Not reported*
Bhowmik 2026 Bangladesh [21]	BP, RBS, urine tests; BMI; student and community health checks	Health literacy; first aid; nutrition; smoking/alcohol; physical activity; SRH; NCDs	Yes — menstruation, contraception, STDs, menstrual hygiene	Indirect via confidence/self-efficacy	Nutrition education (diet classification, BMI)	Hygiene and sanitation education included	A dedicated room allocated by the school

3.6.1. Clinical health services

Clinical service provision emerged as the most variable component across studies. At one end of the spectrum, the Kenyan model [15] and the Bangladeshi model described by Bhowmik incorporated structured clinical activity, including first aid training, deworming, immunization monitoring, and, in the case of Bhowmik, direct measurement of blood pressure, random blood sugar, and urine testing alongside community-linked health checks [21]. By contrast, several studies documented an almost complete absence of clinical infrastructure. While the Nigerian sample reported that first aid boxes were present in most schools, a functioning sick bay was documented in only a small minority of public schools, and essential drug availability lagged considerably behind [13]. The Ghanaian study [19] found public health nurse visits to be largely absent altogether, and the Mumbai-based intervention involved no clinical component whatsoever, relying solely on IEC materials [16]. This bifurcation suggests that school health nursing models in LMICs tend to cluster into two broad categories: those embedded within a wider public health infrastructure with referral and monitoring capacity, and those functioning as standalone, education-only interventions with no clinical backbone.

3.6.2. Health education content

Health education topics covered showed greater consistency, though with notable differences in scope. Hygiene-related content, including handwashing, sanitation, and open defecation prevention, recurred across nearly every study, appearing as either a central focus [14, 16] or a secondary inclusion [20, 21]. Nutrition education was similarly widespread, ranging from basic dietary literacy and food pyramid teaching [20] to more structured nutritional assessment and supplementation programs [14, 15]. Several models extended beyond physical health into broader life-skills domains; the Kenyan and Bangladeshi models in particular incorporated gender issues, disability awareness, non-communicable disease prevention, and substance use education, indicating a more holistic conceptualization of school health that aligns with health-promoting school frameworks.

3.6.3. Reproductive and sexual health

Inclusion of reproductive health content was the most polarizing service dimension across the dataset. Only three of the ten studies incorporated reproductive or sexual health content in any explicit form. The South African model [17] stood out as the only study in which sexual and reproductive health constituted the primary focus of service delivery, encompassing HIV testing, sexually transmitted infection screening, contraception provision, and structured referral pathways, with referral rates documented at thirteen percent. The Kenyan model incorporated reproductive health as one component among several, addressing gender-related issues, antenatal care awareness, and pregnancy prevention alongside its broader service package [15]. Bhowmik's Bangladeshi study addressed menstruation, contraception, and menstrual hygiene as part of a wider sexual and reproductive health curriculum [21]. The remaining seven studies either did not report reproductive health content or explicitly excluded it, suggesting that despite global health-promoting school guidance calling for comprehensive sexuality education, implementation in LMIC school nursing models remains inconsistent and, in several contexts, absent.

3.6.4. Mental health services

Mental health provision was the least developed service domain across the included studies, present in only partial or indirect forms, even where documented. The Ghanaian model referenced counselling as a planned component but provided no evidence of implementation [19]. The Kenyan model incorporated HIV and AIDS counselling alongside peer support and life-skills training, representing a more operationalized mental health linkage[15]. The South African sexual and reproductive health model included counselling as part of its broader service package, while the Bangladeshi nutrition-focused study addressed mental health only indirectly, through constructs such as self-efficacy and confidence rather than discrete mental health services [20]. The Brazilian guideline development study [18] was notable for explicitly incorporating mental health strategies, including social support and wellbeing promotion, into its proposed framework, though as a guidance document rather than an implemented service. Five of the ten studies did not report any mental health component, underscoring a significant evidence and service gap consistent with findings from broader literature on school mental health in low-resource settings.

3.6.5. Nutrition services

Nutrition-related service provision was comparatively well represented, appearing in six of the ten studies in some form. Implementation models ranged from formal nutritional assessment and micronutrient supplementation programs integrated into government school health policy [14, 15] to school feeding programs characterized by inconsistent supply chains [19] and purely educational interventions centered on dietary literacy and BMI-based assessment [20]. This pattern indicates that nutrition is among the more readily adopted components of school health nursing models, likely reflecting its lower resource and training requirements relative to clinical or mental health services, and its alignment with pre-existing school feeding and nutrition policy infrastructure in many LMIC contexts.

3.6.6. Water, sanitation, and hygiene (WASH)

WASH-related components were documented across most studies, though with considerable variation in whether they were accompanied by physical infrastructure or education alone. The Kenyan model again demonstrated the most integrated approach, combining hygiene education with concrete service delivery, including the provision of toilets, water tanks, and hygiene materials supported by external partnerships. By contrast, the Nigerian study found that handwashing basin availability remained markedly low even where hygiene was nominally part of the school health agenda, and the South African barriers study explicitly identified infrastructure gaps as a defining constraint rather than a delivered service. This divergence between WASH as an educational topic and WASH as a functioning infrastructure highlights an implementation gap that recurs across multiple LMIC contexts: hygiene messaging is comparatively easy to deliver, but the physical infrastructure required to act on that messaging is frequently unavailable.

3.6.7. Infrastructure support

Infrastructure emerged as the most consistently limiting factor across the dataset, regardless of which clinical, educational, or nutritional services a given model attempted to deliver. Only the Kenyan and Bangladeshi models reported externally supported or dedicated physical infrastructure, including constructed sanitation facilities and a designated health room within the school. All other studies reported either an absence of infrastructure investment or, in the case of the Nigerian and South African studies, which focused specifically on implementation barriers, documented infrastructure deficits as a central finding. The Ghanaian and Mumbai-based studies described severe or non-functional infrastructure systems, suggesting that in the absence of dedicated capital investment, school health nursing models tend to default to low-cost, education-only delivery formats regardless of the breadth of services notionally included in program design.

3.7 Implementation Strategies

A total of ten studies provided data on the implementation strategies employed across school health nursing programs (SHNPs) in low- and middle-income countries (LMICs). These studies were conducted across six countries: Nigeria, India (Mumbai), Ghana, Kenya, Bangladesh (two studies), South Africa (two studies), Brazil, and Nepal, and collectively represent a heterogeneous range of program designs, delivery mechanisms, and contextual conditions. The following thematic synthesis organizes findings across seven cross-cutting implementation dimensions: (1) health education delivery; (2) community and parental engagement; (3) health assessments and screening; (4) referral systems; (5) use of educational materials; and (6) monitoring and evaluation frameworks. **Table 3** presents a comparative summary of implementation strategies across included studies.

Table – 3: Implementation Strategies Across Included School Health Programs in Low- and Middle-Income Countries (n = 10)

Study	Health Education Delivery	Community / Parent Engagement	Health Assessments / Screening	Referral Systems	Educational Materials / Tools	Monitoring & Evaluation
Mohlabi 2010 South Africa [12]	Not applicable (barrier study)	Community exclusion identified as a key barrier	No services delivered	Referral systems absent/non-functional	*Not reported*	Qualitative barrier analysis
Kuponiyi 2016 Nigeria [13]	Teacher inspection only; no structured health education	Parental notification for sick children (~85% schools)	Teacher inspection; periodic medical exam (7–17% schools); no dedicated nurse	Referral to health centre (~47% schools)	Observational checklist (MoE form)	Structured questionnaire + observational checklist
Shrestha 2019 Nepal [14]	Deworming, nutrition, and hygiene education	Community awareness activities; improved knowledge	Nutritional assessment; anaemia detection; deworming	Referral to health facilities (implied)	SHN programme materials; deworming tablets	Qualitative programme outcome reporting
Akiyama 2020 Kenya [15]	Annual action plans; teacher workshops (life skills, WASH, disease prevention)	Multi-stakeholder engagement (parents, chiefs, CHVs, hospital)	Annual 8-component CSHP checklist; referral register; deworming; immunisation	Referral register; structured criteria (e.g., cough >2 weeks)	Action plan tools; tier award system	Annual checklist; KCPE scores; attendance
Taware 2021 India [16]	Single 45–50 min edutainment session per school	Children as change agents; knowledge shared with family (~42%)	No clinical assessment; hand hygiene index only	*Not reported*	Illustrated story, posters, badges, games	Pre/post KAP survey + Hand Hygiene Index
Ahmed 2023 South Africa [17]	SRH package via visiting nurse (HIV testing, counselling, contraception)	*Not reported*	HIV testing, STI screening, clinical assessment	13% required referral; formal pathways used	SRH informational materials (implied)	Service uptake + referral tracking + test uptake
Muniz 2023 Brazil [18]	Embedded guide strategies: physical activity, nutrition, mental health	*Not reported*	*Not reported*	*Not reported*	Validated School Nursing Guide (CVI 0.997; AVI 0.84)	Content validity + expert validation
Adomako 2024 Ghana [19]	Ad hoc SHEP delivery; guest speakers rarely implemented	Community workshops attempted; low attendance; school health committees	Public health screening largely absent	*Not reported*	Workshop materials: inconsistent supply	*Not reported*
Aivey 2024 Bangladesh [20]	Weekly 45-min evidence-based sessions (play-based)	CHWs monthly home visits; parental health education	Height, weight, BMI at 3 time points	Referral after abnormal findings	Booklet, posters, food models, videos	Pre/mid/post BMI & behaviour assessment
Bhowmik 2026 Bangladesh [21]	Weekly 45–50 min sessions (12 sessions/3 months)	Students as health champions; community education (~200 adults reached)	Height, weight, BP, RBS, urine (students + community)	Referral to health complexes for abnormal results	Health booklet, posters, videos	Pre/mid/post HL scales (HLSAC, HLS-Q12), self-efficacy

3.7.1. Health Education Delivery

Substantial heterogeneity was evident in how health education was conceptualized and operationalized across included studies. A minority of programs employed structured, iterative, evidence-based health education curricula. The most intensive approach was documented by Aivey [20] where weekly 45-minute play-based sessions were delivered over nine months, and by Bhowmik [21] who implemented twelve group-based sessions spanning three months, targeting both health literacy and self-efficacy outcomes. These programs reflect a deliberate pedagogical design aligned with contemporary health education theory.

By contrast, most programs adopted either minimal or ad hoc approaches to health education delivery. Kuponiyi [13] reported that teacher inspection served as the primary health-related activity, with no structured health education component identified in most schools. Similarly, Adomako [19] described health education as inconsistently delivered by School Health Education Program (SHEP) coordinators, frequently constrained by budget limitations and logistical barriers. Ahmed [17]delivered a sexual and reproductive health (SRH) package through visiting nurses, incorporating HIV testing and contraceptive provision, reflecting a clinical rather than pedagogical orientation. Taware [16] implemented a single 45–50-minute edutainment session per school, a design offering brevity and feasibility but limited sustained educational impact.

Two studies did not incorporate health education delivery as a primary intervention component, as both were methodological in nature. a qualitative barrier assessment and a school nursing guide validation study, respectively, and therefore did not report direct educational implementation [12, 18]. Shrestha [14] Implemented a multi-component SHNP inclusive of health and hygiene education, deworming, and nutrition activities, though the specific pedagogical structure was not elaborated upon. Akiyama [15] Embedded health education within annual action plans and teacher-led workshops across a four-year program cycle, indicating a systems-level approach to health education integration.

Across these studies, a consistent pattern emerges: programs with higher session frequency and longer duration tended to demonstrate more robust participant-level outcomes, whereas single-session or teacher-delegated approaches produced limited behavioural or health impact. The evidence base highlights the need for structured, theory-driven, and adequately resourced health education curricula within SHNPs in LMICs.

3.7.2. Community and Parental Engagement

Community and parental engagement emerged as a theoretically valued but practically under-implemented component across the reviewed studies. Only three programs reported substantive community engagement mechanisms. Bhowmik [21] operationalized students as health champions, whereby trained adolescents delivered community health education to approximately 200 adults, a peer-extension model that simultaneously addressed adolescent agency and community health literacy. Similarly, Aivey [20] deployed community health workers (CHWs) to conduct monthly home visits and provide health education to parents, creating a bidirectional community–school interface. Kuponiyi [13] reported parental notification for sick children in approximately 85% of surveyed schools; however, this represented a reactive rather than proactive engagement strategy.

Taware [16]described an indirect community engagement mechanism, whereby students who received health education were observed to disseminate knowledge to family members (reported in approximately 42% of participants), constituting an incidental rather than programmatic community reach. Adomako [19] attempted community workshops but reported consistently low attendance, attributing this to contextual barriers including distance, competing economic priorities, and limited school–community trust. This finding aligns with Mohlabi [12], whose qualitative barrier assessment identified community exclusion as a structural impediment to effective SHNP implementation, noting that community involvement remained minimal across the majority of studied schools.

Community engagement was poorly reported across studies, with most providing no substantive description of related activities [15, 17, 18]. One study reported community awareness activities and improved community health knowledge as program outcomes, although the underlying implementation mechanisms were not described [14].

The cross-cutting pattern across studies reflects a significant implementation gap: while community engagement is widely recognized as essential to school health program sustainability and reach, the evidence base reveals that most SHNPs in LMICs operate in relative isolation from the broader community ecosystem. This gap is particularly consequential in LMIC contexts characterized by low health literacy, limited healthcare access, and high child-to-caregiver dependency ratios.

3.7.3. Health Assessments and Screening

Health assessment and screening activities varied considerably in scope, systematicity, and professional oversight. Only two studies, both from Bangladesh, reported structured, multi-component clinical assessments involving anthropometric measurements (height, weight, body mass index), blood pressure, random blood sugar, and urinalysis [20, 21]. These assessments were conducted at multiple time points, enabling longitudinal tracking of student health status. Ahmed [17]offered HIV testing (with approximately 50% student uptake), clinical assessment, and STI screening delivered by visiting nurses, constituting the most clinically comprehensive screening activity identified across the review.

Clinical screening was limited across most settings. Formal medical examinations were reported in only 7–17% of schools, with teacher inspection serving as the primary screening approach [13]. Other studies described the absence of systematic public health screening due to structural and bureaucratic barriers [19], while one implemented a comprehensive School Health Program (CSHP) checklist encompassing referral, deworming, and immunization monitoring, reflecting a public health systems approach to school-based screening rather than clinical assessment [15].

Clinical assessment components were absent in several studies, reflecting their intervention-focused, qualitative, or guide-validation designs [12, 16, 18]. One study included nutritional assessment, deworming, and anaemia detection as program components, although detailed clinical protocols were not reported [14].

A prominent cross-cutting finding is the near-absence of qualified nursing personnel in the delivery of school health assessments across the majority of included studies. Where nurses were present, as in South Africa and Bangladesh, screening activities were demonstrably more systematic and clinically meaningful. This pattern reinforces the centrality of nurse deployment to achieving quality health assessment within SHNPs in resource-limited settings.

3.7.4. Referral Systems

Referral pathways, a critical component of integrated school health service delivery, were inconsistently described and frequently absent or non-functional across included studies. Ahmed (2023) documented the most formal referral pathway [17], with approximately 13% of students assessed requiring onward referral to higher-level health services, facilitated through an established mechanism. Two studies from Bangladesh reported the referral of students with abnormal clinical findings to the nearest health complex, with parental notification, reflecting a structured and clinically grounded referral protocol [20, 21].

Referral systems were inconsistently reported across studies. Approximately 47% of schools referred students to health centers, although referral quality and follow-up were not described [13]. One study incorporated a formal referral register with predefined referral criteria as part of a comprehensive school health framework [15] whereas other studies did not describe referral mechanisms [14, 16, 18]. Overall, the absence of robust referral systems limits continuity of care and reduces the effectiveness of school-based health assessments.

3.7.5. Educational Materials/Tools Used

The use of educational and program materials varied substantially across studies, reflecting differences in resource availability, program design, and curricular intent. The most comprehensive material packages were reported by Aivey [20], which utilized booklets, health record notebooks, posters, food models, and leaflets, and by Bhowmik et al, which employed health booklets in Bengali alongside posters, illustrative images, and short videos, a multimodal approach consistent with evidence on effective health communication in low-literacy settings [21].

Taware [16] developed a structured set of illustrated materials, including a story, wall posters, badges, book labels, and interactive games for a single-session delivery, a resource-intensive but time-limited strategy that facilitated high visual engagement within a constrained educational format. Akiyama [15] employed annual checklist feedback tools and tier award systems as program materials, reflecting an administrative rather than pedagogical material design. Kuponiyi [13] utilized an observational checklist based on the national Ministry of Education form, functioning more as a data collection instrument than an educational resource.

Muniz [18] produced a School Nursing Guide as the primary program output, validated with a Content Validity Index (CVI) of 0.997. Adomako [19]reported inconsistent material supply as a barrier to program delivery, highlighting the vulnerability of SHNP implementation to supply chain disruptions in resource-constrained environments. Mohlabi [12] and Ahmed [17] did not report specific material use as part of their study designs.

3.7.6. Monitoring and Evaluation(M&E)

Monitoring and evaluation (M&E) frameworks across included studies reflected wide variation in rigor, systematicity, and outcome measurement. The most robust M&E designs were employed in the Bangladesh studies, both of which utilized pre-, mid-, and post-intervention data collection, incorporating validated scales, including the Health Literacy Scale for Adolescents and Children (HLSAC) and the Health Literacy Survey Questionnaire-12 (HLS-Q12), alongside measures of self-efficacy, knowledge, and health behaviour [20, 21]. Ahmed [17] tracked service uptake, student feedback, referral counts, and HIV test uptake, constituting a multi-indicator monitoring approach appropriate to the clinical program design.

Taware [16] employed pre- and post-Knowledge, Attitude, and Practice (KAP) surveys complemented by an observed Hand Hygiene Index, providing both self-reported and behavioural indicators of change. Akiyama [15] used an eight-component, 72-item annual school health checklist alongside KCPE academic scores and school attendance as proxy outcome indicators reflecting a systems-level conceptualization of health impact extending beyond clinical metrics. Kuponiyi [13] applied a structured questionnaire and observational checklist, though without a longitudinal comparison arm.

Formal monitoring and evaluation (M&E) was absent in a study [19]. Evaluation primarily relied on qualitative assessments or validation methods rather than standardized M&E frameworks, limiting generalizability and cross-study comparison [12, 14, 18].

3.8 Barriers to Implementation

Barriers to school health program implementation were reported across all ten studies and clustered into four cross-cutting domains.

Nurse coverage was reduced to once per year or less in some districts, amounting to functional service collapse[12]. Where health personnel were present, clinical training was often inadequate, with one study identifying one-time training and high staff turnover as major threats to program continuity [14], while another reported that School Health Education Program coordinators lacked clinical competencies entirely [19].

Funding limitations constrained implementation in every included setting. A study from Nigeria found that 42.8% of public schools cited insufficient funds as a primary barrier, with no mechanism for independent resource mobilization [13]. External donor dependency was a recurring structural vulnerability, as programs in Kenya, Bangladesh, and India relied entirely on international or NGO funding with no government budget integration. Ahmed et al could not secure dedicated funding to sustain the nurse-led pilot beyond its initial period [17].

Policy and governance fragmentation undermined intersectoral coordination across multiple contexts. Weak or absent collaboration between ministries of health and education was identified in Nigeria, Ghana, Nepal, and Bangladesh. The most acute governance failure was documented in South Africa, where Department of Education officials terminated the nurse-led sexual and reproductive health pilot before completion, demonstrating that policy intent alone does not protect program continuity without cross-ministerial accountability structures.

Infrastructure deficits further constrained service delivery. In Nigeria, functioning sick bays were absent in over 85% of public schools, and ambulance access was unavailable in 97% of settings. Ghana and South Africa reported non-functional water and sanitation infrastructure, dilapidated facilities, and the absence of private spaces for clinical or counselling activities. These conditions effectively precluded clinical service delivery regardless of workforce availability.

3.9 Facilitators of Implementation

Facilitators were less consistently reported than barriers, but several enabling conditions were identified across studies. Joint ministerial governance and established national policy frameworks provided the strongest structural foundation, most evident in Kenya, where the Ministry of Health and the Ministry of Education co-implemented the JICA partnership, and a structured annual planning cycle collectively sustained a four-year program. International donor support was similarly instrumental in Bangladesh and India, enabling nurse deployment and longitudinal evaluation beyond domestic financing capacity. At the program level, principal support and dedicated school space facilitated nurse-led delivery in Bangladesh [21] while task-sharing arrangements involving community health workers and student health champions extended program reach where the nursing workforce was limited. Positive student demand was notably documented in the South African pilot, where high service uptake for sexual and reproductive health services demonstrated receptivity to nurse-delivered clinical care within school settings.

4. DISCUSSION

4.1 Principal Findings

This scoping review mapped school health nursing models across ten LMIC studies and identified three delivery model types: non-specialist workforce models, visiting nurse models, and integrated multi-sector programs. No study documented a permanently embedded school nurse model. Implementation quality was consistently higher where registered nurses held active delivery roles, and universal barriers, such as workforce shortages, funding dependency, infrastructure deficits, and governance fragmentation, constrained service delivery across all settings. These findings confirm that the LMIC school health nursing evidence base remains critically underdeveloped and misaligned with WHO minimum standards for school health service delivery [1].

4.2 Interpretation Against Existing Literature

The dominance of teacher-led and coordinator-delivered models reflects a pattern extensively documented in LMIC school health literature. Bundy et al observed that resource-constrained settings default to low-cost, education-sector approaches rather than clinically integrated models [4], a pattern replicated across Nigeria [13], Ghana [19], and India [16]. As the Framework for 21st Century School Nursing Practice emphasizes, school nurses function simultaneously as direct care providers and system-level coordinators [6] roles that cannot be adequately substituted by non-clinical personnel regardless of training investment.

The visiting nurse models in Bangladesh [20, 21]and South Africa [17] demonstrate that nurse-led delivery is feasible and effective in LMIC contexts. However, no model achieved sustainability. The South African pilot's termination by the Department of Education officials [17] Illustrates the political vulnerability of nurse-integrated models in the absence of cross-ministerial accountability structures, highlighting a well-documented implementation challenge in health policy within low- and middle-income countries. The South African pilot's termination by the Department of Education officials [22]. Another study similarly identified that healthcare innovations fail to normalize into routine practice without institutional embedding and protected resource allocation, conditions absent from every pilot model identified in this review [23].

The near-universal restriction of services to health education and hygiene promotion, with clinical care, reproductive health, and mental health remaining underdeveloped, diverges sharply from the epidemiological realities of school-aged populations in LMICs. The GBD 2019 Study identified mental health disorders and reproductive health conditions as leading contributors to adolescent disability-adjusted life years globally [24] While Patton et al argued that health systems in LMICs remain structurally oriented toward infectious disease priorities despite an accelerating epidemiological transition toward adolescent mental health and non-communicable disease burdens [25]. Addressing this mismatch requires not only curriculum and service expansion but a fundamental reorientation of school health nursing competency frameworks.

Community engagement remained structurally underutilized despite strong evidence of its importance. Langford demonstrated that Health Promoting Schools programs incorporating family and community engagement produced significantly stronger and more sustained outcomes than

school-only models [3]. The Bangladesh health champion model [21], in which trained student peers generated measurable community-level health literacy gains among approximately 200 adults, offers a resource-efficient template for community integration consistent with evidence that community health worker-extended delivery achieves outcomes comparable to professionally delivered programs at substantially lower cost [26].

The methodological heterogeneity across included studies cross-sectional surveys, qualitative assessments, and longitudinal trials with non-standardized outcomes fundamentally limits synthesis and policy translation. Proctor et al argued that implementation outcomes, including fidelity, adoption, and sustainability, must be measured as distinct constructs alongside clinical outcomes [27]. Another study similarly identified process evaluation as essential for generating transferable evidence from complex health interventions, a component absent from nearly all included studies [28]. Adoption of established frameworks, including CFIR [29, 30], Normalization Process Theory [31], or the FRESH framework [32] would provide structured lenses for future program design and cross-context comparison.

4.3 Implications for Policy and Practice

The evidence consistently demonstrates that school health policy without corresponding workforce allocation and intersectoral accountability is insufficient. Nigeria's national School Health Program policy has existed since 2006, yet remains largely unimplemented [13]. Bangladesh has no school nursing policy [20, 21]. South Africa's successful pilot was terminated despite demonstrated effectiveness [17] WHO recommends dedicated school health workforce cadres with defined competency frameworks and supervisory structures, standards no country has met [1]. Governments must move beyond policy documentation toward recurrent budget allocation, permanent nursing posts, and formalized joint Ministry of Health and Ministry of Education accountability frameworks for sustainable intersectoral health governance [33].

A phased task-sharing approach, visiting registered nurses providing clinical oversight alongside community health workers and student health champions extending program reach, represents the most pragmatic near-term pathway, directly supported by outcomes from Bangladesh [20, 21] and Kenya [15] and consistent with WHO task-sharing recommendations for resource-limited health systems.

4.4 Limitations

Restriction to English-language publications may have excluded relevant studies from francophone Africa and Arabic-speaking LMIC regions. The small, included sample (n = 10) reflects a genuine evidence gap rather than a search deficiency but limits transferability. Methodological heterogeneity precluded quantitative synthesis, and several studies provided insufficient detail on workforce composition and implementation fidelity. Short follow-up periods and non-randomized designs across most studies limit causal attribution.

4.5 Recommendations for Future Research

Prospective, controlled trials of permanently embedded nurse-led models with a minimum twelve-month follow-up are the most critical evidence priority. Cost-effectiveness analyses are absent and essential for policy investment decisions. Theory-driven implementation research using CFIR, NPT, or FRESH frameworks is needed to examine how effective models can be institutionalized and scaled. The evidence most strongly supports a Visiting Nurse Model within an Integrated Multi-Sector Governance Framework, structured nurse contact combined with community health worker task-sharing, anchored within joint ministerial governance, as demonstrated in Kenya [15] as the most feasible and evidence-informed pathway toward sustainable nurse-integrated school health in LMICs.

5. Conclusions

This scoping review mapped school health nursing models across ten LMIC studies and found a consistent absence of permanently embedded nurse-led service delivery. The predominant reliance on non-clinical personnel, fragmented governance, and external funding dependency collectively constrain the scope and sustainability of school health programs across all included settings. Where nurses were directly involved, outcomes were demonstrably stronger, affirming the value of nursing workforce integration even in limited, visiting arrangements. Advancing school health nursing in LMICs requires coordinated policy commitment, recurrent financing, and intersectoral governance structures that move beyond time-limited pilots toward sustainable, nurse-integrated models capable of meeting the health needs of school-aged children at scale.

Abbreviations

ANC: Antenatal Care

AVI: Appearance Validity Index

BMI: Body Mass Index

BP: Blood Pressure

CFIR: Consolidated Framework for Implementation Research

CHW: Community Health Worker

CSHP: Comprehensive School Health Programme

CVI: Content Validity Index

FRESH: Focusing Resources on Effective School Health

GBD: Global Burden of Disease

HAPSC: Health Awareness Program for Primary School Children

HIV: Human Immunodeficiency Virus

HLS-Q12: Health Literacy Survey Questionnaire-12

HLSAC: Health Literacy Scale for Adolescents and Children

HPS: Health Promoting Schools

IEC: Information, Education, and Communication

JBI: Joanna Briggs Institute

JICA: Japan International Cooperation Agency

JSPS KAKENHI: Japan Society for the Promotion of Science Grants-in-Aid for Scientific Research

KAP: Knowledge, Attitude, and Practice

KCPE: Kenya Certificate of Primary Education

LMIC: Low- and Middle-Income Country

M&E: Monitoring and Evaluation

MRC: Medical Research Council

NASN: National Association of School Nurses

NCD: Non-Communicable Disease

NGO: Non-Governmental Organization

NPT: Normalization Process Theory

PCC: Population, Concept, Context

PRISMA-ScR: Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews

RBS: Random Blood Sugar

SDG: Sustainable Development Goal

SHEP: School Health Education Programme

SHN: School Health and Nutrition

SHNP: School Health Nursing Programme

SHS: School Health Services

SRH: Sexual and Reproductive Health

STI: Sexually Transmitted Infection

WASH: Water, Sanitation, and Hygiene

WHO: World Health Organization

Declarations

Ethics approval and consent to participate

Not applicable. This scoping review did not involve human participants, human data, or human tissue. No primary data was collected. All data were extracted from publicly available published literature.

Consent for publication

Not applicable. This manuscript does not contain data from any individual person.

Availability of data and materials

All data generated or analysed during this study are included in this published article. The search strategy is available from the corresponding author on reasonable request.

Clinical trial number

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

BAS conceptualized the review, developed the search strategy, coordinated the review process, and drafted the manuscript. DM conducted database searches, participated in study screening, and contributed to data extraction. AZ participated in study screening, full-text review, and data extraction. SSA participated in data extraction and drafted the manuscript. MTY supervised the review, provided methodological guidance, and critically revised the manuscript for important intellectual content. All authors read and approved of the final manuscript.

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Figures

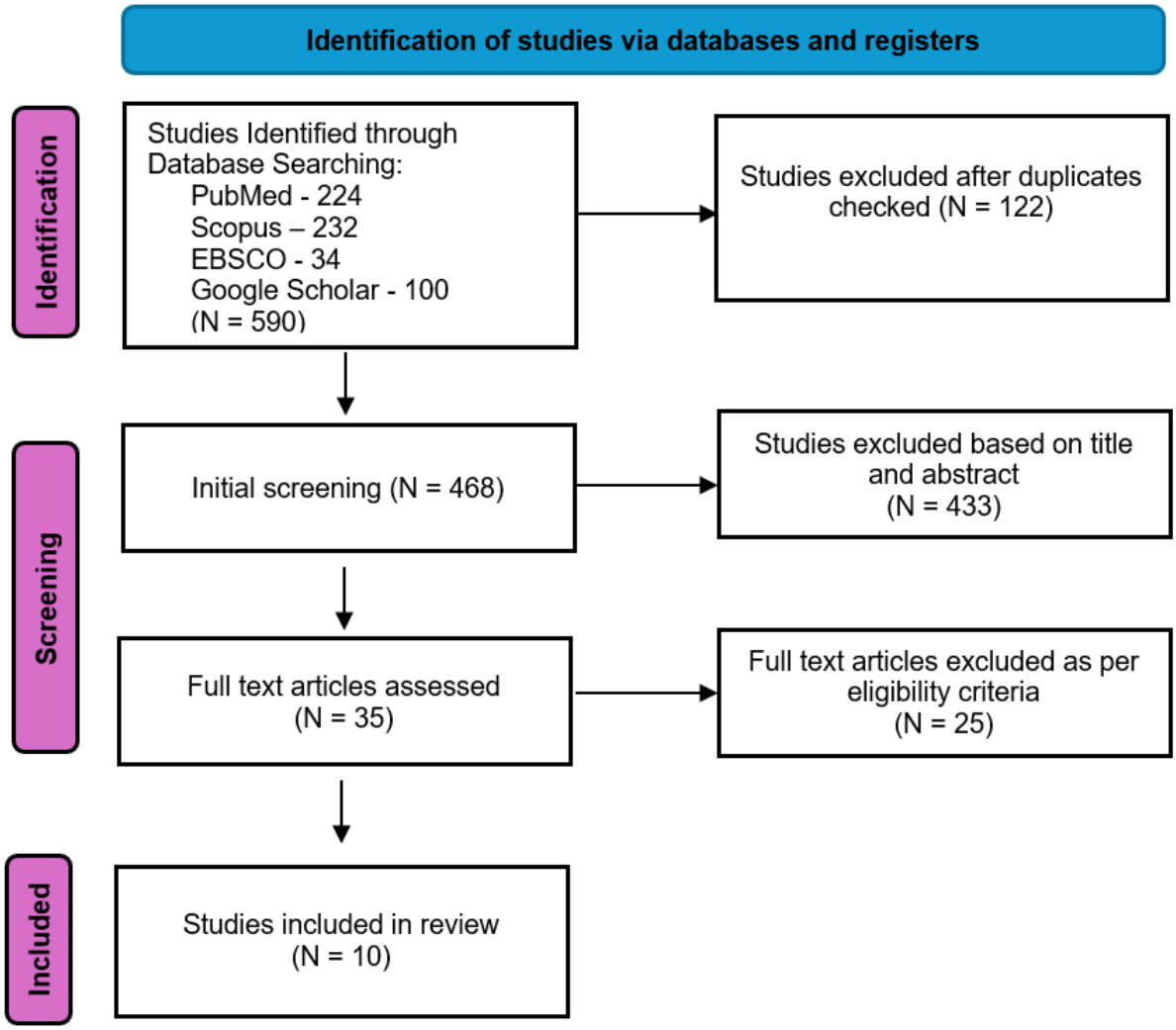


Figure 1

PRISMA flow diagram for studies included.

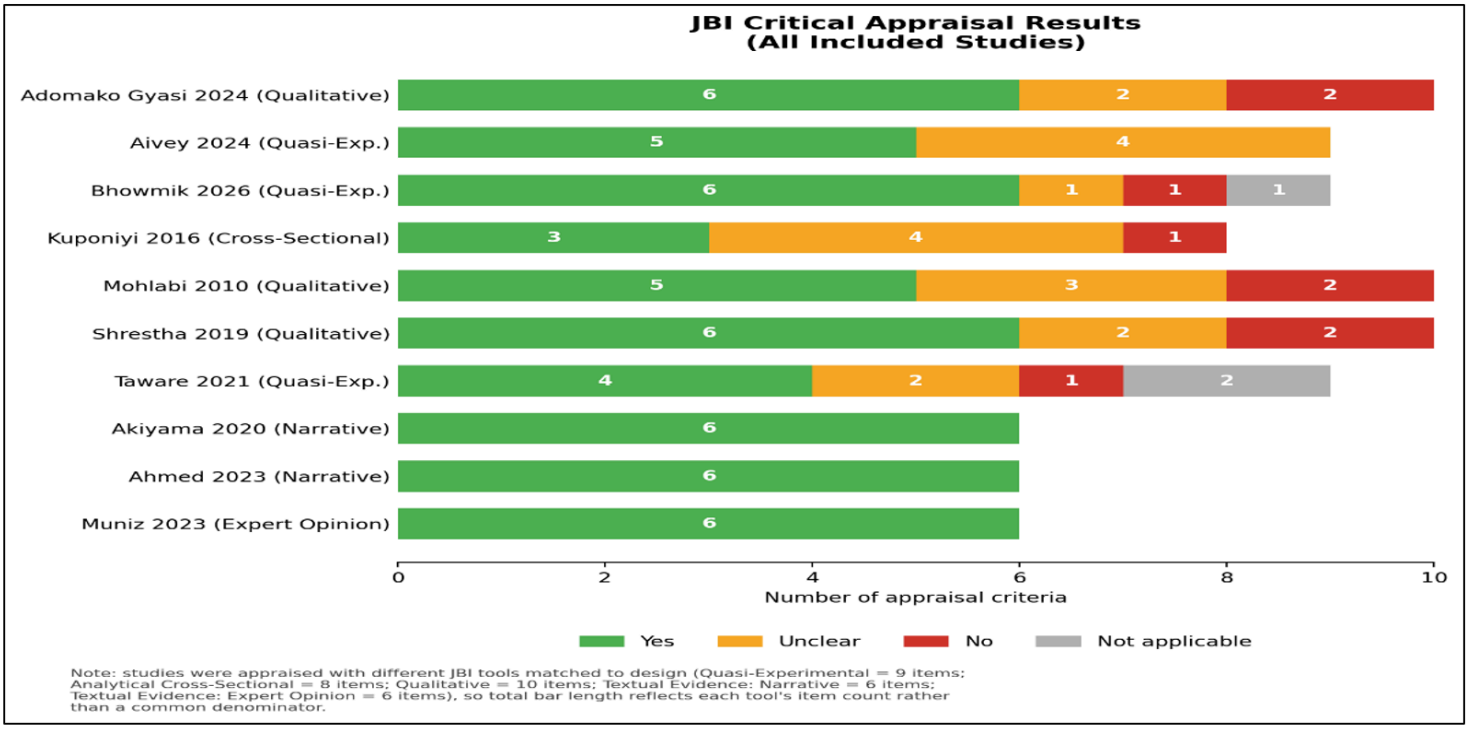


Figure 2

JBI Quality Assessment Results (All studies Included)

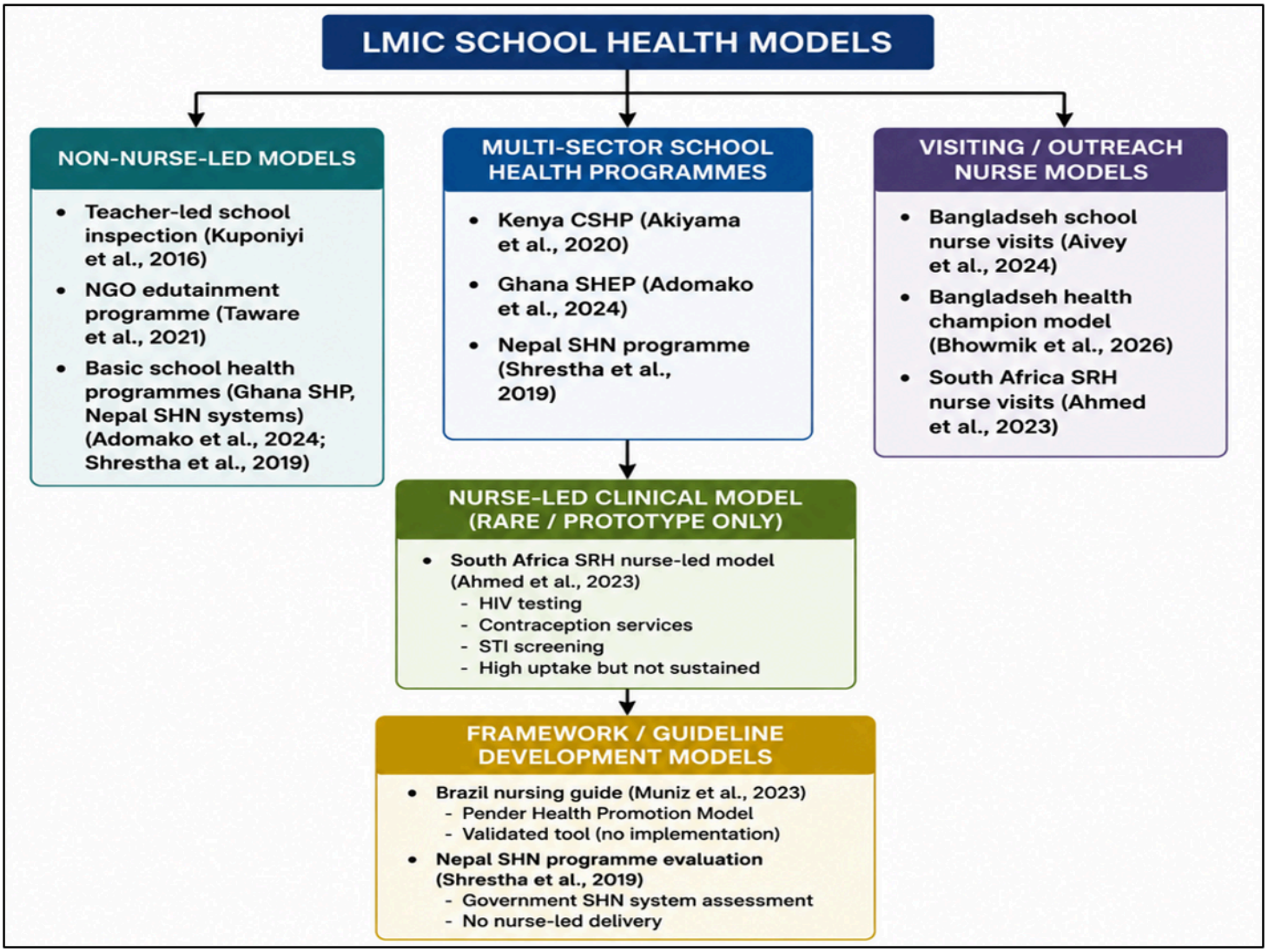


Figure 3

Conceptual Typology of School Health Service Delivery Models in LMICs