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REVIEW ARTICLE

Strategies for Preventing Childhood Obesity at the Primary Care Level: A Review of Effectiveness and Implementation Barriers

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SUMMARY

Introduction: Childhood obesity is a critical public health problem requiring early intervention. While primary health care (PHC) is the ideal setting for prevention during the early childhood "window of opportunity," a significant gap exists between clinical guidelines and actual practice. The aim of this review was to analyze the effectiveness of PHC interventions for children aged 2–12 years and to identify barriers to their implementation.

Methods: An integrative review was conducted using the methodological framework of Whittemore and Knafl. Studies published between 2015 and 2025 from PubMed, Scopus, and grey literature were analyzed, including clinical trials, qualitative studies, and cost-effectiveness analyses. School-based or pharmacological interventions were excluded.

Results: Evidence confirms that early interventions are effective, but they suffer a "fade-out effect" upon reaching school age if there is no ongoing reinforcement. While school-based interventions have proven to be highly cost-effective (approximately $900/QALY), clinical interventions face systemic barriers (lack of time, insufficient training) and relational barriers (underestimation of weight by parents) that perpetuate therapeutic inertia. The most successful models were those that integrated community components and mHealth tools.

Conclusions: Isolated prevention in the doctor's office is insufficient. A shift towards a hybrid model is proposed, where the primary care physician acts as a "detector and connector," leading risk screening and coordinating referrals to community and school resources to ensure the sustainability of behavioral change.

Keywords: *Pediatric Obesity, Primary Health Care, Preventive Health Services, Lifestyle Intervention, Doctor-Patient Relationships,*

Cost-Effectiveness.

INTRODUCTION

Childhood obesity has become one of today's most pressing public health challenges, requiring a preventative approach that begins in the earliest stages of development. Current scientific evidence identifies early childhood, and particularly the first 1,000 days of life (from conception to 24 months), as a critical window for preventative intervention (1,2). During this phase, dietary and physical activity patterns are established that shape long-term health trajectories. Furthermore, biological milestones such as the "adiposity rebound," which typically occurs between the ages of 5 and 7, act as early indicators of future metabolic risk (3). Longitudinal data suggest that children who exhibit excessive weight gain in these early stages have a high probability of maintaining obesity into adolescence and adulthood (4).

In this context, primary health care (PHC) is positioned as a strategic setting for prevention, given the regular contact and the relationship of trust that professionals establish with families during well-child visits. In response to the need to standardize care, current clinical practice guidelines, such as those from the World Health Organization (WHO) and the American Academy of Pediatrics, recommend that PHC professionals routinely monitor body mass index (BMI). They also offer anticipatory counseling on healthy lifestyles. (5–7). Early detection at this level of care allows for timely interventions and facilitates the connection of families with the necessary community resources.

However, translating these theoretical recommendations into daily clinical practice faces significant systemic and behavioral barriers. Primary care providers frequently cite time constraints during consultations as a major obstacle, often resulting in superficial discussions or the complete omission of obesity counseling (8,9). This is compounded by a lack of structured protocols and insufficient training in behavioral and nutritional management, factors that diminish the professional's self-efficacy in addressing the issue with families (10,11). Additionally, there are perception barriers, where parents may underestimate their children's weight, hindering the initiation of preventive actions (12).

While interventions in the school environment have proven to be cost-effective due to their broad reach (13). Strategies based on primary care show greater variability in their economic and clinical outcomes, frequently with higher costs per unit of outcome (14). Therefore, it is imperative to examine not only which interventions are effective but also what factors facilitate or hinder their implementation in the clinical “real world.”

The objective of this integrative review is to analyze the effectiveness of interventions carried out in primary care for the prevention of childhood obesity in children aged 2 to 12 years. This includes identifying the critical barriers to their implementation and exploring the mechanisms that favor their long-term sustainability.

METHODS

Studio design

An integrative literature review was conducted following the methodological framework proposed by Whittemore and Knafl (15). This design was specifically selected for its ability to combine data from diverse methodologies—including randomized controlled trials (RCTs), qualitative studies on perceived barriers, and cost-effectiveness analyses—allowing for a holistic understanding of complex phenomena such as obesity prevention in clinical and community settings.

Search strategy

A literature search was conducted to identify relevant studies published between January 2015 and the present (2025). This timeframe was chosen to capture the most recent evidence in light of updated clinical guidelines and the rise of digital health tools. Combinations of controlled terms (MeSH/DeCS) and keywords in English and Spanish were used, including “Pediatric Obesity,” “Primary Health Care,” “Preventive Health Services,” “Lifestyle Intervention,” “Parental Education,” and “Cost-Benefit Analysis.” The databases and information sources consulted

included PubMed, Scopus, and relevant grey literature from international organizations (WHO).

Eligibility criteria

To ensure the relevance of the findings, the following selection criteria were applied:

Inclusion criteria

- **Population:** Studies focused on children aged 2 to 12 years and their families/caregivers. Data on early childhood (0–2 years) were included only when interventions had longitudinal follow-up into school age.
- **Around:** Interventions implemented mainly or partially in the context of primary health care (PHC), or community strategies that maintained a direct connection with clinical providers.
- **Type of studies:** Randomized clinical trials, quasi-experimental studies, observational studies with association analysis, recent systematic reviews, and qualitative studies on perceptions of providers or users.
- **Language:** Articles published in English or Spanish.

Exclusion criteria

- Interventions carried out exclusively in schools without any clinical or family linkage component.
- Studies focused on obesity secondary to genetic syndromes (e.g., Prader-Willi) or specific endocrine conditions.
- Pharmacological or surgical treatments (bariatric surgery).
- Studies conducted in tertiary hospital settings (inpatient care).

Data extraction and synthesis

Study selection and data extraction were guided by predefined research questions aimed at assessing effectiveness, implementation barriers, and costs. Data synthesis was organized thematically into key analytical categories: (1) clinical effectiveness and sustainability of outcomes; (2) the role of parental education and family interventions; (3) barriers and facilitators perceived by healthcare professionals; and (4) comparative policy analysis and cost-effectiveness. This approach allowed for the integration of quantitative findings (e.g., reduction in BMI z-score) with qualitative findings (e.g., lack of consultation time) to construct a coherent narrative on the state of the art.

Evaluation of methodological quality

Given the heterogeneity of the included study designs, methodological quality was assessed using the Mixed Methods Appraisal Tool (MMAT), version 2018. This tool allows for the concurrent evaluation of qualitative, quantitative, and mixed-methods studies. Particular attention was paid to critical quality indicators identified in the previous literature, such as attrition rates, control for confounding factors (socioeconomic status), and standardization of outcome measures. Studies were not excluded based solely on their quality score to avoid the loss of relevant information about real-world implementation barriers, but methodological limitations (e.g., selection bias or lack of long-term follow-up) were considered during the discussion and interpretation of results.

Ethical considerations

As this was an integrative review of publicly available secondary literature, this study did not require ethics committee approval, nor did it involve the direct participation of human subjects. However, the ethical principles of integrity in research were rigorously upheld, ensuring accuracy in data extraction, objectivity in analysis, and proper recognition of intellectual property through correct citation of all primary sources.

RESULTS

The literature review identified significant heterogeneity in interventions, ranging from brief educational programs in clinics to multicomponent community strategies. The findings are summarized below in four main thematic categories.

Effectiveness of interventions and long-term sustainability

Evidence supports that the early childhood period (0–2 years) is a critical window for establishing healthy behaviors, given that behavioral plasticity is greatest during the first 1,000 days of life (1,2). Longitudinal studies indicate that interventions at this stage can mitigate the risk associated with early “adiposity rebound,” a key predictor of future obesity (3).

However, as children transition to school age (2–12 years), the sustainability of these effects becomes a challenge. Multiple studies indicate that while early interventions achieve modest reductions in BMI in the short term, these benefits tend to fade as the child

grows older if ongoing reinforcement mechanisms are not in place (16,17) For example, the Healthy Beginnings trial and the ToyBox study demonstrated that the integration of ongoing community support is vital to maintaining preventive outcomes during the transition to school age (18,19).

In the 2-12 year age group, school interventions have shown consistent effectiveness, especially multicomponent interventions such as the IDEFICS study, which positively impacted body fat indicators through nutritional education and physical activity (20,21). In contrast, interventions led exclusively by primary care showed variable results. Although innovative digital strategies, such as the MINISTOP app, have facilitated dietary education, their isolated impact on long-term BMI z-scores is modest without a complementary community component (14,22).

The role of the family and parental education

There is a strong consensus on the centrality of the family in prevention. Interventions that actively involve parents as “agents of change” are significantly more effective than those directed solely at the child (23).

Primary health care acts as a natural entry point for these interventions. Structured programs like KAN-DO (Kids and Adults Now! Defeat Obesity) demonstrate that a family-centered approach during developmental transitions facilitates the adoption of sustainable healthy behaviors (24). However, parental engagement is a critical variable. Factors such as low socioeconomic status and a lack of perceived risk regarding the child's weight (parental underestimation) act as significant barriers to adherence to these programs, exacerbating health inequities (25–27).

Barriers and facilitators in primary care clinical practice

From the perspective of healthcare providers, the implementation of prevention guidelines faces substantial systemic and relational obstacles:

- **Systemic barriers:** Time constraints during the consultation are the most frequently cited barrier, preventing in-depth nutritional counseling (8,9). Furthermore, professionals report a lack of standardized protocols and specific training in behavioral change techniques, which reduces their self-efficacy (10,11).
- **Relational barriers:** Parents' misperceptions about their children's weight complicate the start of preventative conversations, leading to frustration among providers (12).
- **Facilitators:** The multidisciplinary approach (including nutritionists and nurses) and the connection with community resources improve the quality of care (28).The use of mHealth tools integrated into clinical care is emerging as a promising facilitator for extending support beyond the doctor's office (29).

Cost-effectiveness and policy priorities

Economic evidence favors large-scale interventions. School-based programs like CATCH (Coordinated Approach to Child Health) have demonstrated high cost-effectiveness, with estimated costs around $900 per quality-adjusted life year (QALY) saved (13). Simple strategies such as promoting water consumption in schools are also highly effective (30).

Conversely, intensive interventions in primary care, such as the STAR study, although clinically effective in subgroups, have higher costs per unit of outcome (14). Evidence from the APPLE project suggests that hybrid models, which combine primary care screening with community-based environmental reinforcement, offer the best balance between clinical impact and economic viability (31). Current policy priorities emphasize addressing the social determinants of health to ensure that these interventions are accessible to vulnerable populations (32).

DISCUSSION

This integrative review synthesized the current evidence on the effectiveness of primary care interventions for preventing childhood obesity, contrasting theoretical efficacy with real-world implementation barriers. The findings reveal a fundamental paradox in contemporary pediatrics: while there is a biological consensus on the critical importance of intervening in the first years of life (“window of opportunity”), the current clinical infrastructure lacks the operational capacity to sustain these efforts long-term in the face of a pervasive obesogenic environment.

Our results confirm that early interventions (0–2 years) are capable of modifying risk trajectories, capitalizing on developmental plasticity during the first 1,000 days (1,2). However, the review exposes a critical phenomenon: the “fade-out effect” observed

when the child transitions to the school stage (16). This loss of effectiveness does not indicate a failure of the intervention per se, but rather a problem of "dose": episodic clinical intervention (brief counseling during health check-ups) is insufficient to compete with daily exposure to obesogenic environments. School-based interventions, on the other hand, achieve greater consistency by modifying the daily environment (21). Isolated clinical interventions fail because they cannot neutralize continuous external influences.

The reviewed literature emphasizes that the success of any intervention in primary care depends on parental engagement (23). However, we identified a significant equity barrier, where families of lower socioeconomic status have lower enrollment rates, not due to a lack of interest, but due to structural barriers (access to food, time, financial stress) that traditional educational interventions fail to mitigate (25). This suggests that continuing to prescribe "education" without addressing social determinants may exacerbate health inequities. The interventions that showed the greatest impact were those that, like KAN-DO, adapted their strategies to the family and psychosocial context, going beyond simply providing nutritional information (24).

The review highlights the dissonance between clinical guideline expectations and the operational reality of primary care through a triad of interconnected barriers that perpetuate therapeutic inertia. First, there is a systemic barrier characterized by a chronic lack of consultation time, which prevents addressing the behavioral complexity of obesity and reduces intervention to a simple anthropometric measurement without effective management (9). In addition, there is a professional barrier stemming from a lack of specific training in behavioral change techniques, such as motivational interviewing, which reduces physicians' self-efficacy and makes them feel "unequipped" to manage resistance to change (11). Finally, a relational barrier emerges due to the parents' underestimation of the child's weight (12), creating an initial resistance that many professionals avoid confronting for fear of offending the family or damaging the doctor-patient relationship. Thus, they lose valuable opportunities for secondary prevention.

Cost-effectiveness analysis presents a clear dilemma between the efficiency of school-based interventions, which reach an approximate cost of $900/QALY in programs like CATCH due to their massive scale, and intensive clinical interventions, which are costly and difficult to scale up (14). The solution that emerges from the evidence is not a dichotomous choice but rather the integration of both into a hybrid model. In this framework, the primary care team does not attempt to replicate the mass education provided by schools but instead assumes a dual role as "detector and connector." As a detector, it performs rigorous anthropometric screening and metabolic risk stratification, an irreplaceable clinical function; as a connector, it actively refers families to existing community and school resources for daily behavioral management (28). In this context, mHealth technologies (such as the MINISTOP app) appear as the missing piece to maintain this low-cost connection (22).

Among the strengths of this review, its integrative design stands out (15). This approach allowed for the triangulation of clinical efficacy data with qualitative evidence on perceived barriers and economic data, offering a more holistic and pragmatic perspective than traditional reviews focused exclusively on randomized controlled trials (RCTs). However, the study has inherent limitations due to the methodological heterogeneity of the primary studies, which prevented a quantitative meta-analysis. Furthermore, there is a notable scarcity of studies with follow-up exceeding 24 months, limiting our ability to confirm whether early clinical benefits persist into adolescence without ongoing reinforcement interventions.

In conclusion, preventing childhood obesity at the primary care level is a necessary but insufficient strategy if implemented in isolation. Current evidence supports an urgent paradigm shift away from the "lone counseling" approach in the doctor's office toward an integrated care system. In this model, primary care should lead the early detection and management of complex cases, but it must systematically rely on school and community infrastructure to ensure the daily "dose" of health care that children need. For this to be viable, health policies must redirect resources toward training providers in behavioral management and investing in the social determinants that ultimately determine the success of any family intervention.

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Conflicts of interest

The authors declare no commercial conflicts of interest.

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