

Adolescent Nutrition Surveillance in Africa: Addressing the Triple Burden of Malnutrition Through Stronger Health Information Systems

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Abstract *Adolescence represents a critical stage of human development characterized by rapid physical growth and increased nutritional requirements. However, adolescents remain underrepresented in nutrition surveillance systems, particularly in low- and middle-income countries where the burden of malnutrition remains high. This study aimed to examine the current state of adolescent nutrition surveillance and identify key gaps in existing data systems that limit evidence-based policy and programming. We conducted a narrative literature review and policy analysis using scientific publications and authoritative institutional reports published between 2000 and 2025. Data sources included peer-reviewed journals and reports from major global health organizations. The analysis focused on measuring adolescent nutritional indicators and integrating these indicators into national health information systems. The findings reveal that current surveillance systems largely prioritize children under five years of age and women of reproductive age, leaving adolescents underrepresented in routine monitoring systems. Existing data sources, including household surveys and school-based health surveys, provide only partial and irregular information on adolescent nutritional status. Furthermore, adolescents are increasingly affected by the triple burden of malnutrition, including undernutrition, overweight and obesity, and micronutrient deficiencies such as anaemia. Strengthening adolescent nutrition surveillance by integrating standardized indicators into national health information systems is essential to support evidence-based decision-making, guide targeted interventions, and improve long-term health outcomes for adolescents.*

Keywords *Adolescent Nutrition, Anaemia, Malnutrition, Nutrition Surveillance, Overweight, Thinness.*

Introduction

Adolescence, defined as the period between 10 and 19 years of age, represents a critical stage of growth and development characterized by rapid physical, cognitive, and psychosocial changes. Nutritional requirements increase substantially during this period, making adolescents particularly vulnerable to poor dietary practices and nutritional deficiencies. Investments in adolescent nutrition can generate long-term benefits for health, educational attainment, and economic productivity across the life course. Recent global health research highlights adolescence as a unique opportunity to improve health trajectories and break intergenerational cycles of malnutrition [1].

Globally, adolescents face a triple burden of malnutrition encompassing undernutrition, overweight and obesity, and micronutrient deficiencies such as anaemia. These forms of malnutrition increasingly coexist within the same populations due to complex interactions between food insecurity, nutrition transition, urbanization, and socio-economic inequalities. While undernutrition and micronutrient deficiencies remain highly prevalent in many low- and middle-income countries, overweight and obesity among adolescents have increased considerably over recent decades [2, 3]. This evolving nutritional landscape requires stronger surveillance systems capable of monitoring diverse dimensions of adolescent nutritional status.

Sub-Saharan Africa hosts the world's fastest-growing adolescent population, and projections from the United Nations Population Fund (UNFPA) indicate that adolescent populations in the region could increase by more than 60% by 2050 [4]. This demographic transition presents major opportunities and challenges for health systems, particularly in relation to nutrition. Despite growing global recognition of adolescent health, many African countries still lack comprehensive systems to monitor

adolescent nutritional status and generate routine data to guide policy and programming.

In Senegal, a 2025 national assessment conducted within the Global Action for Measurement of Adolescent Health (GAMA) framework highlighted substantial gaps in adolescent nutrition surveillance systems. Although multiple national data sources exist, including DHIS2 routine data, demographic surveys, and nutrition assessments, major limitations persist regarding the availability, standardization, and age disaggregation of adolescent nutrition indicators, particularly among adolescents aged 10–14 years. The assessment also reported an anaemia prevalence of 29.1% among adolescents, with higher prevalence among adolescents aged 15–19 years (38.9%) compared with those aged 10–14 years (23.3%). Thinness was more prevalent among younger adolescents, while overweight and obesity were more frequently reported among older adolescents. These findings illustrate broader challenges faced across many African countries in strengthening adolescent nutrition surveillance systems and integrating adolescent-specific indicators into routine health information systems.

Although adolescents represent a large proportion of the African population, nutrition surveillance systems continue to prioritize children under five years of age and women of reproductive age, leaving adolescents underrepresented in many national health information systems. Existing data sources, including Demographic and Health Surveys (DHS) and school-based health surveys, often provide fragmented and incomplete information on adolescent nutrition. At the same time, Africa continues to face a persistent burden of undernutrition, micronutrient deficiencies, and increasing overweight and obesity among adolescents. Globally, more than 390 million children and adolescents aged 5–19 years were overweight in 2022, including approximately 160 million living with obesity [5]. These trends underscore the urgent need for

stronger adolescent nutrition surveillance systems and standardized indicators to support evidence-based public health action.

Global frameworks increasingly emphasize strengthening adolescent health measurement systems. The Global Accelerated Action for the Health of Adolescents (AA-HA!) framework [6] and the Global Action for Measurement of Adolescent Health (GAMA) initiative [7] both call for improved monitoring systems and standardized indicators to support evidence-based adolescent health policies and programmes. GAMA specifically identifies key nutrition indicators, including the prevalence of overweight and obesity, thinness, and anaemia among adolescents. Integrating these indicators into national health information systems, including digital platforms such as DHIS2, offers an important opportunity to strengthen adolescent nutrition surveillance and improve decision-making.

However, significant gaps persist in the availability, standardization, and use of adolescent nutrition data within many African health systems. Unlike previous reviews that primarily focused on global adolescent nutrition trends, this study emphasizes the African context and examines adolescent nutrition surveillance from a health information systems perspective. By integrating evidence from global frameworks together with emerging national experiences from Senegal, the review highlights operational gaps related to adolescent nutrition indicators, age disaggregation, and the integration of adolescent nutrition data into routine health information systems. This review therefore contributes to the limited literature examining adolescent nutrition surveillance in African settings and explores opportunities to strengthen data systems for improved policy and programmatic decision-making.

Materials and Methods

This study used a narrative literature review combined with a policy analysis approach to

examine the current status of adolescent nutrition surveillance and identify key gaps in existing measurement systems. The review focused on global and regional evidence related to adolescent nutrition, particularly the triple burden of malnutrition, which includes undernutrition, overweight and obesity, and micronutrient deficiencies such as anaemia. The study primarily examined how global health frameworks and national health information systems measure and monitor adolescent nutrition.

Figure 1 presents the conceptual framework illustrating the relationship between adolescent malnutrition and surveillance systems.

The literature search used combinations of keywords related to adolescent nutrition, nutrition surveillance, health information systems, DHIS2, Africa, and Senegal.

The analysis was conducted as a global review of scientific literature and policy documents with particular relevance to low- and middle-income countries, where the burden of adolescent malnutrition remains substantial and adolescents continue to face major nutrition vulnerabilities [8]. The analysis considered global frameworks guiding adolescent health measurement, including the Global Accelerated Action for the Health of Adolescents (AA-HA!) framework, the Global Action for Measurement of Adolescent Health (GAMA) initiative, and monitoring indicators linked to the Sustainable Development Goals (SDGs). These frameworks provide important guidance for strengthening adolescent health measurement and integrating adolescent nutrition indicators into national health information systems.

Because the study relied entirely on secondary data sources, no laboratory experiments or biological measurements were conducted as part of this research. Instead, the analysis focused on synthesizing existing evidence regarding adolescent nutritional indicators, data collection methods, and surveillance frameworks reported in the literature. Particular attention was given to

commonly used indicators such as body mass index, dietary patterns, anaemia prevalence,

and other micronutrient deficiencies reported in national and global surveys.

Conceptual Framework for Adolescent Nutrition Surveillance

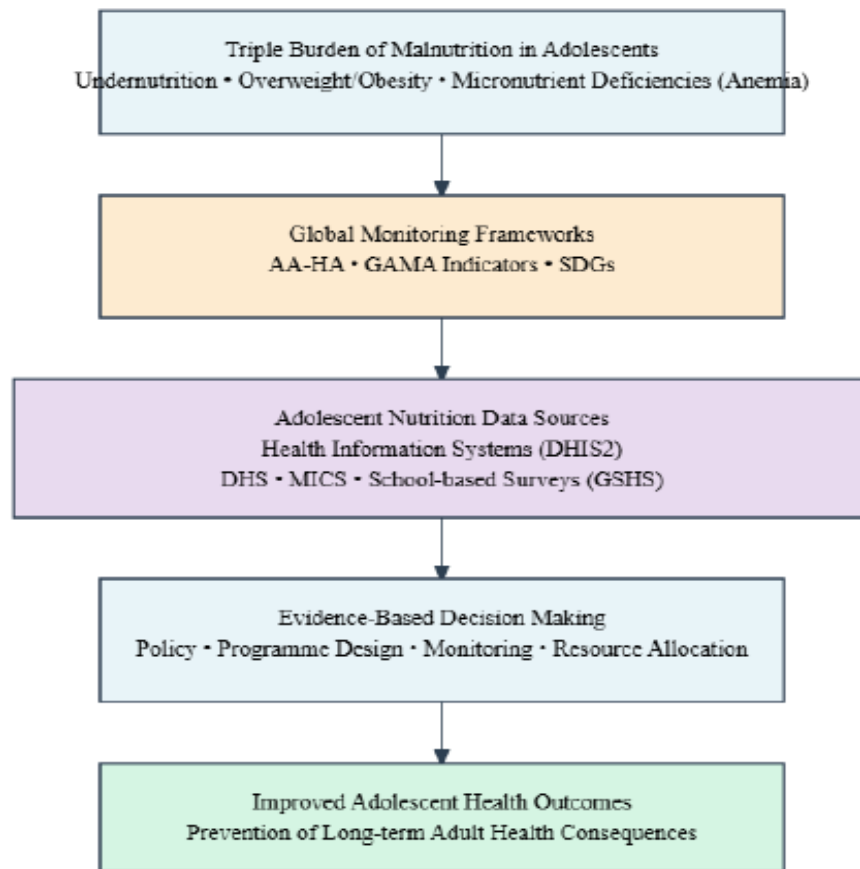


Figure 1. Conceptual Framework Illustrating the Relationship Between the Triple Burden of Malnutrition Among Adolescents, Global Monitoring Frameworks, Nutrition Surveillance Systems, and Evidence-Based Policy Responses

Inclusion and exclusion criteria were defined to ensure the relevance and quality of the selected documents. Included documents comprised peer-reviewed scientific articles, institutional reports, policy documents, and global health publications focusing on adolescent nutrition, adolescent health surveillance, nutrition indicators, or health information systems published between 2000 and 2025. Priority was given to documents addressing low- and middle-income countries, particularly African settings.

Documents were excluded if they focused exclusively on children under five years of age or adults without specific adolescent data,

lacked sufficient methodological information, or were not directly related to adolescent nutrition surveillance or health information systems.

The search initially identified 88 documents, of which 19 were finally retained after screening and eligibility assessment. This confirms that while broader literature on adolescent health and nutrition exists, evidence specifically addressing adolescent nutrition surveillance and integration into health information systems in African contexts remains limited. Table 1 summarizes the literature search and document selection process.

Table 1. Summary of Literature Search and Document Selection Process for the Review of Adolescent Nutrition Surveillance Systems

Step of Review Process	Description	Number of Documents
Records identified	Documents identified through PubMed, Scopus, Google Scholar, Web of Science and institutional sources	88
Records screened	Documents screened after removal of duplicates and irrelevant titles	72
Records excluded	Documents excluded because they were not focused on adolescents, nutrition, surveillance, Africa, Senegal or HIS/DHIS2	38
Full-text documents assessed	Full-text articles, reports and policy documents assessed for eligibility	34
Full-text documents excluded	Documents excluded due to limited relevance, absence of adolescent-specific indicators, or insufficient focus on surveillance systems	14
Final documents included	Documents retained for analysis	19

The collected literature was analyzed using a thematic analytical approach to identify common patterns and gaps in adolescent nutrition surveillance. Selected documents were systematically reviewed and categorized by key analytical themes, including existing adolescent nutrition indicators, data collection sources, integration of adolescent indicators within health information systems, and implications for policy and program decision-

making. This analytical approach identified major limitations in current surveillance systems and highlighted opportunities to strengthen adolescent nutrition data systems to better inform health policies and interventions.

Results

Table 2 summarizes the main documents and reports included in the review.

Table 2. Summary of Key Documents Included in the Review of Adolescent Nutrition Surveillance Systems

Author/Organization	Year	Type of Document/Study	Geographic Focus	Main Contribution to Adolescent Nutrition Surveillance
Sawyer S.M. et al.	2018	Review article	Global	Defined adolescence as a critical developmental stage requiring targeted nutrition and health interventions
Christian P. & Smith E.R.	2018	Review article	Global	Examined the burden and physiological determinants of

				adolescent undernutrition
Salam R.A. et al.	2016	Systematic review	LMICs	Reviewed interventions to improve adolescent nutrition outcomes
Ross D.A. et al.	2020	Framework article	Global	Proposed standardized adolescent health indicators under the GAMA initiative
Popkin B.M. et al.	2020	Review article	Global	Described the dynamics of the double burden of malnutrition and nutrition transition
Akseer N. et al.	2020	Review article	Global	Examined adolescent non-communicable diseases, determinants, interventions and policies
Norris S.A. et al.	2022	Lancet Series article	Global	Highlighted the role of nutrition in adolescent growth and development
Patton G.C. et al.	2022	Lancet commentary	Global	Emphasized the urgency of investing in adolescent nutrition globally
Azzopardi P.S. et al.	2019	Multi-country analysis	Global	Assessed progress in adolescent health and wellbeing indicators across countries
Ng M. et al.	2014	Global epidemiological analysis	Global	Reported trends in overweight and obesity among children and adolescents
Sy M. et al.	2025	Cross-sectional study	Senegal	Reported nutritional status and associated factors among adolescents in Senegal
Ndovie P. et al.	2025	Systematic review	Malawi and Ghana	Examined adolescent dietary diversity and micronutrient deficiencies
UNICEF	2021	Institutional review report	LMICs	Highlighted gaps in adolescent nutrition

				monitoring and data availability
WHO	2017	Global policy framework	Global	Introduced the Global Accelerated Action for the Health of Adolescents (AA-HA!) framework for adolescent health action
WHO / GAMA Initiative	2021	Global framework report	Global	Identified priority indicators and measurement gaps for adolescent health and nutrition
Global Nutrition Report	2023	Global nutrition report	Global	Reported trends in the triple burden of malnutrition
World Bank	2020	Technical report	Global	Reviewed nutrition and health data systems for adolescents
WHO	2020	Survey framework	Global	Provided guidance on the Global School-based Student Health Survey (GSHS)
Senegal GAMA Workshop Report	2025	National assessment report	Senegal	Identified gaps in adolescent nutrition indicators, DHIS2 integration and age disaggregation
DHS Senegal	2023	National household survey	Senegal	Provided adolescent nutrition and anaemia-related data for Senegal

The review of scientific literature and global health reports revealed several key insights regarding the current status of adolescent nutrition surveillance. Overall, the findings indicate that although global awareness of adolescent health has increased in recent years, the measurement and monitoring of adolescent nutrition remain fragmented and insufficiently integrated into routine health information systems.

A key finding of the review is that most existing nutrition data systems focus primarily on children under five years of age and women

of reproductive age, with limited attention to adolescents. Large-scale household surveys such as Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) provide some information on adolescent nutrition, particularly among adolescent girls. However, these surveys are conducted only periodically and therefore cannot support continuous monitoring of adolescent nutritional trends. In addition, many national health information systems do not systematically include adolescent-specific nutrition indicators, which limits the

availability of routine data for policy and program planning [3].

The review also identified several global and national data sources that provide partial information on adolescent nutritional status. School-based surveys, including the Global School-based Student Health Survey (GSHS), collect data on dietary behaviors, physical activity, and body mass index among adolescents. Similarly, some national nutrition surveys include anthropometric measurements that can be used to assess undernutrition or overweight among adolescents. However, these data sources are often implemented irregularly and are not always harmonized across countries, making cross-country comparisons difficult [9].

Another key finding concerns the types of indicators currently used to monitor adolescent nutrition. The literature indicates that the most commonly reported indicators include body mass index for age, prevalence of overweight and obesity, dietary diversity, and anaemia prevalence among adolescent girls. While these indicators provide valuable information, they often fail to capture the full complexity of adolescent nutritional status. For example, micronutrient deficiencies other than anaemia are rarely measured in routine surveillance systems, and indicators related to dietary quality and food environments remain limited [2].

The review further highlights the growing concern regarding the triple burden of malnutrition affecting adolescents globally. In many low- and middle-income countries, undernutrition and micronutrient deficiencies remain widespread, particularly among adolescents living in rural and low-income settings. At the same time, overweight and obesity among adolescents have increased significantly in both urban and rural areas,

reflecting global dietary transitions and increased exposure to energy-dense processed foods. Recent global estimates suggest that overweight and obesity among adolescents have risen dramatically over the past decades, creating new public health challenges for health systems [10, 11].

The provisional report of the Global Action for Measurement of Adolescent Health (GAMA) assessment conducted in Senegal further illustrates the growing triple burden of malnutrition among adolescents. The report documented an anaemia prevalence of 29.1% among adolescents, with higher prevalence among adolescents aged 15–19 years (38.9%) compared with adolescents aged 10–14 years (23.3%). Thinness was more prevalent among younger adolescents aged 10–14 years (24.5%), while overweight and obesity were more frequently reported among older adolescents aged 15–19 years. These findings highlight substantial nutritional vulnerabilities among adolescents and emphasize the importance of age-disaggregated nutrition surveillance systems.

Another key observation in the literature is the fragmentation of adolescent nutrition data sources. Data relevant to adolescent nutrition are often collected across multiple sectors, including health, education, and social protection systems. However, these data are rarely integrated into a unified surveillance system that can provide a comprehensive picture of adolescent nutritional status. As a result, policymakers often face challenges in accessing reliable and timely information needed to design targeted interventions and monitor program performance [12].

The main sources of data used to monitor adolescent nutrition are summarized in Figure 2.

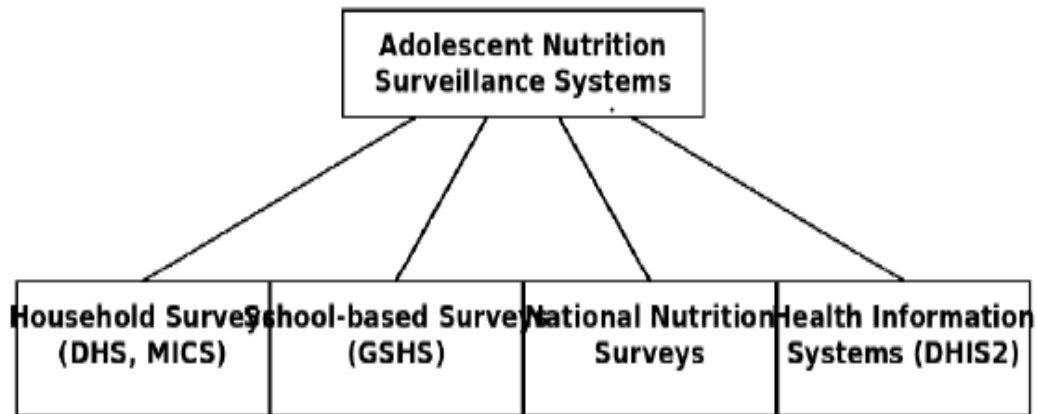


Figure 2. Major Data Sources Contributing to Adolescent Nutrition Monitoring, Including Household Surveys (DHS, MICS), School-Based Surveys (GSHS), National Nutrition Surveys, and Routine Health Information Systems such as DHIS2

Finally, the review indicates that despite growing recognition of the importance of adolescent health, major gaps remain in the availability, quality, and use of adolescent nutrition data. The limited integration of adolescent health indicators into national health information systems, and irregular data collection mechanisms contribute to significant knowledge gaps. Strengthening adolescent nutrition surveillance systems is therefore essential to support evidence-based policymaking and to ensure that adolescent nutrition receives adequate attention within national and global health agendas.

Discussion

The findings of this review highlight persistent gaps in the measurement and monitoring of adolescent nutrition despite increasing global recognition of the importance of adolescent health. While international initiatives and global health frameworks have emphasized the need to address adolescent health and nutrition, the results indicate that adolescents remain underrepresented in nutrition surveillance systems. Existing monitoring structures continue to prioritize children under five years of age and women of reproductive age, leaving a significant gap in

the routine collection of data on adolescent nutritional status.

This pattern is consistent with previous research highlighting the historical neglect of adolescent nutrition within global health systems. Ross et al. [13] emphasized the need for a shared conceptual framework and multidimensional indicators to strengthen the measurement of adolescent well-being across settings. Similarly, studies examining adolescent nutrition have emphasized that the lack of standardized measurement tools and surveillance frameworks limits the ability of policymakers to accurately assess adolescent nutritional needs and monitor progress over time [14].

The results of this study also confirm the complexity of adolescent nutrition, characterized by the coexistence of undernutrition, overweight and obesity, and micronutrient deficiencies. This triple burden of malnutrition reflects broader global nutrition transitions and changing food environments affecting adolescents worldwide. Evidence suggests that many low- and middle-income countries are simultaneously facing persistent micronutrient deficiencies and rising rates of overweight and obesity among adolescents. According to global analyses, the increasing availability of energy-dense foods and the rapid

urbanization observed in many regions have significantly influenced dietary patterns and lifestyle behaviours among adolescents [15].

Another significant issue highlighted in this study is the fragmentation of existing adolescent nutrition data systems. Information on adolescent nutritional status is often dispersed across different sectors such as health, education, and nutrition programs, with limited coordination or integration between these systems. As a result, decision-makers often lack access to comprehensive and timely data needed to inform policies and interventions targeting adolescent populations. Previous studies have emphasized that strengthening health information systems and integrating adolescent health indicators into routine data systems are essential steps toward improving evidence-based decision-making [16].

Experiences from Senegal further illustrate the operational challenges faced by many African countries in integrating adolescent nutrition indicators into routine health information systems. These challenges include fragmented data sources, limited age disaggregation between younger and older adolescents, and insufficient harmonization of adolescent nutrition indicators within national DHIS2 platforms.

From an operational perspective, integrating adolescent nutrition indicators into national DHIS2 platforms requires harmonization with existing reporting tools, standardization of indicators, and capacity building for health workers and data managers to improve the routine collection, analysis, and utilization of adolescent nutrition data within national health information systems, in addition to validation within national health information system governance frameworks. Experiences from Senegal further demonstrate that fragmented data sources and the absence of adolescent-specific nutrition indicators within routine reporting systems remain major barriers to

effective monitoring and evidence-based policymaking.

Furthermore, global initiatives such as the Global Action for Measurement of Adolescent Health (GAMA) have highlighted the urgent need for standardized indicators and improved measurement approaches to ensure that adolescents are adequately represented within health data systems. Integrating adolescent nutrition indicators into national health information systems could significantly improve governments' and development partners' capacity to monitor trends, identify priority populations, and design targeted interventions.

From a policy perspective, strengthening adolescent nutrition surveillance requires coordinated efforts across sectors, including health [17], education, and social protection systems to improve data integration and support coordinated policy responses. Governments and development partners should prioritize the integration of adolescent nutrition indicators into routine health information systems and national monitoring frameworks. Such efforts would also contribute to the achievement of the Sustainable Development Goals and strengthen national capacities for monitoring adolescent health and nutrition outcomes [18]. Investments in digital health platforms such as DHIS2 can further support the routine collection and analysis of adolescent health data, thereby improving the capacity of countries to monitor nutrition trends and design targeted interventions for adolescents. Strengthening adolescent data systems and improving the availability of routine nutrition information have also been identified as critical priorities for evidence-based decision-making in low- and middle-income countries [19].

A conceptual model illustrating how adolescent nutrition surveillance systems could be strengthened through the integration of standardized indicators into national health information systems is presented in Figure 3.

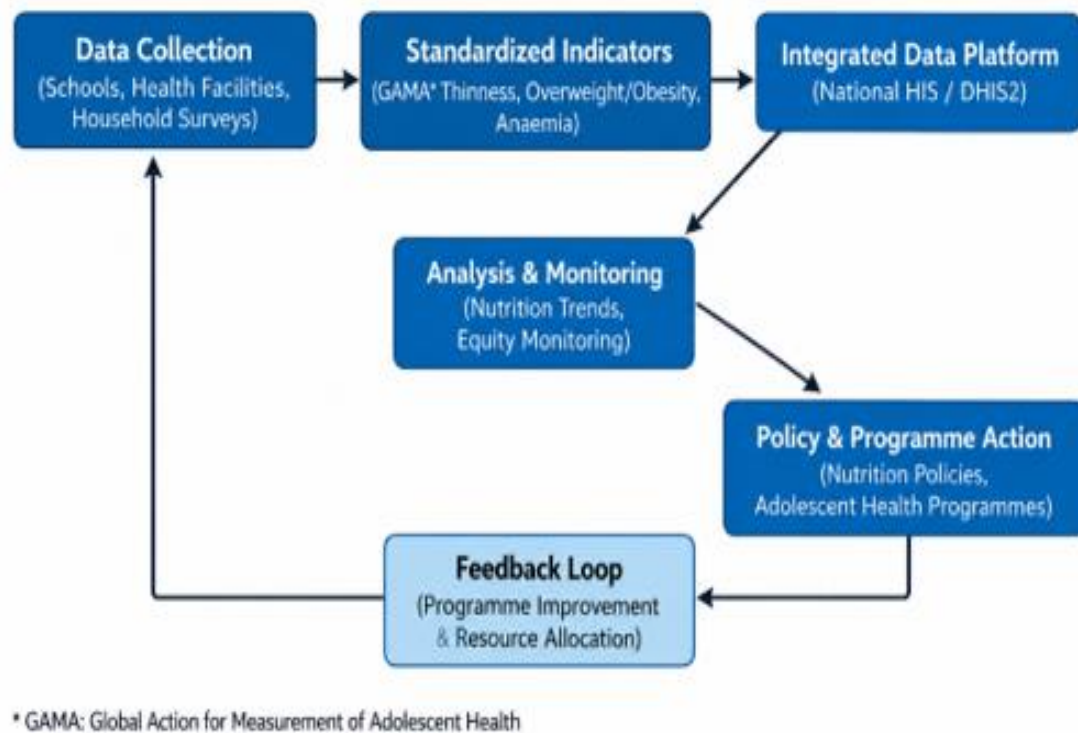


Figure 3. Recommended Adolescent Nutrition Surveillance System Illustrating the Flow from Data Collection Through Standardized Indicators and Integrated Health Information Systems to Analysis, Policy Action and Programme Feedback Mechanisms

Despite the valuable insights provided by this review, several limitations should be acknowledged. First, the study relied primarily on secondary data from published literature and institutional reports, which may not fully capture country-specific experiences or recent developments in adolescent nutrition surveillance. Second, the narrative review methodology does not allow for quantitative synthesis of findings or direct measurement of the magnitude of surveillance gaps across different settings. Additionally, variations in study designs and measurement approaches across the reviewed literature may limit the comparability of findings.

These limitations highlight the need for more context-specific and empirical research to better understand how adolescent nutrition surveillance systems can be strengthened at national and subnational levels. In this regard, the present study provides an essential

conceptual and analytical foundation for further research. Building on these findings, the author will conduct more in-depth investigations as part of their doctoral research, which aims to explore the feasibility, challenges, and opportunities for strengthening adolescent nutrition surveillance systems within national health information systems. This research will generate context-specific evidence to support integrating adolescent nutrition indicators into routine monitoring systems and to inform evidence-based policy and programming.

The Global Action for Measurement of Adolescent Health (GAMA) initiative identifies key indicators for monitoring adolescent nutrition, including the prevalence of overweight and obesity among adolescents, prevalence of thinness among adolescents, and prevalence of anaemia among adolescents (Table 3).

Table 3. Key Indicators for Monitoring Adolescent Nutrition Based on the Global Action for Measurement of Adolescent Health (GAMA) Framework

GAMA Indicators	Description	Potential Data Sources	Relevance for Nutrition Surveillance
Prevalence of overweight and obesity among adolescents	Proportion of adolescents aged 10–19 years with body mass index above WHO reference thresholds for overweight or obesity	School-based surveys (GSHS), national nutrition surveys, health examinations	Captures the growing burden of overweight and obesity associated with nutrition transition and increased risk of non-communicable diseases
Prevalence of thinness among adolescents	Proportion of adolescents aged 10–19 years with body mass index-for-age below WHO reference thresholds	Household surveys (DHS, MICS), national nutrition surveys	Indicates undernutrition and chronic energy deficiency among adolescents
Prevalence of anaemia among adolescents	Percentage of adolescents aged 10–19 years with haemoglobin levels below WHO thresholds for anaemia	DHS surveys, school health programmes, micronutrient surveys	Reflects micronutrient deficiencies and nutritional vulnerability, particularly among adolescent girls

Conclusion

This study highlights persistent gaps in adolescent nutrition surveillance and monitoring, despite growing global recognition of the importance of adolescent health. Adolescence represents a critical period of growth and development during which nutritional status can significantly influence health outcomes across the life course. However, most nutrition surveillance systems continue to prioritize younger children and women of reproductive age, leaving adolescents underrepresented in routine health information systems.

The findings of this review emphasize that adolescents are increasingly affected by the triple burden of malnutrition, including undernutrition, overweight and obesity, and micronutrient deficiencies such as anaemia. Without adequate monitoring systems, these conditions may remain undetected and untreated, potentially leading to long-term health consequences in adulthood, including increased risks of non-communicable diseases,

poor reproductive health outcomes, reduced productivity, and the intergenerational transmission of malnutrition.

Global measurement initiatives such as the Global Action for Measurement of Adolescent Health (GAMA) have identified key indicators to improve the monitoring of adolescent nutrition. These include indicators related to adolescent overweight and obesity, undernutrition, and anaemia prevalence among adolescents. Systematic measurement of these indicators is essential to capture evolving nutritional challenges affecting adolescents and inform evidence-based policies and interventions.

Strengthening adolescent nutrition surveillance therefore requires supporting countries in integrating these priority indicators into national health information systems and routine monitoring platforms. Such efforts will enhance the availability of reliable and timely data needed to guide policy decisions, design targeted nutrition interventions, and ultimately improve the health and well-being of adolescents while contributing to the

achievement of global nutrition and health targets.

Improving adolescent nutrition surveillance today represents a strategic investment in the health, productivity, and well-being of future generations.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article. The research was conducted independently, and no financial, institutional, or personal relationships influenced the design, analysis, or interpretation of the findings.

Author Contributions

Elodia	Cheutou	Siewoue:
Conceptualization of the study, literature review, data analysis, and Manuscript drafting.		

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Ethical Approval

Ethical approval was not required for this study because the research was based exclusively on secondary data obtained from published scientific literature and publicly available institutional reports. No human participants, personal data, or biological samples were involved in the conduct of this study.

Data Availability

All data used in this study are derived from publicly available sources cited in the reference list. No new datasets were generated or analysed during the current study.

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