

A review of implementation and evaluation of Pan American Health Organization's policies to prevent childhood obesity in Latin America

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Abstract

Rationale: To inform future policies, the study objectives were to determine to what extent the policies included in the 5-year Plan of Action for the Prevention of Obesity in Children and Adolescents—proposed by Pan American Health Organization (PAHO) and signed by 19 Latin America countries in 2014—have been implemented and evaluated.

Methods: A scoping review of the Governmental websites for Latin American countries and a literature review was conducted to identify whether policies have been implemented and evaluated. Key information was abstracted.

Results: The review identified 115 PAHO policies/interventions implemented (43% implemented after signing the proposed plan in 2014). Nearly all (18/19) countries implemented food guidelines or school feeding programs, but fiscal and marketing policies were less commonly implemented (6/19). Through the review, 44 evaluations of PAHO policies were identified of which 23% were qualitative and 77% quantitative. The results of these evaluations were in general positive (e.g., decrease in sugar-sweetened beverages consumption following tax implementation) but no studies evaluated the outcome of reduced obesity.

Conclusions: PAHO recommended policies have been implemented to various degrees in Latin America since 2014 and more research is required to understand their impacts on child and adolescent obesity.

KEYWORDS

childhood obesity, Latin America, PAHO

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1 | INTRODUCTION

Worldwide estimates suggest that 158 million children of 5–19 years of age were living with obesity in 2020 and it is expected that this will almost double to 254 million.¹ Over the last decades, the Latin America region (representing almost 9% of the global population) has seen a large increase in the number of children living with obesity due to higher levels of urbanization, limited access to space for physical activities,^{2–4} and increased access (higher availability and lower prices) to ultra-processed food with lower nutrients but excessive calories.^{3,5} As a result, the percentage of overweight or obese children and adolescents in Latin America increased from 25% in 2007⁶ to 38% in 2016.⁷ To address this growing epidemic, several countries in the region had implemented policies over the last decades to prevent obesity among children and adolescents⁸ (e.g., Baby Friendly hospitals in the 1990s⁹).

In parallel, the Pan American Health Organization (PAHO) developed a 5-Year Plan of Action for the Prevention of Obesity in Children and Adolescents to unify efforts in Latin America and launch a regional public health initiative. PAHO's Plan of Action, which was signed in October 2014 by all 19 countries of Latin America,¹⁰ was centered around five main areas called lines of actions (e.g., primary healthcare and breastfeeding promotion, school nutrition, fiscal and marketing, multisectoral, and surveillance) resulting in 11 objectives (Table S1 presents the detailed lines of action and objectives of the PAHO Plan of Action). However, the extent to which these 2014 PAHO recommendations have been implemented in Latin America or were evaluated has not been studied yet as a whole. While the 2019 Global Atlas on Childhood Obesity¹ gathered information of 196 countries about the prevalence, risk factors, and the existence of governmental policies to tackle childhood obesity, the Atlas did not contain detailed information about the type of policies that were implemented or whether these policies were evaluated. While the World Cancer Research Fund International (WCRF) created in 2020 a database to track worldwide policies related to diet, weight, and physical activity as per the NOURISHING and MOVING frameworks,¹¹ the WCRF data do not include other policies included in PAHO recommendations (e.g., surveillance, and multifactorial social programs). Other authors have reviewed interventions to prevent childhood obesity around the world¹¹ in Latin America (i.e., Mexico, Chile, Colombia, and Brazil)¹² or the impact of taxes for sugar-sweetened beverages (SSB)¹³ but the studies included in these reviews preceded the implementation of PAHO recommendations in 2014^{11,12} or their scope was too narrow (focus in only one policy).¹³ In addition, a 2014 workshop¹⁴ on the prevention of childhood overweight and obesity in Latin America highlighted the need to develop a cohesive research agenda,¹² to build research capacity¹⁵ and to carefully evaluate² interventions to prevent childhood obesity in the region. As such, the impact of the extent in Latin American countries of policies/interventions identified in the PAHO strategic plan has not been formally evaluated. To inform future policies, the objectives of this study were to determine to which extent the PAHO recommendations have been implemented and evaluated in Latin America.

2 | METHODS

2.1 | Overview

To answer the study objectives, a scoping review was conducted to identify PAHO policies implemented in Latin America at the country level that were publicly funded. Scoping review designs are particularly appropriate to answer a broad question and when the type of documents and material used to determine the existence of policies and interventions are generally not published in indexed journals.¹⁶ The results of this scoping review were reported following the Preferred Report Item for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines.¹⁷

2.2 | Selection of PAHO interventions

Table 1 presents the detailed objectives associated with each of the PAHO five lines of actions and the policy interventions to be considered in this evaluation. Compared to the overall 11 objectives given in the PAHO strategic plan (Table S1), the two policies related to “engaging other government institutions” and “improving access to urban recreational spaces” were excluded from the assessment due to the difficulty in identifying and measuring those two policies in public documents. Overall, 10 policies recommended by PAHO were included in the evaluation (Table 1).

2.3 | Scoping review

A search strategy was developed to identify for each of the 19 Latin America countries any policies/interventions proposed by PAHO to combat obesity in children and adolescent and implemented at the country level. The search was conducted in Spanish, Portuguese and English and did not include timeframe limit. Two searches were conducted. First, governmental websites of each of the 19 countries (e.g., Ministry of Health) were searched to identify any reference to the implementation of each policy and intervention recommended by PAHO, through governmental press releases or other official documents. The websites of WHO, PAHO and the World Cancer Research Fund International (WCRFI) were also searched. Policies implemented at the local levels or privately funded were excluded. Following the results of this first search, a second systematic search was performed in PubMed, LILACS and EconLit to identify any publications reporting on the evaluation of PAHO policies identified during the first exploration of government websites. In addition to relevant subject headings (e.g., pediatric* OR childhood obesity), broad terms such as “(impact evaluation OR process evaluation OR evaluation*) AND ([country]) AND ([specific policy/intervention])” were used. For example, the combination “(impact evaluation OR process evaluation OR evaluation*) AND (Mexico OR Mexican) AND (Sugar-sweetened beverage tax OR SSB tax)” was used to identify papers evaluating policies related to the quantitative and qualitative

TABLE 1 Summary of PAHO's lines of actions and proposed policies/interventions

PAHO's lines of actions	Objectives	Policy/interventions considered
1. Primary health care and promotion of breastfeeding and healthy eating	1. Promotion of healthy eating based on national food-based dietary guidelines [...]	National food-based guidelines
	2. To reinforce efforts to implement the global strategy for infant and young child feeding [...]	Baby friendly hospital initiative
2. Improvement of school nutrition and physical activity environments	1. National school feeding programs as well as the sale of foods and beverages in schools [...]	National school feeding programs Food sales regulation at schools
	2. Promote and strengthen school and early learning policies and programs that increase physical activity	Programs for physical activity at school ^a
3. Fiscal policies and regulation of food marketing and labelling	1. Reduce children and adolescents' consumption of sugar-sweetened beverages [...]	Taxes for sugar-sweetened beverages
	2. Regulations to protect children and adolescents from the impact of marketing [...]	Marketing regulation of unhealthy food and beverages
	3. Implement norms for front-of-package labeling [...]	Food labeling for packaged food and beverages
4. Other multisectoral actions	1. Increase the availability of and accessibility to nutritious foods	National programs of food subsidies and money transferences
5. Surveillance, research, and evaluation	1. To strengthen country information systems [...]	Development and implementation of national surveys/census of nutritional and anthropometric status

^aExtracurricular mandatory physical education.

evaluation of the implementation of SSB taxes in Mexico. The search was also conducted with Google Scholar search engine to identify additional literature. Documents found through Google Scholar were cross-referenced with the published literature to minimize the risk of missing any relevant studies. References of all retrieved documents or publications were also reviewed. The searches were conducted from February to April 2020.

2.4 | Data abstraction process and analysis

For each of the 19 Latin American countries, a standardized data abstraction form was used to capture the following information for each policy recommended by PAHO: implementation status (yes or no), year of implementation and whether it was before or after 2014 PAHO recommendations, as well as the characteristics of the implemented policies/interventions. For example, for a policy related to the implementation of national food-based dietary guidelines, the data retrieved included the key characteristics of these guidelines (e.g., recommendations regarding daily amount of calories, water consumption or physical activity), how the information was summarized (e.g., image of a plate of food) and whether the recommendations were customized by subgroups (e.g., age). The second objective was to document whether an intervention had been evaluated in Latin America and abstracted key information on these evaluations (impact or process evaluation, objectives, study design, intervention and comparator groups, outcomes, results, and authors' conclusion). Due to differences in methods and outcomes, meta-analyses

techniques were not conducted. The data extraction process was conducted by one author (MM) and reviewed by another (JET).

3 | RESULTS

3.1 | Scoping review results

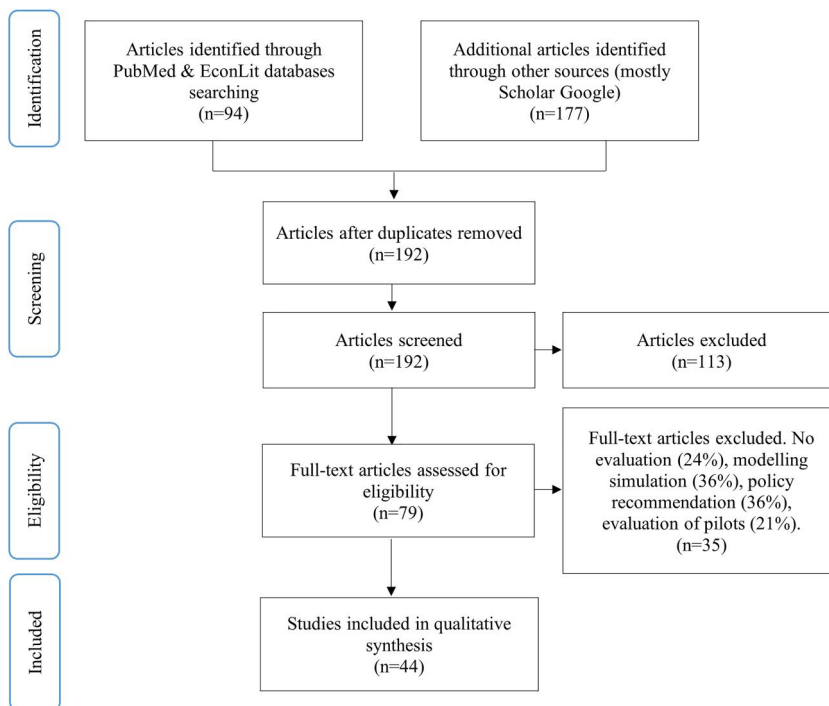
Through the search of government websites, the review identified 115 PAHO policies/interventions implemented in the Latin America region. The search of the published literature identified 44 publications, which evaluated at least one of the 115 PAHO interventions implemented in Latin America. Figure 1 presents the selection process.

3.2 | Implementation of PAHO policies in Latin America

3.2.1 | Overall results

Out of a maximum of 10 policies/interventions that could have been implemented, the number of PAHO interventions introduced in each country ranged from 2 (Nicaragua and Cuba) to 10 (Ecuador and Mexico). As shown in Table 2, 18 out of 19 countries of Latin America implemented national food-based dietary guidelines and national school feeding programs. The majority of the countries also implemented policies to increase the availability and accessibility to

FIGURE 1 Study identification, screening, and eligibility, guided by PRISMA-ScR



nutritious food (14 countries), to create country information systems to better monitor obesity trends (14 countries), to regulate sales of foods and beverages in schools (13 countries) or to run extracurricular physical activities (10 countries). Less commonly implemented were fiscal and marketing policies related to taxes (six countries), marketing regulation (six countries) and food labeling (six countries). While interventions related to primary healthcare and breastfeeding promotion (line of action 1) were mostly introduced before the 2014 PAHO recommendations (e.g., 61% of national food based dietary guidelines), other lines of actions (e.g., policies related to the sale of foods and beverages) were mostly rolled out in recent years. Table 2 presents the detailed results for each of the 10 policy recommendations.

3.2.2 | Results by line of action

Line of Action 1. Primary health care and promotion of breastfeeding and healthy eating (i.e., food guidelines and baby-friendly hospital)

Except Nicaragua, all Latin American countries have implemented national food-based dietary guidelines and almost two thirds (62%) of countries implemented the food guidelines before the 2014 PAHO recommendations. Most of food guidelines recommended the use of physical activity (83%), drinking water daily (72%) and avoiding SSB consumption (67%). Almost all national dietary guidelines (except Mexico) included key messages to support the recommendations. Baby friendly hospitals designed to promote breastfeeding (i.e., second policy of PAHO Line of Action 1) were implemented in 10 countries in the 1990s. Detailed information by country can be found in Tables S2–S20.

Line of Action 2. School nutrition and physical activity environments (i.e., school feeding programs, sales regulation at school and physical activity programs)

Eighteen (94%) of the 19 Latin American countries have implemented school feeding programs, which stipulated that school should provide at least one complete meal a day (83%) or a complementary snack (17%). Two thirds of the countries offered school feeding programs to all school-aged children (66%) while the remaining school feeding programs (33%) were restricted to vulnerable children only. Almost a two-third of the school feeding programs (61%) were implemented before the 2014 PAHO Strategic Plan. Regulation of unhealthy foods and beverages sales in schools (i.e., the second policy of PAHO Line of Action 2) was implemented in 68% of the 19 Latin American countries and 83% of these policies were implemented after 2014. Healthy food that should be available in school (23%), warning labels for unhealthy foods (23%), banned advertising and marketing of unhealthy products in schools (23%) or the requirement for schools to provide free drinking water (15%) were the most common types of policies implemented in Latin America to regulate the sale of foods and beverages in schools. Finally, 10 Latin American countries (52%) have implemented national programs of physical activity at school. Only two countries (20%) provided information on the characteristics of these programs (i.e., lectures not longer than 40 min with a ten-minute break for physical movements; 15 min of physical activity at start and end of the school day).

Line of Action 3. Fiscal policies, regulation of food marketing and labelling

Compared to the previous PAHO Line of Actions 1 and 2, policies related to Line of Action 3 were less commonly implemented in Latin

TABLE 2 Results for policy/intervention implemented by country and line of action

Country	Primary health care and breastfeeding promotion		School nutrition and physical activity		Fiscal and marketing policies				Surveillance and data availability		% Policies/interventions applied after 2014 ^a	
	Food guideline	Baby-friendly hospital	School feeding	Sales regulation at school	Physical activity	Taxes	Marketing regulation	Food labeling	Food availability and accessibility	Information systems		Total policies/interventions implemented
Argentina	2019	1991	2010	2010	2019	-	-	-	2003	2004	7	29%
Belize	2012	-	2017	-	-	-	-	-	2012	-	3	33%
Bolivia	2014	1991	2015	-	-	-	2016	2016	2006	2018	7	71%
Brazil	2015	-	2009	2015	1998	-	2014	-	2003	2013	7	43%
Chile	2013	1991	1964	2015	2010	2014	2016	2016	-	2003	9	44%
Colombia	2015	--	2013	2019	-	-	-	-	-	2005	4	50%
Costa Rica	2011	-	2017	2012	-	-	-	-	-	1996	4	25%
Cuba	2009	1990	-	-	2013	-	-	-	-	-	3	0%
Ecuador	2017	1991	1989	2014	2014	2016	2013	2013	2003	2011	10	40%
El Salvador	2009	--	2009	2017	-	2010	-	-	2009	-	5	20%
Guatemala	2012	1991	2010	2017	2014	-	-	-	2016	1987	7	43%
Honduras	2013	-	2017	2016	-	-	-	-	-	2019	4	75%
Mexico	2010	1993	2001	2014 ^b	2002	2014	2014	2020	2014	2000	10	50%
Nicaragua	-	1991	2007	-	-	-	-	-	2007	-	3	0%
Panama	2013	-	2019	2017	2008	2019	-	-	2006	2019	7	57%
Paraguay	2013	1991	2014	-	2015	-	-	-	2005	2011	6	33%
Peru	2019	-	2012	2019	2018	2018	2013	2019	2005	2006	9	56%
Uruguay	2016	1991	1997	2014	-	-	-	2018	2006	2013	7	43%
Venezuela	1991	-	1969	-	-	-	-	-	2003	-	3	0%
Total countries implemented	18	10	18	13	10	6	6	6	14	14	115	48%
% countries implemented after 2014 ^a	39	0	33	85	50	83	67	83	14	21		

^a2014 as reference for the initial PAHO's recommendations.

^bThis was preceded by *Programa de acción en el contexto escolar* in 2010 which was implemented only in public elementary schools.

America and more recent. For example, less than one-third (32%) of Latin American countries have established fiscal policies to reduce children and adolescents' consumption of SSBs, and five countries implemented these policies after 2014. When these policies were implemented, two-third of the countries used ad valorem taxes (e.g., 10% of retail price) or specified cut-offs for beverages to be taxed. The remaining countries used either a fixed amount of tax per quantity (e.g., 0.25USD per liter) or a general tax on all beverages with sugar added regardless of the amount of sugar. Similarly, only six Latin American countries (32%) implemented PAHO policy to protect children and adolescents from the impact of marketing of SSB, high-dense energy food and fast food, the second policy of Line of Action 3. Specifically, three countries banned the marketing of these products in television, movies and sports events while three countries regulated advertising content and exposure hours (e.g., junk food and SSB advertisement is banned between 14:30 and 19:30 h on public television in Mexico). Finally, eight countries (42% of all countries) implemented norms for front-of-package labelling, the third policy of PAHO Line of Action 3. Hexagons (50%) and traffic lights (25%) were commonly included on the packaging of food products to indicate "excess" of calories, sugar, sodium, saturated fat, and trans fats. In addition, four countries (50%) banned characters and cartoons from food packaging.

Line of Action 4. Other multisectoral actions

Fourteen countries (74% of all countries) have implemented interventions to increase the availability and access to nutritious food, and 12 of those countries (86%) implemented these policies before the 2014 PAHO Strategic Plan. Most of the countries (86%) targeted vulnerable populations living below the poverty line and a similar number of countries used subsidies or money transfers to promote healthy food consumption. Five countries (36%) conditioned the monetary transfer to educational and health responsibilities, and three (21%) also provided financial aid for agriculture production (either to sell farmer products or self-consumption). Finally, four countries (29%) provided food supplements to families.

Line of Action 5. Surveillance, research, and evaluation

The last line of action is related to the development and implementation of information systems to allow for the analysis of trends and determinants of obesity to better inform policy decision-makers. Most of the countries (74%) have implemented specific health surveillance systems for research and evaluation and in general, these systems were existing before 2014 (79%). Six countries (43%) performed one-time surveys, one country (7%) has an ongoing cohort of children (started in 2013), and two (14%) are specific for mother-child health.

3.3 | Evaluation of PAHO policies implemented in Latin America

The review identified 44 peer-reviewed publications which evaluated PAHO interventions implemented in Latin America. Ten

studies were qualitative studies (23%), while 34 (77%) were quantitative studies. School nutrition programs and fiscal and marketing policies were the most frequently evaluated policies. Table 3 presents the details.

3.3.1 | Qualitative studies

In general, the qualitative studies evaluated barriers and facilitators to the uptake of food-based dietary guidelines, best practices to implement school nutrition and physical activity programs or population awareness of fiscal policies. Most studies relied on focus groups while a few studies were qualitative evaluations of best practices.¹⁸⁻²⁵ Results of these studies supported the implementation of these programs; although, a few barriers to the implementation of these policies were identified (e.g., healthy food was not always palatable or was perceived as difficult to cook, governmental policies were often perceived as insufficient to combat obesity issues, and there was a lack of knowledge and understanding of anti-obesity policies). Table S21 presents the details of 10 qualitative studies evaluating PAHO policies implemented in seven countries.

3.3.2 | Quantitative studies

Thirty-one PAHO related policies implemented in seven countries were evaluated using quantitative methods. Most of these studies were published over the last five years. The present section provides an overview of these studies by line of action. No quantitative studies evaluating the impact of national food-based guidelines or baby friendly hospital initiatives (Line of Action 1) or the development of obesity-related national surveys/census (Line of Action 5) were found.

Line of Action 2

Eight publications reported the evaluation of national school feeding programs from six countries. A variety of methods (e.g. difference-in-differences, Interrupted Time Series, repeated cross-sectional' studies Ordinary Least Square) using two to 10 years of data were used to measure the impact of these programs in terms of academic performance or school attendance,²⁶⁻²⁹ children's nutrition^{30,31} or adherence of children to the school feeding program.^{32,33} Results indicated that these programs had little impact on academic performance or children nutrition. Table S22 presents the details of these eight evaluations of national school feeding. In addition, two studies evaluating the impact of regulating sales of foods and beverage in schools in Chile and Mexico found that less unhealthy food was sold at schools (from 90.4% to 15% of total sales in Chile) after the implementation of such programs.³⁴ The results also indicated that the consumption of homemade food was increased (from 31.9% to 48% children brought food from home) although homemade food was found to lack macronutrients in general³⁵ (Table S23).

TABLE 3 Results for policy/intervention evaluated by country and line of action

		Qualitative studies	Quantitative studies	Number of studies	Total countries evaluated	As % of countries that implemented
Primary health care and breastfeeding promotion	Food guideline	Brazil (2017), Uruguay (2017)	None	2	2	11%
	Baby-friendly hospital	None	None	0	0	0%
School nutrition	School feeding	Bolivia (2017)	Argentina (2013), Brazil (2018, 2019), Chile (2013), Colombia (2009, 2015), Ecuador (2004) and Mexico (2017)	9	7	39%
	Sales regulation at school	Mexico (2019)	Chile (2019) and Mexico (2017)	3	2	15%
	Physical activity at schools	Mexico (2018)	None	1	1	10%
Fiscal and marketing policies	Taxes	Mexico (2018)	Chile (2018a, 2018b, 2020) and Mexico (2015, 2016a, 2016b, 2016c ^a , 2017a, 2017b, 2017c, 2017d, 2017e ^a , 2018a, 2018b, 2019 ^a , 2019b ^a)	17	2	33%
	Marketing regulation	None	Peru (2018), Chile (2020a, 2020b)	3	2	33%
	Food labeling	Ecuador (2017a, 2017b) and Chile (2019)	Chile (2020) and Ecuador (2019)	5	2	33%
Multisectoral	Food availability and accessibility	Argentina (2016)	Brazil (2011) and Ecuador (2019)	3	3	21%

^aNon-basic energy-dense food tax.

Line of Action 3

The impact of implementing taxes for SSB in Mexico³⁶⁻⁴⁵ or Chile⁴⁶⁻⁴⁸ were evaluated in 13 studies using before and after approaches (62%) or Interrupted Time Series (38%) applied to 1–3 years of monthly, quarterly, or annual data. Most studies explored changes in household purchases (38%) or changes in prices of sugared beverages (38%). All studies indicated that the consumption and purchases of SSB decreased in a range from 8% in Mexico³⁹ to between 2%⁴⁸ and 22% in Chile⁴⁶ after SSB prices increases. In addition, several studies reported that the implementation of a sugar tax had no impact on employment, industries' sales, or inflation rates. Three quasi-experimental studies performed in Mexico evaluated changes in taxed food purchases, after 8% tax implementation.⁴⁹⁻⁵¹ Similar to the SSB documents, all studies revealed a reduction in taxed food purchase; between 5.1% and 5.3% in the first year, and 7.4% for the second. Table S24 provides the details. The impact of marketing regulations on the content of sugar sweetened products in Peru and Chile were evaluated in three studies.^{24,52,53} Results indicated that junk food advertisement decreased (35% of preschoolers and 52% adolescents reported watching none or a lower amount of advertisement for junk food in Chile after regulation⁵³) while the promotion of healthy diets and physical activity increased following the implementation of marketing regulations (Table S25). The impact of food labeling showed mixed results with one study

showed a decrease in the sales of SSB in Chile⁵⁴ while no changes were observed in Ecuador⁵⁵ (Table S26).

Line of Action 4

Two studies evaluating the impact of increased access to nutritious food reported the consumption of healthy food increased in Brazil following a program to subsidized food products such as cereals, beans, and meat. Findings suggested that population increased food consumption (from all groups), but also increased the consumption of SSBs.⁵⁶ A similar program was found to reduce malnutrition and health related problems in Ecuador. Results showed that for each 1% of program coverage, the malnutrition rate was reduced by 3%.⁵⁷

4 | DISCUSSION

This study documents for the first time to which extent 10 national policies recommended by PAHO to reduce obesity in children and adolescents were implemented in the 19 countries of Latin America. While 19 countries signed in 2014 on the Plan of Action for the Prevention of Obesity in Children and Adolescents proposed by PAHO, only Mexico and Ecuador have implemented all policies/

interventions included in this plan. Some of these interventions (e.g., National Food-Based Dietary Guidelines or School Feeding Programs) were already implemented in many countries before 2014 while others (e.g., fiscal policies) were mostly implemented after the signing of the PAHO document. Compared to policies related to the implementation of national food-based dietary guidelines or school feeding programs which were implemented in almost all countries, fiscal and marketing policies were only implemented in six of the 19 signing Latin American countries. Even though PAHO did not provide specific guidelines, the analyses showed that most of the policies shared similar characteristics. For example, almost all dietary guidelines included symbols to summarize recommendations and there were only two types of food labels and two types of taxes. In addition to describe the PAHO policies implemented in Latin America, this study contributes to the development of an inventory of interventions for the prevention of obesity in children and adolescents. As such, this work complements the inventory of interventions related to diet and physician activity included in the WCRF database by identifying other types of children and adolescent obesity prevention policies such as surveys to monitor population health, and multisectoral interventions.

Another important contribution of the study is the review of 44 evaluations of policies recommended by PAHO. More than three-quarter of the studies were quantitative studies using pre-post study design. Most the studies were performed for Mexican policies/interventions, especially for fiscal strategies (39%), more than half were quantitative (77%) and used a few years of either monthly, quarterly, and annual data to evaluate the impact of the policies using a pre-post design. Evaluations of the effect of taxes on SSBs showed a reduction on SSB purchases as well as a reduction in non-basic high dense energy food. A reduction on advertisement exposure and junk food consumption was also found following the implementation of advertising regulations and food labeling. On the other hand, the results of evaluations of national school feeding programs showed mixed results. Results of qualitative studies showed overall support for programs aimed at decreasing obesity among children and adolescents although several barriers to the implementation of such programs were identified (e.g., preference for unhealthy food, lack of knowledge of policy being implemented).

It is difficult to compare the results of this study to the existing literature about implementation or evaluation of interventions/policies against childhood obesity due to the focus on Latin America. However, results are consistent with two recent studies. Following a review of 24 controlled studies, Flodmark et al. reported that obesity could be prevented through programs that combine promotion of healthy eating and physical activities. While results of evaluations of PAHO policies or interventions implemented in Latin America support these results, none of the identified studies used comparative data or focused on changes of prevalence of overweight or obesity.¹¹ Teng et al. performed a systematic review and meta-analysis of 15 studies evaluating the impact of taxes for SSBs on purchases and calorie intake. The results indicated that implementing a tax of 10% decreased

beverage purchases and calorie intake by 10%.¹³ Due to the larger scope of this study compared to Teng et al. this search identified four additional studies (one for Chile and three for Mexico) which evaluated the impact of taxation on employment and industries' sales.^{41,44,47} Yet, since most of the studies included in Teng et al. were also identified in the current review, the results of Teng are consistent with this study. While these results support the implementation of PAHO policies in Latin America, results suggest the need for additional longitudinal comparative studies using longer follow-up, and anthropometric measures to better understand the value of national policies aimed to decrease obesity in children and adolescents. This argument was also discussed by Parra et al.¹⁵ who noted that while research on childhood obesity in Latin America is improving (especially after 2014), research has not been comprehensive and was concentrated in a few countries only. Even so, a complete analysis of a particular policy may be complicated due to the fact that other policies and interventions may have been implemented in parallel³⁷ and it may be therefore important to evaluate national strategies as well as their individual components. This fact, however, implies that public and open surveillance systems are in place.¹² Facilitators (e.g., consideration of socio-cultural features and increasing awareness) and barriers (e.g., preferences for palatable unhealthy food, and superficial knowledge of programs) identified in this review could help designing national policies.

When interpreting the results of this review, some limitations should be noted. First, information about the implementation of PAHO policies in Latin America was gathered from governmental websites or official press releases. This was done under the assumption that any PAHO interventions implemented in a country will be traceable through Government electronic documents, which may not be always true. However, to minimize the risk of missing PAHO policies implemented in Latin America, a cross reference of country searches with PAHO, WHO and the WCRFI websites was performed. In some cases, the documents retrieved did not provide detailed information on the intervention specifics (e.g., type of food banned for sales regulation). Although a more systematic approach was taken when evaluating the peer-reviewed literature, there is always a risk to miss one or several studies even if all the publications references retrieved by the search were checked. It was only documented whether a policy was implemented, not if it remained into effect. Another limitation of this study is related to scope as only policies and interventions implemented nationally and publicly funded as PAHO recommendations were meant to be implemented by governments at the country level were reviewed. As such, the review did not include any evaluations of local or regional initiatives or privately funded. Finally, when reviewing policies/intervention evaluations in Latin America, no quality assessment of the studies was performed. Rather, a general description of these studies was provided. Although the study documented whether a policy was implemented before or after 2014 PAHO Strategic Plan, it is not

possible to determine to which extent the 2014 PAHO Strategic Plan had a direct impact in policy development and implementation after 2014. The reason is that a policy may take a few years to develop and implement. Clearly, if a policy was implemented before 2014 then the 2014 PAHO strategic Plan has nothing to do with it. However, if the policy was implemented after 2014, it is impossible to know if this was the direct result of the PAHO Strategic Plan or not. It may be the case that the 2014 PAHO Strategic Plan has helped accelerating the process from the agenda to implementation.

Despite these limitations, this study represents the first attempt to provide an inventory and to categorise policy interventions implemented in Latin America for the prevention of obesity in children and adolescents. Future research should validate and complement this inventory by using other methods and sources of data such as surveying academic institutions. Overall, this scoping review suggests that many of the policies recommended by PAHO 2014 strategy have been put into effect in Latin America, but much still needs to be done. This includes ensuring that funding is available for the continuation of these policies when implemented. For example, many school feeding programs implemented in Latin America had to cease or scale down their activities once the monetary aid from international organizations ended.⁵⁸ A similar situation happened with the Baby-Friendly Hospital Initiative which was cancelled in some countries due to the costs associated with renewing the hospital certifications.⁹ It is also well known that the food industry has lobbied against the implementation of fiscal, regulatory, and marketing policies related to unhealthy food and beverages^{2,59,60} and therefore ensuring political buying from governments is key for the successful implementation of such policies. All these arguments open the door to further analysis. Deep policy analysis could be performed to understand political forces and pathways that have determined whether a policy is implemented or not. For example, previous studies in the region concluded that, when analysing some policy case studies, evidence-based advocacy created strong opposition against industry while supporting policy development.² Besides, exploring the duration of policies and interventions is relevant to analyze determinants of success, beyond the main implementation. In addition, there is a need for reliable datasets and well-designed observational studies to accurately evaluate interventions in the Latin American region.^{8,12}

Research is a key element in the combat against childhood obesity in Latin America and elsewhere, specifically to inform further development and implementation of policies and interventions with more robust and long-term surveillance.^{2,8,12,15} This work found that PAHO recommended policies have been implemented to various degrees in Latin America and more research is required to understand the impact of these policies on child and adolescent obesity.

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CONFLICT OF INTEREST

Authors have no conflicts of interest to declare.

AUTHOR CONTRIBUTIONS

All authors have contributed to the conception and design of the analysis; data; drafting and reviewing of the manuscript; table construction; and approval of the final version.

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