



Review Article

Growth Monitoring as a Tool for Early Detection of Malnutrition in Infants in Nigeria: A Systematic Review

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Abstract

Malnutrition remains a significant public health concern in Nigeria, particularly among infants, where early detection is crucial for effective intervention. Growth monitoring is a preventive health measure that involves regular measurement and assessment of an infant's growth parameters to identify deviations from expected patterns. This systematic review aimed to assess the current state of growth monitoring practices in Nigeria and evaluate its effectiveness as a tool for the early detection of malnutrition in infants relied on Social Cognitive Theory (SCT) and Ecological Systems Theory (EST) as the Theoretical framework. A comprehensive search of peer-reviewed articles, government reports, and relevant grey literature published between 2014 and 2024 was conducted across databases such as PubMed, Google Scholar, Scopus, and African Journals Online (AJOL). Inclusion criteria focused on studies conducted in Nigeria, involving infants aged 0–24 months, and addressing growth monitoring practices and their outcomes. Findings revealed that growth monitoring is implemented in various healthcare settings in Nigeria but faces challenges such as inadequate training of healthcare providers, irregular record-keeping, lack of essential equipment, and limited community awareness. Despite these challenges, growth monitoring proved to be a valuable tool in identifying early signs of malnutrition, enabling timely interventions such as nutritional counseling, supplementary feeding, and referral to appropriate care. However, its effectiveness is often hindered by inconsistent practices and gaps in follow-up care. The review concludes that strengthening growth monitoring systems through healthcare worker training, provision of standardised tools, and increased community sensitisation could significantly improve early detection and prevention of malnutrition among Nigerian infants.

Keywords: Growth monitoring, Healthcare, Infants, Malnutrition, Systematic review

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Introduction

Background of the Study

Malnutrition remains a persistent public health challenge in many low- and middle-income countries, particularly in sub-Saharan Africa, where Nigeria ranks among the top nations with high rates of infant malnutrition (UNICEF, 2021). Infant malnutrition, especially undernutrition, manifests in various forms such as stunting, wasting, and underweight, all of which have long-term consequences on cognitive development, immunity, and overall survival of children under five (World Health Organization [WHO], 2021). According to the 2018 Nigerian Demographic and Health Survey (NDHS) that was implemented by the National Population Commission (NPC) in collaboration with the National Malaria Elimination Programmes (NMEP) of the Federal Ministry of Health, Nigeria about 37% of children under five in Nigeria are stunted, 7% are wasted, and 22% are underweight. These figures reflect the urgent need for effective strategies for early identification and intervention. Growth Monitoring and Promotion (GMP) has been recognized globally as a cost-effective and evidence-based strategy for the early detection of malnutrition in infants and young children (Olusanya, Wright and Nair, 2020). Growth monitoring involves regular measurement and documentation of a child's weight, height/length, and sometimes head circumference, plotted against standard growth charts such as those provided by WHO. It enables health workers, caregivers, and policymakers to track a child's growth trajectory over time and identify deviations from expected patterns (Ashworth, Shrimpton and Jamil, 2008).

Early detection through growth monitoring is critical in Nigeria, where socio-economic inequalities, food insecurity, inadequate healthcare infrastructure, poor maternal education, and cultural feeding practices contribute significantly to poor nutritional outcomes (Ogunba and Agostoni, 2021). By identifying early signs of faltering growth or nutritional deficiencies, timely interventions such as nutritional counselling, supplementation, and treatment of underlying illnesses can be deployed before malnutrition progresses to severe stages. Moreover, growth monitoring provides an entry point for broader health promotion, including immunization, hygiene education, and infant and young child feeding (IYCF) counselling (Ogunjimi, Adeniran and Olawuyi, 2022).

Despite its potential, the implementation and effectiveness of growth monitoring in Nigeria remain inconsistent. Various studies have shown that while GMP programs exist at primary healthcare levels, their coverage, quality, and utilization by mothers and caregivers are suboptimal. For instance, a study by Ogunjimi et al (2022). In Southern Nigeria, it was found

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that only 40% of mothers regularly attended growth monitoring sessions, citing reasons such as distance to health facilities, poor staff attitudes, and lack of awareness about the purpose of growth monitoring. Similarly, the lack of training and supervision for frontline health workers, inadequate growth monitoring tools, and poor record-keeping practices hinder the accuracy and reliability of growth data (Abidoye and Sikabofori, 2000).

At the policy level, the Nigerian government has adopted strategies aligned with global nutrition goals, including the National Policy on Food and Nutrition (NPFN, 2016–2025) and the National Strategic Plan of Action for Nutrition (NSPAN, 2014–2019). These frameworks promote the integration of growth monitoring into primary healthcare services and maternal and child health programs. However, gaps remain in terms of coordination, funding, and scaling of effective GMP models, especially in rural and underserved communities. Globally, evidence supports the role of growth monitoring in improving child survival rates when combined with responsive actions and community participation. Studies from countries like Bangladesh, Ghana, and Ethiopia have demonstrated significant reductions in child malnutrition where growth monitoring is implemented systematically and integrated with health education and service delivery (Adebayo and Olayemi, 2019). These successes underscore the importance of context-specific evaluations to assess the relevance, challenges, and outcomes of growth monitoring in Nigeria.

This systematic review, therefore, seeks to synthesize existing research on growth monitoring as a tool for early detection of malnutrition in Nigerian infants. While several individual studies have examined the knowledge, practices, and outcomes associated with growth monitoring, there is a lack of consolidated evidence to guide national policy and programme development. A systematic review offers a methodological framework to appraise the quality and findings of existing studies, identify trends and gaps, and propose recommendations for strengthening growth monitoring practices across Nigeria.

Importantly, growth monitoring must be understood not just as a technical procedure but as part of a broader ecosystem of maternal and child health. Its success depends on multiple factors: health worker capacity, caregiver engagement, data use for decision-making, availability of anthropometric tools, and political commitment to nutrition (Akinyemi, Owoaje and Cadmus, 2020). Without these enabling conditions, growth monitoring risks becoming a mere data collection exercise with limited impact. Additionally, in the wake of the COVID-19 pandemic and worsening economic conditions in Nigeria, the risk of malnutrition has escalated. Disruptions in health services, loss of livelihoods, inflation, and food insecurity have further compromised the nutritional status of infants and young children. In such a context,

strengthening growth monitoring systems could serve as an early warning mechanism to detect nutritional crises and direct resources where they are most needed.

This review aims to systematically assess: (1) the extent and effectiveness of growth monitoring practices in Nigeria; (2) the association between growth monitoring and early detection of malnutrition in infants (3) the contextual factors that influence the implementation and utilization of growth monitoring services and (4) the roles of caregivers, health workers and community factors in the success or failure of growth monitoring practices. The findings will contribute to the evidence base for improving infant nutrition outcomes in Nigeria and align with the global Sustainable Development Goal (SDG 2) of ending all forms of malnutrition by 2030. Growth monitoring represents a vital but underutilized strategy in Nigeria's fight against infant malnutrition. Its potential to identify at-risk children early, guide timely interventions, and support caregiver education makes it an indispensable component of child survival and development. However, its success hinges on addressing operational, institutional, and cultural barriers. A systematic review of the current state of knowledge and practice is therefore timely and essential.

Statement of the Problem

Malnutrition among infants remains a major public health challenge in Nigeria, contributing significantly to child morbidity, mortality, and impaired physical and cognitive development. According to the 2018 Nigerian Demographic and Health Survey (NDHS) that was implemented by the National Population Commission (NPC) in collaboration with the National Malaria Elimination Programmes (NMEP) of the Federal Ministry of Health, Nigeria, 37% of children under five are stunted, 7% are wasted, and 22% are underweight—indicators of chronic and acute malnutrition. These alarming statistics suggest that many cases of malnutrition go undetected and unmanaged during infancy when interventions are most effective. Growth Monitoring and Promotion (GMP) has been globally endorsed as a simple yet vital tool for the early detection of malnutrition, enabling timely interventions and promoting positive child health outcomes. By systematically measuring and tracking a child's growth using standardized growth charts, caregivers and healthcare providers can identify deviations from normal growth patterns and take appropriate action (Ashworth et al, 2008; WHO, 2021). However, despite the presence of GMP policies in Nigeria's primary healthcare system, evidence indicates that its implementation and effectiveness remain weak and inconsistent across the country.

Several studies have revealed low caregiver participation in growth monitoring programs, inadequate training of health workers, lack of functional tools, and poor data use in guiding nutrition interventions (Adebayo et al, 2019). Moreover, in rural and underserved

communities where the risk of infant malnutrition is often higher growth monitoring services are either unavailable, underutilized, or poorly managed. This results in missed opportunities for the early identification of at-risk infants and the prevention of life-threatening consequences of malnutrition. Despite the individual studies conducted across various regions in Nigeria, there has been no comprehensive synthesis of evidence on the role, effectiveness, and implementation challenges of growth monitoring as a tool for early detection of malnutrition in Nigerian infants. Without such consolidated knowledge, policymakers and healthcare planners lack the critical insights needed to strengthen growth monitoring programs and reduce the burden of infant malnutrition nationally.

Therefore, this study seeks to bridge that gap by systematically reviewing available literature on the use of growth monitoring for early detection of malnutrition among infants in Nigeria. It aims to assess existing practices, identify implementation challenges, evaluate outcomes, and recommend strategies to improve the use and effectiveness of growth monitoring tools in combating infant malnutrition.

The objective of this study is to systematically review existing literature on the use of growth monitoring as a tool for the early detection of malnutrition in infants in Nigeria.

Specifically, the study seeks to:

1. Identify and analyze common growth monitoring practices used for infants in various regions of Nigeria.
2. Evaluate the effectiveness of growth monitoring as a tool for the early detection of malnutrition among Nigerian infants.
3. Examine the challenges and barriers affecting the implementation and utilization of growth monitoring programs in Nigeria.
4. Assess the roles of caregivers, health workers, and community factors in the success or failure of growth monitoring practices.

Research Questions

The study will be guided by the following research questions:

1. What are the growth monitoring practices for infants in Nigeria?
2. How effective is growth monitoring as a tool for the early detection of malnutrition among infants in Nigeria?
3. What are the challenges and barriers affecting the implementation and utilization of growth monitoring programs in Nigeria?
4. What are the roles of caregivers, health workers, and community factors in the success or failure of growth monitoring practices?

Significance of the Study

The study will provide an evidence-based synthesis of how growth monitoring has been implemented in Nigeria and its effectiveness in early malnutrition detection. This will enhance the understanding of healthcare professionals, policymakers, and researchers on the role of growth monitoring in improving child health outcomes. Findings from this review will help inform government agencies, particularly the Federal Ministry of Health and the National Primary Health Care Development Agency (NPHCDA), on the need to strengthen growth monitoring programmes. The findings will be useful for healthcare training institutions and professional bodies in designing curricula and training modules that equip health workers with the skills and tools necessary for accurate and effective growth monitoring.

This systematic review focuses on growth monitoring as a tool for the early detection of malnutrition in infants in Nigeria. The study examines research evidence from peer-reviewed journals, government reports, and credible grey literature published between 2010 and 2025 to provide a comprehensive understanding of the practice and its effectiveness while efforts are made to capture studies from across Nigeria, some geopolitical zones may have limited published data, creating possible geographical bias.

Review of Related Literature

The Concept of Growth Monitoring (GM)

Growth Monitoring (GM) refers to the regular measurement and assessment of a child's growth over time to detect deviations from expected growth patterns and facilitate early interventions. It involves the periodic measurement of parameters such as weight, height/length, and mid-upper arm circumference (MUAC) and the plotting of these measurements on standardized growth charts to compare with reference standards (WHO, 2021; Ashworth et al, 2008). According to the World Health Organization (WHO, 2021), growth monitoring is an essential component of primary health care and child health services because it allows health workers and caregivers to track a child's nutritional status and development. It serves as both a preventive and promotive tool, enabling early detection of growth faltering, malnutrition, or underlying health conditions before they become severe (Ubesie, Ibeziako, Ndiokwelu, Nzoka and Nwafor, 2019).

The process of GM typically involves three core elements:

Measurement – Accurate and regular collection of anthropometric data such as weight and height/length (WHO, 2021).

Interpretation – Comparison of the child's growth trajectory with standardized reference curves, such as the WHO Child Growth Standards (Olatona, Aderibigbe and Sekoni, 2018).

Action – Communication of the results to caregivers, coupled with appropriate counseling, referral, or intervention when growth faltering is detected (Adebayo et al, 2019).

The conceptual framework of GM is rooted in the principle that consistent monitoring, combined with timely counseling and intervention, improves child survival, reduces the prevalence of undernutrition, and promotes overall health and development (Akinyemi and Owoaje, 2016). GM also serves as an entry point for broader child health programs, including immunization, deworming, and maternal nutrition education. In Nigeria and other low- and middle-income countries (LMICs), GM plays a critical role in addressing the high burden of undernutrition and stunting. However, its effectiveness depends not only on the technical accuracy of measurements but also on the engagement and understanding of caregivers, the training of health workers, and the integration of GM into routine health services (Ekpo et al, 2020). In summary, Growth Monitoring is both a diagnostic and preventive public health strategy that combines regular child measurements with caregiver education to support optimal child growth and early detection of malnutrition. When implemented effectively, it is a low-cost, high-impact intervention for improving child survival and development outcomes.

Malnutrition

Malnutrition is a broad term that refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients, resulting in measurable adverse effects on body composition, function, and clinical outcomes (WHO, 2021). It encompasses both undernutrition (wasting, stunting, underweight, and micronutrient deficiencies) and overnutrition (overweight, obesity, and diet-related noncommunicable diseases). According to the World Health Organization (WHO, 2021), undernutrition occurs when the body does not receive enough energy, protein, or micronutrients to maintain health and normal body functions. This may manifest as:

Wasting – low weight-for-height, usually a result of acute food shortage or disease.

Stunting – low height-for-age, reflecting chronic undernutrition.

Underweight – low weight-for-age, which can reflect both acute and chronic undernutrition.

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Micronutrient deficiencies – inadequate intake or absorption of vitamins and minerals such as iron, iodine, vitamin A, and zinc.

Overnutrition, on the other hand, is characterized by excessive intake of calories and certain nutrients, leading to overweight, obesity, and an increased risk of noncommunicable diseases such as type 2 diabetes, cardiovascular diseases, and certain cancers (Abiodun, Oloruntoba and Oladele, 2021). The causes of malnutrition are multifaceted and often interlinked. The UNICEF conceptual framework in 2021 categorizes them into immediate causes (inadequate dietary intake and disease), underlying causes (household food insecurity, inadequate care practices, poor access to health services, and unhealthy environments), and basic causes (socio-economic, political, and cultural factors). Poverty, conflict, poor sanitation, and lack of education are common contributors (Eze, Agu and Nwokedi, 2021).

Globally, malnutrition remains a significant public health challenge. In 2020, an estimated 149 million children under five were stunted, 45 million were wasted, and 39 million were overweight (UNICEF,2021;WHO,2021). In Nigeria, the 2018 National Demographic and Health Survey (NDHS) reported that 37% of children under five were stunted, 7% were wasted, and 22% were underweight, indicating that undernutrition is still widespread. The consequences of malnutrition are profound and far-reaching. For children, undernutrition can lead to impaired cognitive development, weakened immunity, increased susceptibility to infections, and higher mortality risk. Overnutrition, particularly childhood obesity, increases the likelihood of lifelong health problems. In economic terms, malnutrition reduces human capital, productivity, and national economic growth (Adepoju and Omotayo, 2021).

Addressing malnutrition requires multi-sectoral approaches, including improving dietary diversity, enhancing maternal and child health services, promoting exclusive breastfeeding, fortifying foods, ensuring food security, and implementing public health and nutrition education programs (Ekpo, Udoh and Effiong, 2020).

Early Detection

Early detection refers to the timely identification of a disease, condition, or developmental problem at an initial stage—often before noticeable symptoms appear so that prompt intervention can be taken to improve health outcomes (WHO, 2021). In public health, early detection is a critical preventive strategy because it increases the chances of successful treatment, reduces the severity of disease progression, and minimizes associated complications. The concept is rooted in the principle that many health conditions, including malnutrition, infectious diseases, and chronic illnesses, begin with subtle physiological or behavioral changes that may not be obvious without targeted screening or monitoring

(Adebayo et al, 2019). For instance, in child health, early detection of growth faltering through Growth Monitoring (GM) allows caregivers and health workers to intervene before a child's nutritional status deteriorates into severe malnutrition (Ashworth et al, 2008).

According to WHO's framework on early detection and prevention, three major steps are involved:

Screening or monitoring – using tools such as anthropometric measurements, diagnostic tests, or behavioral assessments.

Interpretation of findings – comparing results to standardized benchmarks to determine if a deviation is present.

Timely intervention – implementing actions such as treatment, counseling, or referral to prevent progression.

In the context of child nutrition, early detection is particularly important because the early years—especially the first 1,000 days from conception to age two—are a critical window for growth and development. Growth faltering during this period, if undetected, can result in irreversible physical and cognitive impairments. Studies have shown that consistent early detection strategies in community health settings can reduce childhood morbidity and mortality, particularly in low- and middle-income countries (UNICEF, 2021). However, the effectiveness of early detection depends on several factors, including the availability of trained personnel, community awareness, accessibility of screening tools, and integration of detection programs into routine health services. Without prompt follow-up and intervention, early detection alone does not improve outcomes (Ashworth et al, 2008).

Early detection is a proactive health approach that identifies health threats in their initial stages, thereby enabling timely interventions that can save lives, reduce health care costs, and improve long-term quality of life. In nutrition and child health, it is a cornerstone of preventive care, often operationalized through regular growth monitoring and community-based health programs.

Anthropometric Measurement

Anthropometric measurement refers to the systematic collection of quantitative data on the physical dimensions and composition of the human body, primarily used to assess growth, nutritional status, and health risks (WHO, 2021). In public health and nutrition, anthropometry is a key tool for evaluating malnutrition, obesity, and other growth-related health issues in both children and adults (Onyango, Borghi and de Onis, 2018). According to the World Health Organization (WHO, 2021), anthropometric measurements are simple, non-invasive, and cost-effective methods that can be applied in various settings from community

health centers to large-scale national surveys. The most commonly used anthropometric indicators in child health include:

Weight – used in conjunction with age or height to assess wasting, underweight, or overweight.

Height/Length – height (for children ≥ 2 years) or length (for children < 2 years) is used with age to identify stunting, a measure of chronic undernutrition.

Mid-Upper Arm Circumference (MUAC) – a quick field measure to detect acute malnutrition, especially in emergency situations.

Head Circumference – primarily used in infants to monitor brain growth and detect abnormalities in early development.

Body Mass Index (BMI) – weight (kg) divided by height (m^2), often used to classify underweight, overweight, and obesity in older children and adults.

The interpretation of these measurements is based on standardized reference values, such as the WHO Child Growth Standards for children under five years and the WHO Growth Reference for older children and adolescents. For example, a weight-for-height Z-score (WHZ) below -2 indicates moderate acute malnutrition, while a WHZ below -3 indicates severe acute malnutrition (WHO, 2021). Anthropometric data play a critical role in Growth Monitoring (GM) and early detection of nutritional problems. Regular measurement allows health workers to track changes over time, identify growth faltering, and initiate timely interventions (Ashworth et al, 2008). In addition, these measurements are essential for epidemiological research, public health policy-making, and evaluating the effectiveness of nutrition programs. However, the accuracy and reliability of anthropometric measurements depend heavily on proper training of personnel, use of calibrated equipment, standardized techniques, and consistent measurement protocols. Errors in measurement or interpretation can lead to misclassification and inappropriate interventions. Anthropometric measurement is a cornerstone of nutritional assessment, growth monitoring, and public health surveillance. When applied correctly, it provides vital information for improving child health, reducing malnutrition, and guiding evidence-based policy.

Complementary Feeding

Complementary feeding refers to the process of introducing solid, semi-solid, and soft foods to an infant's diet alongside continued breastfeeding, starting at around six months of age, when breast milk alone is no longer sufficient to meet the infant's nutritional requirements (WHO, 2021). The period of complementary feeding spans from 6 to 23 months and is considered a critical window for child growth and development, as inadequate feeding practices during this stage can lead to malnutrition, poor growth, and increased morbidity.

According to the World Health Organization (WHO, 2021), appropriate complementary feeding should meet the following principles:

Timeliness – food introduction should begin at six months of age while breastfeeding continues.

Adequacy – foods should provide sufficient energy, protein, and micronutrients to meet a child's growing needs.

Safety – foods should be hygienically prepared, stored, and fed to minimize the risk of illness. Appropriateness – feeding should be responsive, taking into account the child's appetite, developmental readiness, and cultural context.

Nutritionally, complementary foods should be rich in protein, energy, iron, zinc, vitamin A, and other essential micronutrients. In low- and middle-income countries, diets during the complementary feeding period often lack diversity, with heavy reliance on staple foods and insufficient animal-source foods, fruits, and vegetables. This dietary inadequacy is a major contributor to stunting and micronutrient deficiencies (Adebayo et al, 2019). The consequences of poor complementary feeding practices can be severe. Early or delayed introduction of complementary foods, feeding foods with low nutrient density, and infrequent feeding can result in growth faltering, underweight, micronutrient deficiencies, and increased susceptibility to infections (UNICEF, 2021). Conversely, overfeeding or introducing high-calorie, low-nutrient foods may increase the risk of childhood overweight and obesity (Ogunba and Agostoni, 2021). Evidence shows that improving complementary feeding practices through nutrition education, food fortification, and community-based interventions can significantly reduce stunting and improve overall child health (Eze et al, 2020). Strategies include educating caregivers on meal frequency, food diversity, and responsive feeding techniques, as well as ensuring access to affordable and nutritious foods (UNICEF, 2021). In summary, complementary feeding is a crucial stage in child nutrition that bridges the gap between exclusive breastfeeding and full family diets. Proper timing, quality, and frequency of complementary foods—combined with continued breastfeeding—are essential for optimal growth, cognitive development, and long-term health.

Common growth monitoring practices used for infants in various regions of Nigeria.

Growth monitoring in Nigeria typically combines routine anthropometric measurement, record keeping, caregiver counseling, and referral—implemented at both facility and community levels. While the basic elements are similar nationwide, how they are carried out varies by region and service delivery context (urban vs rural). The most commonly reported practices are outlined:

1. Routine anthropometry (weight, length/height, MUAC)

Primary health centres (PHCs), immunization clinics and community outreach sessions routinely measure weight (monthly for infants) and, where possible, length/height and mid-upper arm circumference (MUAC) for older infants/children. Weight-for-age (WFA), weight-for-height (WFH) and length-for-age (LFA) are the usual indices used to detect underweight, wasting and stunting respectively, plotted against the WHO growth standards. These core measurements are the backbone of early detection efforts. (Olusanya et al, 2020).

2. Use of child health/growth cards and home-based records

Most programmes issue child health cards or growth charts that caregivers keep at home. Health workers record weight and growth trends on these cards during each contact (e.g., immunization visits). These records serve as both monitoring tools and prompts for counseling when faltering is observed (Onabayo, Koleosho and Oguntona, 2019).

3. Integration with immunization and routine contacts

Growth monitoring is commonly integrated with routine immunization and maternal/child clinic visits to increase contact opportunities. Combining services helps improve attendance for growth checks and allows prompt action when growth falters (Ubesie et al, 2019).

4. Growth-promotion counselling and IYCF support

Beyond measurement, many programmes emphasize growth-promotion—providing caregivers with counseling on infant and young child feeding (IYCF), hygiene, illness management, and when to seek care. Effective counseling is considered essential for converting growth data into action (Ashworth et al, 2008; Ogunba and Agostoni, 2021).

5. Community-based growth monitoring (CBGM) and outreach

In rural and hard-to-reach areas, community-based growth monitoring—often led by community health workers (CHWs) or volunteers with periodic weighing sessions at community points—is widely used. CBGM is designed to increase coverage and caregiver participation but its frequency and quality vary by locality (Abidoye and Sikabofor, 2000).

6. Referral pathways and linkage to nutrition services

When growth faltering or acute malnutrition is identified, standard practice is to refer infants for further assessment and treatment (e.g., therapeutic feeding programmes,

micronutrient supplementation, or medical care). However, the functionality of referral systems differs across states and facilities.

7. Periodic growth-monitoring campaigns and screening drives

Some states run periodic screening campaigns – often tied to Child Health Weeks or nutrition days – to identify at-risk infants missed by routine services. These campaigns can temporarily boost detection rates but require good follow-up systems to be effective (UNICEF, 2021).

8. Data recording, reporting and use

Health facilities are expected to record growth data in facility registers and report aggregated indicators to local health authorities. In practice, data quality and use for decision-making are inconsistent: where records are well-kept, managers can detect local trends and target interventions; where not, opportunities for timely action are lost (Abidoeye et al, 2000).

The effectiveness of growth monitoring in facilitating early detection and intervention for malnutrition among Nigerian infants.

Growth monitoring is recognized as a key public health strategy for the early detection and management of malnutrition in infants and young children. It involves the regular measurement and plotting of a child's growth parameters – such as weight, height, and mid-upper arm circumference – against standardized growth charts to assess growth patterns and detect deviations from normal development (World Health Organization [WHO], 2021). In Nigeria, growth monitoring is widely integrated into primary health care services, particularly under the National Programme on Immunization and maternal and child health initiatives, as a means to promote optimal child health outcomes (Eze et al, 2020).

The effectiveness of growth monitoring in Nigeria lies in its potential to identify early signs of undernutrition before they progress to severe malnutrition. Studies indicate that routine weight-for-age tracking enables health workers and caregivers to detect growth faltering and initiate timely nutritional interventions, such as dietary counseling, supplementation, or referral to specialized care (Ubesie et al, 2019). For instance, (Adekanmbi, Uthman and Madasiru, 2017) found that infants enrolled in regular growth monitoring programs had a significantly lower prevalence of moderate to severe malnutrition compared to those not consistently monitored, highlighting the program's preventive capacity.

Furthermore, growth monitoring has been shown to enhance caregivers' awareness of child nutrition and feeding practices. By providing visual feedback through growth charts, health

workers can effectively communicate a child's nutritional status and guide parents toward appropriate feeding practices, thereby preventing further deterioration (Ogunba et al, 2021). This interactive process reinforces health education and empowers mothers to take proactive steps in improving their infants' diet quality. However, the full potential of growth monitoring in Nigeria is sometimes hindered by challenges such as inadequate training of health personnel, irregular attendance by caregivers, and poor record-keeping systems (Adebayo et al, 2019). Despite these constraints, when implemented effectively and consistently, growth monitoring serves as a cost-effective, evidence-based approach to reducing the burden of malnutrition among Nigerian infants (Eze et al, 2020; WHO, 2021). Growth monitoring in Nigeria is an effective tool for the early detection of malnutrition, enabling prompt interventions that improve survival rates and long-term developmental outcomes. Strengthening training, supervision, and community participation in these programs can further enhance their impact on child health and nutrition.

Social Cognitive Theory (SCT)

Another relevant framework is the Social Cognitive Theory (SCT) by Bandura (1986), which emphasizes the role of observational learning, self-efficacy, and reciprocal determinism in behavior change. In growth monitoring, health workers model proper anthropometric measurement techniques, counsel caregivers on feeding practices, and reinforce positive behaviors through feedback. Caregivers' confidence (self-efficacy) in their ability to improve feeding and care practices for their infants is critical for the success of growth monitoring interventions. SCT also explains how environmental factors such as availability of health facilities and cultural norms interact with individual behaviors to influence malnutrition outcomes.

Ecological Systems Theory

The Ecological Systems Theory by Bronfenbrenner (1979) provides a broader perspective by recognizing that child nutrition and growth are influenced by interactions across multiple levels, including the family, community, health systems, and policy environment. For instance, community health structures, government nutrition policies, and socio-economic conditions all play interconnected roles in determining whether growth monitoring is effectively implemented and whether cases of malnutrition are detected early. In Nigeria, where disparities in healthcare access exist between urban and rural areas, this theory emphasizes the need for contextualized interventions that consider local realities.

Empirical Studies

According to Akinyemi et al (2020), regular growth monitoring significantly contributes to the early identification of underweight and stunted growth among children under five, thereby

enabling timely nutritional interventions. In a cross-sectional study conducted in rural communities of Southwest Nigeria, it was found that children whose growth was monitored monthly at primary health facilities had a 25% lower risk of severe malnutrition compared to those without consistent monitoring. Similarly, Olatona et al (2018) examined the relationship between growth monitoring attendance and malnutrition outcomes in urban slums of Lagos State. Their findings revealed that infants who attended growth monitoring sessions for at least six consecutive months were more likely to receive age-appropriate complementary feeding and nutrition counseling, which translated into improved weight-for-age and height-for-age scores. The study further highlighted that parental engagement and caregiver education during growth monitoring sessions played a pivotal role in reinforcing appropriate feeding practices.

In Northern Nigeria, Adekanmbi et al (2017) conducted a longitudinal study to assess the impact of community-based growth monitoring programs on the nutritional status of infants. The results showed a notable decline in the prevalence of wasting from 18.5% to 11.2% within one year of implementing a community-led monthly growth monitoring initiative. The program's success was attributed to consistent follow-up, home visits, and the integration of nutrition counseling alongside anthropometric measurements. On the other hand, Ogunba et al (2021) identified barriers to effective growth monitoring in their research in Osun State, including inadequate health worker training, poor record-keeping, and limited caregiver awareness of the importance of growth charts. Despite these challenges, the study affirmed that growth monitoring remains a vital, low-cost, and feasible method for the early detection of malnutrition, especially when combined with health education interventions.

Methodology

This study adopted a systematic review research design. A systematic review involves a structured, transparent, and reproducible process of identifying, selecting, appraising, and synthesizing existing research evidence on a specific topic (Moher, Liberati, Tetzlaff and Altman, 2009). This design was deemed appropriate because it allows for the integration of findings from multiple peer-reviewed and credible sources to provide a comprehensive understanding of growth monitoring as a tool for the early detection of malnutrition in infants in Nigeria. The data for this study were obtained from secondary sources, specifically published journal articles, conference papers, governmental and non-governmental reports, and relevant grey literature, that focused on growth monitoring in infants (0-24 months). Priority was given to studies conducted between 2014 and 2024 to ensure currency and relevance of the findings.

A qualitative descriptive analysis approach was employed. Studies were thematically grouped according to the research questions. Themes were generated based on recurring findings, patterns, and gaps in the literature. No meta-analysis was performed because of heterogeneity in study designs, populations, and outcome measures. As a review of existing literature, this study did not involve direct interaction with human participants; hence, ethical approval was not required. However, due ethical practices such as proper citation, acknowledgment of sources, and avoidance of plagiarism were strictly adhered to.

Discussion of Results

Research Question 1

What is the current state of growth monitoring practices for infants in Nigeria?

Growth monitoring practices in Nigeria are largely based on the use of growth charts and Mid-Upper Arm Circumference (MUAC) measurements at primary healthcare facilities. Most states in Nigeria have adopted the WHO child growth standards, and these are implemented through Routine Immunization and Child Welfare Clinics. Studies reveal that awareness and coverage of growth monitoring vary widely between urban and rural areas. In urban centres, trained healthcare workers are more likely to consistently use standard tools such as weight-for-age and height-for-age charts. In rural areas, poor infrastructure, limited staff training, and inadequate availability of monitoring tools hinder effective implementation (Ogunba et al, 2021). Despite the existence of guidelines, evidence shows that attendance at growth monitoring sessions is irregular, with many mothers discontinuing attendance after immunization schedules are completed (UNICEF, 2021). The integration of growth monitoring with nutrition counselling is also suboptimal, meaning opportunities to detect malnutrition early are often missed (Adebayo et al, 2019). In summary, while Nigeria has a functional growth monitoring policy framework, gaps exist in training, equipment availability, community participation, and continuity of attendance, especially in rural areas.

Research Question 2

How effective is growth monitoring as a tool for the early detection of malnutrition in infants in Nigeria?

Evidence suggests that growth monitoring is highly effective in detecting early signs of malnutrition when implemented consistently and interpreted correctly (WHO, 2021). Studies in Nigeria have demonstrated that regular measurement and plotting of infant growth can identify undernutrition before clinical symptoms become severe, enabling timely intervention (Okafor et al, 2018). For example, a longitudinal study in northern Nigeria found that children who were regularly monitored and received nutritional counselling had a 30–40% reduced risk of progressing to severe acute malnutrition compared to those without monitoring (Ekpo,

Akinola and Lawal, 2018). Another study in Cross River State reported that growth monitoring improved mothers' knowledge of infant feeding practices and increased timely referral rates for malnourished infants (Ekpo, Udoh and Effiong, 2020).

However, the effectiveness of growth monitoring is undermined by poor record-keeping, low caregiver attendance, and inadequate follow-up. In some facilities, data from growth charts are not analyzed to trigger early action, and healthcare workers lack refresher training to improve interpretation skills. Overall, while growth monitoring has proven potential as an early detection tool for malnutrition, its full effectiveness in Nigeria depends on consistent application, trained personnel, caregiver engagement, and integration with targeted nutrition interventions.

Research Question 3

What are the challenges and barriers affecting the implementation and utilization of growth monitoring programs in Nigeria?

Despite the recognized importance of growth monitoring (GM) in improving child health outcomes, several challenges hinder its effective implementation and utilization in Nigeria. These challenges are multifaceted, spanning infrastructural, socio-cultural, economic, and policy-related factors. One major barrier is inadequate health infrastructure and resources. Many primary healthcare facilities in Nigeria lack the necessary equipment such as calibrated weighing scales, height/length boards, and growth charts, which are essential for accurate growth monitoring (Akinyemi et al, 2016). In addition, shortages of trained health workers to conduct growth assessments and interpret results compromise the quality of the service (Ekpo et al, 2020).

Poor awareness and knowledge among caregivers also limit the utilization of GM services. Studies have shown that many mothers and guardians have limited understanding of the purpose and benefits of growth monitoring, leading to irregular attendance at growth monitoring sessions (Ogunjimi et al, 2022). This problem is compounded by low literacy levels and inadequate health education campaigns in rural communities.

Socio-economic constraints further pose significant challenges. Poverty, transportation difficulties, and the cost of accessing healthcare services discourage caregivers from regularly taking their children for monitoring (Bello, Lawal and Abdulazeez, 2019). In rural and hard-to-reach areas, long distances to health facilities often result in missed appointments and reduced continuity of care (Adepoju et al, 2021). Cultural beliefs and practices also influence GM participation. Some communities view regular child weighing with suspicion or associate poor growth with spiritual causes rather than nutritional or medical issues, which discourages

active engagement with the program (Okafor and Ezeh, 2018). Additionally, weak policy implementation and monitoring systems limit the scale and effectiveness of GM programs in Nigeria. While policies on maternal and child health exist, gaps in funding, coordination, and supervision mean that growth monitoring is not consistently prioritized within broader health service delivery frameworks (WHO, 2021).

The effective implementation of growth monitoring programs in Nigeria is hindered by infrastructural deficits, limited caregiver awareness, socio-economic challenges, cultural influences, and weak policy execution. Addressing these barriers requires a multifaceted approach, including investment in health infrastructure, community education, targeted policy enforcement, and the integration of GM into broader child health and nutrition interventions.

Research Question 4

What are the role of caregivers, health workers, and community factors in the success or failure of growth monitoring practices?

Growth monitoring (GM) is a cornerstone of child health programs, especially in low- and middle-income countries like Nigeria, where malnutrition remains a public health concern. Its success or failure is largely influenced by the roles played by caregivers, health workers, and broader community factors.

Role of Caregivers

Caregivers, particularly mothers, are central to the effectiveness of GM because they are responsible for attending sessions, providing accurate health histories, and acting upon nutrition advice. Their knowledge, attitudes, and perceptions towards GM significantly determine whether early detection and intervention for growth faltering occur (Akinyemi et al, 2020). For instance, caregivers who understand the importance of regular weighing and growth chart interpretation are more likely to adhere to follow-up visits and adopt recommended feeding practices. However, low literacy levels, socio-economic constraints, and cultural beliefs sometimes hinder their participation (Bello et al, 2019). For example, in some Nigerian communities, the perception that a child's weight gain is solely dependent on genetics rather than feeding practices may lead caregivers to undervalue GM services (Onabanjo et al, 2019).

Role of Health Workers

Health workers are instrumental in conducting accurate measurements, interpreting growth charts, and providing tailored counseling. Their communication skills, technical competence, and attitude toward clients directly influence caregivers' willingness to continue participating

in GM programs (Olusanya et al, 2020). Training and retraining are essential, as inadequate skills can lead to inaccurate growth assessments, misinterpretation of data, and missed opportunities for early intervention (Ekpo et al, 2018). Additionally, health worker shortages, high workloads, and limited resources often result in rushed consultations that diminish the quality of caregiver education (Abiodun, Oloruntoba and Oladele, 2021).

Community Factors

Community-level factors also play a decisive role in GM program outcomes. Accessibility of health facilities, availability of weighing equipment, and supportive community structures can either encourage or discourage utilization (Adebayo et al, 2019). In rural Nigerian settings, long travel distances to clinics and poor road infrastructure frequently result in missed appointments (Adedokun, Adekanmbi and Uthman, 2020). Moreover, community beliefs and norms regarding child feeding, health-seeking behavior, and trust in health services can influence the uptake of GM. For instance, communities that value preventive child health care are more likely to have higher GM attendance rates (Onyango et al, 2018). The involvement of community leaders, religious figures, and local women's groups in promoting GM awareness has been shown to improve participation and compliance (Eze et al, 2021). The success or failure of GM practices in Nigeria is a product of the interconnected roles of caregivers, health workers, and community factors. Strengthening caregiver education, improving health worker capacity, and addressing community-level barriers are crucial to maximizing the benefits of GM. Policy interventions should focus on a multi-sectoral approach that empowers all stakeholders to actively participate in child growth monitoring and promotion activities.

Conclusion

Growth monitoring remains an essential component of Nigeria's child health strategy, with strong potential to serve as an early warning system for malnutrition in infants. However, its current implementation faces significant challenges that limit its coverage, accuracy, and overall impact. The findings highlight that effectiveness depends not only on the technical aspects of measurement but also on the broader health system's capacity, including training, supervision, equipment availability, community participation, and data use for decision-making. Therefore, while GM is proven to be an effective tool for early detection, its benefits will only be maximized if Nigeria strengthens the operational framework supporting its delivery at both the community and facility levels.

Recommendations

Based on the findings of this review, the following recommendations are proposed:

- i. Regular training of healthcare workers and community health extension workers on anthropometric measurement techniques, interpretation of growth charts and counseling skills.
- ii. Adequate provision of calibrated weighing scales, height/length boards, MUAC tapes, and standardized growth charts in all primary healthcare centres
- iii. Education of caregivers on the importance of regular GM visits and follow-up checks through targeted awareness campaigns.

Suggestions for further research

It is hereby suggested that the future research should accommodate children between 2-6 years and some important documents written in local and foreign languages which were excluded from this review.

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