

# Childhood obesity prevention: does policy meet research? Evidence-based reflections upon the spanish case

## Abstract

Childhood obesity is a major public health challenge, and its prevalence and severity are increasing worldwide despite the different actions launched. The aim of this article is to critically review to what extent policies developed at different international institutional levels affecting Spain have effectively translated current research into practice as well as to discuss how the available evidence can serve policy makers. A review of reviews on childhood obesity prevention practices was first performed using MEDLINE and ERIC databases. To select the relevant policies, several experts on childhood obesity prevention were consulted. Results show that, on paper, policies comply with current research recommendations, but in practice there is a gap in how to reach these goals as a role overlap between institutions. Actions need more definition, particularly in the procedural and methodological aspects. Policymakers face numerous barriers to work on this direction, one of the most relevant being the difficulty of implementing systemic policies based upon compartmentalised research. Lessons learned in fields such as community development and education might inform this process.

**Keywords:** childhood obesity, prevention, effectiveness, policy, review

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## Introduction

The WHO and IOTF have already qualified obesity as the 21<sup>st</sup> century epidemic. Childhood obesity is even more concerning because of the impact that this condition has on youth health and adult life. Implementing preventive actions to reduce obesity has become a priority in most public health agendas. Spain is amongst the European countries with highest prevalence's: one out of two adults and one out of three children are overweight or obese.<sup>1</sup> In 2013, the WHO's Global Action Plan for the Prevention and Control of Non-Communicable Diseases 2013-2020 set the modest goal of achieving a zero increase in prevalence from 2010 to 2025. However, in light of the advancement made - no country has yet successfully reversed these trends,<sup>2-4</sup> even this conservative aim seems challenging. At different levels, several circumstances may explain this difficulty. Here we tap into four of them. First, the controversial understanding of obesity itself;<sup>5-7</sup> second, the pressure posed by the utterly competitive food industry;<sup>6-9</sup> third, the very own human nature in biological, psychological, cultural, and social terms;<sup>7-11</sup> and fourth, the current scientific evidence hierarchy and the difficulty to translate it into actual policy<sup>5-14</sup> which will be the main focus of this paper. In the first Lancet's Obesity Series published in 2011, the globalization of food systems that led to overconsumption, an expectable outcome of market economies, was posed as the main factor responsible for the increasing burden of obesity. In other words, obesity was seen as the normal response of individuals to the obesogenic environment they find themselves in, and as a consequence, policy and regulatory actions were identified as the most cost-effective means to tackle the problem. Four years after, a second edition under the leadership of Boyd Swinburn identifies further high-priority actions by overcoming some of the more established dichotomies in the phenomenon of obesity: personal versus collective responsibilities, upstream versus downstream drivers for change, treatment versus prevention, or under

nutrition versus over nutrition priorities. Obesity is a complex issue, and the fact that little progress has been made between the publication of these two monographs somehow reflects the limitations of looking at obesity in terms of "either/or".<sup>15</sup> Healthy behaviors are reinforced when policy and environment support healthy choices at the same time that individuals are educated and motivated to make those choices,<sup>16</sup> as attested by the success achieved in the case of other health risks such as tobacco or alcohol. Notwithstanding that, tackling obesity demands broader, more specific actions than the ones used in these cases, as food is indispensable to life and, anthropologically, its connotations for human beings go beyond nutrition and acquire a psychological, social and cultural meaning (among others) that cannot be overlooked.<sup>17-18</sup> All the previous considered, one might think that enough evidence to tackle obesity is not yet available. However, a quick search on PubMed with the words "obesity prevention" indicates just the opposite. As by January 2017, it yielded close to 41,000 references, with a ratio of publications per year that has evolved from less than 300 in the mid-nineties to more than 3,500 in the last two years. Thus, it is not that there is a lack of evidence, but that, considering the intrinsic complexity of the obesity pandemic; this evidence is not adequate or easily translated into policy. From the late nineties, the emergence of evidence-based medicine overflowed the clinical field and policymakers were also required to found their work on sound data.<sup>4-14</sup> The need for evidence-based policy is difficult to argue. However, the actual development of evidence-based policies is certainly challenged by a poor fit between atomized academic research, rigid evaluation standards, and the complex needs of policymakers. Since environmental actions progress according to a different timing: every intervention generates a series of events with different results that provide different indicators.<sup>19,20</sup> It means that the ultimate effect of an intervention (i.e. obesity reduction) may not be noticeable until decades later, but it produces other changes in terms of knowledge or behaviours that can be measured over time. Besides, these furthest

outcomes are exposed to so many influences, that when it comes to their evaluation it is difficult to establish cause-effect relationships. Because of that, some authors argue that currently accepted evidence levels are not sufficient or necessarily appropriate to determine good practices.<sup>21–27</sup> These and others considerations belong to a growing consensus on the need of developing new approaches to define and interpret evidence in public health. Green & Tones use the term “judicial review” to describe a triangulation-based process in which the final evaluation is made after exhaustively review all the evidence gathered through different methods. Other authors, like McNeil & Flynn<sup>22</sup> or Brennan et al.,<sup>28</sup> develop similar approaches which, on a general basis, we can refer to it as an ecological method of research.<sup>29</sup> If, to tackle obesity, systemic, holistic, ecological and evidence-based policies must be implemented, then more adequate methodological designs of evaluation are required. The aim of this article is to critically review to what extent childhood obesity prevention policies developed at different international levels have succeed at effectively translate current research into practice as well as to discuss how the evidence available can serve policy makers, with a focus on the specific case of Spain. With that intention, a review of reviews on childhood obesity prevention practices is first presented to identify the main recommendations on that field. Secondly, the most relevant policies implemented at different International institutional levels affecting Spain were reviewed to assess how they match the scientific literature recommendations. The emphasis on the need for a quick and effective response to the obesity alarming situation has entailed many initiatives and much research to find successful solutions. For this reason, numerous reviews on this topic have been published with a double intention: on the one hand, assessing the effectiveness of those actions, and on the other, providing evidence-based recommendations that allow the creation of successful and cost-effective interventions [30]. In our study, the choice of a tertiary level research such as reviewing reviews has been made to optimise the ability to synthesise the prevailing state-of-the-art on childhood obesity prevention, given the proliferation in the last years of systematic and other types of reviews in public health. Moreover, a review of reviews is an accepted practice in the medical and health behaviour literature.<sup>3–31</sup>

## Methods

To identify current research recommendations on childhood obesity prevention, a search of systematic reviews and meta-analysis published from 2004 to 2015 using the search words “obesity”, “overweight”, “prevention”, “diet”, “nutrition” and “effectiveness” alone or in combination was performed in the MEDLINE and ERIC databases. Limits were set to only include studies targeting children and youth.

Inclusion criteria were

- i. Systematic reviews.
- ii. Studies addressing eating habits alone or eating habits and physical activity/sedentary behaviours.
- iii. Exclusion criteria included
- iv. Papers not written in English or Spanish
- v. Studies focused on specific populations in terms of socioeconomic status, race, disabilities, or other health conditions.

To be coherent with the ecological approach described above, no restrictions were made regarding to the setting of the interventions or

the actors involved. In the cases in which updates of previous review were available only the most recent version was included. References of the selected papers were also searched for further studies, with a final sample of 22 papers. To select the relevant policies undertaken at the different institutional levels, different experts on childhood obesity prevention were consulted. Next, a search for official documents on the different institutions’ websites was conducted.

## Results

### Research recommendations for childhood obesity prevention

Table 1 shows the descriptive data of the 22 systematic reviews included in our study as well as the characteristics of these interventions that have been related to their effectiveness. A preliminary point of consensus among these reviews is the need for more accurately designed experimental studies on the prevention of childhood obesity: very few studies provide cost-effectiveness data, and although some studies reveal positive findings, these present some methodological weak points.<sup>21–35</sup> In addition to the design, another methodological aspect that needs to be taken into account is the development of reliable instruments, along with the collection of anthropometric data and diet records.<sup>35,36</sup> A given study can have positive or negative results depending on the corporal parameter used. For example, skin folds provide different information than adjusted weight,<sup>33–38</sup> so it is indispensable to agree on how obesity is defined and measured, as it will clearly affect the intervention outcomes and comparability between studies. Measurement of behavioural changes also needs to be agreed upon. It has been recommended to base interventions in a behavioural theory and to develop assessment tools based on them. Few studies build their actions upon those theories, and even those theory-founded programmes do not evaluate in relation to their framework.<sup>38</sup> Some authors claim for longer follow-ups, which would allow assessing whether the changes last over time.<sup>32–41</sup> Regarding intervention characteristics, most reviews report actions based on nutritional education. While leaflets or two-hour activities can improve knowledge, they have not shown to modify behaviours sustainably. In this context, long-term interventions that entail contact between the children and the people delivering the intervention appear to be more effective, because habit changes are difficult and require continual reinforcement.<sup>21–43</sup> Beyond that, though, and in accordance with the socioecological approach, the most relevant aspect associated with successful actions is multidimensionality: those interventions tackling dietary along with physical activity aspects, both at the individual and environmental level, have reported the best results.<sup>21–45</sup> The best age for interventions is not yet clear. Most reviews support the premise that primary-school age is appropriate, and most interventions have been conducted in this age range. However, more research is needed to confirm this hypothesis.<sup>35–43</sup> In addition, particularly at young ages, habit changes do not directly depend on children but rather on the adults in their environment, principally parents, but also other relatives, neighbors, teachers, and canteen educators. As expected, family involvement emerges as a crucial aspect<sup>36–48</sup> although a remaining major question concerns how they should be involved.<sup>21–39</sup>

### Public policies against childhood obesity at European level

As we can observe in Table 2, actions against childhood obesity have been undertaken from all institutional levels: the WHO, the

WHO Regional Office for Europe, the EU Commission and the Spanish government has developed wide-range policies aiming at offering an integral solution to the dramatic rise of obesity rates. It becomes evident, for example, in the fact that policies do not target only children -although encourage specific actions for this segment, but they offer a wider range of actions for all population. The overall goal of all the policies reviewed is dual: on one hand, they all seek to address non-healthy habits and sedentary behaviors. They all intend to increase fruit and vegetables consumption and physical activity practice while decreasing the consumption of saturated fats, sugar and refined products. On the other, there is a manifested resolution to connect and engage all society sectors towards the common goal of reducing obesity. In fact, all initiatives seek to improve lifestyle by

- i. Promoting actions in different fields affecting individuals' health behaviours (food industry, education, media, advertising, etc.
- ii. Stimulating relationships between the stakeholders in those sectors with the intention to facilitate and encourage the exchange of experiences and best practice procedures. These aims are obviously tackled differently depending on the institutional level: the role of the WHO is eminently consultative, which means that it will not

display concrete actions, but will provide a solid evidence bases and counselling to the States and institutions with legislative competence on how to implement policies. Likewise, the European Commission has consistently worked towards establishing priorities and offering guidance to the member States, especially through the funding of an important body of researches about the causes of obesity and how to better redirect the current tendency. At this level, the European Commission has also developed regulations in areas under its competence, such as food labelling and marketing. The Spanish government policies are also built upon the principles of a socioecological approach. Their actions transcend far beyond the healthcare and educational areas, by combining actions in all those sectors of society playing a role in preventing obesity. Yet, these actions are developed to a very high level and it remains unclear how individuals have been involved. The NAOS Strategy has not been evaluated yet, although the instruments for its assessment have been developed since 2011.<sup>2</sup> Regarding the PERSEO programme, results have been modest-however, they yield significant directions on how to advance to reduce the prevalence of childhood obesity through a holistic approach.

**Table I** Reviews on the effectiveness of intervention for childhood obesity prevention

Review	Inclusion criteria	Exclusion criteria	Sample	Characteristics of the studies associated with greater effectiveness and further research recommendations
Sobol et al. <sup>43</sup>	Documents published between 2006 and January 2012. At least English language abstract. RCTs of children and teenagers 5-18years old. School-based interventions tested based on their effect on BMI	Studies focused exclusively on obese children or designed to treat eating disorders or other medical conditions.	32 studies.	Comprehensive studies, defined as "having all of the following intervention components: providing information on nutrition and physical activity, attitudinal changes, monitoring eating and physical activity, environmental modifications; and/or all the following lifestyle behavioral targets: increased physical activity, decreased sedentary activity, improved healthy eating and decreased unhealthy eating. Duration longer than 1 year. Involved parental support. Targeting children versus teenagers.
Bleich et al. <sup>40</sup>	Documents published through August 11, 2012. Intervention primarily implemented in the community setting. At least 1 year of follow-up after baseline. RCT of children and adolescents aged 2-18years old. Studies reported differences in weight between the intervention and control groups.	Articles published in languages other than English. Studies targeted only at overweight or obese children or adolescents, or suffering a chronic condition. Studies collecting only qualitative data.	9 studies.	Combination of interventions implemented in multiple settings -including a school component- and focused on both diet and physical activity. Longer follow-up. Targeting children in middle school or younger.
Showell et al. <sup>61</sup>	Documents published through August 11, 2012. Conducted in high-income countries. RCT of children and adolescents aged 2-18years old. Involving a significant family component or targeting children in their homes. Reporting effects on weight-related outcomes.	Studies targeting children with excess weight of other pre-existing medical conditions.	6 studies.	Poor evidence that home-based child obesity prevention programs are effective. Additional research is needed to test home-based interventions, especially those including parenting strategies and addressing environmental influences.

Table Continued..

Review	Inclusion criteria	Exclusion criteria	Sample	Characteristics of the studies associated with greater effectiveness and further research recommendations
Sung-Chan et al. <sup>48</sup>	Documents published between 1975 and 2012. RCT of family-based life-style interventions of weight loss and weight control in children and adolescents aged 2-19.	Not in English.	15 studies.	Family-based models of interventions produce positive effect regarding weight loss in overweight children. Interventions based on behavioral approaches seen to be more effective than those based on systemic theories. More rigorous methodological designs can help to further understand the potential of the family systems approach. Researchers should address the role of gender in family-based interventions, since it may give different meanings and actions towards bodily changes.
Golley RK et al. <sup>59</sup>	Documents published between 1998 and 2010. Prospective studies evaluating the effectiveness of an intervention on children aged 1-18, run in parallel with a control/comparison group. Studies describing community or school-based interventions that included a nutrition or activity component and a behavior change component and involved parents or caregivers. Studies with at least one objectively measured primary outcome or a self-reported subjective outcome assessed using a validated tool.	Studies not applicable to the general population and where the intervention description was not sufficiently clear to code its components.	15 studies.	Effective interventions used behavioral change techniques including providing general information on behavior-health links, prompting practice of behavior and planning for social support/social changes. Intervention effectiveness is associated with study quality and clear use of theory to guide the design. Interventions in which school and families cooperate towards the same goals.
Niemeier et al. <sup>42</sup>	Documents published between 2004 and 2010. Interventions with control group. Children and adolescents aged 2-19 years - old as intervention participants. Interventions with pre and post measurements in terms on BMI.		36 studies.	Interventions that require parent participation more effectively reduce body mass index. Longer interventions that involve parental participation appear to have greater success. Additional studies on how interventions on parents indirectly affect children's BMI are encouraged.
Van Stralen et al. <sup>62</sup>	School-based randomized controlled or quasi-experimental studies. Targeted energy balance behaviors. Children and adolescents aged 4-18 years. Written in English. Conducted mediation analyses.	Not full text available. Outcome other than energy balance-related behaviors associated with overweight prevention.	24 studies.	Interventions that tap into self-efficacy, intention, self-regulation, intrinsic motivation, enjoyment, autonomy support and proxy efficacy for physical activity. Interventions that tackle knowledge, attitude and habit improve dietary habits. Social influence, social support and social norms and eating together may be promising aspects to work on. Different strategies may be needed to change physical activity levels, with regard to diet-related behaviors.
Bond et al. <sup>57</sup>	Controlled trials of interventions designed to maintain appropriate weight and/or achieve weight loss and/or manage weight gain. Interventions with a minimum 3-month follow-up period. Delivered in any setting for children under 5 years old.	Children with underlying causal morbidity.	7 studies	Interventions that promote moderate to vigorous exercise and the active engagement of the parents as role models. Interventions seem to be more successful if they are sensitive to cultural differences. A significant factor in effectiveness may be the training and enthusiasm of the staff for the intervention.

Table Continued..

Review	Inclusion criteria	Exclusion criteria	Sample	Characteristics of the studies associated with greater effectiveness and further research recommendations
Golley et al. <sup>59</sup>	<p>Studies published between 1998 and 2008.</p> <p>Prospective studies of any duration of a researcher-introduced intervention with control groups and objective pre- and post- measures.</p> <p>Interventions targeting parents to improve children's weight status, dietary and or/activity patterns targeting nutrition or physical activity AND a behavior change.</p>	<p>Not English language.</p> <p>Studies not applicable to the general population.</p>	17 studies	<p>Interventions that include strategies that span the spectrum of the behavior change process. Interventions that use behavior change techniques to consider include specific goal setting, prompt self-monitoring and self-talk, encourage barrier identification, restructure the home environment, set graded tasks and provide contingent rewards.</p> <p>Both interventions targeting one or multiple behavior changes.</p>
Waters et al. <sup>35</sup>	<p>Controlled study design with or without randomization.</p> <p>Interventions longer than 12months targeting children younger than 18years old at the start of the study.</p> <p>Objective weight-related outcome measures weight, % fat content, BMI, pondered index, skin-fold thickness, obesity and overweight prevalence.</p>	<p>Interventions for preventing childhood obesity or targeting specific populations.</p>	55 studies.	<p>Interventions need to be developed that can be embedded into ongoing practice and operating systems, rather than implementing interventions that are resource intensive and cannot be maintained long-term.</p> <p>Programs have beneficial effects on BMI, particularly when targeted to children aged 6-12years old.</p> <p>More research should be carried out to distinguish which of the components of the interventions contributed the most to the positive changes. Until the moment, the following strategies seem the most promising: inclusion of healthy eating, physical activity and body image content on the school curriculum, increased physical activity hours at school, parent support and home activities, environments and cultural practices that encourage children to eat more healthily and be more active; involvement of teachers and school staff.</p>
Hesketh et al. <sup>38</sup>	<p>Studies published between January 1995 and August 2008.</p> <p>Targeting children 0-5years old. And reporting anthropometric, diet, physical activity or sedentary behaviors outcomes.</p> <p>School-based interventions English language.</p>	<p>Focused on breastfeeding.</p> <p>Eating disorders.</p> <p>Obesity treatment.</p>	23 studies.	<p>Interventions need to be sensitive to cultural and socioeconomic differences.</p> <p>Interventions are effective when they target skills and competences, and not only knowledge.</p> <p>Most studies reporting modest results lacked a parental component that may be key.</p> <p>More data on the cost-effectiveness of these interventions is required.</p>
Hingle et al. <sup>47</sup>	<p>RCT of interventions that included child dietary intake as a behavior change target and as a measured primary or secondary outcome.</p> <p>Published between 1980 and 2008.</p> <p>Targeting children and teenagers 2-18years old and involving a parental component</p>	<p>Studies designed to treat obesity or targeting children with specific medical conditions.</p>	24 studies.	<p>Studies using direct methods to involve parents are more likely to report positive results than those using indirect methods.</p> <p>Strategies targeting parents may be more effective than those operating in schools.</p> <p>However, the understanding of the parenting strategies linked to positive results need to be improved.</p>
López et al. <sup>46</sup>	<p>Studies published between 1998 and July 2008.</p> <p>Targeting children younger than 18years old.</p> <p>Including direct or indirect measures of body adiposity.</p>	<p>Results nor applicable to the general population.</p> <p>Interventions to treat obesity.</p>	40 studies.	<p>Increasing physical activity time at school reports positive results.</p> <p>Interventions should take into account the different cultural and socioeconomic backgrounds.</p> <p>More research about the optimal duration, follow-up, and ways to implement multiple setting interventions need to be carried out.</p>

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Review	Inclusion criteria	Exclusion criteria	Sample	Characteristics of the studies associated with greater effectiveness and further research recommendations
Brown & Summerbell. <sup>58</sup>	Studies that reported a weight outcome. RCT or controlled clinical trial of lifestyle interventions set in school for children aged 5-18years old and of at least 12weeks of duration.	Not English language. Studies targeting children with critical illnesses or eating disorders.	38 studies	Physical activity interventions may be more effective in younger children and girls. Gender differences need to be taken into account. There is insufficient evidence to elucidate whether physical activity interventions are more or less effective than dietary interventions, but the combination of both seems effective to prevent weight gain at least in the short term.
Jaime & Lock <sup>32</sup>	Studies published up to November 2007. Interventions at <i>pre-, primary or secondary schools</i> . Interventions that promote changes in the environment, beyond nutritional education.	Non-school setting. Studies targeting specific populations.	18 studies	Longer interventions that include environmental changes that remain after the intervention get better results. There is a need to foster programs evaluation, especially in the follow-up.
Kropski et al. <sup>33</sup>	Studies published between 1990 and 2005. Experimental or quasi experimental studies targeting children 4-14years old. BMI as a primary or secondary outcome. Duration longer than 6months.	Studies on obesity treatment.	14 studies.	Evidence suggests that girls may respond better to educational components grounded based upon social learning, while boys may be more influenced by structural and environmental changes facilitating increased physical activity and improved diet intake. Long interventions targeting 10-14years old seemed to obtain better results. Further research is needed to determine whether involve parents is a cost-effective strategy.
Sharma <sup>36</sup>	Studies published between 1990 and 2005 in English language. Interventions conducted outside the United States targeting children 3-18years old.	Studies published in no peer reviewed journals. Interventions targeting only obese children.	21 studies.	Studies targeting primary school children and based in some behavioral theory seem more effective. Interventions yield better results when parents are involved. More research is needed to elucidate whether one component or multicomponent interventions are more effective.
Li et al. <sup>34</sup>	Studies published between 1990 and 2006. Interventions conducted in Chinese kinder gardens or schools.	Interventions addressing students with specific medical conditions.	22 estudies	The interventions reported in the studies that focused on health education and/or lifestyle behavioral changes e.g. eating habits, physical activity were reported to be effective. None of the trials identified by this systematic review demonstrated convincing evidence of the efficacy of any single intervention for the prevention of overweight and obesity in children and adolescents from Mainland China.
Sharma <sup>39</sup>	Published in English. Published between 1999 and 2004. Conducted in the USA or UK. Addressed not only to obese children. Having an explicit school-based curriculum for prevention of obesity.		11 studies	Most of the interventions focused on behavioral changes at the individual level, such as physical activity and nutrition, or TV watching. Further research is needed if interventions are more effective when targeting one specific behavior or when they address a combination of them. Anyway, it seems clear that both diet and physical activity need to be addressed. Interventions targeting children below 10years old seem to be more effective. Most of the studies are based upon some behavioral theory, but behavioral changes are, in general, poorly documented. More efforts to develop instruments that measure them are needed. Few studies involve families, although this is a potentially promising approach. School interventions need to be reinforced with environmental changes and local policies.

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Review	Inclusion criteria	Exclusion criteria	Sample	Characteristics of the studies associated with greater effectiveness and further research recommendations
Doak et al. <sup>37</sup>	Published until 2005. Interventions targeting school age children. Interventions with pre- and post- body measures. Interventions targeting diet and/or physical activity.	Studies with a documented monitorization and evaluation. Non-obesity related studies. Interventions addressed only to obese children.	25 studies	There is a need for more research with more rigorous designs. Until the moment, primary school interventions seem to be more appropriate. Physical education in schools and reducing television viewing are two examples of interventions that have been successful. Gender, ethnicity and culture need to be taken into account since are likely to affect interventions' results.
Flynn et al. <sup>21</sup>	Published between 1982 and 2003. Studies reporting on outcome weight, comorbidity, risk factors and process indicators.	Program reports associated with marketing products. Foreign language reports that did not include English abstract. Case studies, surgical interventions. Participants older than 17years old. Participants with physical or mental health issues.	147 studies	Health education on healthy diet and physical activity was the most common intervention. Environmental interventions were infrequent. There is a need to develop validated measures to assess behavioral changes. Self-evaluations are susceptible of producing biased results. There are several methodological limitations that hinder the validity of the results of the paper reviewed. There is a lack of long-term studies that makes difficult to confirm behavioral changes in the youth after the interventions. Few studies consider the role of a leader as something conditioning the success of the program, but it seems a promising strategy. Few studies address psychosocial variables. There is a gap of specific interventions for some groups, namely 0-5y old, immigrants, and boys. Schools emerge as a pivot in childhood obesity prevention. On the other hand, studies regarding the family setting are lacking.

**Table 2** Childhood obesity policies implemented at different institutional levels affecting Spain

Name	Institution	Major aims	Objectives	Other key questions	Actions undertaken	Evaluation
Global Strategy on Diet, Physical Activity and Health, 2004WHO <sup>63</sup>	WHO, in response to the request made by the Member States in the World Health Assembly 2002.	To provide a wide range of global policy options for all sectors WHO, States, International Associates, Private Sector and Civil Society to address non-healthy habits and sedentary behaviours.	To reduce risk factors for unhealthy diet and sedentary behaviour-related chronic diseases through the development of Public Health actions. To raise awareness and understanding on diet and physical activity influences on health and the potential positive effect of preventive action. To develop, reinforce and implement policies at the global, national and regional level, as well as sustainable action plans to improve diet and physical activity levels that actively involve all sectors. To promote research in healthy eating and physical activity.	It enunciates responsibilities for each of the stakeholders involved WHO, States, International Associates, Private Sector and Civil Society and formulates specific recommendations.	Given the consultive role of the WHO, the main endeavor undertaken under the umbrella of the Global Strategy consist of activities that intend to encourage States and other stakeholders to develop and implement comprehensive policies to prevent non-communicable diseases.	No.

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Name	Institution	Major aims	Objectives	Other key questions	Actions undertaken	Evaluation
European Charter on Counteracting Obesity, 2006 <sup>65</sup>	WHO Regional Office for Europe, together with the European Commission	To place obesity among the priorities of Public Health and other sectors political agendas and to promote greater awareness and political engagement.	To help WHO European countries: To evaluate their needs. To assess current state, tendencies and policies. To gather and analyse evidence of intervention effectiveness. To promote knowledge and good practice exchange, as well as facilitate global agreements in the fight against obesity.	It claims political commitment and governmental leadership to mobilise and create synergies between the different social actors. It set goals to be achieved and principles and guidelines to reach them. It recognises the value of working at the local level. It reminds us that every policy – economic, agrarian, transport- has an impact on health.	According to its advisory role, providing guidance and support to the Member States based on updated evidence.	No
EU Action Plan on Childhood Obesity 2014- 2020 <sup>66</sup>	European Commission, in coordination with the WHO.	To demonstrate the shared commitment of EU Member States to address childhood obesity; to set out priority areas for action and a possible toolbox of measures for consideration and to propose ways of collectively keeping track of progress – while recognizing Member States' roles and freedom of action in counteracting childhood obesity.	The Plan, which strongly emphasises Member States exclusive competence in defining national health policies, sets out eight priority areas for various stakeholders to: Support a healthy start in life Promote healthier environments, especially in schools and pre-schools Make the healthy option the easier option Restrict marketing and advertising to children Inform and empower families Encourage physical activity Monitor and Increase research	As a continuation of the Strategy for Europe on Nutrition, Overweight and Obesity-related Health Issues 2007, the Action Plan benefits from the its evaluation and applies a much more comprehensive approach on the causes and health effects of childhood obesity, poor diet and physical inactivity, and how these can be operationalized.	No data available yet.	It counts with a complete set of operational objectives and indicators to be applied at the end of 2020. Additionally, a review of the objectives and actions described in 2014 is foreseen to be done every three years to stablish whether some redirection is necessary.



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Name	Institution	Major aims	Objectives	Other key questions	Actions undertaken	Evaluation
White paper, "A Strategy on Nutrition, Overweight, and Obesity-related health issues" 2007 <sup>67</sup>	European Commission, from the Green Paper "Promoting healthy diets and physical activity: a European dimension for the prevention of overweight, obesity and chronic diseases" and the EU platform for action on diet, physical activity and health.	To complement and optimise national and local actions, as well as address some issues of the European Commission competence. To combine local and national actions of common interest and set mechanisms to share good practices.	<p>It is mainly focused on measures that affect EU fields of competence; thus, the measures are primarily legislative and economic:</p> <ol style="list-style-type: none"> <li>To regulate advertising especially that addressed to children and nutritional labelling.</li> <li>To give options for a healthier lifestyle, promulgating laws to promote a greater consumption of unprocessed food and more regular physical activity practice, for example, encouraging bicycle use as a regular means of transportation.</li> <li>To give priority to childhood obesity, especially through environmental actions, with the support of teachers and families and in cooperation with local and national governments. To establish a communitarian system to monitor and evaluate actions.</li> </ol>	<p>It is developed under the assumptions that: As a last resort, each individual is responsible for his/her lifestyle and his/her children's lifestyle. Only a well-informed consumer can make well-reasoned decisions. Integral responses involving different sectors and levels are needed to develop effective responses to the current situation.</p>	<p>Creation of the High Level Group on Nutrition and Physical Activity<sup>31</sup> and the EU Platform for Action on Diet, Physical Activity and Health as primary instruments set up for implementation of the Strategy. Formulation of policies regarding food labelling, nutrition and health claims, the Common Agricultural Policy CAP and the transport, urban planning, education and culture sectors, as well as research projects in physical activity, nutrition and health</p>	<p>Independent external evaluation in 2012/2013. The results of this evaluation were positive and support continuation of the Strategy and its However, it was determined that to ensure a more balanced response, greater focus is now needed on physical activity promotion. Continued coordination at the EU-level by the European Commission also remains necessary to facilitate actions relevant to children and young people.<sup>70</sup></p>
NAOS strategy, 2005 Strategy for Nutrition, Physical Activity and the Prevention of Obesity <sup>68</sup>	Ministry of Health and Consumer Affairs, through the Spanish Agency for Food Safety and Nutrition AESAN	To address the current Spanish obesity situation through an approach that involves families, communities, schools, health centers and the private sector.	<p>To change obesity tendencies and to prevent the development of obesity as well as that of eating disorders</p> <p>To make people aware of the benefit of, and to promote, a healthy diet and the practice of physical activity as a means to maintain energy balance.</p> <p>To work with the food industry to promote healthier products.</p> <p>To promote health professional awareness to systematically assess and follow obesity.</p> <p>To promote obesity-related research to find effective ways to prevent and treat obesity.</p>	<p>It promotes action to bring obesity prevention to local agendas. It develops preventive actions targeting publicity and marketing addressed to children.</p>	<p>Development of specific regulations for the advertising of food products for children – Código PAOS. Launch of several publications on healthy eating and physical activity for different targets. Agreements with the private sector for the formulation of healthier food products.</p>	<p>A set of indicators was developed in 2011 to monitor and assess the strategy, but it has not been applied yet.</p>

Table Continued..

Name	Institution	Major aims	Objectives	Other key questions	Actions undertaken	Evaluation
PERSEO Programme, 2006 Pilot Programme in Schools for Health and Physical Exercise and against Obesity <sup>69</sup>	Spanish Ministries of Health, Social Services and Equality and the Ministries of Education, Culture and Sports	As a NAOS Strategy in schools, it aims to promote the learning of healthy eating habits and to encourage regular physical activity among schoolchildren to prevent obesity.	To promote the development of a healthy lifestyle among scholars to prevent childhood obesity. To detect childhood obesity early and avoid its progression through clinical assessment in primary health care. To raise awareness on the important role of educators To create a school and family environment that favours healthy eating and regular physical activity practice. To design indicators to be applied and assessed easily.	It purports that its actions also reach families and plans actions to make healthy food choices easier to make; it is also present in school canteens. Its first results have shown a modest reduction of the prevalence of obesity and a greater change of habits among the scholar-participants.	Development of guides on healthy eating for families, schools, Health professionals and children. Organization of workshops for teachers, families and class activities for children.	Significant improvement of physical activity levels and diet quality. Modest results on the prevalence of obesity, which increases during the study, but less than in the control group.

## Discussion

Tackling childhood obesity is a serious public health issue and a major concern worldwide, as evident in the numerous actions undertaken by different institutions. In the last years, a vast theoretical comprehension of the phenomenon, as well as a growing social awareness has been achieved, but, in practice, the situation has not significantly improved.<sup>5-49</sup> Current understanding of obesity, as well as recent investigations support a holistic approach that extends beyond mere education and involves different stakeholders at the individual, social and environmental levels. At this point, obesity is a social issue that will only be solved with strong policy actions. However, policymakers face numerous barriers to work on this direction, one of the most relevant being the difficulty of implementing systemic policies based upon compartmentalised research.<sup>6-50</sup> On paper, the policies analysed in this study comply with and incorporate research recommendations, attempting to offer an integral response to the current situation; but in practice there is a gap in how to reach these goals, as well as a functional overlap of objectives and actions between the different institutional levels. Actions need more definition, particularly in the procedural and methodological aspects. In most cases, the target for these actions is not clear, nor is it how the message will arrive or how it will change attitudes and behaviours. These observations are valid in the case of Spain, and, considering the different levels of competence, in the case of upper institutions too. In order to optimise resources, it is essential to connect the different institutional levels so that each one has well-defined competencies, objectives and actions. By avoiding duplications, a better resource distribution is favoured and a greater scope of and/or more intense actions can be launched. In other words, childhood obesity prevention must move towards the milestone set in the European Charter on Counteracting Obesity, which is to consolidate a framework that connects the main stakeholders, policies and actions taken at different levels and that enables the enhancement of the capabilities of each contributor.<sup>6-51</sup> Our results indicate that we have enough evidence to know what to do, but we still need to figure out how to implement these actions in a coordinate and sustainable way. From our perspective, a lot can be learned by examining how these local partnerships have been developed in other fields. For example, collaborative networks have demonstrated to be a valuable tool to improve educational achievement, innovative capacities and

a greater organizational capacity at the community level,<sup>52-56</sup> and given the common characteristics of those phenomena with childhood obesity, they may well serve as inspiration for the development and implementation of more comprehensive models of intervention in public health.

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## Conflict of interest

Author declares that there is no conflict of interest.

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