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Effectiveness of community-based interventions in reducing childhood obesity: A scoping review

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Abstract

Background: Childhood obesity is a growing public health concern, particularly in Africa, where interventions to mitigate its impact remain underexplored. This scoping review aims to synthesize evidence on the effectiveness of community-based interventions targeting childhood obesity across African countries, with a focus on dietary behaviors, physical activity, and combined approaches.

Methods: A systematic search of six databases, including PubMed, Scopus, Google Scholar, Medline, Web of Science, and PsycINFO, was conducted to identify relevant studies published between 2009 to 2024, spanning for 15 years. A total of 1135 articles were retrieved, with an additional 18 records identified through manual searches. After removing duplicates and applying eligibility criteria, 12 studies were selected for inclusion in the review. These studies were analyzed qualitatively, focusing on intervention types, settings, outcomes, and barriers to effectiveness.

Results: Of the studies included, 83.3% were peer-reviewed journal articles, while 16.7% were technical reports or theses. The interventions predominantly focused on two areas: 41.7% targeted dietary behaviors through nutrition education and counselling, and 58.3% addressed physical activity or combined physical activity with other interventions. School settings were the primary venue for interventions (66.7%), and 50% of the studies involved family or community engagement. Combined nutrition and physical activity interventions were the most effective, leading to significant improvements in body mass index (BMI), physical fitness, and overall health behaviors. Key facilitators of successful interventions included parental and community involvement, multi-sectoral collaboration, and integration into school curricula. However, barriers such as limited parental engagement, inadequate resources, and socio-economic disparities hindered the full impact of these programs.

Conclusion: Community-based interventions addressing childhood obesity in Africa show promise, particularly when integrating nutrition education and physical activity in school settings. However, addressing socio-economic barriers and enhancing family engagement is critical for maximizing the effectiveness of these programs. Future interventions should adopt a multi-sectoral approach that combines educational, physical, and community-oriented strategies to support children's health outcomes better.

Keywords: Childhood Obesity; Community-Based Interventions; Physical Activity; Nutrition Education

1. Introduction

Childhood obesity has become a significant public health issue worldwide, impacting both developed and developing countries. In 2023, the worldwide incidence of childhood obesity persisted in increasing, constituting a major public health issue.[1] Approximately 37 million children under five years old and 390 million children and adolescents aged five

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to nineteen worldwide are classified as overweight or obese. This rise is primarily attributed to bad diets, decreased physical exercise, and urbanization.[1] The worldwide incidence of obesity in children aged 5–19 has surged significantly, increasing from 8% in 2021 to over 22% in 2022.[1,2] This trend does not indicate abating, hence increasing the risk of obesity-related health issues among youngsters. Childhood obesity is growing throughout Africa, especially in metropolitan regions where lifestyle changes and food habits play a significant role. The 2024 WHO report indicates that the prevalence of overweight children under five years old in Africa has risen by about 23% since 2000.[1,2] This syndrome is marked by an excessive buildup of body fat, which elevates the risk of chronic diseases, including type 2 diabetes, cardiovascular diseases, and respiratory ailments. The illness is multifaceted, influenced by a complex interplay of genetic, social, behavioral, and environmental factors. In recent decades, the incidence of childhood obesity has escalated, leading international entities such as the World Health Organization (WHO) to classify it as a significant public health issue.[1]

Although juvenile obesity has historically been linked to rich countries, Africa is experiencing a concerning increase in obesity rates among youngsters. Rapid urbanization, evolving food patterns, and diminishing physical activity levels have contributed to this increase.[3,4] As African countries shift towards sedentary lifestyles and the intake of high-calorie, processed foods rises, childhood obesity is rapidly emerging as a critical health issue that necessitates immediate intervention.

Multiple causes influence the rising prevalence of paediatric obesity in Africa. Urbanization has altered dietary practices, leading numerous urban residents to embrace Westernized diets characterized by energy-dense, nutrient-deficient items, including fast food and sugary beverages.[5,6] The increase in screen time, encompassing television, mobile devices, and video games alongside dietary modifications, has led to a sedentary lifestyle, diminishing children's chances for physical activity. The prevalence of unhealthy food options, which are frequently more economical and accessible than better choices, intensifies the issue.[7,8] Socio-economic status

significantly influences dietary choices; higher-income families often access a broader array of unhealthy processed foods, whereas low-income households typically depend on inexpensive, calorie-dense meals lacking critical nutrients.[9,10] The reduction in physical activity inside educational institutions and communities is a significant contributing element. Due to safety concerns or a lack of recreational venues, many African children have fewer possibilities for physical activity, resulting in increasingly sedentary lifestyles. This lifestyle, along with the convenient availability of unhealthy food, promotes swift weight gain, which, if unregulated, results in obesity.[7]

Addressing childhood obesity necessitates a comprehensive strategy that transcends individual-level interventions. Resolving the issue requires the promotion of physical activity, the advocacy for healthier dietary practices, the regulation of unhealthy food marketing directed at children, and the enhancement of access to nutritious and cheap food options.[11,12] Interventions targeting the initial 1,000 days of life, from conception to 24 months, have demonstrated notable efficacy. During this pivotal phase, nutritional decisions, including breastfeeding and complementary feeding habits, substantially influence the child's propensity for obesity in later life.[13,14] Nonetheless, efforts at the individual level may be inadequate in addressing this escalating problem in Africa. The demand for comprehensive, community-oriented treatments has increased, focusing on jointly modifying surroundings and behaviours.[14]

Community-based treatments are widely acknowledged as vital for the prevention of childhood obesity in Africa. These interventions encompass multiple domains: educational institutions, families, healthcare professionals, and the broader community, together fostering circumstances that promote healthy lives.[15] Nutrition instruction can be incorporated into the curriculum, better meal options can be offered in school cafeterias, and physical exercise can be encouraged through sports and active playtime hours in educational institutions.[8,16] Parental participation is essential, as it significantly impacts children's food and activity behaviors. Programs that instruct parents on nutritious food preparation, portion management, and active family participation in physical activities promote the desired behavior within the household. Healthcare providers are essential in the early identification of children at risk for obesity, offering guidance on nutrition and physical activity and assisting parents in weight management for their children. Simultaneously, community-wide initiatives may concentrate on environmental modifications, including the

establishment of secure recreational areas for children and the enhancement of access to affordable, healthy food via farmers' markets and community-oriented food programs. Cultural sensitivity is essential when developing interventions for African populations due to the continent's unique cultural norms and dietary traditions. Programs tailored to local cultural contexts, such as meal plans featuring indigenous foods and activities that resonate with community values, generally yield superior benefits.[4,17]

Community-based interventions differ significantly from clinical or individual-level approaches by focusing on systemic changes rather than solely addressing individual cases [42]. While clinical interventions target individuals, community-based strategies aim to improve health outcomes across the entire population by modifying social and physical environments, promoting policy changes, and encouraging community participation.

Studies indicate that community-based treatments can significantly enhance efforts to combat juvenile obesity by targeting individual behaviors and the environmental context. Interventions within schools in sub-Saharan Africa have shown effective in improving food selections and augmenting physical activity among youngsters.[4,15] The efficacy of these interventions frequently hinges on the socio-economic and cultural environment of their implementation. Although certain programs have achieved success, others encounter significant obstacles. Limited financial resources, inadequate infrastructure, and weak policy frameworks can impede the success and sustainability of these initiatives.[9] Consequently, it is essential to establish more robust data regarding the most effective strategies in diverse African contexts, considering the distinct difficulties and possibilities inherent to each region.[15]

Global trends indicate a rise in obesity rates, while certain African countries experience a dual burden of malnutrition, where undernutrition and obesity are shared within the same communities. According to the World Health Organization, the prevalence of overweight children under five in Africa was 5.4% in 2019, reflecting a concerning upward trend.[43] Despite the increasing incidence of paediatric obesity in Africa, a significant knowledge vacuum persists about effective community-based treatments to tackle this issue. Current research predominantly concentrates on high-income countries, resulting in few recommendations for African states regarding the most appropriate solutions for their unique settings. Moreover, the variety of African cultures, eating

practices, and socio-economic circumstances necessitates customized interventions that cater to the specific requirements of diverse groups. Furthermore, there is an absence of extensive data regarding the long-term efficacy and sustainability of community-based strategies in African contexts. In the absence of these data, it is challenging to formulate and expand effective programs to tackle the obesity epidemic on the continent. This research aims to thoroughly investigate the data about community-based interventions to address the concerning increase in children obesity rates in Africa and its potential for long-term impact. This review seeks to identify beneficial interventions, reveal deficiencies in existing literature, and offer insights to guide the creation of targeted strategies for combating paediatric obesity. This research will enhance the existing knowledge on community-based interventions, aiding policymakers, healthcare professionals, and community leaders in formulating culturally relevant and resource-efficient strategies to mitigate childhood obesity among African children. The findings will have significant ramifications for global initiatives aimed at preventing childhood obesity, providing essential insights into the necessity of community involvement, environmental modifications, and cultural relevance in addressing this public health issue.

1.1. Research Questions

The scoping review aims to address this overarching question

What is the effectiveness of community-based interventions in reducing childhood obesity?

The review explores the following sub-questions:

- What types of community-based interventions have been implemented?
- What are the reported outcomes related to obesity reduction (e.g., BMI, physical activity, dietary changes)?

Objectives of the Study

The main objective is to examine the effectiveness of community-based interventions in reducing childhood obesity. The specific objectives of this study are to:

- Examine the types of community-based interventions that have been used to reduce childhood obesity.
- Evaluate the effectiveness of community-based interventions in addressing childhood obesity in Africa.

2. Methodology

2.1. Study Design

This study follows a scoping review methodology, which is designed to map the existing literature on the effectiveness of community-based interventions in reducing childhood obesity. A scoping review is suitable for examining broad research questions where the literature is diverse in terms of study designs and interventions. The methodology follows the guidelines of the Arksey and O'Malley framework.[18] with enhancements from Levac et al.[19] and the Joanna Briggs Institute (JBI) manual for scoping reviews.[20]

2.2. Eligibility Criteria

2.2.1. Inclusion Criteria

Studies are included in the review based on the following criteria:

- Population: Children aged 0–18 years
- Intervention: Community-based interventions focused on reducing childhood obesity. Interventions may include educational programs, physical activity initiatives, nutrition counselling, family or school-based programs, etc.
- Outcome Measures: Outcomes related to childhood obesity (e.g., BMI, weight reduction, changes in physical activity, or dietary habits).
- Study Design: Peer-reviewed quantitative, qualitative, and mixed-methods studies, systematic reviews, and reports from 2009 to 2024 with focus on barriers and facilitators related to socio-economic and cultural contexts.
- Setting: Studies conducted in community settings (e.g., schools, local communities, family programs).
- Language: Articles published in English.
- Geography: Global studies, with emphasis on both high-income and low- to middle-income countries in Africa

2.2.2. Exclusion Criteria

Studies are excluded if they focus on interventions not delivered in community settings (e.g., clinical or hospital-based interventions), do not report any specific outcomes related to childhood obesity and fitness, are editorial articles, commentaries, or opinion pieces and articles that do not capture African context and are published before 2009

2.3. Search Strategy

A comprehensive literature search is conducted across the following databases: PubMed, CINAHL (Cumulative Index to Nursing and Allied Health Literature), Web of Science, Scopus, EMBASE and Google Scholar. The search covers publications from January 2009 to February 2024. The search terms will include combinations of keywords, and MeSH terms include: "childhood obesity," "community-based interventions," "physical activity," "nutrition programs," "school-based interventions," "family-based interventions," "BMI reduction," and "child health promotion." The search strategy is customized for each database, and Boolean operators (AND, OR) are used to refine searches. References of selected articles are hand-searched for additional relevant studies.

2.4. Study Selection Process

The study selection process involves three main steps. Initially, titles and abstracts of the identified studies are screened for relevance and eligibility. Studies that meet the initial criteria undergo full-text review. In addition to database searches, manual searches are conducted by reviewing reference lists and citation tracking to capture studies that may not have been identified through the databases. Finally, eligible studies are selected based on predefined inclusion criteria, and any discrepancies in the inclusion decision are resolved.

2.5. Data Extraction

A standardized data extraction is developed and used to extract key information from each included study. It captures Study characteristics (author, year, location), Intervention type and Barriers and facilitators to implementation components, Study design, Participant characteristics, Outcome measures (BMI, dietary changes, physical activity), Duration and frequency of the intervention and Conclusions. Data are charted into a table that summarizes the key characteristics of each included study. The chart consists of Author(s), year, Study setting (community type, country),

Intervention description (type, duration, frequency), Sample size and population characteristics (e.g., age range, socio-economic status); Outcomes measured (BMI, dietary changes, physical activity) and Conclusion (Intervention Success)

2.6. Data Analysis and Synthesis

A descriptive analytical approach will be applied to map the findings of the included studies. The data synthesis will involve both quantitative summaries (e.g., frequency of specific intervention types) and qualitative thematic analysis (to identify common themes and patterns across studies). The findings of this scoping review will be reported following the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) guidelines. A flowchart will be used to display the study selection process, and the results will be presented both narratively and in tables, summarizing key findings.

2.7. Ethical Considerations

Since this scoping review involves secondary data analysis of publicly available research, no formal ethical approval is required. However, all studies are handled according to standard ethical guidelines for conducting literature reviews, ensuring that data is reported accurately and objectively.

3. Results

3.1. Study Selection Process

Figure 1 represents the PRISMA flow chart of the selected articles for this review. Records identified through database searching across PubMed, Scopus, Google Scholar, Medline, Web of Science, and PsycINFO totaled 1135 articles. An additional 18 records were identified through other sources after removing 54 duplicates; 1099 unique articles were screened based on titles and abstracts. One thousand and fifty-nine (1059) records were excluded as they did not meet the inclusion criteria. Then, 40 full-text articles were assessed for eligibility, and 28 full-text articles were excluded for various reasons: Non-Community-based (10 articles), study not within an African location (7 articles), six articles not focused on Obesity and insufficient Data (5 articles). Finally, 12 studies were included in the qualitative synthesis.

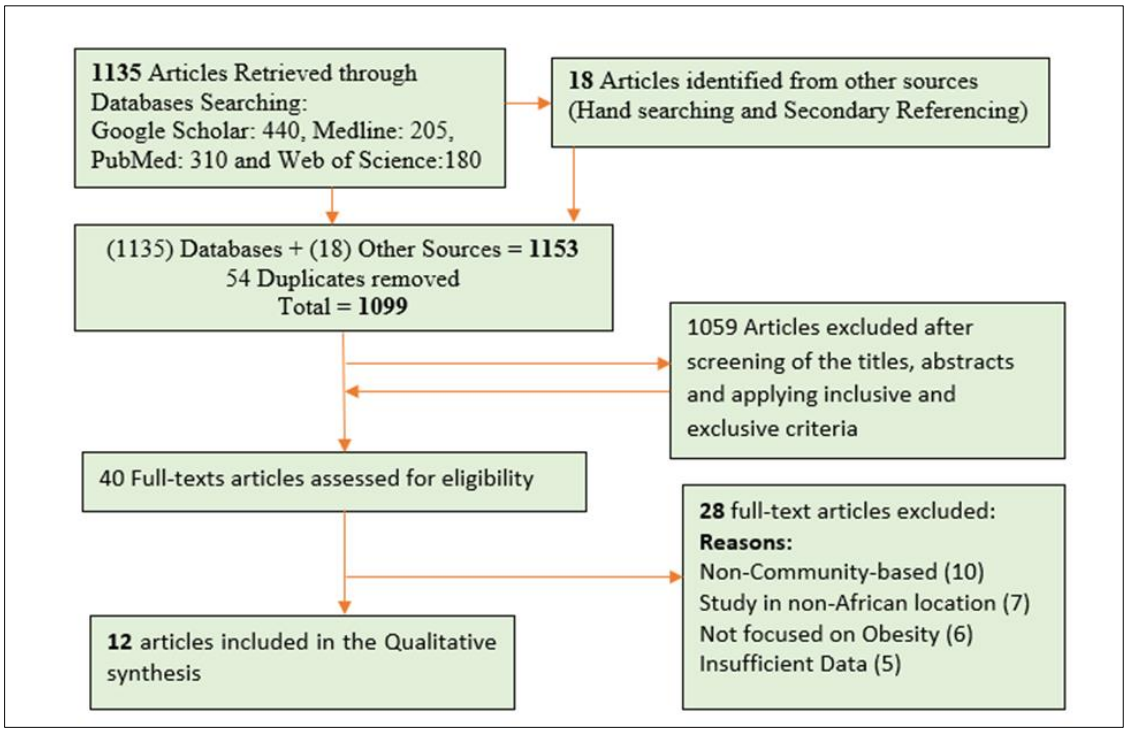

Figure 1 PRISMA flow chart of selected articles for the scoping review

3.2. Study Characteristics

Most of the studies (83.3%) were published as journal articles, reflecting peer-reviewed sources. Publications with technical reports and theses are less common, with only one study each (8.3%) reported in these formats.

Five studies (41.7%) focused on improving dietary behaviors through educational programs, nutritional counselling, or health awareness campaigns. Seven studies (58.3%) targeted increasing physical activity levels or combined physical activity with other interventions, such as nutritional education. Six studies (50%) highlighted the role of parents, family members, or community engagement in interventions. Eight studies (66.7%) utilized the school setting for delivering intervention programs, including nutrition, physical activity, or combined approaches.

Table 1 Characteristics of included studies (n=12)

Reported variables	**Frequency (n=12)**	**%**
Literature sources		
Journal Articles	10	83.3
Technical Reports	1	8.3
Thesis	1	8.3
Themes		
Nutrition Education and Counselling Interventions	5	41.7
Physical Activity and Combined Interventions	7	58.3
Family and Community Involvement	6	50
School-Based Interventions	8	66.7

3.3. Types of Interventions

Health interventions aimed at improving child well-being across various African countries highlight key themes involving family and community involvement, nutrition education, physical activity, and combined interventions targeting both physical and nutritional health. The synthesis of studies across Nigeria, South Africa, Ghana, and Tunisia showcases diverse methods and participant settings, providing insight into the efficacy of different intervention types.

3.3.1. Family and Community Involvement in Child Health

Several studies emphasize the importance of family and community involvement in promoting child health. Adeniyi *et al*.[21] conducted a cross-sectional study in Nigeria, focusing on school-aged children and their mothers in Lagos. The study revealed that only half of the mothers were engaged in preventive health practices. Similarly, Ganle *et al.*[22] in Ghana demonstrated that higher parental education and dietary habits were linked to increased obesity risk in school-aged children. Orighoye[23] conducted a mixed-methods study in Lagos, Nigeria, addressing socio-economic and cultural barriers to effective nutritional and physical activity interventions. This study highlighted the complexity of implementing health programs in multi-ethnic communities, stressing the necessity of community engagement and culturally sensitive approaches.

3.3.2. Nutrition Education Interventions

Nutrition education emerged as a recurring theme in interventions aimed at improving children's dietary habits and reducing malnutrition. Dike *et al*.[24] conducted a group-randomised trial in Nigeria, focusing on nutritional counselling for rural-dwelling children. The study found positive and sustained improvements in children's eating habits following the intervention. Ede et al.[25] surveyed health counsellors working with rural children in Nigeria, identifying key strategies to reduce malnutrition, including caregiver education and awareness creation. In Tunisia, Kebaili *et al*.[26] conducted a quasi-experimental study that revealed significant changes in students' nutrition knowledge and behaviors post-intervention. Similarly, Maatoug *et al*.[27] also conducted a school-based intervention in Tunisia and reported increased healthy dietary habits and a reduced risk of excess weight. These studies demonstrate the effectiveness of school-based nutrition education in improving children's health behaviors.

3.3.3. Physical Activity Interventions

Physical activity was a key focus in interventions aimed at improving fitness levels among children and adolescents. Draper *et al*.[28] conducted a quasi-experimental study in South Africa, which involved fitness testing and focus groups with teachers and monitors in three primary schools. The intervention resulted in improved fitness levels and self-efficacy for physical activity, with participants reporting fewer perceived barriers to exercise. Similarly, Lennox and

Pienaar[29] implemented a physical activity intervention in Potchefstroom, South Africa, which showed that higher attendance in physical activity programs was associated with better aerobic fitness and increased activity levels among adolescents from socio-economically disadvantaged communities. Nyawose and Naidoo[30] extended this work by involving parents and educators in a physical activity intervention in Clermont Township, South Africa. The study found significant improvements in physical fitness and healthier lifestyle practices among grade six learners.

3.3.4. Combined Nutrition and Physical Activity Interventions

Combined interventions that integrate both nutrition and physical activity have shown promising results in improving child health outcomes. Naidoo *et al.*[31] piloted a physical and nutritional activity program in KwaZulu-Natal, South Africa, that was integrated into the school curriculum. The results demonstrated increased participation in physical activity and improvements in both fitness and nutrition. Maatoug *et al*.[27] also explored the combined effects of nutrition and physical activity in a quasi-experimental school-based intervention in Tunisia. The study found that students who participated in the program exhibited healthier dietary habits and a lower risk of excess weight.

3.3.5. School-Based Nutrition Programs

School-based nutrition programs have been particularly successful in improving child health in disadvantaged areas. Hochfeld *et al.*[32] conducted a three-phase evaluation of a school breakfast program in Alexandra, South Africa, which showed marked improvements in height for age and BMI for age among students.

Table 2 Extracted Data

S/N	Study (Authors/Year)	Country	Method/Technique	Setting and Participant	Themes
1	Adeniyi *et al*.[21]	Nigeria	Cross-sectional study. Multi-stage sampling technique. Data was collected via an interviewer-administered questionnaire.	Four hundred forty school-aged children (6-13 years) and mothers from two LGAs in Lagos, Nigeria.	Family and Community Involvement: Only half of the mothers were involved in preventive practices.
2	Dike *et al*.[24]	Nigeria	Group-randomised trial. Nutritional counselling interventions. Independent sample t-tests for analysis.	One hundred eight rural-dwelling children in Enugu North agricultural zone, Nigeria.	Nutrition Education: Improvement in children's eating habits post-intervention, sustained during follow-up.
3	Draper *et al*.[28]	South Africa	Quasi-experimental study. Pre-post fitness testing. Focus groups with teachers and monitors.	Three primary schools in Alexandra Township, Johannesburg, South Africa.	Physical Activity: Improved fitness levels and self-efficacy for physical activity. Decreased perceived barriers.
4	Ede *et al.*[25]	Nigeria	Survey of health counselling strategies. Descriptive and inferential statistics for data analysis.	Two hundred nine health counsellors working with rural children in Nigeria.	Nutrition Education: Strategies for reducing malnutrition, including caregiver education and awareness creation.
5	Ganle *et al.*[22]	Ghana	Cross-sectional quantitative survey. Multivariate logistic regression for analysis.	Two hundred eighty-five in-school children aged 5-16 years in a metropolitan district in Ghana.	Family Involvement: Higher obesity risk linked to parental education and consumption habits.
6	Hochfeld *et al.*[32]	South Africa	Three-phase evaluation (baseline, interim, final). Mixed methods approach	Six pilot schools in Alexandra, Johannesburg, South Africa.	School Nutrition: Improvement in height-for-age and

			with anthropometric measurements.		BMI-for-age after the breakfast program.
7	Kebaili *et al*.[26]	Tunisia	Quasi-experimental study. Pre- and post-evaluation of knowledge, behaviors, and intentions.	Two thousand two hundred urban students aged 12-16 years in Sousse, Tunisia.	School Nutrition: Significant changes in nutrition knowledge and behaviors in the intervention group.
8	Lennox and Pienaar[29]	South Africa	Quasi-experimental study. Physical activity intervention program twice weekly for 60 minutes.	Two hundred fifty-two adolescents from a socio-economically disadvantaged community, Potchefstroom, South Africa.	Physical Activity: Higher aerobic fitness and physical activity levels with greater program attendance.
9	Maatoug *et al*.[27]	Tunisia	Quasi-experimental school-based intervention. Multivariate analysis for impact assessment.	Schoolchildren in Sousse Jawhara and Sousse Riadh, Tunisia.	Combined Nutrition and Physical Activity: Increased healthy dietary habits and reduced risk of excess weight.
10	Naidoo *et al.*[31]	South Africa	Pilot study. Physical and nutritional activity interventions integrated into the school curriculum.	Four primary schools in KwaZulu-Natal, South Africa.	Combined Intervention: Increase in physical activity participation and improvements in fitness and nutrition.
11	Nyawose and Naidoo[30]	South Africa	Quasi-experimental design. Assessment pre- and post-intervention. Interviews and focus group discussions.	Grade six learners, parents, and educators in Clermont Township, South Africa.	Physical Activity and Family Involvement: Significant increases in physical fitness and healthier lifestyle practices.
12	Orighoye[23]	Nigeria	Mixed methods study. Systematic-type review, semi-structured interviews, and focus group discussions.	Children aged 8-15 years and parents in a suburban multi-ethnic community in Lagos, Nigeria.	Family and Community Involvement: Addressing socio-economic and cultural barriers in diet and physical activity interventions.

3.4. Characteristics of the Intervention Strategies

3.4.1. Interventions Outcomes/Effectiveness

The interventions produced varying degrees of effectiveness, with many reporting significant improvements in child health outcomes. However, Dike et al.[24] found that nutritional counselling interventions led to sustained improvements in children's eating habits, even during follow-up. Similarly, Ede et al.[25] reported enhanced caregiver knowledge about nutrition and better dietary habits among children following health counselling strategies.

Physical activity interventions also yielded positive results. Draper et al.[28] and Lennox & Pienaar[29] observed significant improvements in children's fitness levels and increased participation in physical activities. Nyawose & Naidoo[30] reported healthier lifestyle practices and enhanced physical fitness among learners due to family involvement and physical activity programs.

School-based nutrition programs, such as the breakfast feeding initiative evaluated by Hochfeld et al.[32], led to improvements in children's height-for-age and BMI-for-age, while Kebaili et al.[26] noted significant gains in nutrition knowledge and healthier eating behaviors among students. Combined interventions, such as those examined by

Maatoug et al.[27] and Naidoo et al.[31], were also effective in increasing healthy dietary habits and physical activity levels, reducing the risk of excess weight among students.

3.5. Barriers to the Intervention Effectiveness

Several barriers impacted the effectiveness of interventions aimed at improving child health outcomes across different settings in Africa. The barriers are categorized into three (3) according to recurring themes across studies which are:

3.5.1. Parental/Caregiver Involvement

A common barrier was limited parental or caregiver involvement. For example, in the study by Adeniyi et al.[21], low maternal engagement in obesity prevention practices was a significant challenge, with only 55.2% of mothers participating. Ede et al.[25] also found that limited caregiver knowledge and cultural practices hindered the effectiveness of nutrition counselling strategies in Nigeria.

3.5.2. Access and Infrastructure

Another recurring barrier was inadequate access to resources and infrastructure, particularly in rural and underserved areas. Dike et al.[24] emphasized that rural settings faced difficulties in implementing nutritional interventions due to poor access to resources. In schools, Draper et al. and Draper et al.[28] and Lennox & Pienaar [29] both noted inadequate facilities for physical activity as a significant obstacle to physical fitness programs, while Naidoo et al.[31] highlighted the decreasing opportunities for physical activity during school hours as a further challenge. In addition, Hochfeld et al.[32] noted that insufficient funding posed a serious threat to the sustainability of school-based nutrition programs, particularly in South Africa.

3.5.3. Socio-economic Factors

Ganle et al.[22] and Maatoug et al.[27] found that socio-economic disparities adversely affected both family-based lifestyle modifications and school-based interventions in Ghana and Tunisia, respectively. Moreover, Orighoye[23] reported that a combination of socio-economic and cultural barriers limited the effectiveness of family involvement in diet and exercise interventions.

3.6. Facilitators contributed to the success of the Interventions.

Despite these barriers, several facilitators contributed to the success of the interventions. Parental and community involvement was a critical facilitator across multiple studies. In this context, Dike et al.[24] noted that parental involvement and collaboration with community professionals helped improve children's eating habits in rural areas. Similarly, Ganle et al.[22] found that family participation in lifestyle changes was essential in reducing obesity risk. Orighoye[23] also emphasized the role of community partnerships and culturally tailored interventions in overcoming barriers to family involvement.

Public-private partnerships and multi-sectoral collaboration were effective in ensuring the continuity and success of programs. For instance, Hochfeld et al.[32] demonstrated how public-private partnerships helped sustain a school-based breakfast program despite funding challenges. Maatoug et al.[27] highlighted that multi-sectoral collaboration and supportive school environments were crucial in improving students' dietary habits and physical activity levels in Tunisia.

In schools, the integration of health programs into the curriculum emerged as a strong facilitator. Naidoo et al.[31] successfully embedded physical activity and nutrition interventions into the school curriculum, which increased participation and improved fitness levels. Kebaili et al.[26] also integrated interactive nutrition education into school courses, which significantly improved students' knowledge and healthy eating behaviors. Nyawose&Naidoo[30] pointed out that teacher training and the inclusion of parents in physical activities helped enhance program success in South Africa.

Table 3 Characteristics of the Interventions

S/N	Author	Type of Intervention	Barriers	Facilitators	Intervention Outcomes/Effectiveness
1	Adeniyi *et al.*[21]	Family and community involvement in obesity prevention	Limited maternal involvement; lack of awareness	Maternal education on preventive practices	High prevalence of obesity; only 55.2% of mothers engaged in preventive practices.
2	Dike *et al.*[24]	Nutrition counseling intervention	Rural settings with limited access to resources	Parental involvement and collaboration with community professionals	Improved children's eating habits post-intervention, sustained during follow-up.
3	Draper *et al.*[28]	School-based physical activity program	Lack of facilities and equipment for physical activity	Positive attitudes from teachers and program monitors	Significant improvement in fitness levels and decreased perceived barriers to physical activity.
4	Ede *et al.*[25]	Health counselling strategies for malnutrition	Limited caregiver knowledge; cultural practices	Awareness campaigns; caregiver education on nutrition	Enhanced caregiver knowledge about nutrition and improved children's dietary habits.
5	Ganle *et al.*[22]	Family-based approach; lifestyle modification	Socio-economic factors; parental education levels	Family involvement in lifestyle changes	Higher obesity risk linked to parental education; physical activity reduced obesity risk.
6	Hochfeld *et al.*[32]	School-based nutrition (breakfast feeding program)	Limited funding for continuous support of the program	Public-private partnerships	Improved height-for-age and BMI-for-age among children in pilot schools.
7	Kebaili *et al.*[26]	School-based healthy nutrition education	Lack of engagement among some students	Integration of interactive programs in school courses	Significant improvements in students' nutrition knowledge and healthy eating behaviours.
8	Lennox and Pienaar[29]	After-school physical activity program	Barriers to participation outside school hours	High program attendance	Improved aerobic fitness and increased physical activity levels in adolescents.
9	Maatoug *et al.*[27]	School-based intervention with nutrition and physical activity	Socio-economic disparities	Multi-sectoral collaboration; supportive school environment	Increased healthy dietary habits and reduced risk of excess weight among students.
10	Naidoo *et al.*[31]	Combined physical activity and nutrition intervention	Decreasing opportunities for physical activity during school hours	Integration of the program into the school curriculum	Increased participation in physical activities and a slight improvement in nutritional behaviour.
11	Nyawose and Naidoo[30]	School and Family Physical Activity Intervention	Low levels of parent engagement	Teacher training; involvement of parents in physical activities	Significant increase in physical fitness and healthier lifestyle practices among learners.

12	Orighoye[23]	Family involvement in diet and exercise	Socio-economic and cultural barriers	Community partnerships; culturally tailored interventions	Addressed socio-economic barriers in diet and exercise; improved physical activity and diet practices.

4. Discussion

The findings from this scoping review on the effectiveness of community-based interventions in reducing childhood obesity highlight several key aspects regarding intervention types, their outcomes, and factors influencing their success or failure. This section discusses these findings in the context of the research objective and broader literature on childhood obesity interventions.

4.1. Intervention Types and Their Impact

The review identified that most interventions aimed at addressing childhood obesity were delivered through school-based programs, accounting for 66.7% of the studies. This finding aligns with global trends that leverage schools as effective platforms for health interventions, particularly in low-resource settings where schools offer direct access to large populations of children. The prevalence of school-based interventions is consistent with Bleich et al.[33], who reported that school-based approaches, especially those combining nutrition education and physical activity, are among the most widely implemented strategies worldwide. Furthermore, Wang et al.[34] concluded that school settings are highly effective due to structured environments conducive to regular health education and physical activity.

This review supports the effectiveness of combined interventions, which integrate both nutrition and physical activity components. These were shown to produce more significant health outcomes than single-focus interventions, mirroring the findings of Bleich et al.[33] and Wang et al.[34]. In this lieu, nine out of the twelve studies included in this review focused on improving both diet and physical activity behaviors, with notable success observed in BMI reduction and waist circumference improvement. However, it is noteworthy that only a limited number of studies included meaningful community or family involvement in the intervention's design, potentially limiting their broader impact. This outcome is supported by Sultana et al.[35], who emphasized the need for multi-sectoral and multi-component approaches to capture a range of health determinants effectively.

4.2. Intervention Outcomes and Effectiveness

The effectiveness of the reviewed interventions varied based on the type and scope of the programs. Nutrition education interventions were linked with positive outcomes, such as significant improvements in children's dietary habits and nutrition knowledge. This finding aligns with the meta-analysis by Zeb et al.[36], which demonstrated the positive impact of health education and behavioral interventions on reducing obesity-related measures like BMI and waist circumference. Similarly, Wang et al.[34] emphasized the role of family-based nutrition education in improving dietary behaviors among children from minority households, which further supports our finding that parental involvement can enhance the effectiveness of nutritional interventions.

Physical activity interventions also showed promising results, with multiple studies documenting improvements in fitness levels and physical activity engagement among children. This result is consistent with the conclusions drawn by Lim et al.[37], who found that school-based physical activity programs were effective in rural communities where structured settings provided children with regular opportunities for exercise. Moreover, the current review supports the notion that combined interventions addressing both physical activity and nutrition are more effective than single-component approaches. For instance, Karacabeyli et al.[38] indicated that multi-setting interventions with components addressing various aspects of children's health are beneficial in preventing childhood obesity.

4.3. Barriers to Intervention Effectiveness

Despite the positive outcomes observed, several barriers hindered the effectiveness of these interventions. Limited parental or caregiver involvement emerged as a recurring challenge. This finding shows that only five out of the twelve studies in this review actively involved the target audience in intervention development or implementation, limiting the interventions' cultural relevance and acceptability. This observation is in line with Proaño et al.[39], who identified the lack of stakeholder engagement as a barrier to successful obesity prevention in Latin American settings.

Access and infrastructure limitations were also significant obstacles, particularly in the context of physical activity interventions. These findings echo the results of Lim et al.[37], who noted that inadequate infrastructure in rural schools

limited the ability to implement comprehensive physical activity programs. It is also reflected in Hillier-Brown et al.[40], where the lack of physical resources constrained the reach and sustainability of interventions targeting socio-economically disadvantaged populations. Furthermore, socio-economic factors played a critical role in shaping intervention outcomes. Families from lower-income backgrounds faced challenges in accessing healthy foods and safe exercise spaces, which corroborates the findings of Luybli et al.[41], who observed similar difficulties in low-socioeconomic settings.

4.4. Facilitators of Success

Several facilitators were consistently associated with successful outcomes across the studies. Parental and community involvement proved to be key factors in enhancing the effectiveness of interventions, aligning with the conclusions of Wang et al.[34], who emphasized the importance of culturally tailored family-based approaches for childhood obesity prevention. This finding is also supported by Wang et al.[34], who found that interventions incorporating culturally tailored elements, such as addressing language barriers and specific family dynamics, were more successful in promoting healthy behaviors among children from racial and ethnic minority groups. The findings align with this evidence, as the studies that included community participation (n = 4) demonstrated better outcomes in obesity prevention than those that did not.

Public-private partnerships and multi-sectoral collaborations emerged as critical facilitators for sustaining interventions. Sultana et al.[35] noted that such partnerships could help bridge funding gaps and provide resources necessary for the continuation of community-based programs. Similarly, the study by Proaño et al.[39] highlighted how stakeholder coordination and integration into local policies were instrumental in overcoming economic and political barriers to program implementation.

4.5. Limitation

This scoping review faced several limitations that may impact the generalizability and comprehensiveness of its findings. First, despite a broad search strategy, the review may have missed relevant studies published in non-indexed or regional journals, particularly those not available in English, which could limit the representation of community-based interventions in non-English-speaking African countries. Second, the heterogeneity of the included studies, in terms of intervention design, duration, and outcomes measured, made it difficult to conduct a meta-analysis or directly compare results across studies. Additionally, the reliance on self-reported data in several studies presents a significant limitation. In particular, the accuracy of data concerning dietary intake and physical activity may be compromised by underreporting or overreporting, driven by social desirability bias or recall issues. Participants may downplay unhealthy behaviors or exaggerate positive behaviors, which can skew the results and diminish the reliability of the findings. This introduces a source of bias that could impact the interpretation of intervention effectiveness, as behaviors may not be accurately captured.

5. Conclusion

The effectiveness of community-based interventions in reducing childhood obesity is largely influenced by the type of intervention, the level of parental and community involvement, and the availability of resources. Combined interventions targeting both nutrition and physical activity appear to be the most effective, particularly when delivered through schools. However, barriers such as limited caregiver involvement, resource constraints, and socio-economic disparities must be addressed to ensure the sustainability and sca lability of these interventions. Facilitators such as community engagement, public-private partnerships, and integration into school curricula can help overcome these barriers and enhance the long-term success of childhood obesity interventions. Future programs should focus on multi-component, contextually relevant approaches that address both individual behaviors and broader social determinants of health.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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