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## **Implementation of childhood obesity prevention and control policies in the United States and Latin America: Lessons for cross-border research and practice**

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**Authors**

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## SUPPLEMENT ARTICLE

# Implementation of childhood obesity prevention and control policies in the United States and Latin America: Lessons for cross-border research and practice

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## Summary

Progress has been made in the development and widespread implementation of effective interventions to address childhood obesity, yet important challenges remain. To understand how the United States and Latin American countries achieved success in implementing obesity policies and programs (PAPs) and identify improvement opportunities using implementation science principles. We identified three comparative case studies: (1) front-of-food package labeling (Mexico and Chile); (2) Open Streets/play streets (Colombia and the United States); and (3) the Baby-Friendly Hospital Initiative (Brazil and the United States). Information from multiple sources (e.g., scientific and gray literature and key informant interviews) was synthesized to describe barriers, facilitators, and progress of PAPs across RE-AIM framework dimensions. Evidence-based advocacy along with political will and evidence of scalability and impact were key for successful launch and implementation of all PAPs. Diverse adaptations of PAP design and implementation had to be done across contexts. Stronger process and impact monitoring and evaluation systems that track equity indicators are needed to maximize the population benefits of these PAPs. Implementation science offers an important contribution toward addressing knowledge gaps, enhancing obesity policy dialogue, and producing transferable lessons across the Americas and, therefore, should be used for research and evaluation during PAP development and throughout the implementation and maintenance phases.

## KEYWORDS

childhood obesity, implementation science, Latin America, Latino populations

## 1 | INTRODUCTION

Childhood obesity has become a global pandemic that is concentrating more and more among the poor.<sup>1</sup> Currently, over 38 million children under the age of 5, over 340 million children and adolescents

aged 5–19, and more than 1.9 billion adults are estimated to be overweight or obese.<sup>2</sup> Great progress has been made in the development and large-scale implementation of highly effective interventions to address childhood obesity in Latin America and among Latino populations in the United States. However, the benefits of proven

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interventions have not been fully realized because of enduring barriers to adoption and adaptation that have restricted scale-up and sustainability. The field of implementation science holds promise for addressing these barriers.

The National Institutes of Health (NIH) defines implementation science as the study of methods to promote integration of research findings and evidence into healthcare policy and practice.<sup>3</sup> Implementation science makes use of diverse study designs including observational studies, efficacy trials, and large-scale implementation and effectiveness trials of complex health interventions while emphasizing the use of epidemiologic methods, economic evaluation, and qualitative methods to understand “how” and “why” implementation efforts succeed or fail. Implementation science, which focuses on identifying barriers and solutions to effective and sustainable implementation of proven interventions in real-world settings, is critical to the goal of reducing childhood obesity. Moreover, implementation science plays an important role in speeding the integration of research evidence into obesity policies and programs (PAPs) and bringing these PAPs to scale, which is crucial for meeting the growing challenge of childhood obesity.

This paper aims to understand how the United States and Latin American countries (LACs) achieved success in implementing evidence-based obesity PAPs and identify improvement opportunities as well as barriers and facilitators of effective implementation using the RE-AIM framework and a case study approach. This work is motivated by the high prevalence of childhood obesity in LACs and among Latino populations in the United States and the opportunity for learning across borders regarding obesity solutions and successful implementation of these solutions, taking account of the need for equitable delivery and impact. It builds upon previous obesity prevention implementation science conducted by several coauthors as part of the Childhood Obesity Prevention Across Borders initiative led by the NIH Fogarty International Center.<sup>4</sup>

## 2 | METHODS

We systematically compared three case studies of childhood obesity prevention and control PAPs: (1) front-of-food pack warning labeling in Mexico and Chile; (2) Open Streets/play streets in Colombia and the United States; and (3) Baby-Friendly Hospital Initiative (BFHI) in Brazil and the United States. These PAPs were selected based on evidence of their effectiveness<sup>4,5</sup> and consensus among authors that they offered valuable learnings that could help accelerate progress in implementing and scaling evidence-based interventions to address childhood obesity in both the United States and LACs. Furthermore, the BFHI was selected for inclusion because a decision was made a priori that at least one of the case studies should focus on the first 1000 days of life to acknowledge the substantial importance of preventing obesity risk from the beginning of life. Another criterion was the availability of information needed to develop illustrative case studies, including access to policy documents and/or key informants.

The case studies were designed to present information regarding the goal and intended outcome, barriers, facilitators, systems and processes involved, key stakeholders, equity considerations, and the dynamic process of PAP implementation. Given that the type of information available differed across PAPs and settings, we used a variety of approaches for accessing, documenting, and synthesizing the information. They included (1) a literature review to identify reports and peer-reviewed articles describing implementation aspects of the policy/program; (2) key informant interviews as needed to confirm and/or gather new information; and (3) qualitative thematic analyses.

The case examples presented in this paper were analyzed using the RE-AIM framework (Tables S1–S4), a commonly utilized framework in implementation science. Specifically, RE-AIM conceptualizes the public health impact of an intervention as a product of the interaction between five factors: reach, effectiveness, adoption, implementation, and maintenance.<sup>6</sup> This framework suggests that the public health impact of an evidence-based intervention will be achieved if an effective intervention reaches a broad and representative segment of the population by being adopted by key stakeholders, implemented with fidelity, and maintained over time. Initially used primarily as an evaluation tool for health behavior research, RE-AIM has expanded to cover diverse public health domains and multiple research and evaluation stages, including planning and study design, as well as retrospective assessment and evaluation of PAPs.<sup>7,8</sup> As a result, all case studies mapped the findings onto one or more dimensions of the RE-AIM framework depending on the stage of implementation of each PAP. The author leads for each case study (see acknowledgments section) conducted the initial comparative analysis for their respective case study. All authors participated in reaching final consensus on the key lessons learned from these analyses.

## 3 | CASE STUDY #1: FRONT-OF-PACK WARNING LABELING

A key goal of front-of-pack warning labeling (FOPL) is to improve the transparency and easiness of understanding by consumers of the nutritional value of a food product. FOPL is considered key to helping consumers readily identify calorie-rich ultra-processed foods and beverages with added sugars and almost no nutritional value in addition to foods high in saturated and trans fats and sodium. Hence, FOPL is expected to empower consumers to reduce their consumption of these obesogenic foods and beverages and to help prevent diet-related noncommunicable diseases (NCDs). This case study compares the adoption and implementation of front-of-pack warning labels on food and beverage products in Chile and Mexico.

### 3.1 | Front-of-pack warning labeling in Chile

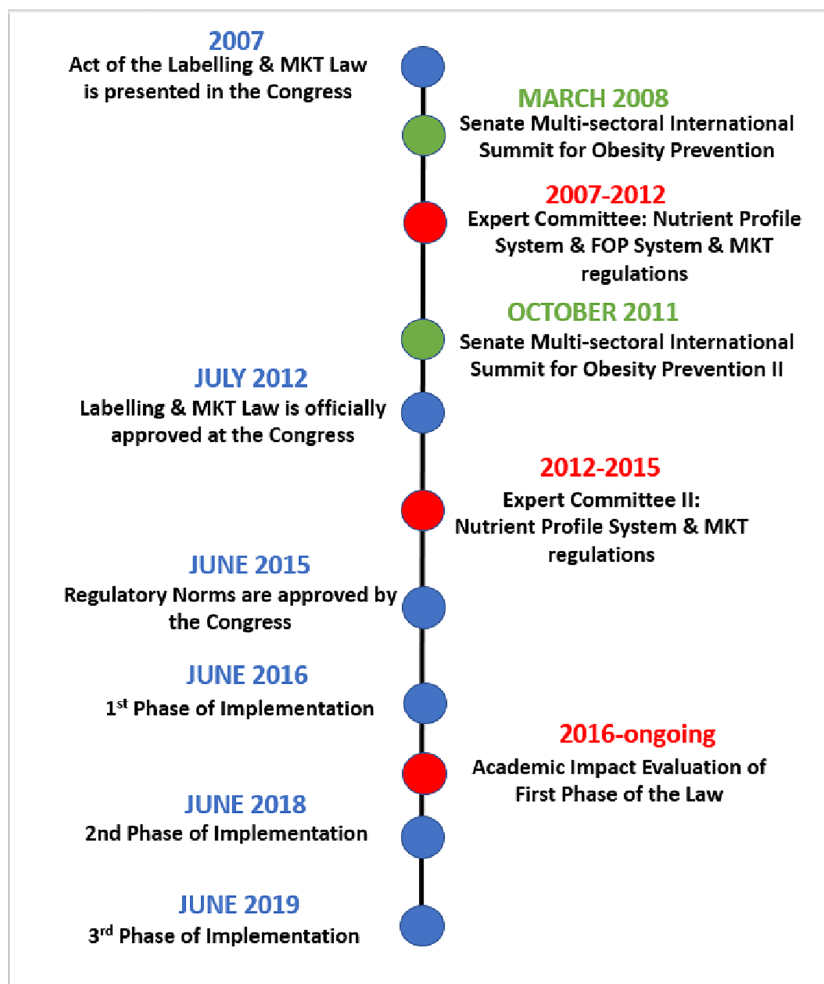
In June 2016, Chile implemented the Food Labeling and Advertising Law to benefit the health of the entire population, particularly children. As previously reported, the law was successfully developed and

approved as a result of a multiyear multisectoral dialogue with key actors.<sup>9</sup> This process greatly benefited from strong evidence-based advocacy led by academic champions in partnership with a charismatic and influential legislator.<sup>9</sup> This national policy called for a package of actions for promoting healthier diets and preventing obesity, including the placement of black octagonal labels similar to a STOP sign on the front of packages to warn consumers of packaged foods that have high concentrations of critical nutrients that increase the risk for diet-related NCDs (i.e., sugars, saturated fats, and sodium<sup>9,10</sup>; Figure 1). Specifically, all prepackaged foods with ingredients such as added sugars, saturated fats, or sodium were subject to the use of labels if they exceeded the law's limits; notably, these products account for ~60% of the energy intake of Chileans.<sup>11</sup> The Chilean law also included regulations on the foods that could be offered in schools and a prohibition to market unhealthy foods to children under 14 years old. Limits of energy and nutrient content were defined by the regulation mandating that food products incorporate one black octagon for each of the limits exceeded (e.g., a product exceeding energy and sugars limits would need to have two FOPLs). The policy was implemented in three phases, with the limits became progressively stricter over time. Full implementation was achieved in June 2019. Governmental and academic reports have described the process of

developing front-of-food pack labeling (FOPL) legislation, the degree of implementation, and its impact evaluation after the first phase of implementation.<sup>4,12-15</sup> Of note is that the FOPL policy was implemented together with comprehensive marketing restrictions to children under 14 years old and the prohibition to sell or provide regulated foods and beverages at early child care and education centers and schools<sup>9</sup> (Table S1).

Our RE-AIM mapping analyses were based on reviewing ongoing research conducted by the Institute of Nutrition and Food Technology of the University of Chile and the University of North Carolina designed to evaluate the impact of the Chilean Food Labeling and Advertising on economic impacts, food environment, and consumer and food industry behavior. We also examined official government documents and conducted six key informant interviews with governmental officials, most of whom were from the Chilean Ministry of Health.

The first year after the labels were implemented, the industry showed strong compliance with 95% of packaged foods and beverages requiring labels actually including them. From the consumers side, about 60% of the consumers self-reported using the FOPL when interviewed about food shopping decisions<sup>16,17</sup>; these results were independent of educational level. Also, our analyses have shown that



**FIGURE 1** Front-of-Food Pack warning labeling and marketing legislation timeline in Chile (2007-2019). Abbreviations: FOP, Front-of-Food Package; MKT, marketing

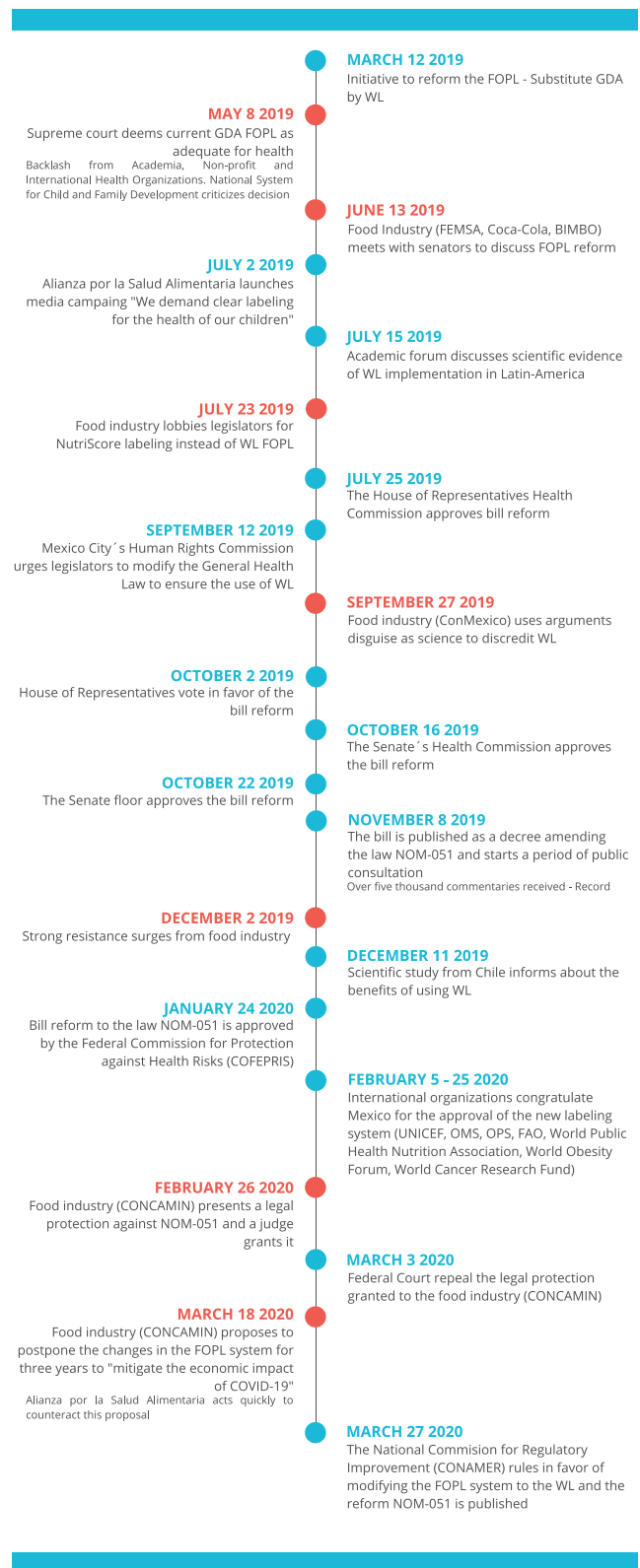
consumers' food perceptions and knowledge improved; purchases of unhealthy beverage and food purchases decreased; and industry driven product reformulation decreased sugars and sodium in some food products such as sweetened beverages and cheeses, respectively.<sup>17–19</sup> One concern with the regulation relates to the substitution of sugar by nonnutritive sweeteners as there are also health concerns associated with the consumption of these products.<sup>20–22</sup> Another concern was related to job losses as a result of a reduction in sales of the food products targeted by the law. However, research shows that there has been no change in job losses or wages when comparing food industries with product lines that include regulated foods compared with food industries that do not sell such food products.<sup>23</sup>

All food companies implemented the policy simultaneously, with the exception of small food companies, which were given 3 extra years for implementation. The regulation was also implemented throughout all food assistance programs immediately. However, among programs with external providers with contracts that were renewable every 3 years, implementation of the regulation was delayed until the next cycle of renewal. An interesting finding is that at the retail level, the food distributors had the ultimate responsibility to ensure that all their products complied with the FOPL. Hence, supermarkets or food stores pressured food companies to comply with the law in order for them to sell their products.

The FOPL continues to be implemented according to plan, despite changes in the political coalitions that have governed the country during this period. The last stage of implementation was reached in June 2019—except for small companies, and all of the actions have continued in place through at least June 2020. The implementation of the FOPL policy in Chile was successful as a result of the combination of evidence collected prior to and during implementation, political will (i.e., the endorsement of and enabling of the proposed legislation by the political establishment), policymaking, the strength of public opinion to overcome resistance from the food industry, and effectiveness across RE-AIM dimensions; reach, effectiveness (especially with regards to purchasing and consumption of unhealthy foods and product reformulation by industry), adoption, implementation, and maintenance (Table S1). In the current case, we used available information retrospectively to map the implementation of the FOPL legislation from Chile into the RE-AIM framework. Moreover, because of the retrospective nature of the analysis, we identified gaps in information limiting what could be mapped into RE-AIM. In these instances, key informant interviews were helpful in filling in gaps.

### 3.2 | Front-of-pack warning labeling in Mexico

Mexico began implementing the new FOPL policy October 1, 2020, to address the highly obesogenic environment of the country and the aggressive food marketing targeted at children. In October 2019, the Mexican Congress approved the inclusion of a FOPL in the General Health Law, leading to a reform in the regulation NOM-051. Figure 2



**FIGURE 2** Front-of-Food Pack warning labels and marketing legislation timeline in Mexico (2019–2020). Abbreviations: FOPL, Front-of-Food Pack legislation; GDA, Guideline Daily Amount nutrition facts label; WL, warning labels

summarizes the timeline of key events related to the adoption of FOPL between 2019 and 2020.

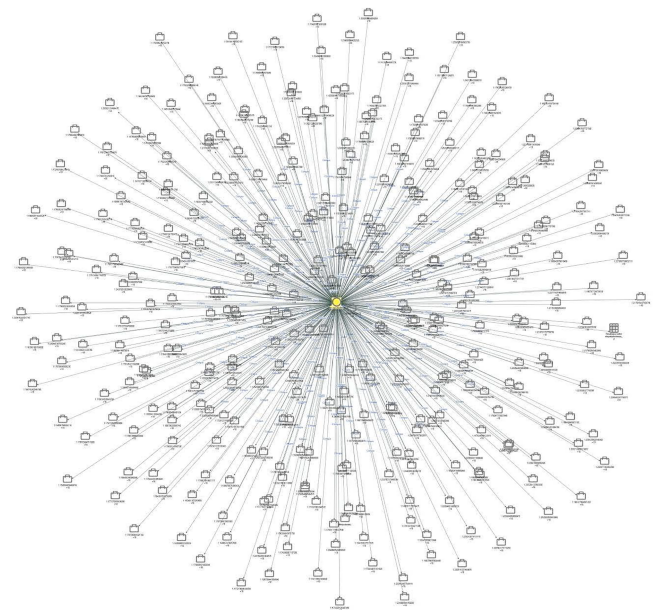
We conducted a scoping review and a Twitter analysis of information gathered during the policy formulation and initial implementation stages. Twitter was chosen for analysis because, according to the National Household Survey on Availability and Use of Information Technologies 2017, approximately 77% of Mexicans aged 6 years old and over had a smartphone, and among them, 57% were active on Twitter.<sup>6</sup> The review included scientific literature searched in academic databases (i.e., EBSCO, Web of Science, PubMed, and Scielo) and gray literature (i.e., research that was either not published in peer-reviewed journals or published as governmental or technical reports) from key nonprofit organizations in Mexico. The details of the review are presented as supplementary online material (Table S5). We extracted data from 21 articles and 15 gray literature documents using the RE-AIM framework. Twitter analysis was performed using data mining for social networks and machine learning algorithms on Python.<sup>24</sup> The goal was to assess attention to the FOPL legislation, and to understand who the key actors were, which advocacy strategies were used, and document public sentiments evoked by the proposed FOPL regulatory policy. This analysis focuses on the hashtag created to promote the FOPL, #EtiquetadoClaroYa (translates as “transparent labeling now”). The analysis included 9228 tweets from 1966 users between March 12, 2019, and May 12, 2020. Because the process of adopting the policy was underway during the time this manuscript was written, we focused only on the RE-AIM dimension of adoption (Table S2). As the FOPL had just been approved at the time of this writing, it was not possible to map the remaining RE-AIM domains, as it was done with the rest of the case examples in the article.

As summarized in Table S2, six factors that facilitated the reform of the existing labeling system in Mexico were identified. First, there was a growing body of scientific evidence demonstrating that Mexican consumers did not understand the Guideline Daily Amount (GDA) nutrient content panel and that FOPLs or multiple traffic light systems could better inform consumers.<sup>25–28</sup> Nieto et al.<sup>29</sup> highlighted that FOPLs provided consumers with better guidance than GDAs for making informed food choices. The Mexican National Health and Nutrition Survey conducted in 2016 (MC-ENSANUT) highlighted that the great majority of Mexicans could not understand the GDAs.<sup>30</sup> Other studies further emphasized the role of clear labeling in reducing the consumption of sugary beverages.<sup>31,32</sup> Scientific evidence was also fundamental in demonstrating that conveying correct nutrient information through FOPL could help improve the amount and quality of food purchased as well as the consumption of healthier products.<sup>33,34</sup> Jauregui et al.<sup>34</sup> specifically found that systems such as the traffic lights and FOPLs could reduce shopping times and foster healthier choices when compared with the GDAs. This evidence was key for reaching consensus on the need for FOPLs as a policy instrument in the context of the obesity and chronic diseases epidemics in Mexico.<sup>35,36</sup>

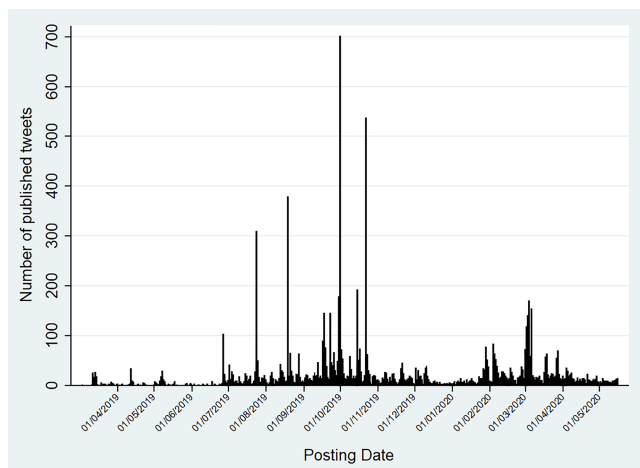
A second facilitator was previous international experiences in using alternative labeling systems. A group of top public nutrition experts in Mexico published a position paper in 2018,<sup>37</sup> highlighting the need for a new FOPL, strongly based on the positive experiences

in Chile, Peru, Brazil, and Canada. The positive experiences of other countries like Chile were fundamental in the adoption process in Mexico. In the Twitter analysis, Chile emerged both in the word ramification analysis (Figure S1) and in the top 10 tweets, confirming its influence in the policy design and public debate. For example, a tweet published in August 2019 and retweeted 734 times and marked as favorite by 1471 users stated: “this is how a cereal looks in #Chile: no marketing and warning labels. In Mexico we need a #EtiquetadoClaroYa (transparent labelling now) pic.twitter.com/hAWi4gZ3YS.”

A third facilitator in the adoption of the FOPL in Mexico was the prior experience from the adoption of the sugar-sweetened beverage tax, which highlighted the central advocacy role from civil society organizations (e.g., *Alianza por la Salud Alimentaria*) with strong ties to academic and legislative champions.<sup>38</sup> During the implementation process of the FOPL, academia and civil society coalitions again had a well-coordinated strategy that successfully and visibly placed FOPL on the government's agenda.<sup>39</sup> This was further strengthened by the backing of international organizations such as the World Health Organization (WHO). The central role of civil society organizations was documented in the sociogram analysis of twitter depicting the relationship between Twitter users around the #EtiquetadoClaroYa, placing *El Poder del Consumidor* as a key node, and showing the density of relationships of retweets and mentions of @elpoderdelc (Figure 3). Fourth, the Twitter analysis highlighted the role of social networks as a mobilization strategy to increase visibility during key times of the adoption process. Interestingly, during periods in which the Mexican House of Representatives or the Senate floor needed to approve the FOPL bill, Twitter activity around FOPL increased (Figure 4). A similar



**FIGURE 3** Egocentric sociogram of users relating to the front-of-food pack labeling #EtiquetadoClaroYa social media campaign in Mexico. The yellow central node represents *El Poder del Consumidor*, a prominent Mexican civil society organization



**FIGURE 4** Number of daily Tweets linked to the front-of-food pack labeling #EtiquetadoClaroYa in Mexico

pattern was identified in late February and early March 2020 when the food industry presented a legal challenge to the FOPL in Federal Court.

Fifth, emulating strategies used during the adoption of the sugar-sweetened beverage tax in Mexico,<sup>38</sup> social media also served as an active motivator for civil society mobilization.<sup>39</sup> Sixth, the Twitter analysis showed that compared with other policies to combat obesity, the FOPL had a high level of public support.<sup>35</sup> The Twitter analysis highlighted that 40% of the tweets evoked positive emotions around the FOPL such as “good work” or “safes lives,” whereas close to 60% were linked to negative emotions toward industry actions like “misleading,” “poisoning,” or “lies.”

The adoption phase faced significant barriers linked to the food industry's response through well-known strategies to prevent the FOPL legislation from being enacted. They worked through common lobbying tactics such as alliances with governmental officials and legislators to influence policy design.<sup>26</sup> As the proposal advanced, the food industry tried to slow down the process by providing many comments during public consultations (Figure 2). They also used indirect mechanisms to increase confusion among the public, such as newspaper editorials, and organizing events with international “experts” to counteract the robust international and local scientific evidence backing the FOPL legislation. In addition, they introduced a legal challenge through the Federal Court. These attempts to derail the FOPL policy were overcome largely because the political context favored evidence-based public health interventions to address the obesity epidemic.<sup>39</sup> The FOPL legislation process began in the initial months of a new political administration. The FOPL system was adopted (i.e., NOM-051) and published in April 2020.

The use of the RE-AIM framework in studying the FOPL policy in Mexico was helpful but limited as only the adoption step could be addressed. In the future, as the FOPL is implemented, it will be relevant to document the other steps of RE-AIM as it was done in the Chilean case presented above.

### 3.3 | Lessons learned

The Chilean and Mexican FOPL policies were mapped onto the RE-AIM framework. In the case of Chile, RE-AIM was used to assess the policy's reach, effectiveness, adoption, implementation, and maintenance, whereas in Mexico it was used to understand the extent to which the policy had been adopted. Even though the policies are similar in substance, the processes for approving these policies differed including the role played by civil society organizations, which has been much stronger in Mexico, perhaps as a result of less political will at the start of the process compared with Chile. The evidence from the twitter analysis in Mexico clearly illustrates this finding. On the other hand, this case study underscores how powerful the combination of evidence, civil society organizations' engagement, public opinion, and political will is at advancing adoption of anti-obesity policies such as FOPL despite strong opposition from powerful food industries.<sup>4,40</sup>

Given that Chile is in a more advanced stage of policy implementation, Mexico has an opportunity to learn from Chile as it plans a system for monitoring and evaluating the coverage and quality of implementation of the policy, as well as its impacts on food consumer purchasing behaviors. A case in point is the higher level of attention that the law in Mexico pays to nonnutritive sweeteners as a result of the findings from Chile showing a sharp increase in their consumption as a result of the policy. Future studies in this area should consider incorporating implementation frameworks such as RE-AIM from the beginning so that the information can be collected prospectively, and the data can actually help guide improvements to the implementation process in real time.

This case study illustrates the potential that establishing networks of anti-obesity policy experts across LACs can have to improve the impact of future research and dissemination initiatives to improve the effectiveness of key policies such as FOPL. The experience of countries benefiting from the FOPL Chilean experience is not unique to Mexico as many other countries have also learned from and been inspired by it.<sup>41</sup> Understanding barriers and drivers to successful implementation via implementation science approaches like the use of RE-AIM in this manuscript could also inform better implementation approaches for obesity prevention and control interventions. Equity considerations did not emerge as a prominent feature in the design or implementation of PAP in either country. However, in Chile, one of the expected advantages of using interpretative FOPL warnings was that it would be understood irrespective of educational level.<sup>18</sup>

## 4 | CASE STUDY #2: CICLOVÍAS, OPEN STREETS, AND PLAY STREETS

Sustainable programs aimed at promoting active play and physical activity among children and families require multisectoral interventions.<sup>42</sup> In this context, promising programs include the play street and Open Streets programs known as Ciclovías,<sup>43,44</sup> which are community interventions in which main or neighborhood streets are



temporarily closed to motorized transport to create a safe and free space exclusively for activities during leisure time.<sup>45</sup> These programs provide a supportive environment for children and families to engage in activities in a safe setting. Currently, Ciclovías and Open Streets are implemented in at least 27 countries,<sup>44</sup> and play streets are implemented in at least five countries.<sup>43,44</sup> Most of the programs, which are in Latin America and the United States, have been associated with the promotion of physical activity and less sedentary behaviors among children.<sup>32</sup>

For the development of this case study, we first conducted an initial search for “play streets” in PubMed between 2000 and 2020 in English- and Spanish-language peer-reviewed journals. Of the more than 75 articles found, the search yielded four articles in San Francisco and four in Colombia. Second, we reviewed two systematic reviews of Ciclovías and the references in a systematic review article<sup>44</sup> from which we found additional peer-reviewed articles not indexed in PubMed.<sup>45</sup> In addition, we looked at the gray literature, including program websites, neighborhood blog posts, and other relevant sites. For the San Francisco Play Streets program example, which we describe further below, we conducted a key informant interview with Dr. Susan Zieff, who led the 2016 evaluation of the San Francisco Play Streets program.<sup>46</sup> For the case study in Colombia, described below, we conducted an interview with Bibiana Sarmiento, the coordinator of Bogotá’s Ciclovía. Information from these sources was mapped to the RE-AIM framework.

#### 4.1 | Sunday streets in San Francisco

In the United States, the Sunday Streets San Francisco program, an Open Streets initiative that started in 2008, showed increased physical activity levels for residents in low-income areas.<sup>47</sup> Building on this success, San Francisco along with eight other US sites piloted play streets in 2013 to increase youth physical activity on weekends. Initial funding from the Partnership for a Healthier America, coupled with positive research results from that pilot, have prompted widespread support for play streets from across the city, including neighborhood leadership and the San Francisco Municipal Transportation Agency.<sup>46</sup>

Play streets are a citywide program of the San Francisco Municipal Transportation Agency in partnership with the nonprofit Livable City.<sup>48</sup> Each of the San Francisco Play Street program segments is developed by an organizing team of community members and nonprofit representatives who plan and host at least three health-focused block parties on a designated street, which is usually flat and straight and already has low car traffic.<sup>49</sup> Play streets community organizers must provide equipment or programming support for at least three physical activity programs, including an activity that is accessible to people with limited mobility and a community building activity.

The initial San Francisco Play Streets program aimed to increase youth physical activity time on weekends and targeted four neighborhoods that were low income, had higher rates than the city average of chronic diseases including childhood obesity,

and encompassed underserved areas in terms of recreational resources.<sup>46</sup> The neighborhood demographics showed that Latino populations represented between 17.5% and 45% of the groups who participated.<sup>46</sup> A program process evaluation identified the programs’ strengths, weaknesses, reach, and sustainability or maintenance using questionnaires and a validated tool called System for Observing Play and Recreation in Communities to observe participant activities. An outcome evaluation sought to understand participants’ use and attitudes toward the Play Streets events by comparing both the use of the space before (baseline) and during (treatment) the event and through a comparison group with a non-treatment neighborhood that matched the Play Streets sites based on demographic measures, health disparities, and availability of recreation amenities.<sup>46</sup> In terms of reach, they found that the community members that participated in the program were younger and more racially and ethnically diverse, particularly for Latinos, than the comparison neighborhoods. The program attracted families with young children and older adults, though evaluators observed that the adults were more sedentary than the children. They also found that the play streets did not bring out the initially targeted teens and pre-teens,<sup>46</sup> which Dr. Zieff believes may be due in part to the name “play streets.” In terms of effectiveness, they found that vigorous physical activity increased threefold (11.5%–35%) and that 93% of participants agreed that play streets “strengthen our community” at the end of the program period. The program, using Google Earth Pro, reported adding 47%–100% more open space for physical activity in the neighborhood. In fact, Dr. Zieff reported that in one neighborhood with high drug activity, as the children came outside to participate in the program, those adults moved out of the area, giving the children a place to play and providing a safe space that was previously deemed unsafe or inappropriate for play.

Adoption and maintenance of the program have been possible through financial support from the San Francisco Municipal Transportation Agency; however, neighborhoods have to apply to be part of the program, making community buy-in and leadership a cornerstone of the program. In addition, as part of the implementation plan, there are guidelines for times, frequency, and types of activity that help to promote fidelity across the programs while also allowing neighborhoods to adapt the program to their community’s individual needs and interests. Though Dr. Zieff reported that schools and community centers were originally unable to participate, restrictions have been lessened, and the program now encourages partnerships with these other organizations. In addition, it does not appear that the initial focus on underserved neighborhoods is still a requirement, as the 2019 Program Guidelines do not include this.<sup>49</sup>

#### 4.2 | Ciclovía in Bogotá, Colombia

In Latin America, the largest Ciclovía with specific programs for children was inaugurated in 1974 in Bogotá, Colombia.<sup>45</sup> The development and sustainability of the program has been influenced by

multisectoral policies. Ciclovía has been identified by political leaders within the local and national government as an initiative that aligns with policies aimed at overcoming inequalities and providing health and quality of life for citizens. Importantly, successive policymakers with common views have contributed to the expansion and sustainability of the programs.<sup>50</sup>

The Ciclovía of Bogotá is a multisectoral program coordinated by the District Institute of Sports and Recreation. Ciclovía comprises a 126-km circuit that runs through the localities of the city. The 7-hour events occur on Sundays and holidays, with about 66–72 events per year with 600,000–1,750,000 participants at each event. This program has several complementary activities for children and families, such as the “bicycle school,” in which children and their families are taught how to ride bikes, and the “Recreovía program,” which offers physical activity classes for children and their families on the street and at parks close to the Ciclovía circuit.<sup>43</sup>

The program reached children and adolescents mostly of low to middle socioeconomic status without inequity by gender.<sup>43</sup> Most participants reported participating in the program with their parents or family members. Of the activities, including walking, skating, and jogging, the majority of youth identified biking as their main activity (70.5%). Program effectiveness has only been assessed through cross-sectional studies showing that regular users of the program were more likely to meet the daily 60-min physical activity recommendations on the Sunday that they participated and are less likely to register sedentary activities compared with people who did not participate or were irregular users.<sup>43</sup>

Adoption, implementation, and sustainability of the program have been possible mainly through public funding and community support. Multisectoral partnerships among sports and recreation, health, transport, environment, safety, education, and tourism have been crucial for the sustainability of the program.<sup>51</sup> Scalability and global dissemination of the program is apparent by the fact that in the last two decades, programs have been implemented in all the continents. Currently, there are programs in 27 countries. During the COVID-19 pandemic, the 85 km of the temporary streets became a permanent Ciclovía to incentivize biking for transport.<sup>52</sup>

### 4.3 | Lessons learned

The RE-AIM framework enabled a structured approach to evaluating the implementation and comparing the experiences of play streets in San Francisco and Ciclovía in Bogotá (Table S3). Although Bogotá and San Francisco have created successful programs that promote physical activity, the implementation pathways and features have been quite different. On the one hand, their reach in terms of size, frequency, and documented long-term impacts is different due to the influence of when they started and the social, political, economic, and healthcare systems contexts in which they operate. On the other hand, both Play Streets in San Francisco and Ciclovía in Bogotá had similar aspects in regard to adoption, implementation, and maintenance, demonstrating the

need for multisectoral support along with community buy-in, including local leadership, and establishing guidelines for ongoing and future projects. Each program was implemented in underserved communities, thereby reaching vulnerable populations that may not otherwise have had access to active play spaces. Although neither program was expensive, each has financial support through city-wide public funding that will contribute to sustainability or maintenance of the program, but data on these dimensions of the RE-AIM framework were not available. Indeed, moving forward, the effectiveness of the programs in terms of sustainable community-based physical activity increases needs to be evaluated. A cross-sectional study of the Ciclovía of Bogotá showed that children increased moderate to vigorous physical activity and reduce sedentary behavior during the days they participate in the program. However, the long-term impact of these programs has not been fully evaluated, and natural experiments across countries would provide useful comparative insights for the regions. In addition, the programs need to consider the food environment to better understand how leisure activities and physical activity can better interact with healthy nutrition initiatives. This may particularly be the case for the Ciclovía program in Bogotá and other cities, where food vendors are typically plentiful and the quality and healthfulness of food offerings are often variable. Equity considerations emerged strongly in San Francisco given differences in neighborhood demographics and to a lesser extent in Bogotá where there were no specific aspects in the design of the Ciclovía expressly focused on facilitating access to individuals from the most socioeconomically disadvantaged communities.

## 5 | CASE STUDY #3: BABY-FRIENDLY HOSPITAL INITIATIVE

The Baby Friendly Hospital Initiative (BFHI) is an important approach for addressing the global epidemic of childhood obesity, given evidence that breastfeeding is likely to protect against overweight and obesity in childhood.<sup>53</sup> Launched in 1991 by the WHO and the United Nations Children's Fund (UNICEF), BFHI is centered on adherence to the Ten Steps to Successful Breastfeeding (Ten Steps), a set of actions that have been shown to improve breastfeeding outcomes<sup>54</sup> (Table S6). To achieve Baby-Friendly status, a facility must adhere to the Ten Steps as well as the WHO *International Code of Marketing of Breastmilk Substitutes*, which prohibits distribution and promotion of formula.<sup>54</sup>

We searched PubMed and Embase databases using search terms related to BFHI (Baby Friendly or BFHI, Ten Steps or 10 steps) and breastfeeding (breastfed, breastfeed, breastfeeding) and, after an initial screening, identified 148 articles on the BFHI in the United States and Brazil to inform this case study through a two-phase screening process. We then reviewed the full text of these articles to identify articles that focused on the history of BFHI in these countries and/or one or more of the dimensions of the RE-AIM framework. In addition, we reviewed gray literature and content on government and

nongovernmental agency websites. Findings were mapped to the RE-AIM framework (Table S4).

## 5.1 | Baby-Friendly hospitals in the United States

In the United States, the BFHI is managed by Baby-Friendly USA, an organization that provides implementation guidance for facilities seeking designation and serves as an independent accrediting body.<sup>55</sup> Since 1996 when the BFHI launched in the United States, the number of Baby-Friendly facilities has grown exponentially.<sup>55</sup> In 2007, there were approximately 60 Baby-Friendly hospitals, and as of 2019, this number had increased to over 600 hospitals in all 50 states, the District of Columbia, and Puerto Rico.<sup>55</sup> Over 1.1 million babies are now born in Baby-Friendly facilities each year, accounting for nearly one-third of the annual births.<sup>55</sup>

The rapid expansion of Baby-Friendly hospitals across the country was likely fueled by strong evidence and political support for BFHI. The American Academy of Pediatrics endorsed the Ten Steps in 2009.<sup>56</sup> In 2011, the US *Surgeon General's Call to Action to Support Breastfeeding* called for accelerated implementation of the BFHI.<sup>57</sup> Adherence to the Ten Steps was promoted by several broader health policy statements or recommendations that identify the nation's health priorities and drive the national agenda for health promotion and disease prevention, such as the *National Prevention Strategy* and *Healthy People 2020* goals and objectives.<sup>56</sup> The Ten Steps were also included as an evidence-based strategy for slowing the rising prevalence of childhood obesity as part of a former Centers for Disease Control and Prevention (CDC) Director's Winnable Battles program (2010–2015).<sup>58</sup>

Political support for BFHI was matched by large public investment and targeted training and technical assistance that may have accelerated adoption and reach of the Ten Steps (Table S4). It is noteworthy that the CDC also provided funding and technical assistance to support state health departments nationwide in improving hospital policies and practices that increase breastfeeding rates.<sup>56,57</sup> States have used a diversity of strategies to encourage statewide adoption of the Ten Steps (Table S4).<sup>59</sup> In California, for instance, the 2013 Senate Bill 402 required that all birthing facilities in the state implement the Ten Steps.<sup>60</sup> System-wide approaches have also contributed to increased adoption and reach of the BFHI. In 2011, the Indian Health Service committed to achieving Baby-Friendly status as part of the former First Lady Michelle Obama's Let's Move! in Indian Country initiative.<sup>56</sup>

Surveillance of maternity care policies and practices related to breastfeeding has been a cornerstone of the BFHI in the United States. Baby-Friendly USA tracks the number of facilities that have adopted the Ten Steps and the number of babies born in Baby-Friendly hospitals. Since 2007, CDC has conducted the Maternity Practices in Infant Nutrition and Care (mPINC) survey, a national census of maternity practices in facilities with registered maternity beds. CDC then sends each participating facility an individualized benchmark report that compares the facility's maternity care policies and practices to recommended standards, enabling the facility to identify opportunities for improvement.<sup>57</sup> CDC also disseminates mPINC state

reports, which have garnered media attention.<sup>57</sup> In addition, the CDC telephone National Immunization Survey collects data to monitor breastfeeding rates at state and national levels.<sup>61</sup> The results are used to track progress toward the Healthy People 2020 goals on breastfeeding, as well as to identify opportunities for improved maternity care practices.<sup>61</sup> Together, these surveillance activities have likely encouraged adoption, implementation, and maintenance of the Ten Steps.<sup>56,57</sup>

Measurement of the effectiveness of the Ten Steps has been possible because of the availability of data on breastfeeding and maternity care practices (Table S4). Adherence to the Ten Steps improves breastfeeding outcomes,<sup>54,62</sup> and there is a dose–response relationship between the number of BFHI steps mothers experience and the likelihood of breastfeeding initiation<sup>63</sup> and duration.<sup>64,65</sup> Moreover, BFHI may reduce socioeconomic and racial disparities in breastfeeding outcomes by providing systemic breastfeeding-friendly services across populations regardless of their sociodemographic characteristics.<sup>63,66</sup> In spite of this, notable barriers for BFHI success remain including high caesarean section rates<sup>67</sup> and widespread provision of in-hospital infant formula.<sup>68</sup>

To sustain momentum of the BFHI in the United States, future efforts should address barriers to adoption of the Ten Steps, such as the high cost of Baby-Friendly designation.<sup>55</sup> Two barriers to maintain Baby-Friendly status are lack of economic incentives for hospitals and the lack of a critical mass of healthcare staff properly trained on breastfeeding and human lactation. Adoption and maintenance of the Ten Steps are also hampered by organizations that question the effectiveness and safety of the BFHI approach.<sup>55</sup> Implementing the Ten Steps with high fidelity is also challenging because most healthcare systems have not established systems for monitoring maternity care policies and practices. Additionally, there has been a lack of clarity and recommended standards on how to implement Step 10 (foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic), which has often resulted in weak implementation, despite evidence that this step is key for sustaining breastfeeding benefits of BFHI.<sup>54,62</sup> Furthermore, there is no system for overall coordination and monitoring of BFHI activities at the national, state, and local levels, such as an empowered “National Breastfeeding Committee.”

## 5.2 | Baby-Friendly hospitals in Brazil

In Brazil, BFHI was launched in 1992 by the Ministry of Health (MOH), which serves as the lead agency for implementing and managing the initiative and accrediting public and private sector facilities as Baby-Friendly. Between 1992 and 2010, 359 hospitals achieved Baby-Friendly status; however, the speed of adoption of the Ten Steps has slowed since then, and in 2015, the number of Baby-Friendly facilities had dropped to 326.<sup>69</sup> Although the reach of the initiative is limited—only 9% of facilities are designated as Baby-Friendly—they cover about 21% of all deliveries in the country.<sup>70</sup>

Early implementation of the BFHI in Brazil was propelled by public policies that promoted women and children's health.<sup>69,71</sup> Through the BFHI, the Brazilian government changed practices and routines of maternity units linked to the Unified Health System.<sup>72</sup> In addition, Brazil is a special case in that hospital accreditation not only requires fulfilling the Ten Steps but also other requirements including adoption of the Brazilian version of the *WHO International Code of Marketing of Breastmilk Substitutes*, as well as birth and delivery best practices.<sup>69,73</sup> Several implementation strategies contributed to the successful implementation of BFHI. For example, an important strategy for promoting the adoption of BFHI in Brazil was the delivery of a train-the-trainer model and countrywide workshops that facilitated continuous training of health professionals.<sup>74</sup>

In 2010, the MOH introduced a computerized monitoring tool for the BFHI accreditation process. This web-based system allows hospitals and evaluators to register the pre-assessment, external evaluation, monitoring, and annual external assessments. Hospitals can access their own data and results, and assessors and states can access information about the hospitals. It also enables the MOH to track progress.<sup>75</sup> In addition, to monitor implementation, the MOH originally hired external evaluators every 3 years to carry out a reaccreditation process; though starting in 2010, BFHI-accredited hospitals began monitoring themselves annually. This self-monitoring process, which is performed by internal health professionals and staff,<sup>73</sup> was established to allow more frequent feedback to hospitals and prevent accredited hospitals from losing their Baby-Friendly status.

Furthermore, successful implementation of BFHI can be attributed, in part, to the strong multisectoral coordination among civil society, celebrities, politicians, health policymakers, the media, international organizations, and researchers.<sup>75</sup> This coordination allowed for adoption and translation of policies into programs by fostering synergies instead of redundancies across sectors and actors (including civil society) and by facilitating decentralization of decision making and consistency of implementation of BFHI across municipalities.<sup>75,76</sup>

As in the United States, the effectiveness of the Ten Steps has been associated with improved short- and longer term breastfeeding outcomes,<sup>77</sup> benefiting both infants and mothers. For example, one study found a 29% decreased risk for mastitis among mothers who gave birth in BFHI hospitals.<sup>78</sup> Successful BFHI implementation has also been associated with increased skin-to-skin contact and rooming-in.<sup>69,79</sup> As a result, exclusive breastfeeding is two times more likely to happen in the first 15 days postpartum in children born in BFHI-certified or accredited hospitals (i.e., accredited refers to those complying with BFHI standards but not yet certified) than among children born in non-BFHI hospitals.<sup>80</sup> Another positive aspect of BFHI has been its extended influence to Baby-Friendly primary healthcare clinics in Brazil.<sup>81,82</sup> There were also positive spillover effects; evidence indicates that the Ten Steps have extended to hospitals that have not been certified.<sup>83</sup>

Opportunities to strengthen the implementation of BFHI in Brazil remain. A current challenge is that the Ten Steps have not been consistently implemented across facilities.<sup>84</sup> For example, there is

evidence that BFHI Steps 4 through 10 have not been evenly implemented across hospitals, even after staff received the same training (Step 2), resulting in different exclusive breastfeeding outcomes across settings.<sup>85</sup> Studies examining compliance of the Ten Steps in Baby-Friendly hospitals in Brazil have documented unsuccessful implementation of Steps 2 (training), 9 (no artificial teats or pacifiers), and 10 (breastfeeding support groups after discharge from the hospital).<sup>86</sup> Furthermore, progress in breastfeeding rates resulting from the BFHI implementation in Brazil can be hampered if there is a decrease in births in BFHI hospitals, as reported in the northeastern region of Brazil.<sup>87</sup>

### 5.3 | Lessons learned

The RE-AIM framework enabled a structured and systematic approach to evaluating the implementation of the BFHI in the United States and Brazil while allowing comparison of the experiences of each country. Although the United States and Brazil have achieved successful implementation of the Ten Steps of the BFHI following international guidance, the implementation pathways have differed substantially, which is expected given the differences in social, political, economic, and healthcare systems contexts. For example, whereas Brazil has a national healthcare system, the United States does not. Likewise, regulations of infant formula companies' marketing practices have been adopted in Brazil but not in the United States, and therefore, it is not possible for the US government to penalize infant formula companies who market their products disregarding the WHO Code. On the other hand, the experiences of the BFHI in the United States and Brazil illustrate shared drivers for the adoption and reach of the Ten Steps across different country contexts, namely, a combination of strong political support at the national level, public investment, and training and technical assistance. The adoption and implementation of the Ten Steps across many facilities in these two countries, however, required different approaches, given their differing healthcare systems. The Brazil MOH scaled up the BFHI across one national health system, whereas the fragmented health system in the United States required active involvement of numerous hospital systems and government and non-governmental agencies from the federal to the county or town level. Finally, both countries established systems for monitoring maternity care practices and policies related to breastfeeding and ensured results were available to facilities, though Brazil employed a self-monitoring process and the US CDC spearheaded monitoring efforts. Although the RE-AIM framework does not include an explicit focus on health equity, we were able to capture information about equity in the implementation of the BFHI. For example, we found that equity considerations were at the forefront in the United States, as demonstrated by CDC-led surveillance of breastfeeding rates by states and sociodemographics and efforts directed toward improving maternity care practices to reduce racial/ethnic, income, and geographic disparities in breastfeeding. Our evaluation of the implementation of BFHI in Brazil using the RE-AIM framework yielded

information showing that the country applied an equity lens as BFHI was framed into a set of broader national policies aimed at reducing disparities in maternal and infant mortality.

## 6 | DISCUSSION AND CONCLUSION

Policies and programs to address childhood obesity are being rolled out at scale in various country contexts, and a consolidated method for evaluating the implementation of these initiatives is needed to enable cross-initiative comparisons and catalyze learning across borders. The analysis in this paper shows that implementation science holds promise for providing insights on drivers and barriers to successful implementation and that the use of specific implementation science frameworks like RE-AIM enables a systematic approach to identifying commonalities and differences in implementation of PAPs to address childhood obesity.

Across the case studies, multisector buy-in and monitoring were instrumental for the successful launch, adoption, and maintenance of PAPs. National governments can use our findings to implement obesity policy changes more efficiently. For example, the FOPL case from Mexico illustrates the great importance of creating demand for such policies, a task that requires heavy evidence-driven civil society mobilization in the absence of political will.<sup>40</sup> The FOPL case from Chile illustrates how rapidly widespread reach can happen followed by rapid documentation of effectiveness (e.g., overwhelming compliance by food industry and reduction in sales of unhealthy foods and beverages) when sound policies are implemented with guidance from monitoring and evaluation systems. These systems also allowed for the rapid detection of an increase in consumption of products containing nonnutritive sweeteners. Mexico, which has just passed the law, was able to take this finding from Chile into account in the development of its FOPL. Mexico could also benefit from other regulations deployed and strongly enforced in Chile to protect minors against the marketing of unhealthy foods and beverages.<sup>88</sup> Similarly, Chile and other countries could learn from the experiences of two Mexican states, Oaxaca and Tabasco, that passed legislation to ban the sales to minors of these products in stores and within school premises.<sup>89</sup>

Our findings also illustrate how much context matters when implementing PAPs. For example, despite being based on 10 standardized “steps,” BFHI has followed quite different pathways of adoption and implementation across countries. Whereas Brazil has a national healthcare system, the United States does not, making it much more difficult to have national coordination mechanisms to enhance reach, quality of implementation, and overall effectiveness of the Ten Steps in the United States. Likewise, important differences with respect to adoption and implementation were impacted by substantially different approaches to design and stakeholder engagement in the “Open Streets” programs in the United States and Colombia.

The analysis in this paper illustrated major gaps in knowledge regarding RE-AIM dimensions specifically in terms of effectiveness.

Indeed, using RE-AIM to systematically evaluate childhood obesity PAPs highlighted the fact that some key outcome data are not routinely monitored and thus unavailable. This information gap highlights the need for engaging the health sector in longitudinal monitoring and evaluation of childhood obesity PAPs. For example, other than financing, aspects of implementation quality and maintenance were only partially addressed across settings, and therefore, data on those dimensions were limited. In Brazil, documentation of maintenance of the BFHI was sparse. Accordingly, application of the RE-AIM helped point to aspects of implementation that require future investigation.

In addition, our analysis using the RE-AIM framework generated some important insights on equity in the implementation of PAPs to address childhood obesity. In the future, the RE-AIM framework could be enhanced by incorporating an explicit and well-operationalized focus on equity. This would prevent inequities from being overlooked, enable thoughtful attention to equity across the RE-AIM dimensions, and yield more robust assessments of equity in implementation of evidence-based interventions, social justice, and people-centered approaches in design, implementation, and evaluation.

Overall, our analysis highlights that each of the RE-AIM dimensions is instrumental and interdependent, and thus, PAPs to address childhood obesity should work to collect data on all dimensions to help achieve the greatest impact.<sup>7</sup> As illustrated by the three case studies, it is necessary to document all aspects of policy development and subsequent implementation and maintenance phases to identify what works and what does not and take timely corrective actions as needed. This in turn is crucial for cross-pollination or knowledge sharing across countries and regions as clearly illustrated by the FOPL comparative case study. In this way, using an implementation science approach can make important contributions toward addressing these knowledge gaps, enhancing obesity policy dialogue, and producing transferable lessons across the Americas based on North–South–South capacity building collaborations.

In conclusion, we strongly recommend that countries use the tools implementation science offers<sup>90</sup> for research and evaluation during PAP development and on an ongoing basis throughout the implementation and maintenance phases. Although in our study RE-AIM was very useful for doing post hoc policy analysis, future analysis is needed to understand the value of different implementation science systems oriented frameworks that can inform obesity policy decision making, context fit, equitable impact, and cost-effectiveness on a large scale.<sup>90</sup> Looking ahead, this research is also needed to understand how best to adapt anti-obesity PAPs as a result of public health emergencies such as COVID-19 that are affected by and can lead to obesity through disrupted food and physical activity systems.<sup>91,92</sup>

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### CONFLICT OF INTEREST/DISCLOSURE

The content is solely the responsibility of the authors and does not necessarily represent the official views of the US Department of Health and Human Services, the National Institutes of Health, the Fogarty International Center, or the National Heart, Lung, and Blood Institute, or the Centers for Disease Control and Prevention. The authors declare no potential conflicts of interest.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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