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Child and adolescent health, gender equity, and evidence-based approach in low-and middle-income countries: A review of the literature

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Abstract

Background: Child and adolescent health in low- and middle-income countries (LMICs) is shaped by overlapping burdens of infectious diseases, rising non-communicable diseases, violence exposure, gender inequities, and structural determinants of health. Although significant global declines in communicable disease mortality have been achieved over the past 10 years, children and adolescents continue to face high risks from injuries, mental health disorders, and behavioural risk factors. Violence, harmful gender norms, and limited access to quality healthcare and educational services significantly influence developmental trajectories.

Methods: This review synthesises evidence from Global Burden of Disease estimates, Violence Against Children Surveys, systematic reviews, scoping reviews, and empirical studies published between 2016 and 2026. Findings were organised across selected key domains: adolescent health burdens, violence and mental health outcomes, gender-transformative, sexual & reproductive health (SRH) interventions, school-based and digital health programs, and surveillance & structural determinants.

Results: Violence exposure strongly predicts self-harm, suicidal behaviours, and substance use, with young women disproportionately affected. Gender-transformative interventions and male-engagement programs improve SRH knowledge, equitable norms, and maternal–child health behaviours or outcomes. School-based WASH, nutrition education, digital tools, and nurse- or teacher-led health promotion demonstrate moderate effectiveness. Emerging surveillance systems, including machine-learning-enabled risk prediction and community-based monitoring, enhance early detection and policy responsiveness. Structural barriers including poverty, discrimination, fragmented governance, and limited access to care remain major constraints.

Conclusion: Multisectoral, equity-oriented, and gender-responsive strategies are essential to strengthen health systems and improve child and adolescent wellbeing in Low- and Middle-Income Countries.

Keywords: Adolescent Child Health; Low- and Middle-Income Countries; Gender Equity; Violence; Mental Health; Reproductive Health; School Health Services; Public Health Surveillance.

1. Introduction and global health burden

1.1. Overview of Adolescent Health Challenges

The health status of children and adolescents in low- and middle-income countries (LMICs) constitutes a significant public health challenge of our era. Although they represent a considerable segment of the global population, adolescents and young adults aged 10-20 years have historically been the subject of limited research, especially within sub-Saharan

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Africa (Ross, [1]). The Global Burden of Disease Study 2023 has recorded notable advancements in age-standardised Disability-Adjusted Life Year (DALY) rates over the past thirty years, particularly among individuals younger than 50 years, with the most significant decline observed in the 0-9-year age group (Vos et al., [2]). Furthermore, six infectious diseases continue to be among the top ten causes of DALYs in children under the age of 10. These include lower respiratory infections, diarrheal diseases, malaria, meningitis, whooping cough, and congenital syphilis.

The epidemiological transition continues to reshape morbidity and mortality patterns globally. Between 1990 and 2023, communicable, maternal, neonatal, and nutritional (CMNN) diseases in sub-Saharan Africa decreased from 73.4% to 51.4% of all deaths, representing a 30% reduction (Naghavi et al., [3]). However, this transition has been accompanied by an increase in non-communicable disease (NCD) burdens in low-income settings, posing new challenges for health systems that remain underfunded and unable to provide adequate preventive care (Naghavi et al., [3]). For adolescents and youths aged 10-20 years, three injury causes were among the leading causes of DALYs: road injuries, self-harm, and interpersonal violence (Vos et al., [2]).

2. Methodology

This review adopted a qualitative, desk-based research design to synthesise contemporary evidence on child and adolescent health, gender transformative interventions, violence exposure, and structural determinants in low- and middle-income countries (LMICs). The approach enabled systematic integration of heterogeneous data sources and facilitated interpretive analysis across epidemiological, behavioural, gender, and health system domains.

The study was informed by an interpretivist epistemological orientation, recognising that child and adolescent health, gender norms, and violence are socially constructed phenomena shaped by discourse, history, and power. A complementary critical and decolonial lens supported examination of how colonial legacies, global health governance, and structural inequities influence health outcomes and policy responsiveness in LMICs.

Four categories of evidence were included: (1) global epidemiological datasets such as the Global Burden of Disease (GBD) and Violence Against Children Surveys (VACS); (2) peer reviewed literature including systematic reviews, scoping reviews, meta analyses, and empirical studies; (3) historical and contextual texts addressing colonial and post conflict determinants; and (4) grey literature from WHO, UNICEF, UNFPA, the World Bank, and surveillance networks. The review synthesises evidence from Global Burden of Disease estimates, Violence Against Children Surveys, systematic reviews, scoping reviews, and empirical studies published between 2016 and 2026, and findings were organised across five key domains.

Searches were conducted across trusted databases including CINAHL, Cochrane Library, Google Scholar, PubMed and organisational repositories using terms related to child health, adolescent health, gender norms, SRH, school-based interventions, violence, digital health, surveillance systems, and structural determinants in Low- and Middle-income countries. Studies published in English between 2016 and 2026 were prioritised.

Analysis followed a hybrid strategy combining thematic synthesis, critical discourse analysis, intersectional mapping, and decolonial critique. Reflexive memos documented interpretive decisions and potential biases throughout the process.

As a desk-based review, no ethical approval was required. Limitations include reliance on secondary data, uneven regional representation, and limited gender disaggregated findings in school-based and WASH studies.

3. Thematic results and discussions.

3.1. Regional Disparities in Health Outcomes

This review shows that significant regional disparities are evident in child and adolescent health outcomes. Only four GBD regions, which include high-income Asia Pacific, Central Asia, East Asia, and South Asia, have consistently demonstrated reductions in death rates across all 5-year age groups by sex and Level 1 causes from 2000 to 2023. Conversely, regions such as sub-Saharan Africa and the Caribbean have experienced increases in death rates for multiple cause-sex-age groups, primarily driven by cardiovascular diseases, substance use disorders, and neoplasms (Naghavi et al., [3]). The behavioural risk factors contributing to non-communicable diseases among adolescents and young adults aged 10-24 years show significant regional and gender disparities, with high-income North America exhibiting the

highest burden, reflected in a DALY rate of 2,140 per 100,000 (Feng et al., [4]) and males experiencing higher burdens for mental health conditions and accident injuries or deaths.

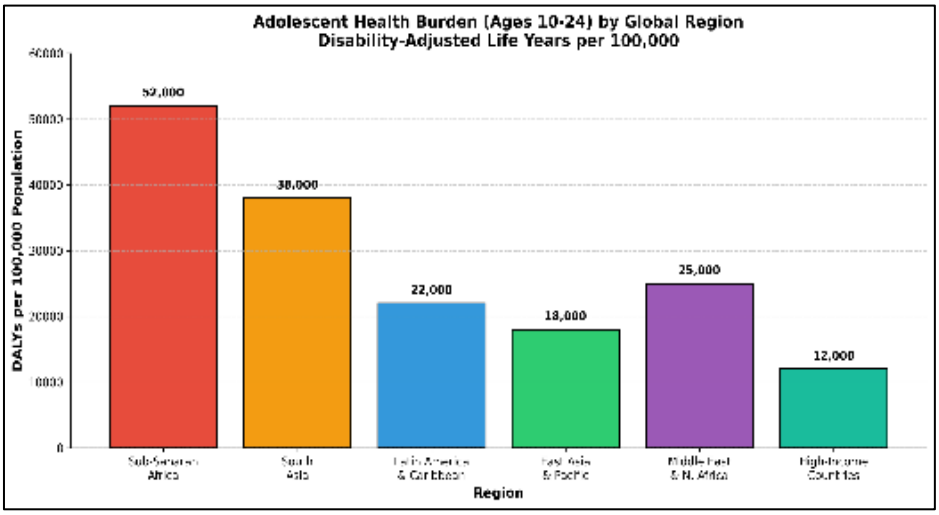

Figure 1 Regional distribution of adolescent health burden (DALYs per 100,000 population), demonstrating significant disparities between LMICs and high-income countries. Data synthesised from Global Burden of Disease studies.

As displayed in **Fig. 1**, the data clearly show a steep regional gradient in adolescent DALYs, ranging from 52,000 per 100,000 in Sub-Saharan Africa and 38,000 in South Asia to 25,000 in the Middle East and North Africa, 22,000 in Latin America and the Caribbean, 18,000 in East Asia and the Pacific, and 12,000 in high-income countries. These disparities reflect structural inequities in healthcare access, disease burden, and social protection. High-burden regions require strengthened adolescent-friendly primary care, expanded mental health and preventive services, and policies addressing poverty, gender inequality, and educational barriers. Coordinated multisectoral investment, national and international, is essential to reduce these preventable disability and mortality. Without sustained action, these gaps will continue to undermine adolescent wellbeing and future life chances, especially in Sub-Saharan Africa.

3.2. Modifiable Behavioural Risk Factors

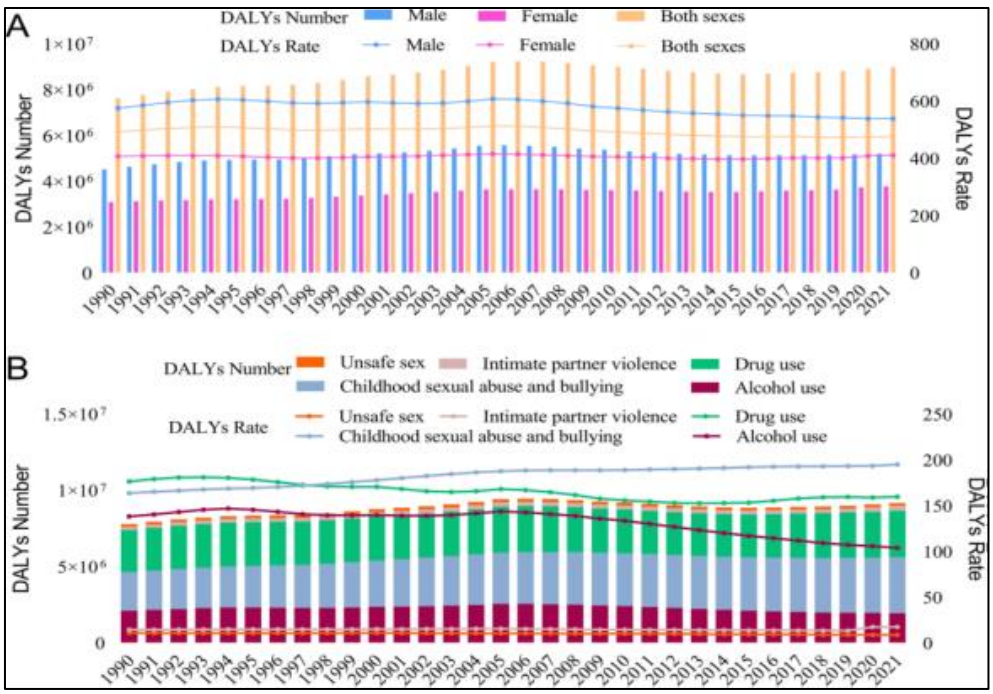

Figure 2 A Global burdens and temporal trends attributable to behavioural risk factors among individuals aged 10–24 by sex from 1990 to 2021. B: Global burdens and temporal trends attributable to five behavioural risk factors among

individuals aged 10–24 years from 1990 to 2021. DALY (disability-adjusted life year) numbers are given as absolute numbers, and DALY rates are per 100,000 population. Data source: Feng et al. (2025).

In **Figure 2**, Feng et al. [4] demonstrated that modifiable behavioural risks serve as pivotal determinants of noncommunicable diseases among adolescents. In 2021, behavioural risk factors were responsible for approximately 23,280 deaths and 9.0 million Disability-Adjusted Life Years (DALYs) globally within this demographic. Notably, substance use disorders, accounting for 4.4 million DALYs, and mental disorders, accounting for 3.9 million DALYs, were the predominant contributors. From 1990 to 2021, DALYs attributed to childhood sexual abuse, bullying, and intimate partner violence exhibited an upward trend, whereas those related to alcohol consumption experienced a decline despite the ongoing burden of 2.0 million DALYs. The worldwide average exposure level for tobacco demonstrated the most pronounced decrease at 26.5%, whereas DALYs associated with drug use increased in high Socio-Demographic Index (SDI) regions.

4. Violence against children and mental health outcomes

4.1. Prevalence and Types of Childhood Violence

Violence directed toward children represents a significant yet neglected concern within public health and human rights domains, with profound repercussions for families and society, especially in low- and middle-income countries (LMICs) (Gallaher et al., [5]). Intentional injuries constitute approximately 7-10% of childhood injuries, with some studies suggesting an even higher prevalence in LMICs. Over seventy-five per cent of children in low- and middle-income countries experience violent discipline at home, with boys more frequently affected than girls, and nearly one in five are subjected to severe forms of violence (UNICEF, [6]). In countries such as Egypt and Ethiopia, 37% and 64% of children, respectively, are subjected to harsh physical punishment by their parents. Data from the Violence Against Children and Youth Surveys (VACS) conducted across eight LMICs reveal that nearly 40% of respondents encountered physical violence during childhood, while 10% experienced sexual violence (Puno and Jeong et al., [7]).

4.2. Mental Health Consequences of Violence Exposure

The association between childhood violence and adverse mental health outcomes is well-documented across multiple LMICs, as illustrated in **Table 1 and Figure 3**. Childhood violence was associated with significantly increased odds of self-harm (physical violence: aOR 2.2; sexual violence: aOR 2.7), suicidal ideation (physical: aOR 3.0; sexual: aOR 4.0), and suicide attempts (physical: aOR 3.6; sexual: aOR 4.9) (Puno and Kim et al., [8]). The odds of all outcomes were highest among those who experienced childhood physical violence by intimate partners and childhood sexual violence by parents or caregivers. Young women who experienced childhood sexual violence had higher odds for all outcomes than young men, highlighting critical gender differences in vulnerability and impact.

Table 1 Violence Types and Associated Health Outcomes in LMICs

Violence Type	Prevalence %	Self-Harm (aOR)	Suicidal Ideation (aOR)	Suicide Attempts (aOR)
Physical Violence	40%	2.2	3.0	3.6
Sexual Violence	10%	2.7	4.0	4.9
Emotional Abuse	25%	2.1	2.8	3.2
Poly-victimization	10%	3.5	4.2	5.1

Source: Violence Against Children and Youth Surveys, 8 LMICs (2017-2019) (Puno and Kim et al., 2024)

Adverse childhood experiences have been acknowledged as significant risk factors for suicidal behaviour among adults, although evidence from low- and middle-income countries (LMICs) remains limited (Rajapakse et al., [9]). A case-control study conducted in Sri Lanka found that adults admitted for self-poisoning were 2.5 times more likely to report adverse childhood experiences compared to controls. Childhood physical abuse (OR 4.7) and emotional abuse or neglect (OR 3.7) markedly increased the risk of self-poisoning in adulthood. Similarly, exposure to household alcohol misuse has been linked to adverse behavioural outcomes during adolescence across twelve different LMICs, including suicidal ideation and behaviour, depression and anxiety disorders, as well as substance use (Jokinen et al., [10]).

As shown in **Figure 3** by Puno and Jeong et al. [7], there appears to be a clear dose–response relationship between exposure to childhood violence and adverse mental health outcomes. Across all violence types, adjusted odds ratios for

self-harm, suicidal ideation, and suicide attempts were consistently elevated compared with adolescents with no exposure. Physical violence conferred a modest risk, emotional abuse showed stronger associations, and sexual violence produced the highest individual elevations. Poly-victimisation conferred the greatest overall risk, indicating that cumulative exposure substantially increases vulnerability to self-harm and suicidality.

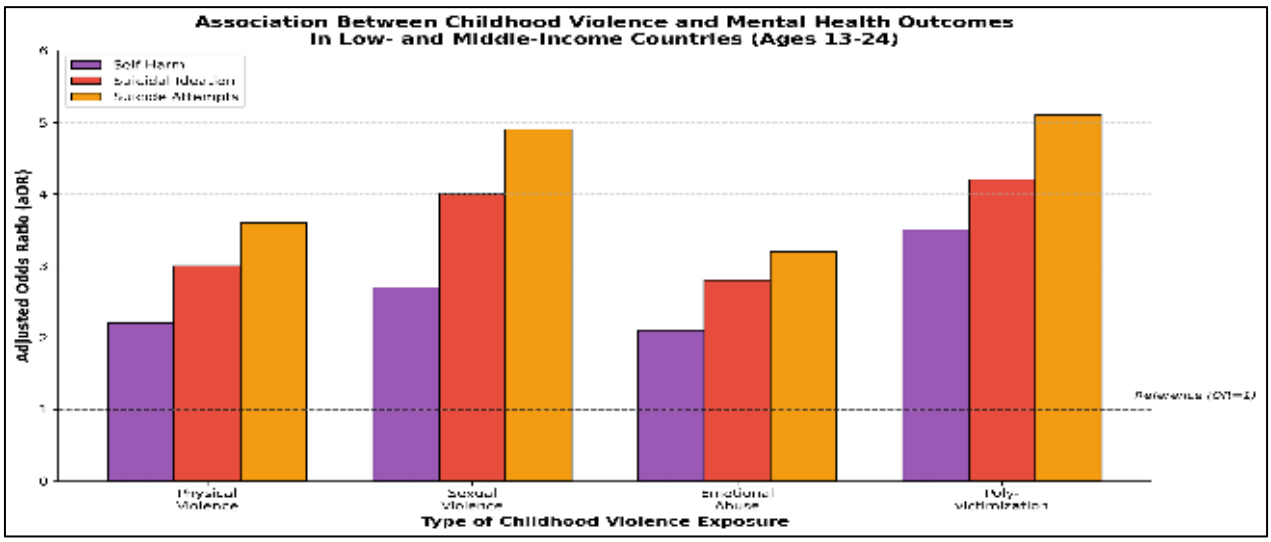

Figure 3 Adjusted odds ratios for mental health outcomes associated with different types of childhood violence exposure among youths aged 13 - 24 in LMICs. Data from Violence Against Children and Youth Surveys (2017-2019).

4.3. Violence and Substance Use Associations

Violence directed toward children and subsequent substance use exhibit a concerning pattern across Low- and Middle-Income Countries (LMICs) (Puno and Jeong et al., [8]). Childhood physical violence was identified as the most prevalent form of violence (40.7%), and approximately 10% of participants reported experiencing poly-victimisation. All forms of violence were associated with increased odds of smoking, binge drinking, and drug use, with poly-victimisation notably elevating the risk. Stronger correlations were observed in young women with a history of childhood sexual violence compared to young men, and these associations were more pronounced among adolescents relative to young adults. Notably, the absence of peer support significantly heightened the likelihood of drug use, indicating protective factors that could be targeted in intervention strategies.

5. Gender-transformative interventions and sexual and reproductive health

5.1. Gender Equity in Adolescent Health Programming

Gender norms—acceptable and appropriate behaviours for men/boys and women/girls in a given community—are major drivers of health and wellbeing, with strong implications for young people's sexual and reproductive health (SRH) and behaviours (WHO, [11]). As young people transition through adolescence and adopt societal beliefs and systems, gender differences between boys and girls begin to emerge, with far-reaching implications. Interventions that promote equitable gender norms at an early age are essential for creating equitable societies and ensuring young people's safe transition to adulthood.

Early adolescence, typically defined as ages 10–14, is widely recognised as a pivotal developmental period during which biological, cognitive, and social transitions converge to shape long-term sexual and reproductive health trajectories. Pubertal onset accelerates during these years, initiating hormonal, physical, and psychosocial changes that influence emerging sexuality and bodily awareness. Global evidence shows that early adolescents begin forming foundational SRH knowledge at this stage, yet often lack access to accurate, age-appropriate information, making this window essential for establishing healthy norms and protective behaviours (UNICEF, [12]).

Simultaneously, gender socialisation intensifies as young adolescents internalise societal expectations, roles, and power dynamics. Research demonstrates that gender norms formed between ages 10 and 14 strongly predict later patterns of help-seeking, relationship behaviours, and vulnerability to SRH risks (Chandra-Mouli et al., [13]). Together, these

findings underscore that early adolescence is not merely transitional but a formative period in which sexual maturation, SRH learning, and gender norm acquisition intersect, shaping health outcomes across the life course.

During early adolescence, young people begin to explore and engage in sexual behaviours that may increase their exposure to risks such as unintended pregnancy, sexually transmitted infections, and coercive relationships. However, this developmental stage also presents a critical opportunity for preventive interventions that strengthen SRH knowledge and promote gender-equitable norms. Evidence shows that radio programs and other mass-media platforms have been effective in disseminating SRH information to adolescents; such interventions have improved knowledge, shaped attitudes, and contributed to shifts in gender norms across diverse settings (Kaufman et al., [14]; Ahmed et al., [15]). However, though evidence suggests their effectiveness, there has been limited focus on radio initiatives specifically targeting youths aged 10-14 with gender and SRH content (Maina et al., [16]).

5.1.1. Male Engagement in Maternal and Child Health

Male engagement is increasingly recognised as a vital strategy for enhancing maternal and child health outcomes and promoting gender equity (Doyle et al, [17]; Aventin et al., [18]). Interventions encompass a spectrum from gender-sensitive approaches, which operate within existing social frameworks, to gender-transformative strategies, which seek to challenge and reshape those frameworks. Key mechanisms identified in successful interventions include increased knowledge, equitable attitudes, self-efficacy, and improved couple communication. These mechanisms are influenced by contextual factors such as patriarchal norms, religious leadership, and the design of health systems. Gender-transformative approaches that encourage critical reflection and collective consciousness have demonstrated more sustainable improvements in health behaviours and gender-equitable practices compared to gender-sensitive strategies, which often produce only short-term effects.

Community dialogue and participation have become increasingly central to debates on the exclusion of boys and men in gender and SRH programming, with scholars arguing that meaningful inclusion of boys and men is essential for achieving gender equality and improving health outcomes. Expanding program reach requires more than technical interventions—it depends on sustained, trust-building engagement with families, community leaders, youth networks, and cultural gatekeepers who shape norms around sexuality, masculinity, and help-seeking. Evidence shows that when communities are involved from the earliest stages—problem identification, co-design, implementation, and evaluation—programs gain legitimacy, generate demand, and foster shared responsibility for young people's SRH. This participatory approach also ensures that information and services are culturally attuned, locally acceptable, and responsive to the diverse needs of adolescents (Mburu et al., [19]).

5.1.2. School-Based Sexual and Reproductive Health Education

Water, sanitation, and hygiene (WASH) in educational institutions have become a vital aspect of comprehensive adolescent health initiatives. A scoping review has identified 83 experimental studies from 33 low- and middle-income countries (LMICs), which measure health or educational outcomes among students related to WASH interventions (Bick et al., [20]). These studies encompass 313 intervention effects across 14 outcome domains, employing an array of WASH technologies and methodologies. Notably, only 7% of the results were disaggregated by gender, thereby limiting the assessment of differential impacts and highlighting the necessity for increased focus on gender-specific outcomes within WASH research.

Table 2 Gender-Transformative Intervention Strategies and Outcomes

Intervention Strategy	Target Population	Key Outcomes	Evidence Quality
Radio Programming	Adolescents 10-14	Improved SRH knowledge, gender attitudes	Moderate
Male Engagement Programs	Men, Fathers	Enhanced couple communication, Maternal Child Health outcomes	High
School-Based WASH	School-age children	Health, education, gender equity	Moderate
Community Dialogues	Parents, Adolescents	Cultural sensitivity, family communication	Moderate

Source: Synthesised from multiple studies (Bick et al., 2023; Maina et al.,2025; Kshtriya et al., 2026)

6. School-based health interventions and nutrition programs

6.1. Effectiveness of School-Based Obesity Prevention

Schools provide an ideal platform for delivering health interventions to adolescents, as they are already engaging in formal education and activities with their peers. A systematic review and meta-analysis of school-based interventions with health education found a significant difference between intervention and control groups in change in BMI z-score of -0.06 (95% CI -0.10, -0.03) (Jacob et al., [23]). Multi-component interventions involving key stakeholders such as teachers and parents, along with digital components, emerged as promising strategies for improving adolescent BMI outcomes.

Adolescent-focused obesity prevention interventions appear to yield stronger behavioural and nutritional outcomes than those targeting younger children, largely because adolescents possess greater cognitive maturity to understand health concepts and exercise more autonomy over food choices. Recent evidence shows that multi-component school-based programmes—combining health education, improved nutritional environments, parental involvement, and community engagement—are particularly effective in shaping healthier behaviours (Nguyen et al., [24]). Interventions grounded in social cognitive theory demonstrate even greater impact, especially when they incorporate environmental modifications such as healthier vending-machine options, educational posters placed throughout school settings, and expanded opportunities for physical activity (Martínez-Gómez et al., [25]). These findings reinforce the value of combining behavioural strategies with supportive environments to enhance adolescent obesity prevention.

6.2. Digital and Innovative Intervention Approaches

Digital interventions have demonstrated potential in enhancing physical activity levels, nutritional knowledge, and healthy dietary habits among adolescents (Kurniawan et al., [26]). A variety of innovative approaches have been employed to engage this demographic, including board games, digital components such as online counselling and SMS messaging, as well as retreat days. Recent evidence indicates that substantial behavioural modifications can be achieved through the integration of health education, goal setting, self-monitoring, and parental involvement, primarily utilising web-based platforms, with secondary emphasis on text messaging and gaming interventions (Nguyen et al., [24]; Osei-Tutu & Mensah, [27]).

Health education interventions are most effective when messages are delivered in ways that align with adolescents' preferences and engagement styles. Evidence shows that complex, interactive approaches such as participatory learning, multimedia content, and peer-supported activities enhance adolescents' receptivity to health messages (Randle et al., [28]). Teacher training prior to intervention delivery also emerges as a critical determinant of success; in recent evaluations, nearly all effective programmes were facilitated by teachers who had received structured training in nutrition education and behaviour-change communication (Okafor & Lim, [29]).

Parental involvement consistently strengthens intervention outcomes, with effective modalities including parent newsletters, homework tasks requiring parent participation, SMS reminders, and structured nutrition-education materials. These multi-level strategies reinforce behaviour change by extending learning beyond the school environment and embedding it within adolescents' everyday social contexts.

6.3. Physical Activity and Movement Behaviours

Adherence to the 24-hour movement behaviour guidelines, which include moderate-to-vigorous physical activity, recreational screen time, and sleep, is linked to various health and developmental outcomes in children and adolescents (Hossian et al., [30]). The global research on these guidelines has expanded significantly since 2016; however, it remains methodologically limited, with 68% of publications originating from six high- or upper-middle-income countries. Worldwide, compliance rates with the 24-hour movement behaviour guidelines have been low (ranging from 0% to 53.6%), with 87% of studies reporting compliance below 10%. Adherence to these guidelines is associated with a decreased likelihood of obesity, mental health issues, and cardiometabolic problems, as well as improved physical fitness, academic achievement, and cognitive functioning.

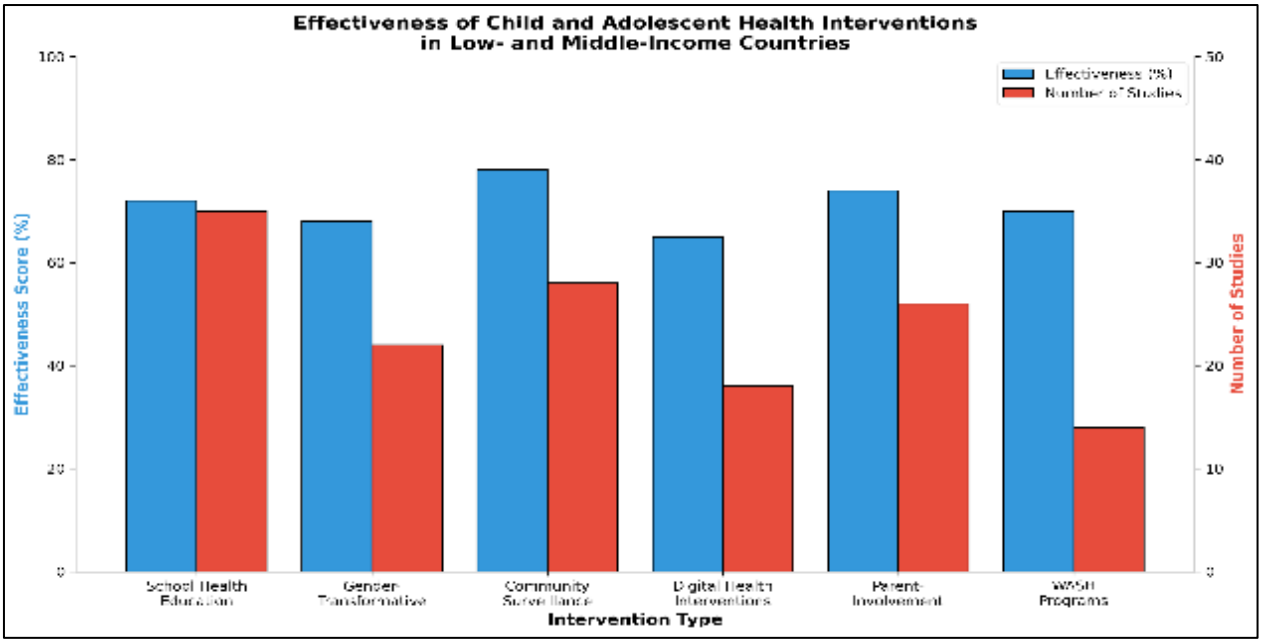

Figure 3 Comparative effectiveness of different intervention types for child and adolescent health in LMICs, showing effectiveness scores and number of studies reviewed. Data synthesised from systematic reviews.

The physical activity transition model has been tested among children and adolescents in LMICs, with a meta-analysis indicating that urban participants accumulated 10 fewer minutes of moderate-to-vigorous physical activity daily compared with their rural counterparts (Akwaboah et al., [31]). This represents about one-sixth of the WHO physical activity guidelines. Stratified analyses showed lower physical activity among participants in urban low- and lower-middle-income countries compared with rural participants, suggesting that urbanisation is associated with lower physical activity levels, consistent with the transition model.

Table 3 School-Based Intervention Components and Effectiveness

Intervention Component	Effect on BMI	Evidence Level	Implementation Considerations
Teacher Training/CPD	Significant reduction	High	Requires institutional support
Parental Involvement	Moderate reduction	High	Multi-modal engagement needed
Digital Components	Small-moderate effect	Moderate	Infrastructure requirements
Environmental Modification	Variable effect	Moderate	Policy and resource dependent
Nutrition Education	Moderate effect	High	Curriculum integration needed

Source: Systematic review of 35 studies (*Jacob et al., 2021*)

7. Data-driven surveillance and health system strengthening

7.1. Health Surveillance Systems for Vulnerable Populations

Public health systems increasingly rely on informatics frameworks to address persistent inequities affecting vulnerable populations, including low-income communities, informal workers, migrants, children, older adults, and people with disabilities (Anioke & Atima, [32]). These frameworks integrate health surveillance systems, administrative datasets, social determinants of health indicators, geospatial analytics, and digital reporting platforms to enable timely identification of risks, service gaps, and policy non-compliance. Advanced analytics, including predictive modelling, interoperability standards, and automated alerts, support evidence-based enforcement of public health policies.

Data-driven public health surveillance systems are transforming how outbreaks are detected, monitored, and managed across diverse global contexts (Famodu et al., [33]). By integrating heterogeneous data streams including electronic health records, laboratory reports, mobility data, environmental indicators, and digital traces, these systems enable earlier outbreak prediction and more precise situational awareness. When designed with equity-oriented frameworks, data-driven surveillance can illuminate disparities in exposure, access to care, and health outcomes among marginalised and underserved populations.

7.2. Community-Based Maternal and Child Health Surveillance

Comprehensive health surveillance for vulnerable populations, particularly mothers and children, is essential beyond traditional surveys (Sigit et al., [34]). Community-based surveillance helps address gaps in identifying issues occurring outside health facilities or linked to social stigma. Household surveys have revealed significant knowledge gaps, with 22.5%, 24.1%, and 15.1% of respondents lacking knowledge of warning signs during pregnancy, childbirth, and newborn care, respectively. Men were less knowledgeable than women across all domains, highlighting the need for targeted health education.

Health and demographic surveillance systems provide a foundation for characterising and defining priorities and strategies for improving population health (Cunningham et al., [34]). The Child Health and Mortality Prevention Surveillance (CHAMPS) project aims to inform policy to prevent child deaths through generating causes of death from surveillance data combined with innovative diagnostic and laboratory methods. To generate actionable health and demographic data to prevent child deaths, the network depends on reliable demographic surveillance across multiple sites in LMICs.

7.3. Machine Learning and Predictive Analytics

Machine learning (ML) has emerged as a promising tool for identifying, classifying, and predicting conditions related to undernutrition and child health outcomes (Bachri et al., [36]). A bibliometric analysis of global research from 2019 to 2025 revealed consistent growth in publications applying ML techniques such as clustering, support vector machines, and random forests to address malnutrition and stunting. The analysis showed thematic evolution indicating a shift towards more integrated, context-aware approaches, with growing focus on built environments and vulnerable populations.

Machine learning models applied to integrated municipal data have demonstrated the ability to predict the risk of child neglect and abuse (Yashuv et al., [37]). Prediction models showed good performance with AUCs (Area Under the Receiver Operating Characteristic Curve) ranging from 0.75 to 0.88. In scenarios where the top 5% of children at risk are assessed by municipal services, 32% of neglected children and 34% of abused children could have been identified up to 2 years in advance. However, ethical considerations, cultural sensitivity, and human oversight remain essential for responsible implementation.

Table 4 Surveillance System Components and Applications

System Component	Primary Function	Target Population	Key Benefits
Health Information Systems	Data integration	General population	Policy decision support
Community-Based Surveillance	Case identification	Mothers, children	Early detection
Machine Learning Models	Risk prediction	At-risk children	Resource allocation
Mobile Health Platforms	Real-time monitoring	Remote populations	Access improvement
Verbal Autopsy Systems	Mortality cause determination	Deceased individuals	Evidence generation

Source: Synthesised from multiple sources (Anioke & Atima, 2023; Cunningham et al., 2019; Yashuv et al., 2026)

8. Healthcare access, barriers, and policy implications

8.1. Barriers to Healthcare Access in Vulnerable Populations

The homeless population faces persistent challenges in accessing and utilising healthcare services (Rabbani et al., [38]). A mixed-method study in Bangladesh found that around 38% of homeless participants had experienced acute illness in the 30 days preceding the survey, with 67% seeking treatment primarily from local drug stores. Financial constraint

(70%) was the primary barrier to not seeking care for acute illness. Additionally, 46% of participants reported chronic illnesses lasting more than 12 months, with about 80% being unable to afford regular treatment due to financial constraints (90%). Qualitative findings identified additional obstacles including poor knowledge about care sources, complex healthcare systems, lack of attendants, belief in natural healing, and discrimination at health facilities.

Research-to-policy partnerships have emerged as critical mechanisms for evidence-informed resource allocation in health systems in Africa (Bruns et al., [39]). State-level adoption of evidence-based treatments and associated implementation support is associated with an interpretable array of policy, financing, and oversight factors. Several unmodifiable state factors, including per capita income, controlling political party, and Medicaid expansion, predicted the level of state fiscal investments in evidence-based treatments. By contrast, modifiable factors such as interagency collaboration and investment in research centres were more predictive of state policies supportive of evidence-based practices.

8.2. Structural Determinants and Health Inequities

Persistent maternal and child health inequities in LMICs are driven not only by service delivery gaps but also by structural social determinants of health, including housing, water and sanitation, poverty, and governance fragmentation (Okedi et al., [40]). A cross-sectional study in Kenya found that structural vulnerabilities—including semi-permanent housing, inadequate WASH infrastructure, and persistent financial constraints—were widespread. Although geographic access to facilities was relatively adequate, effective utilisation of antenatal, delivery, and postnatal services was constrained by indirect costs, transport limitations, and weak cross-sector coordination.

Persistent health disparities in maternal, child, and mental health outcomes continue to afflict underserved communities, driven by structural inequities, systemic racism, fragmented care delivery, and underinvestment in community health infrastructure (Omolola & Diyaolu, [41]). These disparities are particularly pronounced in historically marginalised populations where social determinants such as poverty, housing instability, limited healthcare access, and chronic stress exacerbate adverse health outcomes across generations. Comprehensive community-driven models integrating trusted community health workers, place-based interventions, participatory planning, and trauma-informed care have shown promise in addressing these disparities.

9. Conclusion

This literature review demonstrates that child and adolescent health in LMICs is shaped by complex interactions between biological, behavioural, social, and structural determinants. The evidence clearly shows that violence against children, including physical, sexual, and emotional abuse, is strongly associated with adverse mental health outcomes, including self-harm, suicidal ideation, and substance use disorders. Gender-transformative interventions and male engagement strategies have shown promise in improving maternal and child health outcomes, though sustainability requires addressing underlying power dynamics and social norms. School-based health education interventions offer effective platforms for obesity prevention and health promotion, particularly when incorporating digital components, teacher training, and parental involvement. Data-driven surveillance systems and informatics frameworks provide scalable pathways for identifying vulnerable populations and informing evidence-based policy enforcement. However, substantial barriers to healthcare access persist, driven by financial constraints, structural inequities, and fragmented service delivery systems. Achieving sustainable improvements in child and adolescent health will require coordinated multisectoral action, strengthened healthcare systems, and continued investment in research and implementation science across diverse LMIC contexts.

9.1. Policy recommendations and future research directions

Several key policy implications emerge from this literature review. First, violence prevention and mental health programs for young people in LMICs should consider the types of violence experienced, the perpetrator, and the gender of the survivor. Second, improving maternal and child health in resource-limited settings requires policy shifts beyond facility expansion toward integrated, multisectoral action. Third, health-care infrastructure faces growing challenges associated with increased care needs for chronic disease management requiring long-term care and ongoing treatment.

The need for global collaboration to reduce preventable mortality is more important than ever, as shifting burdens of disease are affecting all nations. Collaborative and focused efforts including coordinated policy initiatives and prevention programs targeting key risk factors are needed to alleviate immediate health challenges related to the rising burden of NCDs in low-income regions and to achieve long-term improvements in global health outcomes.

Future research should focus on under-represented regions and populations, including boys/men's health, use longitudinal and experimental designs, and assess key outcomes to inform policy and practice for improving child, adolescent, and youth health and well-being globally.

Compliance with ethical standards

Disclosure of conflict of interest

The author declares no financial or personal conflicts of interest that could influence the work presented. No funding was sought or received, and the article processing charge (APC) was paid personally by the author. The views expressed are solely those of the author and do not represent the positions of the author's employer or any affiliated institution.

Statement of informed consent

This article did not involve human participants, and therefore informed consent requirements do not apply.

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