

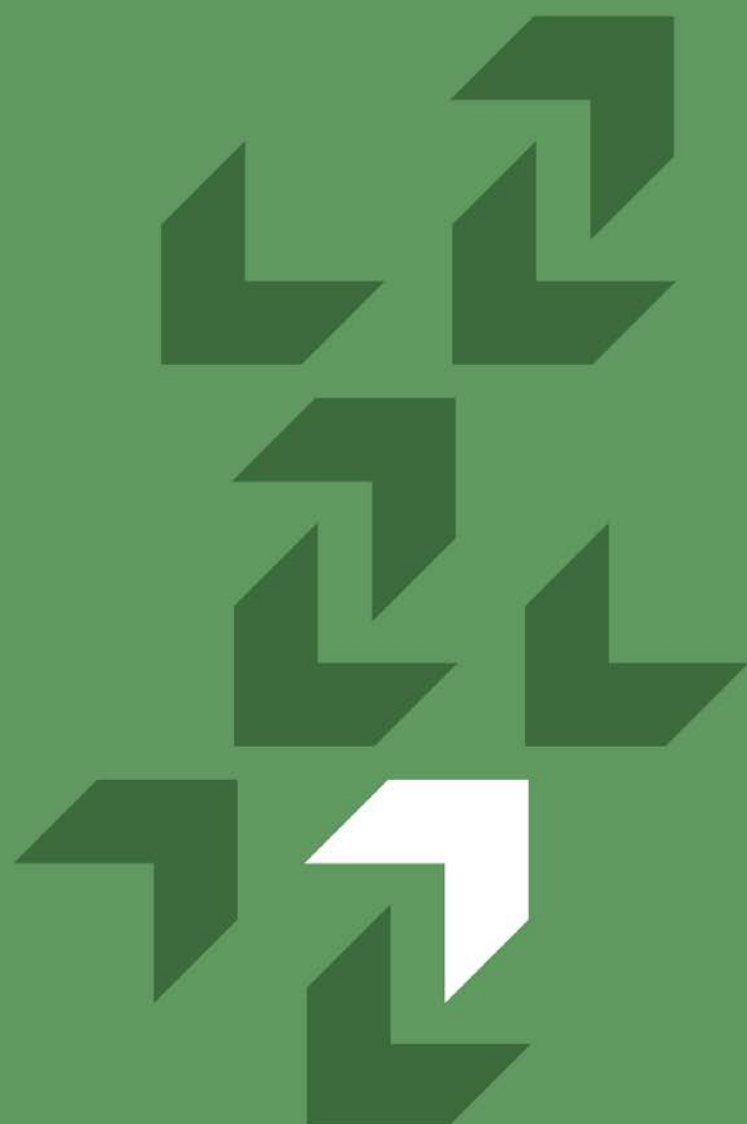


**Què funciona**  
contra la pobresa?  
Àmbit Pobresa infantil

**Report**

# What works against poverty?

Policies and programs to ensure healthy nutrition for vulnerable children: a systematic review of the literature



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# What works against poverty?

## Policies and programs to ensure healthy nutrition for vulnerable children: a systematic review of the literature

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**The ideas presented by the authors do not necessarily have to coincide with those of the entities leading the project**



Projecte de recopilació, anàlisi i transferència d'evidència per a millorar les polítiques públiques destinades a mitigar la pobresa infantil

Un projecte de:



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## 1. Introduction

This report carries out a systematic review of the existing international literature on evaluations of interventions, programmes or public policies focused on guaranteeing or improving a healthy diet in the child population at risk of poverty or social exclusion. This is the third report in the collection *What works against child poverty?* and complements the previous ones, focusing on child malnutrition. In particular, it focuses on the diversity of interventions that seek to mitigate this problem, their approaches (highlighting their most important characteristics) and those that have been most effective. The social and economic context of Catalonia has been taken into account in order to detect those interventions made in similar environments and which, if implemented, could have similar effects.

The synthesis of evidence has been motivated by two factors: the high incidence of the problem and the political will to respond to it. On the one hand, the growing malnutrition in the child population (which results in high prevalences of excess weight and obesity (35.6% of the child population)) and the high rates of poverty and social risk in children (1 out of every 3 children). These two elements are interrelated and lead to more pronounced malnutrition in children in a more vulnerable situation. And, on the other hand, the Strategy to fight child poverty in Catalonia, presented in April 2024, includes access to healthy food as one of the main lines of action, as already established the Government Resolution that gave rise to it and which goes in the same direction as that set out in the European Child Guarantee of the European Union (EU).

Despite existing initiatives, a better understanding of the impacts of interventions on children in vulnerable situations is needed. Intended to be a tool for public decision-makers, the summary ends with the most prominent ideas and future public implications.

## 2. Motivation

Child malnutrition<sup>a</sup> is a reality that has been growing in Catalonia in recent years in parallel with the increase in children who are at risk of poverty or social exclusion. The latest Living Conditions Survey (ECV) (2023) shows that 10.9% of children under the age of 16 are in a situation of severe material deprivation and that 5.7 % cannot eat meat, chicken or fish at least every other day (Idescat, n.d.). 32.5% of children and adolescents in Catalonia are at risk of poverty or social exclusion (AROPE rate, EU 2030),<sup>b</sup> according to data from the same survey (Eurostat, n.d.). This means a very large number of children in Catalonia have difficulty accessing the food necessary to have a sufficient, nutritious and healthy diet, which mainly results in excess weight, since the low-cost food alternatives are more likely to be high in sugars, sodium and saturated fat.

Childhood excess weight and obesity are a well-established fact in Catalonia. Data from the Health Survey of Catalonia estimate that in 2022, 35.6 % of children were overweight (Results of the Health of Catalonia (ESCA) survey. Department of Health, n.d.), which places Catalonia at the bottom of Europe, where the average is 29.5 % (in 2016, most recent data available) (World Health Organization, n.d.). Although it is a global problem, excess weight and obesity are directly linked to the socioeconomic situation of the children who suffer from them. The prevalence of childhood obesity is particularly high among children of families with lower incomes (Carrilero et al., 2021), lower level of education (Posso et al., 2014) and in more depressed environments (De Bont et al., 2020; González-Bueno and Gómez, 2019). This inequality has been increasing in recent years and the probability of suffering childhood obesity doubles when the child lives in an environment of deprivation

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<sup>a</sup> Malnutrition is defined as the pathological state that results from incorrect nutrition due to deficiencies, excesses and imbalances in the person's caloric and nutrient intake. There are three main types of malnutrition: malnutrition, over-nutrition and nutritional deficiencies (see [Glossary](#)).

<sup>b</sup> AROPE rate, EU 2030. At risk of poverty or social exclusion, abbreviated AROPE, is the sum of people who are either at risk of poverty or suffer serious material and social deprivation, or live in a household with very low work intensity. People are included only once, even if they meet more than one criterion. The AROPE rate is the proportion of the total population that is at risk of poverty or social exclusion of the total population. It is the main indicator to monitor the poverty and social exclusion objective of the EU for 2030.

compared to a more well-off environment (Carrilero et al., 2021; De Bont et al., 2020). Furthermore, as the risk of family poverty increases, so does the probability of more excess weight and, therefore, worse current and future health status. Recent evidence highlights worrying figures and confirms that, without immediate, deep and structural action, children who are now overweight (between 35% and 40% according to sources: the Spanish Food Safety and Nutrition Agency. Ministry of Consumer Affairs. High Commissioner for the Elimination of Child Poverty. Presidency of the Government, 2022; Department of Health, 2023), the more likely they will go on to be obese as adults, with the repercussions this entails for the health of children themselves and future adulthood, and also in other areas, such as the health system (Horesh et al., 2021; Llewellyn et al., 2016; Simmonds et al., 2016). Being overweight in childhood is a determining risk factor for many diseases: type II diabetes, cardiovascular diseases, cancer, and musculoskeletal disorders, among others (González-Bueno and Gómez, 2019). This shows the link between child poverty, poor nutrition, the impact on health and development and on the level of education achieved and future work capacity, as well as on the state of health. This situation contributes to poverty in adulthood, closing a vicious circle of persistent impoverishment that is difficult to break. In addition, being overweight and obese increases the possibility of suffering discrimination, stigma and social isolation, which translates into poor school performance, greater risk of bullying or psychological disorders related to low self-esteem in childhood (Rupp and McCoy, 2019).

Moreover, the impact of malnutrition, and some of its consequences such as obesity and excess weight, includes other spheres of the child that influence the environment for the development of their full personality and growth in a healthy, balanced and loving environment. These spheres are included in several rights in the Convention on the Rights of the Child (CRC): the right to health, education, information, non-discrimination, play and recreation and, in general, the right to full development without distinction of any status (United Nations, n.d.).

The United Nations 2030 Agenda for Sustainable Development also includes, in its goals, the need to act to guarantee a healthy diet for the child population and, in particular, for those in a situation of poverty, as a way to

ensure a childhood as healthy and fulfilling as possible in the broadest sense. Of the established SDGs, we are directly challenged by SDG 1 on the eradication of poverty, SDG 2 on hunger and malnutrition and SDG 3 on health and well-being. It is therefore clear that malnutrition is a problem that has implications in other areas of child development and thus has been recognised by a number of institutions and political frameworks; for this reason, action strategies have been created that jointly promote change or reduce its consequences.

In addition, the European Child Guarantee - an initiative of the Council of the European Union (EU) aimed at guaranteeing effective access to key services for children in situations of poverty or social exclusion and groups of children in situations of vulnerability- sets out, as one of its lines of action, the guarantee of a healthy diet (The Council of the European Union, n.d.). This purpose is specified in several recommendations to the government authorities, such as the guarantee of a healthy daily meal at school, and in the promotion of healthy eating outside the school environment.

Although each EU member state must develop a national plan for its implementation, the autonomous communities and local entities are key players in contributing to the achievement of these goals. UNICEF was commissioned by the European Commission to carry out a diagnostic audit of the situation of children and make a series of proposals. In the case of Spain, these have resulted in the National Action Plan for the implementation of the European Child Guarantee (2022-2030), n.d.) With regard to Catalonia, the Strategy to fight child poverty, approved in the Government of Catalonia's Resolution of 10 October 2023 (Department of Social Rights, 2023), is a roadmap created to reverse the current child poverty data in our country and guarantee all children their right to an acceptable standard of living, and to their full development and well-being. The Strategy promotes several lines of action, along the lines of the European Child Guarantee, specifically: 1) benefits and aid, 2) education, 3) language, educational leisure and school success, 4) healthy eating, 5) health, 6) housing and energy poverty, 7) employment of families with dependent children and 8) gender perspective.

It is a fact that child malnutrition is increasingly present on the agenda of institutions, and Catalonia is no exception. An example of this is the various

initiatives that have been carried out to address child malnutrition in Catalonia, all with the aim of reducing and preventing excess weight and obesity among children and adolescents. The approaches are different, among which we highlight the following: inclusion of a family member as an active participant in the intervention (Bibiloni et al., 2019), inclusion of community assets (Cabezas Peña et al., 2023; Gómez et al., 2018), programmes developed and integrated into the school curriculum (Sánchez-Martínez et al., 2021) and programmes with a large physical activity component (Serra-Paya et al., 2013).

These are some examples of experiences that have been implemented and, in some cases evaluated, with varying degrees of success in Catalonia. However, many of these public policies have not taken into account, neither in their design nor execution, the child population at risk of social exclusion. In other words, the axis of inequality has not been factored in from the beginning in their creation, execution or evaluation of the population at risk of poverty: for example, no strategy has been conceived to ensure access for all children or, in a more evaluative context, it has not been stratified according to socio-economic levels or some other variable that captures the state of vulnerability. The lack of knowledge of the impact of interventions and policies on the most vulnerable population is a systemic issue that needs to be reversed. There are two main reasons: first, it is necessary to ensure that the intervention is effective at all social levels and, if possible, to a higher degree in those groups with the greatest need; otherwise, we would be further exacerbating existing inequalities among the child population. And second, as an exercise of responsibility and transparency of public expenditure, which must produce a return on the results obtained.

It is in this context of social urgency, given the data on child malnutrition and children at risk of poverty and unacceptable social exclusion, violation of the child's fundamental rights and the need for government agencies - through the creation of the Strategy for the fight against child poverty - to be equipped with tools and knowledge, that this review makes sense and responds to current needs.

This report addresses the state of the issue of what works in terms of guaranteeing and improving nutrition in children and adolescents through a review of evidence from different interventions, programmes and public



policies implemented around the world. These practices are structured according to the scope of action and the age of the target population. The report ends with a series of recommendations for the design of public policies.

### 3. Description of the programmes covered in this review

Child malnutrition can lead to several health outcomes, among the most immediate, malnutrition or excess weight (morbidly overweight or obesity at its highest level of severity). In the reality of our environment, as a high-income country, child malnutrition mainly results in an increase in the prevalence of excess weight and obesity (Bentham et al., 2017; Vaquera et al., 2018).

It is for this reason that the interventions and programmes carried out in high-income countries with a population at risk of poverty or social exclusion focus on preventing and reducing excess weight and obesity and ensuring appropriate nutritional content in meals. In addition, there has been an increase in the population under the age of 16 who cannot afford meat, chicken or fish at least every other day since 2020 (Idescat. Living Conditions Survey, n. d.).

This report classifies the existing evidence into three broad categories, according to the sphere of action: individual sphere, family sphere and structural sphere. The consideration of these three spheres follows the current conceptual frameworks in which different levels of influence of social factors on inequalities in child malnutrition are identified (Borrell and Malmusi, 2010; Jebeile et al., 2022; Unicef, 2021). However, these spheres are not watertight, that is to say, many factors or social determinants influence two or more spheres, and an interrelationship is established between them. This is why some interventions have even had impacts in all three spheres at the same time. This complexity has been made explicit in the classification of the existing evidence, as comparison between programmes becomes difficult.

Another issue is the age group at which the intervention is aimed, since the interventions, and their results, vary greatly according to the stage of the child's life. In this study, the school stages have been taken into account to create three large age groups: from 0 to 6 years, from 7 to 12 years and over 12 years.

Finally, it is also necessary to mention the great diversity of criteria when considering the risk of poverty or social exclusion. It has been defined in many ways, partly narrowed down by the source of information available. To exemplify this great heterogeneity, to identify this population, the evidence used is: the income level of the family unit, whether or not it receives social assistance, the parents' educational background, belonging to ethnic minorities and indices of economic deprivation of the area where they reside. This great diversity in the classification of our population under study shows the difficulty of specifying among different contexts what is considered a risk of poverty, and also the lack of individual data to specify vulnerability thresholds.

It should be noted that, although the aim and design of the policies are essential for the achievement of the milestones, the way in which they are implemented must not be forgotten. Implementation, suited to the context and the intrinsic characteristics of the population, is key to the success or failure of the same policy.

Taking into account the above criteria, this report has defined three large groups of interventions or public policies, focusing on the main component of each intervention.

### **1) Individual sphere**

These are programmes that mainly affect individual factors. They address aspects of behavioural change, knowledge, attitudes and beliefs about the relationship between perception of one's own weight, self-esteem and psychosocial health.

The population to which these programmes are directed is children, although parents are often also included in part of the sessions, albeit in the background.

## 2) Family sphere

The main aim of these interventions is to affect the family and the child's closest environment. Within this large group, we can distinguish different types according to the age they are aimed at. In family programmes with children aged from 0 to 6 years, parents are the main recipients of the interventions, and exclusively if they are aimed at families with children under 3 years of age.

There is a great diversity of programmes, although the vast majority try to influence behavioural changes in the parents to establish new habits in the family environment. Of the various programmes, however, we will highlight two in particular:

- Parenting support programmes

These are programmes whose main aim is to support parenting, through a multidisciplinary team, to families of low socio-economic status or ethnic minorities, during the child's first 1,000 days.

- Cash transfer

They are financial support programmes for family units with few resources that help in obtaining basic necessities. This type of policy, known as cash transfers, generally consist of wallet cards with a regular transfer of money according to the economic and social situation and the number of members of the family unit.

## 3) Structural sphere

At this level of intervention, the programmes included address aspects such as school canteens (both in terms of access and quality) and regulations and legislation. We highlight:

### **Policies with regard to the school canteen:**

- School canteen

The universal free school canteen is one of the public policies that has spread in many countries. The school canteen is considered an ideal space to guarantee at least one meal a day with suitable content for all children.

Although this service is not free in all countries, other mechanisms have been implemented to guarantee this service, as is the case with food vouchers according to the income level of the family unit.

- Legislation on nutritional quality standards in school canteens

The school canteen is an unrivalled space to influence the quality of the food children eat. According to data from Barcelona, 69 % of children of compulsory school age regularly use the school canteen service; the figure rises to 84% at primary level (Barcelona Education Consortium, 2023). In Catalonia, the Public Health Agency of Catalonia advises and issues recommendations to ensure a balanced menu according to current regulations (Public Health Agency of Catalonia (ASPCAT), n.d.; Law 17/2011, of 5 July, on Food Safety and Nutrition, 2011). On the other hand, the creation of a common regulatory framework is also a matter of public policy that must be put into effect to help reduce inequalities between schools and guarantee the nutritional content of one of the child's three meals.

#### **Consumer behaviour policies:**

- Tax on sugary drinks

In order to discourage the consumption of unhealthy products, the WHO recommended, among a package of measures, levying a tax on some foods, mainly on sugary drinks (soft drinks and sweetened fruit juices) and foods with high saturated fat content (World Health Organisation, 2015). In Catalonia, it has been applied since 2017, with the approval of the Law 5/2017, of 28 March, on fiscal, administrative, financial and public sector measures and the creation and regulation of taxes on large commercial establishments, on stays in tourist establishments, on radiotoxic elements, on packaged sugary drinks and on emissions of carbon dioxide. The aim of this public health measure is twofold: to improve the population's state of health and to raise tax funds to alleviate the negative effects on the health of the population that these foods cause.

- Legislation on nutritional labelling of foods

Since 2016, EU legislation has established the obligation to include nutritional information on the front of food (European Parliament and Council of the European Union, 2011). This information has often been shown in the form of a table, and for this reason it is difficult to understand, even more so when it comes to the most disadvantaged social classes. To facilitate this requirement, the Nutri-Score has been developed as an alternative to the previous model. It is a traffic light-type visual labelling scheme that allows you to display, according to colour, the overall quality rating of food (Aesan - Spanish Food Safety and Nutrition Agency, n.d.).

## 4. Questions that guide the review

The aim of this project is to review the best available evidence published in different countries with a similar context to that of Catalonia - Europe, the United States, Canada and Australia - on the impact of the various programmes on guaranteeing a healthy diet for children of families in a vulnerable situation and reducing the malnutrition of children in poverty. It is therefore a matter of collecting, reviewing and synthesising the quality evidence that mainly reports on the effects of these interventions. Moreover and more specifically, the review aims to answer the following questions:

- What are the most important services, resources and policies to ensure healthy eating for children at risk of poverty or social exclusion?
- What are the characteristics of the programmes that have been shown to be most effective? Are there other dimensions that need to be taken into account when making implementation more effective?
- Are there examples of good practices that can be taken as models for improving the design of these policies here?

## 5. Review of the evidence

### 5.1. Methodology

A literature review was carried out in bibliographic databases (PubMed, Cochrane, Embase, Scopus and Google Scholar) and other sources of

information (institutional and government websites) (see Annex 1 for the search strategy).

The inclusion criteria for the evaluations of this review were as follows: 1) experimental or quasi-experimental methodology, systematic reviews or meta-analyses; 2) results according to the child population at risk of poverty or social exclusion; 3) intervention effects measured in nutrition or health indicators; 4) interventions carried out in the period 2004-2024, and 5) journals or institutions from high-income countries (Europe, the United States, Canada and Australia).

For the review, 43 publications of interest were considered (7 of which were systematic reviews). In exceptional cases, the inclusion of analyses with observational methodology has been considered when there was no alternative to exemplify and describe some type of specific intervention of special interest (it has been indicated, where appropriate, in the body of the report).

## **5.2. Analysis of the evidence**

Next, the included interventions were reviewed according to the scope of action of the interventions: individual sphere, family sphere and structural sphere, with their relevant subcategories. Their impacts are discussed and the most significant and explanatory characteristics for their implementation are developed.

### **a) Interventions at the individual level**

Broadly speaking, the most common interventions in the individual sphere are those carried out during school hours. They target primary school children (6-12 years) and first cycle of secondary school (13-15 years) and include educational activities for the explanation of nutritional concepts.

#### ***What are the impacts? Do they work?***

The meta-analysis by Pastor and Tur (2020) summarises the effectiveness of programmes that included behavioural change interventions in eating habits in children and adolescents at risk of poverty (Pastor and Tur, 2020). This study concludes that there is a significant, albeit small, overall positive

effect on changes in eating habits. That is, in a reduction of unhealthy foods (sugary drinks, foods high in saturated fat, etc.) or an increase in healthy foods (fruits, vegetables, wholemeal flours, vegetable protein, etc.).

Another systematic review by Yoong et al. (2023) on the effects of interventions focused on eating habits in children between 6 months and 6 years old in an educational setting (Yoong et al., 2023) shows that the overall impact of the interventions is uncertain and globally low for the general population, although it is established that they may help in increasing fruit and vegetable consumption, but not in reducing consumption of unhealthy foods. If we compare the effects according to the socioeconomic level of the population, we see that the population of low socioeconomic level produced better results than those of high socioeconomic level in the quality of the diet in general, but also showed lower effects in fruit, vegetable consumption and similar effects on the BMI-z-score.<sup>c</sup> This fact highlights and emphasises the importance of the appropriateness of the interventions according to the population at which they are directed, since the same model does not necessarily fit all contexts. The lack of fit according to the needs and characteristics of the population very often leads to the obtaining of insignificant results.

The vast majority of interventions in an individual action sphere were carried out in the school environment and consisted, as the main element of the intervention, in educational sessions during school hours. In addition, they addressed some or all of the aspects, which can be summarised in four key elements, although each intervention prioritised one or the other or devoted more effort to one or the other.

1) Education sessions on healthy habits: this was the basis of individual interventions, in order to have an impact on the child's knowledge,

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<sup>c</sup> BMI-z-score. BMI is an indicator of the relationship between weight and height. It is frequently used to identify nutritional status. The World Health Organisation (WHO) recommends classifying the nutritional status of children under the age of 19 according to the BMI-z-score according to age. Thresholds are established to determine nutritional status: malnutrition,  $>-2.00$  DE; adequate nutritional status,  $-2.00$  to  $0.99$  SD; overweight,  $1.00$  to  $1.99$ , and obesity:  $\geq 2.00$  DE overweight. (World Health Organisation, n. d.)

behaviour and behavioural change. These sessions were based on eating habits activities, nutritional knowledge of food (food pyramid) and cooking classes.

2) Changes in the school environment: actions in the school canteen, such as changing or adding food or removing vending machines with unhealthy products, setting the teaching staff as an example of good habits or making changes to the menu in establishments in the school environment.

3) Family collaboration: delivery of informative materials on healthy habits for children, group sessions for parents or individuals (with or without children) and encouraging them to sign up and commit to the activities related to the programme.

4) Promotion of physical activity: guided physical activity activities during school hours and participation in extracurricular activities promoting physical activity.

### ***What makes them work? Significant characteristics of the most effective programmes***

While the overall effects are not very prominent, there are some aspects of the design and implementation that can lead to better results. These characteristics have been compiled from the evidence collected. Table 1 shows the basic characteristics of these studies.



**Table 1. Characteristics of individual interventions**

ID	Study design	Duration	Participants	Sphere of intervention	Changes between baseline and follow-up measurements	Short description
Wong, W. W. (2016) USA	Non-randomised controlled trial	18 weeks (3 blocks of 6 weeks)	877 infants mostly African Americans. Age (9-12 years)	Individual	BMI: NS; Food intake: NS	<i>Nutritional education and promotion of physical activity.</i> Sessions (nutrit. edu. 90' physical activity 30') x 2 times a week for 6 weeks. This pattern is repeated 3 times a year.
Mora, T. (2018) Spain	Cluster randomised trial	1 hour	3,291 children Age (adolescents)	Individual	Purchase of products: ↓ choice of unhealthy products at breakfast (7.1% (ES 0.01) in food and 4.4% (ES 0.01) in drinks) (in children from non-high-income neighbourhoods)*	Nutritional education. Intensive 50' session during school hours with playful and game methodology on choosing healthy products for breakfast/snack.
Mora, T. (2015) Spain	Cluster randomised trial	2 years	790 infants Age (6-8 years)	Individual	BMI: ↓ of 1.13 kg/m <sup>2</sup> (SE 0.25) on average in all children*	Nutritional education and promotion of physical activity. Activities on nutrition and physical activity co-created with children. Three hours a week during school hours for activities and informative materials and information for families about nutrition and physical activity offered to the community.

ID	Study design	Duration	Participants	Sphere of intervention	Changes between baseline and follow-up measurements	Short description
Nyberg, G. (2016) Sweden	Cluster randomised trial	6 months	378 children Age (6 years)	Individual; family	BMI: ↓ 0.21 (CI 0.02; 0.4) kg/m <sup>2</sup> in basal obese children*; Food intake: ↓ 0.32 (CI 0.07-0.56) units of unhealthy food consumption* ↓ 0.51 (CI 0.11, 0.90) consumption units unhealthy drinks*	Nutritional education. Nutrition and habit change sessions at school (sleep hygiene and physical activity), both for children and parents. Support with educational and dissemination materials.
Lubans, D. R. (2012) Australia	Randomised controlled trial	1 year	357 girls Age (13 years)	Individual; family	BMI: NS	Nutritional education and promotion of physical activity. Face-to-face sessions at school, information for parents and text messages for follow-up and reminders.
Trude, A. C. B. (2018) USA	Non-randomised controlled trial	2 years (two waves)	509 children Age (9-15 years)	Individual; family; community	BMI: NR; Food intake: ↑ 1.4 (CI 0.1, 2.8) consumption units/week in healthy products; Shopping habits: ↑ 2.8 (CI 0.9; 4.6) purchase units of healthy products/week in 9-12 years* ↓3.5% (CI 0.05, 7.76) of the caloric content of sweets in children aged 13-15 years*	Nutritional education and intervention in establishments. Multicomponent and multilevel intervention. Includes different levels: grocers or small prepared food establishments, department stores, youth leisure centres (sports or civic centres), social networks.

ID	Study design	Duration	Participants	Sphere of intervention	Changes between baseline and follow-up measurements	Short description
Shin, A. (2015) USA	Cluster randomised trial	8 months	152 children Age (13 years)	Individual; community	BMI: ↓ 3.04 kg/m <sup>2</sup> in girls with baseline overweight or obesity * in boys NS	<i>Nutritional education and intervention in establishments.</i> Multicomponent and multilevel intervention. It includes different levels: grocers or small prepared food establishments near the school environment (increase in healthy food) and educational centres (sessions on nutritional and culinary habits).
Robinson, T. N. (2021) USA	Randomised controlled trial	3 years	240 children mostly Latinos Age (7-11 years)	Individual; family; community	BMI: Baseline BMI was not reduced but there was a ↓ of the BMI gain trend after one year of intervention: 0.73 (CI 0.39, 1.07)*; after two years of intervention: 0.63 (0.14; 1.13); Food intake: NS	<i>Nutritional education and promotion of physical activity.</i> Multicomponent and multilevel intervention. Education for parents and individual activities for children. Five modules with sessions on behaviour change (nutritional education, physical activity, sedentary lifestyle (screen time)). Sessions at home, activities in after-school centres and telephone follow-up.

Note: BMI (body mass index); \* (statistically significant); NS (statistically not significant); NR (did not report); CI (95 confidence interval %); SE (standard error)

### **The intensity of the intervention**

We refer to the intensity of the intervention both in terms of duration and the number of sessions and hours spent on it. In general, greater and more significant results were obtained in more intense interventions. The effect on nutritional habits or health expanded as the intervention went on for longer. The effect was slightly greater in interventions lasting more than six months (Pastor and Tur, 2020). This same finding has been consistent in other interventions (Nyberg et al., 2016a; Trude et al., 2018) and also in interventions in the general population (in which the entire child population was included in the analysis) (Racey et al., 2016). Evidence recommends at least six months for guaranteed results. Beyond six months, however, a direct intensity-result relationship is not established, that is to say, the greater the intensity and duration, the better the results proportionally. This fact urges us to reflect on valuing the investment and dedication (especially in long interventions) for the possible small gain in nutritional or health results, although it does encourage that the acquired habits are maintained for longer (Pastor and Tur, 2020). Moreover, in long interventions there is a high risk of low adherence to the programme, and even more so in populations of low socioeconomic level. More often than not, the people most motivated to change are the ones who follow the programme and achieve the best results. An exception, however, is a short intervention with a playful and game methodology (1 session of one hour during school hours) for a healthy choice of breakfast/snack in secondary schools in Barcelona (Mora and Lopez-Valcarcel, 2018). The results obtained in the short term in neighbourhoods of medium-low socioeconomic level were a reduction in the choice of unhealthy breakfasts (pastry and sugary drinks). While short interventions may be effective enough in small immediate behavioural changes, it remains uncertain what their lasting impact is over time.

Monitoring was conducted related to the intensity of the intervention. Closer monitoring is noted to improve adherence and positive reinforcement for behavioural change (Yoong et al., 2023). This monitoring, however, is through the parents, who are included in the activities of the vast majority of interventions. They can be of different types: through the use of digital tools (text messages (Lubans et al., 2012), social networks (Trude et al., 2018), online sessions), telephone or face-to-face (visits at home or in educational

or health centres) (Shin et al., 2015). At this point it should be mentioned that, in many of the interventions with teenagers, follow-up was also done directly with them, with reminders via text messages and social networks. This follow-up strategy is positively valued by adolescents, since they consider that they are regarded as protagonists and are responsible for their own behavioural change (Lubans et al., 2012).

### **Levels of collaboration**

Most of the interventions whose main objective is the behavioural changes of the child at the individual level incorporate some other sphere of action. Generally, the family sphere, but the community sphere is also often added. These interventions, which are more complex, include sessions with or for the parents with the aim of reinforcing the nutritional content that is addressed with the children (Yoong et al., 2023). It should be borne in mind that establishing collaborations with other spheres of action such as the family or the community is a good strategy to improve the effects of the intervention (Pastor and Tur, 2020; Wolfenden et al., 2020). In addition, these interventions tend to have a higher degree of adherence, a fact that must be taken into account in populations with reluctance or difficulties in follow-up. Another level of collaboration is the environment closest to the school: such as grocery stores and prepared food establishments, to reduce the offer of unhealthy products (snacks, pastries and the like) and make other healthier products more appealing (fruit, nuts, dairy products or whole foods). This type of collaboration is more frequent in interventions among teens, since they have more autonomy in buying breakfast or snacks outside of school. Interventions that included this type of strategy saw significantly reduced consumption of unhealthy foods and, in one case, a reduction in body mass index (BMI, see [glossary](#)) in adolescents with obesity at the start of the intervention (Trude et al., 2018; Wong et al., 2016). Both of these interventions were implemented in the United States, in highly obesogenic environments. Although the situation is different in Catalonia, obesogenic environments also exist. A significantly higher presence of unhealthy food establishments in the vicinity of schools has been identified in environments of low socio-economic level (Díez et al., 2019; Londoño-Cañola et al., 2023).

Interventions that include more than one sphere of action in the design come out strengthened. Child malnutrition is a complex and multi-causal phenomenon, in which different spheres of influence are involved. It is, therefore, necessary to join efforts and create joint and converging programmes and strategies over time to promote the creation of a single common message, in as many spheres of the child's life, that feed back and reinforce behavioural change (Swinburn et al., 2011a).

### Co-participation

An intervention design that we would like to highlight is the one that follows the RVAC methodology (research, vision, action and change)<sup>d</sup>, which regards children as agents of change in their immediate environments. RVAC is an interactive teaching method, in which children can approach health and prevention issues in a democratic, competent and effective way. The key elements of this methodology are the children's active participation and action. Thus, they are the main protagonists of the intervention, they decide the content (within a tutored guide), they develop the actions or projects that need to be put into practice to stimulate change. An example can be found in a programme carried out in schools in Granollers with 6-year-old children for 2 years. It showed satisfactory results in reducing the BMI up to 4 years after the start of the intervention; however, these effects were not found in more disadvantaged children (whose parents have low levels of education) (Mora et al., 2015).

**Table 1. Healthy School Start: a model intervention in the individual and family sphere in the school sphere**

Healthy School Start is an intervention implemented in Sweden in schools located in neighbourhoods of low socio-economic status (Nyberg et al., 2016b). It is a model that includes two spheres of action, the individual and the family, and that is carried out in the school environment. This intervention is designed to start in the compulsory school stage, at 6 years of age, and although it is carried out entirely in the school environment, it is at the primary care health centre that the children's health is monitored, taking the opportunity of mandatory

<sup>d</sup> RVAC Methodology. For more information see: *A school-community approach to influence the determinants of a healthy and balanced growing up* [www.shapeurope.net](http://www.shapeurope.net) *Methodological Guidebook Towards a healthy and balanced growing up Children and adults taking action together!* (Simovska et al., n.d.).

monitoring visits. So there is a school-health relationship established in the design and implementation in order to detect and provide treatment if the need arises. The intervention hinges on two equally important elements: the child and the parents. The key elements of the intervention are the simultaneous conducting of sessions and/or activities between parents and children for 6 months. For the parents, the sessions were designed incorporating the principles of social cognitive theory (see below, family interventions) and considering factors such as parental knowledge, attitude, self-efficacy and willingness to change. These psychosocial aspects aim to awaken the individual's awareness of their ability to change by promoting the motivation to change. For the children, 10x30-minute sessions were held during school hours on healthy habit changes, nutritional education, physical activity and tasks to be done at home with adults. All the materials were tested and endorsed and both the teachers and the social workers received training for a quality programme execution and consistency between centres. The evaluation of the intervention, through a randomised controlled trial, included 390 children and had pre, post and 5 month measurements after completion. The results of the intervention were modest; a reduction in the consumption of unhealthy food was detected only in boys and a reduction in sedentary behaviour up to 5 months after the intervention and a reduction in BMI in previously obese children, although the impact was not maintained beyond the end of the intervention. Changes in the quality of the diet were few, because the baseline levels were already high (in Sweden, the free and universal school lunch scheme is implemented). The evaluation highlights that the short duration of the intervention makes it difficult to materialise behavioural changes that require much more time. It also points to the cultural diversity of the participants as an element that may influence the results of the intervention. It is advisable to take into account both in the design and in the evaluation the expectations and habits in diet and physical activity in order to fine-tune the communication and adapt it to everyone. This is an example of a school intervention that aims to empower parents to support behavioural change in aspects such as nutrition or physical activity, and is implemented with a coordinated effort between schools, health professionals and trained educators.

## **b) Interventions in the family sphere**

Within the group of family interventions there was great heterogeneity, although all of them include as a main element actions for one of the parents, both parents or the whole family. We will treat them together and distinguish two for their specificity: parenting support programmes and cash transfer programmes.

### ***What are the impacts? Do they work?***

The evidence is very quantitative in programmes where the main level of action is the family. They can be divided into two large groups according to the age of the child - under 6 years old, coinciding with the non-compulsory schooling stage in Catalonia, and from 6 to 12 years old, the stage of the compulsory primary education cycle. The design, execution and results vary considerably. This great diversity makes comparison difficult. In this study, we have detected those that have components applicable to our context and that have shown to be effective in changing habits, diet quality or some related element.

The evidence for interventions in the 3-6 year old population (second cycle of early childhood education) is uncertain and inconclusive, although some experiences are effective in some changes in the composition of the diet. The systematic review article by Kim (2020) points out that when family members are included and lead behavioural change through changes in healthy habits and acquisition of motivational tools, more satisfactory and lasting results are obtained in prevention and reduction of obesity. However, the biggest difficulty with these programmes is encouraging adult follow-up (Kim and Lee, 2020). It is not surprising that the most effective interventions are those in which adults were the main participants in the interventions; in this way, monitoring and fulfilment of the programme is encouraged. It is a strategy that must be taken into account, since parents play a fundamental role in the child's development and in the acquisition of healthy family habits; they are the ones who make the daily decisions.

A programme that should be highlighted is Head Start, from the United States. It is a programme fully funded by the Federal Government and implemented since 1965. It provides low-income children with a space with



educational, health and nutritional services (education in eating habits and up to three meals a day) for better school preparation and support for families (including home visits) (Early Childhood Learning and Knowledge Center (ECLKC), n.d.). It has been widely evaluated in terms of school achievement and cognitive development, but there is little evidence regarding nutritional outcomes. Two observational cohort studies with a control group using data from official agencies (with more than 4,000 children each) show that there is a significant improvement in BMI (reducing it in cases of obesity or increasing it in cases of malnutrition) and in the quality of the diet in children who have participated in Head Start (Lee et al., 2013; Lumeng et al., 2015).

Interventions in the 6-12 year old population (primary education) do not show large effects on nutritional changes either. A UK school-based programme for all families, with nutrition education, physical activity promotion and active engagement with families, showed no changes in children's BMI at any socioeconomic level (Adab et al., 2018). Interventions based on group sessions for parents, to hold nutritional education sessions and provide strategies for behavioural change, have not been effective in any nutritional or health indicator either (Fiechtner et al., 2021; Moore et al., 2019a).

#### Table 2. Parent-child cooperation

An experience that obtained significant results was an intervention based on the father (male parent)-child relationship, which establishes a day of cooperation and joint stimulation in the fulfilment of the programme. Healthy Dads Healthy Kids is an intervention that was evaluated in a population without risk of poverty, with satisfactory results (Morgan et al., 2011). It is a type of intervention that changes the focus of action, making fathers the protagonists and acting in order to obtain changes in the children. In summary, the main aim of the programme is to help parents lose weight, to become role models to promote healthy habits (nutrition and physical activity) for their children. By including children in part of the intervention, empathy and shared enthusiasm is sought, thus strengthening the motivation for change. The programme promotes a 'do as I do' rather than 'do as I say' philosophy and encourages parents to make small changes, build on early success and create a family environment where healthy eating patterns and physical activity are the usual experience. In addition, parent-child sessions include a hands-on session to demonstrate strategies for engaging children in positive and enjoyable physical activity experiences. The

intervention consists of 8 group sessions of 90', 4 of which are with the children. Interventions are led by local community facilitators/technicians in community spaces (Morgan et al., 2019a). This programme has proven effective in reducing BMI and improving the quality of the diet (reduction of sugary drinks and prepared food and increase of fruit and vegetables) in both fathers and children one year after the intervention.

Despite the good results, interventions directed exclusively at one of the parents (in this case according to gender) favour the perpetuation of patriarchal roles and unequal care management in the family role. A recommendation is to include one of both parents interchangeably to make the adult-child tandem in carrying out the intervention.

In conclusion, interventions in which parents are included with an active role in the programme are potentially more effective in improving healthy habits, although the evidence is inconclusive in all cases.

***What makes them work? Significant characteristics of the most effective programmes***

**Table 3. Parenting support programmes. The first 1,000 days: a window of opportunity to establish healthy nutritional habits**

It is well established that the first three years of life are of vital importance in the physical and cognitive development of the child (Council of the European Union, 2017). At the same time, it is also an optimal time to establish family habits that promote suitable nutrition (Woo Baidal et al., 2016). This intervention strategy puts the focus on the parents, and especially the mother, on the care and responsibility of raising the children.

Two systematic reviews (Lioret et al., 2023, and Laws, 2014) explore interventions during this period. It is emphasised that the timing of intervention is important. The most effective are those that begin at birth or even during pregnancy, taking advantage of contact with health centres during pregnancy check-ups. The main aim of these interventions is the promotion of breastfeeding, the creation of safe spaces, support in parenting, the establishment of healthy habits in the family and obesity prevention. These parental support programmes share a series of features: they take place in primary health centres or similar venues, in group sessions and also include individual and home visits. The most effective interventions have been: 1) those that have included a multidisciplinary team (nutritionist, nurse/midwife, “expert” mothers or doulas and social worker), 2)

those in which there has been a co-creation of the programme with the parents and 3) those that have had a duration of 2 years.

Although these parenting support programmes are established as an opportunity to create healthy spaces from the beginning of the child's life, in the vast majority of cases it is the mother who receives the intervention exclusively, which perpetuates gender roles in the care of children. It is therefore an opportunity to redesign and take advantage of this space to help reduce gender inequalities in care.

These types of programmes have been shown to be effective in short-term nutritional changes, such as diet composition and quality, and little or no change in BMI. However, there is a lack of long-term impact assessments to be able to determine their effectiveness beyond the child's two years of age.

### **Behavioural change training**

One of the frequent methodologies in this type of programme is the use of tools based on behavioural change. They are based on the framework of social cognitive theory, specifically on the self-efficacy of parents (belief that they can and have the capacity and control to achieve behavioural change). Other aspects of emotional management that are worked on are observational learning, behavioural capacity, expectations of results and self-regulation. These concepts are mainly worked on in group sessions and in motivational interviews (very frequently at home and/or individually). The motivational interview is aimed at strengthening the person's interest in behavioural change. Achievable objectives are set that will be reviewed in successive visits. The goals, although personal, also have an impact on the family dynamic and on the child's habits. Both the group sessions and the motivational interview are conducted by expert staff (psychologists, therapists, etc.) who guide the adult's change process. These interventions defend the action and the active tackling of the problem by laying down guidelines with the intention of improving issues such as sedentary lifestyles, exposure to screens, nutrition and children's education in general. The following table shows examples of programmes that have used this type of technique (French et al., 2018; Moore et al., 2019b; Morgan et al., 2019b; Nyberg et al., 2016b). Others have also included techniques for setting

boundaries and self-control in food management and healthy habits (Fisher et al., 2019; Nix et al., 2021).

**Table 2. Characteristics of interventions with a behavioural change component for parents**

ID	Study design	Duration	Participants	Changes between baseline and follow-up measurements	Short description
<b>French, S. A. (2018) USA</b>	Randomised controlled trial	3 years	534 children Age (2-3 years)	BMI: in children total NS, in children with overweight or basal obesity ↓ 0.71 kg/m <sup>2</sup> (CI 0.12; 1.30), in Latin American children ↓ 0.59 kg/m <sup>2</sup> (CI 0.04; 1.14); food intake: ↑ 1.05 (CI 0.97, 1.14) fruit and vegetable units/day*; total kcal: ↓ 0.90 kcal/day (IC 16; 164)*	<i>Nutritional education and behavioural change.</i> Intervention for the prevention of obesity. Group parent sessions, 1 weekly for 12 weeks. Monthly home visits and reminder-support calls.
<b>Nix, R. L. (2021) USA</b>	Randomised controlled trial	10 weeks	66 children Age (2 years)	Food intake: ↑ 0.57% (CI 0.08, 1.06) presence of fruit and vegetables in meals*	<i>Nutritional education and food management techniques.</i> 90' weekly sessions for parenteral education in a home environment according to healthy lifestyle habits in nutrition and food management techniques for children.
<b>Buscemi, J. (2019) USA</b>	Quasi experimental	8 weeks	153 children Age (2-5 years)	BMI: NS; Food intake: NS	<i>Nutritional education and behavioural change.</i> 90' weekly sessions for 8 weeks on healthy habits and family food management in parents and children.

ID	Study design	Duration	Participants	Changes between baseline and follow-up measurements	Short description
<b>Fisher, J. THE. (2019) USA</b>	Randomised controlled trial	12 weeks	120 children Age (3-5 years)	BMI: NS; kcal in unhealthy products: ↓ of 23% (94 kcal on average)*	Nutritional education and behavioural change. 90' weekly sessions exclusively for mothers for nutritional education and behavioural change towards children.
<b>Moore, S. M. (2019) USA</b>	Randomised controlled trial	3 years	360 children Age (11 years)	BMI: NS; Abdominal circumference: NS	<i>Nutritional education and behavioural change.</i> Group family intervention to change lifestyles and improve nutrition: through changes in routine and habits.
<b>Morgan, P. J. (2019) Australia</b>	Quasi experimental	3 months	208 children Age (8 years)	BMI: ↓ in children total 0.12 kg/m <sup>2</sup> (CI 0.07, 0.17) post-12 months intervention*, in children with baseline overweight or obesity ↓ 0.17 kg/m <sup>2</sup> (CI 0.09, 0.26) post-12 months intervention*; Food intake: ↓ 0.34 (CI 0.14, 0.53) snack units/day*, ↓ 0.29 (CI 0.19, 0.39) glasses of sugary drinks/day*	<i>Nutritional education and behavioural change.</i> Parent-child intervention. Sessions for parents on healthy habits and other parents-children.
<b>Fiechtner, L. (2021) USA</b>	Randomised controlled trial	1 year	407 children Age (6-12 years)	BMI: NS	<i>Nutritional education and behavioural change.</i> Intervention for children with obesity. Monthly group family sessions for 6 months and follow-up calls 6 months later.

ID	Study design	Duration	Participants	Changes between baseline and follow-up measurements	Short description
<b>Lee, R. H. (2013) USA</b>	Observational analytical longitudinal cohorts	2 years (two waves)	4,350 children Age (3-5 years)	BMI: ↓ in children in foster care 0.17 kg/m <sup>2</sup> (ES 0.07)*; Food intake: ↑ in all children 2.21 (ES 0.74)*healthy products/week, ↑ in children in the care of guardians 2.74 (ES 1.32)* healthy products/week	<i>Nutritional education and behavioural change.</i> Family program to address different areas of child well-being (education, emotional well-being, healthy habits and nutrition). Family sessions at home, groups and provision of meals for children. Head Start is a state-wide programme with multiple providers, but common protocols that follow official nutritional guidelines.
<b>Lumeng, J. C. (2014) USA</b>	Observational analytical longitudinal cohorts	2 years	45,385 children Age (2-5 years)	BMI: ↓ in children with basal overweight 0.36 kg/m <sup>2</sup> (ES 0.03)*, ↓ in children with basal obesity 0.70 kg/m <sup>2</sup> (ES 0.04)*Maintenance of results in two years	

Note: BMI (body mass index); \* (statistically significant); NS (statistically not significant); NR (did not report); CI (95% confidence interval); ES (standard error)

### **Community participation**

Throughout the document, emphasis has been placed on the community as an area of action that needs to be taken into account. There are a few interventions that have included it as a determining part in the design (Fiechtner et al., 2021; Robinson et al., 2021; Shin et al., 2015; Trude et al., 2018) and in the vast majority they have obtained some positive results in terms of weight reduction and improvement of nutritional habits. Community interventions are those actions in which a collaboration is established between professionals and members of a community to create knowledge and generate social change. The "*La Mina se activa*" pilot project was implemented with this core strategy, led by the primary care team in the La Mina de Sant Adrià del Besòs neighbourhood, a programme to improve children's habits and reduce the prevalence of overweight through a comprehensive approach to health in an area with severe economic deprivation. This programme was based on different phases: 1) identification of social and community agents, neighbourhood assets and other complementary initiatives, 2) identification of needs and social determinants involved, 3) comprehensive approach with family and community involvement. The target population is overweight and obese children and their families, and the intervention is conducted from conception with a multidisciplinary team (a nutritionist, a paediatrician, psychologists, etc.). The intervention consisted of fortnightly sessions with children and families, some of which were individual and others in group sessions for an average of 14 months, complemented by community activities. According to needs and objectives, it was divided into two stages: the first with general advice, a motivational interview, consolidation of habits and sustainable goals agreed with the child (led by paediatricians) and the second, if the objective of the first phase was not achieved, with the inclusion of other healthcare professionals (a nutritionist, psychologists, physiotherapists, etc.) for a more intensive intervention. The evaluation of the pilot test (through a pre-post study) found a reduction in the consumption of unhealthy foods (49 % in sugary drinks and 33 % in fast food)



and a significant reduction in BMI of 3.8 %<sup>e</sup> (Cabezas Peña, 2023). This experience has served to promote a 2024-2025 plan for 28 primary care centres throughout Catalonia to reduce childhood overweight and obesity (Ministry of Health of the Government of Catalonia, n.d.).

### **Cash transfers**

In April 2024, the "wallet cards" programme was approved throughout Spain, for the transfer of funds to families in a situation of vulnerability - which varies according to the members of the family unit - to purchase food (Royal Decree 93/2024, of 23 January, which regulates the direct granting of funding to the Spanish Red Cross social organisation for the implementation during 2024 of the European Social Fund Plus Basic Material Assistance Program (BASIC Programme), 2024). This type of policy, generally unconditional,<sup>f</sup> generates some controversy. On the one hand, they are policies that help to destigmatise the family, making them part of the usual circuits and supply in obtaining products; but, on the other hand, there is little or no control over the quality and types of food purchased. A recent study on the evaluation of products purchased in supermarkets in a Red Cross wallet card programme in Catalonia (2016-2022) concludes that the food purchased by families receiving this aid followed the Mediterranean diet below the Spanish average. No differences were found according to age or sex, but according to nationality, and those from the Maghreb, Asia and Africa were the ones with the healthiest indices (Mora et al., n.d.).

Another experience can be found in the United States. The Food Stamp Program is a programme implemented since 1964, which provides financial aid through wallet cards to families in poverty (with an equivalent income below the poverty threshold) for the acquisition of food without restrictions on participating establishments. A study, with an observational methodology, compared the diet of children aged 10-12 between children who

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<sup>e</sup> At the time of review, there is no publication/report on the evaluation of the "*La Mina s'activa*" programme in a scientific journal. The data obtained have been extracted from a communication on the most outstanding results in the cycle of "Public Health Thursdays". See "Prevention and treatment of childhood obesity in the Mina neighbourhood: results and reflections", <https://scientiasalut.gencat.cat/handle/11351/9093>.

<sup>f</sup> Cash transfer programmes can be divided into two large groups: 1) conditional, when the recipient must do some activity to obtain the aid or 2) unconditional, the recipient does not have to take any action to receive the aid.

benefited from the programme and children who did not in a sample of more than 5,000 boys and girls (all with the same vulnerability situation) by means of the United States National Health and Nutrition Examination Survey (NHANES). The findings were that all children had an inappropriate diet by national standards. However, children benefiting from the programme had worse results (more consumption of processed red meat, high-fat dairy and sugary drinks) than children not included in the programme (Leung et al., 2013).

Another experience in the United States was the design of a nutritional education intervention for parents aimed at behavioural change in purchasing, while making them beneficiaries of wallet cards to purchase food, with the aim of creating synergies between the two interventions. The results were that the group that received both interventions at the same time (wallet card nutritional education) underwent a significant change in the composition of the purchase, with more fresh products (fruit and vegetables) and less saturated fat (Banerjee and Nayak, 2018).

In general, the existing evidence of these programmes suggests that, although they meet part of the family's basic needs, they do not seem to have an impact on the nutritional quality of children's diets. However, when they are accompanied by educational interventions, they are more effective in behavioural changes in terms of the composition of the purchase.

### **c) Interventions in the structural sphere**

The conceptual frameworks on malnutrition and child poverty point out that the structural determinants (access to nutritional supply, the legal framework, culture and social values, etc.) are the most external sphere, otherwise known as the *causes of causes* of inequalities in malnutrition (Borrell and Malmusi, 2010; Jebeile et al., 2022; Swinburn et al., 2011b; UNICEF, 2021). Modifying these determinants can produce a chain effect, since they impact family or meso determinants, which affect an individual, or micro, which as a last effect modifies nutritional and health indicators. In other words, carrying out a legislative change in a tax on certain products can change family purchasing habits and, consequently, have an effect on individual health. It is important to take into account the hierarchical

relationship between the determinants to understand the complexity of the phenomenon and the reasons why interventions are often ineffective. A "serious" approach to malnutrition in the population in a situation of poverty cannot avoid all the structural burden that this child suffers due to being in a situation of economic vulnerability. This child suffers in different areas of his/her daily life the consequences of socio-economic inequalities: education, housing conditions, health, nutrition and much more besides. Many of the interventions described in the previous sections emphasise modifying factors at levels closer to children. This approach, although it is necessary, since it directly affects those mainly affected by the phenomenon, must be complemented with actions to affect the structural factors that help to create healthier environments, in order to discharge the exclusive responsibility of the child and family from their malnutrition situation. It is the governments that have the tools to modify the structural determinants, legislating in accordance with an equitable society model. In the following section we summarise the existing evidence on public policies to create healthier environments.

### ***3.1. What are the impacts? Do they work?***

The public policies collected, all within the framework of public health, have had a positive impact on improving the quality of the population's nutrition. Unfortunately, the evaluation of these policies, in many cases, has not taken into account the heterogeneity of the population; stratified analyses have not been prepared taking into account neither the age of the population nor the risk of poverty, and even fewer analyses including the two axes of inequality. Next, we summarise the evidence from studies that have included either childhood or the risk of poverty in the analyses.

#### **Policies with regard to the school canteen**

The school is an ideal place to apply universal policies for different reasons: 1) children spend most of the day at school and have at least one meal there, 2) the school stage is compulsory from the age of 6 to 16 and 3) it is a space for socialisation and peer relationships.

The Action Plan for the European Child Guarantee proposes different actions in order to guarantee adequate nutrition, among them: expand and improve

the coverage of school canteen programmes at all educational stages and regulate the food supply in educational and health and sports centres. (State action plan for the implementation of the European child guarantee (2022-2030), n. d.). It is not surprising, then, that the sphere of the school canteen is a priority space for action. The policies that affect the school canteen have been characterised by being implemented at government level, impacting all children, and benefiting from public funding. The characteristics of these policies vary widely. In some cases milk or a meal (breakfast or snack and/or lunch) is provided for free or with a grant for children from families with economic or social vulnerability criteria and, in other cases, coverage is universal for all children in school. There are many examples: Finland was a pioneer and introduced this measure in 1943 for all children in compulsory schooling 0-14 years free of charge (Pellikka, n.d.). Unesco collects the most significant ones, although not all these programmes have been evaluated and of those that have, most have measured the impact globally, without taking into account populations at risk of poverty (Health and Education Resource centre, n.d.).

The two systematic reviews, one by Cohen et al. and another by Kristjansson et al., summarise the existing evidence in evaluations of free and universal school lunch programmes and outcomes in program adherence, school absenteeism, diet quality, level of education, family economics and BMI (Cohen et al., 2021; Kristjansson et al., 2022). The following conclusions are derived from these reviews: 1) the levels of overweight do not improve, although it has been seen that a preventive effect is established in some programmes; 2) the impact on the quality of the children's diet improves, but it is dependent on the quality standards of each school; 3) school absenteeism is reduced (particularly in children of low socio-economic status), and 4) the number of children who adhere to the programme is increased.<sup>§</sup>

In the United Kingdom, school meal programmes have been evaluated in different phases. An evaluation of a pilot trial in 4-9 year olds offering all

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<sup>§</sup> To put this in context. In many countries (many of which are in the Anglosphere) children are allowed to bring lunch from home; but this practice is not allowed in our environment. There may be cases where children who are eligible for the free school lunch do not opt for this aid and prefer to bring lunch from home.

boys and girls a free hot meal in two regions of England found no change in BMI or eating habits (with the exception of a significant reduction in the consumption of chips) (Kitchen et al., n.d.). Subsequently, this programme has been implemented in all schools in England since 2014, and in Scotland since 2015 in school years between ages 4 and 7 (Holford and Rabe, n.d., 2022; Parnham et al., 2022). The evaluations that have been carried out emphasise that this type of programme increases the adherence of families to the school canteen (including those who were previously eligible to receive a free canteen service), since being a global measure it reduces the stigma for families in a vulnerable situation. It is highlighted that the impact is greater on children who live in poorer areas. A reduction in BMI was observed in all children one year after programme implementation, and was greater in children living in areas of medium-low deprivation (Holford and Rabe, 2022). Regarding the quality of the diet, a significant reduction in the consumption of fat, salt and animal protein is shown in the population of the most disadvantaged areas (Parnham et al., 2022).

In Catalonia, there is a policy of meal grants, individual grants (which fully or partially cover the cost of the service) for primary and secondary school students who are of families in disadvantaged socio-economic situations. A means-tested financial aid of 70% or 100% of the total amount is provided according to income and members of the family unit (Individual Dining Allowances. Ministry of Education, Government of Catalonia, n. d.). In the 2022-2023 school year, 178,000 children received scholarships, of whom 21.4 % got 100 % discount on the price of the school canteen (Ministry of Education, Government of Catalonia, n.d.). These grants, however, were mostly for children attending primary school (6-12 years old), since in 70% of secondary school students are not users of dining services. This fact is due, in part, to the intensive schedule that is carried out in some schools and to a lack of service (of the public secondary schools, only 29% have a dining service and 31% a canteen; whereas, 94% of private secondary schools have a canteen).<sup>h</sup> This change from primary to secondary, both in the management of teaching time and the provision of the service, leaves no choice for children who need and are eligible to receive a dining allowance. This makes it difficult to guarantee one quality meal a day to the children who need it

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<sup>h</sup> Source: Educational inspection of the Department of Education.

most (Barcelona Education Consortium, n.d.). However, the impact of canteen grants in Catalonia, both on nutritional, academic and health indicators, is yet to be determined.

We can conclude that the free and universal school canteen is a potentially effective measure, not only in guaranteeing adequate nutrition for children, since it provides at least one meal a day, but also because of the results demonstrated in other areas: improved health, less absenteeism and better academic results. It is a measure of social cohesion, reduces inequalities and destigmatises groups in a more vulnerable situation.

### **Consumer behaviour policies**

This policy package brings together measures aimed at the sale of food to the general public, regulating supply and demand, legislation, advertising, etc. These public health policies attempt to reduce the consumption of unhealthy products and create environments that promote appropriate nutritional habits.

#### **- Sugary drinks**

The tax on packaged sugary drinks is one of the public policies that has been implemented in recent years with the aim of reducing the consumption of unhealthy products, and that can aggravate certain pathologies in the general population (such as cardiovascular diseases, diabetes, etc.) and the development of obesity (particularly in the child population). In other words, this type of policy also has the aim of collecting money from the externalities that the consumption of these products produces in the population (health, labour consequences, etc.). This strategy has been followed in governments of several countries - to name a few: The United States, Denmark, the United Kingdom, Poland, Portugal, and Spain - and mainly for sugary drinks (soft drinks and sweetened fruit juices), but there have also been experiences such as in Denmark for products with a high saturated fat content.

The results of this type of policy generally show that there is indeed a reduction in the consumption of these foods (Cawley et al., 2019; Cawley and Frisvold, 2023; Mytton et al., 2007), although there is not much evidence of impact on health indicators. The experience in the United States has been a significant reduction in the consumption of soft drinks among children

(especially in those who already started with a high consumption), but not among adults (Cawley et al., 2019). This study, also from the United States, shows that although there has been a reduction in the purchase of this product in children and adolescents, it has had no effect on BMI, and adds that there has been a compensatory effect, as the acquisition of other untaxed types of sugary drinks has increased (Fletcher et al., 2010). In the UK a study comparing the sugar content of drinks in children's lunchboxes (food prepared at home) found no change after the introduction of the tax, as fruit juices and the like were excluded from the Act (Chu et al., 2020).

All the assessments that have been carried out in Catalonia and Spain have shown a reduction in the consumption of these foods in the short and long term, with differences in their magnitude according to the study: 15.4% in the study by Vall Castelló and Lopez Casasnovas, 2020, and of 2.2% in Fichera et al., 2021 (Fichera et al., 2021; Ivàlua, 2019; Royo-Bordonada et al., 2022, 2023). In the population in low socioeconomic brackets, the results obtained differ according to the study. An analysis that compared consumption between areas of low socioeconomic brackets in Barcelona and Madrid (used as a control when the tax had not yet come into effect) found a reduction of 39% of sugary drink consumption (Royo-Bordonada et al., 2019). Another example can be found in a study conducted with family budget survey data from all over Spain (the Canary Islands, Ceuta and Melilla as a control group) in which it was pointed out that the measure had only had a significant impact on households with children in low socio-economic brackets, with a reduction of 20% of consumption (equivalent to 25 litres/year) (Martínez Jorge et al., 2022). Conversely, a study carried out based on consumption data from a supermarket chain (with 10% of the total volume of sales in Catalonia) determined that the reduction in the purchase of sugary drinks was general, although greater and significant in high income areas, with 29% compared with 5% in low-income areas, and in areas with a higher prevalence of obesity, a reduction of 15% versus areas with less prevalence of obesity with 13% (Vall Castelló and Lopez Casasnovas, 2020).

Another consideration to keep in mind is its possible side effects. These types of policies can promote changes in the behaviour of individuals: more consumption of other products with a high sugar content that are not taxed (brioxeria or similar) or other "sugar-free" drinks (labelled as *diet* or *Free*), as

well as the purchasing of products in other tax-free areas (in cross-border areas) (Cawley and Frisvold, 2023; Fletcher et al., 2010; Vall Castelló and Lopez Casanovas, 2020).

All this evidence points to the fact that a tax on unhealthy products discourages consumption and promotes good results in public health. However, the evidence is scarce on the impact on health among the population with few economic resources and among the child population. In addition, these types of measures can generate collateral effects by promoting changes in purchasing behaviour in order to avoid the tax. We add that, as a general conclusion, to increase effectiveness, this type of policy can benefit from other measures such as the control of advertising, labelling and the reduction of the supply of sugary drinks in environments frequented by children and adolescents.

- **Legislation in nutritional labelling of foods: the Nutri-Score case**

Since 2016, it has been mandatory to include information on the nutritional content of packaged foods with the aim of improving consumer information and thus providing them with tools for more responsible consumption in terms of purchasing 'unhealthy foods' (European Parliament and Council of the European Union, 2011). Although there is no single established model, one of the most recognised is Nutri-Score, a traffic light-type model that makes it possible to display the overall quality of food according to colour. This model improves on the previous one (a table with the percentages of the type of nutrient), which, despite containing a lot of information, was not very clarifying regarding the overall quality of the food. The impact of Nutri-Score, however, has been very little evaluated and even less so in the population of low socio-economic level. However, we find an exception in a study carried out in France in which purchasing behaviour was quantified in a low-income population according to whether the products were labelled with Nutri-Score, the table model with percentages of nutrients or without type of information on the packaging. The results concluded that the Nutri-Score shopping group bought fewer high-fat dairy products, fewer pastries, cookies and sugary drinks (Egnell et al., 2021).

To close this section of policies in the area of purchasing, we would like to include an experience carried out in supermarkets in neighbourhoods of low



socioeconomic level in the United States in which different strategies were implemented to promote the purchase of healthy products (alternatives to their less healthy versions; for example, instead of pre-cooked dishes high in saturated fat and sodium, similar pre-cooked dishes with less fat and sodium were promoted) (Foster et al., 2014). These strategies were implemented simultaneously with the healthy alternative products and included: applying a competitive price, promotions, free tastings and strategic location. The results were positive for some of the foods (more sales of skimmed milk than whole and less sales of sugary drinks). This is an example of an intervention that points to supermarkets as an ideal and timely place to carry out actions in order to modulate the quality of the purchase.

### ***3.2. What makes them work? Significant characteristics of the most effective programmes***

#### **The environment matters: the sum multiplies**

Many of the policies and interventions in this review have included an environment change component. It is well demonstrated that the environment plays a key role in creating synergies between the different spheres of action: individual, family and structural. The impact of a family intervention will have little or less effectiveness if their environment does not accompany the messages. In other words, if the intervention aims to promote the consumption of fresh and seasonal food and the performance of physical activity, it is also necessary to promote access to these services by providing nearby supermarkets where this offering is available and public spaces to exercise. All this complexity must be taken into account to ensure maximum impact and continuity of the effects of the intervention. For this reason, detecting and modifying the obesogenic environment (Cetateanu and Jones, 2014; Swinburn et al., 2011a) is increasingly included in the design and actions of many interventions and public policies. Complex interventions (which include more than one sphere of action) are presented as an example to follow because they have been shown to be more effective as they include more action components and also act simultaneously (Banerjee and Nayak, 2018; Yoong et al., 2023). Public health policies, such as, for example, the regulation of establishments and the sale of products, of

advertising, of spaces and urbanisation, etc., as they affect the entire population, are established as an ideal tool to create healthy environments and establish synergies with other simultaneous interventions to help drive social change.

In the box below we list actions in the environment and their characteristics that have been carried out in a set of interventions, in which some component based on change in the community has been included:

**Table 3. Collection of actions of the environment and their main characteristics in interventions implemented with a community component**

Sphere of the environment	Reference	Implications
<b>Food establishments close to schools</b>	Trude, A. C. B. (2018) USA	Inclusion of food stores close to schools in the intervention in exchange for a financial consideration: <ul style="list-style-type: none"> <li>- Exclusive shelves for the promotion of foods chosen by the intervention.</li> <li>- Training in restaurants and fast food shops with many students, to improve and change cooking techniques (for example, reduction of fried foods, adjusting proportions and quantities, etc.).</li> </ul>
	Shin, A. (2015) USA	Restaurants and prepared food points: <ul style="list-style-type: none"> <li>- Inclusion of a dish proposed by the intervention in their menus.</li> <li>- Information points on healthy habits and nutritional content.</li> </ul>
<b>Supermarkets and food stores</b>	Foster, G. D. (2014) USA	Marketing strategies for promoting healthy products: <ul style="list-style-type: none"> <li>- Price: must be the same as or lower than the less healthy alternative.</li> <li>- Promotion: reminders over the PA system of the supermarkets about the promotion of healthy products that need to be encouraged. 2 x 1 type promotion or price reduction when</li> </ul>

Sphere of the environment	Reference	Implications
		<p>buying a set of products, etc. Free tastings of promotional products.</p> <ul style="list-style-type: none"> <li>- Product: choose similar products but with a healthier content in order to replace the less healthy versions.</li> <li>- Location: the healthiest products were placed on the most advantageous lines, at arm's length and within sight.</li> </ul>
<p><b>Educational establishments</b></p>	<p>Coleman, K. J. (2012) USA</p>	<p>Modification of the school environment through different actions and recommendations, in order to create a healthy and cooperative environment:</p> <ul style="list-style-type: none"> <li>- Elimination of unhealthy food inside the school:               <ul style="list-style-type: none"> <li>no use of treats or similar as a prize or reward.</li> <li>The entry of unhealthy food into the school is prohibited (soft drinks, sweets, pastries...).</li> <li>Not using food sales to raise money for end-of-year trips or similar.</li> <li>Recommend healthy options for school parties.</li> <li>Ban on unhealthy food ads.</li> </ul> </li> <li>- Establish healthy models in the classrooms:               <ul style="list-style-type: none"> <li>The teams of teachers and educators are role models for the children. Their behaviour and their messages must be aligned with the messages that the school promotes. In this regard, instructions are established for teachers and professionals not to consume unhealthy products inside the centres.</li> </ul> </li> </ul>

### Advertising

Many of the interventions include advertising as an aspect that needs to be improved. Children and adolescents are a vulnerable population to the food industry, as they are exposed to large amounts of persuasive and influential advertising. Advertising is an element that, in a silent way, captures the

attention of children making them more prone to a type of habits. Advertising of unhealthy foods has a harmful impact on the child's obesogenic environment: it creates social norms around food, establishes habits and increases the preference for ultra-processed foods (Unicef, n.d. et al.). Some examples of this type of advertising are: television ads in prime time and in children's programming spaces, advertising on food containers with well-known characters or role models, advertising on banners in leisure spaces or areas with high children's attendance, etc. A relationship has been established between the consumption of fast and ultra-processed food and the absence of regulation in advertising in countries (Kovic et al., 2018). Advertising of unhealthy products aimed at children is regulated in many European countries such as Portugal, Norway and the United Kingdom. Here, efforts are being made to be able to regulate advertising aimed at children (Royo-Bordonada et al., 2023). In fact, the regulation of advertising is established as one of the priorities in the National Strategic Plan for the reduction of childhood obesity 2022-2030 (High Commissioner for Child Poverty, 2022). It is not surprising that in many interventions (most carried out in the United States, where advertising is much more invasive) the limitation or elimination of advertising for these products has been one of the components. For example: advertising removed from schools (Alaimo et al., 2013; Coleman et al., 2012), modified in food service (Shin et al., 2015; Trude et al., 2018) or in supermarkets (Egnell et al., 2021; Foster et al., 2014). The systematic review by Sadeghirad et al. (2016) on the effects of unhealthy food and beverage advertising on food preferences and consumption concludes that children who are exposed to it have a higher risk of preferring and consuming unhealthy foods (high content of fats and sugars) than those who do not have this exposure (Sadeghirad et al., 2016).

### **The quality of menus**

The quality of children's diet in the universal and free meal programmes is very diverse and is closely related to the quality standards of the menus in each region. It is a significant factor in the overall results of the quality of the children's diet (Cohen et al., 2021). One of the reasons that the existing evaluations point to is that the effects could be greater if the quality of the menus in the school canteens were more balanced, nutritious and suitable for the children's age (Holford and Rabe, 2022). A measure that has been

established in several countries to alleviate this lack has been the creation of standardised mandatory protocols for all educational establishments, in order to ensure a minimum content of quality and endorsed by nutritionists. In the United Kingdom, the measurement of the new nutritional quality standards of school menus was evaluated in the population of areas with economic deprivation, and led to an increase in fruit consumption (Spence et al., 2014). Another example can be found in the United States. A regulatory intervention to improve the quality of school menus and practices obtained a significant improvement in fruit and vegetable consumption if schools made at least three changes in nutritional quality guidelines (for example: controlling the content in the machines vending machines, or in the menus, removing sweets or similar as a prize, etc.). Here, schools are advised and monitored by nutritionists from the School Menu Review Programme of Catalonia, who guarantee a balanced menu according to current regulations (Law 17/2011, of 5 July, on Food Safety and Nutrition, 2011). The data from the latest report (2022) state that almost all of the assessed schools, both primary and secondary (in public and chartered schools), comply with the current guidelines (Public Health Agency of Catalonia (ASPCAT), n.d.).

### 5.3. General remarks

To conclude this summary, we would like to provide a series of remarks and characteristics that have repeatedly emerged in the interventions included in the summary. These are aspects that are key when implementing an intervention and that can determine its success or failure (Wolfenden et al., 2020).

**Table 4. Points to consider when implementing programmes, interventions or public policies for children at risk of poverty or social exclusion**

Scope	Considerations
<b>Cultural values</b>	The cultural characteristics of the population must be considered for the intervention to be accepted. We live in increasingly multicultural societies and migration

Scope	Considerations
	<p>is a fact. Moreover, migration is an axis of inequality that affects, to a great extent, the risk of poverty in Catalonia 2023; the risk of poverty is 3.6 times higher in citizens of countries outside the EU-27, 1.7 in EU-27 countries, than among the native population. 16% of children under the age of 14 in Catalonia are foreign nationals, so cultural diversity in the child population at risk of poverty is a fact (Idescat, 2023). Perspectives, beliefs and values differ according to the child's culture of relationship and coexistence. In addition, there are other difficulties in multicultural environments: language barriers, diversity of reference values (for example: what is considered healthy), culinary tastes and practices, social relationships and a long list of other things that are an added challenge.</p> <p>A culturally appropriate intervention must take these characteristics into account in both its design and implementation. The role of the cultural mediator, included in many of the interventions, has been key in order to create a conducive environment (including the sensitivities of all cultures or those most present in the intervention) and to achieve maximum acceptance and adherence to the programme. These roles are community agents (many of whom are also foreign nationals) who act as a liaison with the communities and participate in all phases of the program, both in design and in execution and review in order to detect cultural barriers and mismatches.</p>

**Appropriateness of content**

It is necessary to adapt the contents and materials to the population to which they are directed, both by age and by culture or level of understanding. Different aspects must be considered: adapted and understandable language, clear definition of concepts, digital barriers, language barriers, among others.

To address this aspect, it is recommended, prior to the intervention, to validate all materials (videos, posters,

Scope	Considerations
	<p>guides, etc.) with a sample of the population for whom the intervention is intended.</p>
<p><b>Co-design/active participation</b></p>	<p>The inclusion of potential participants in the design of interventions is not common practice. However, it is emphasised that they should be important actors in all phases of the intervention. Their active participation provides a perspective and knowledge based on their experiences, and detects barriers and facilitators of the intervention. Their information is of great value to obtain a design more adapted to the needs and realities of the group.</p>
<p><b>Gender</b></p>	<p>There are very few assessments that have been made according to the gender of the child. The invisibility of this differentiation of results makes it difficult to observe the differential behaviours and effects between boys and girls of the intervention. This fact is more prominent in adolescence, when social patterns and behaviours according to gender are more divergent. Recommendations: 1) include gender perspective in all phases of the intervention, that is to say, rethinking and adapting it if necessary so that there is equality in access as well as in the design and results, and 2) include the gender axis in a systematic way in the evaluations and analyses to determine whether the effectiveness is equitable and act accordingly subsequently according to the results obtained.</p>
<p><b>Equity</b></p>	<p>It is necessary to guarantee equity in access, in the preparation and, as far as possible, in the results of the interventions carried out. This translates into investing more resources in those who need it most. The child population at risk of poverty or social exclusion faces multiple difficulties that can become barriers to being included and carrying out programmes intended for them. Interventions or public policies that address improving child nutrition do not aim to improve structural aspects that cause</p>

Scope	Considerations
	existing inequalities. But they must take them into account when designing the programme to try not to cause more inequality and to reduce it as much as possible.

## 6. Summary

From all the evidence reviewed, some conclusions can be drawn that can be useful for setting up programmes to improve child malnutrition. We review and summarise the main issues raised at the beginning of the report.

*What are the most important services, resources and policies in the fight against child malnutrition in children at risk of poverty or social exclusion?*

This review has shown a wide range of policies implemented in different areas of action, although with generally modest results. Individual interventions, mostly carried out in the school environment and with a format that includes one or more areas - education sessions on healthy habits, changes in the intra-school environment, family collaboration and promotion of physical activity - have a slightly positive effect on improving eating habits. With regard to interventions in the family sphere, the importance of the active participation of adults, especially parents, in the promotion of healthy habits is highlighted. Programmes that actively involve family members, incorporating techniques for behavioural change, especially that of parents (which encourages the mirror effect), have shown a certain effectiveness in changing eating habits and improving the quality of diet, although the evidence is variable. The existing policies in the structural field are very diverse and this is also how their results are shown. Those whose main objective is to guarantee one meal a day (for example, universal and free school canteens) have not been evaluated in our environment, although they are postulated as the main action to improve child malnutrition and, especially, in vulnerable children: 1) have a positive impact on the quantity and quality of the diet (regulated protocols); 2) they are equitable, since they eliminate bureaucratic barriers to access to financial aid, and 3) they promote social cohesion. On the other hand,



regulatory policies that aim to discourage the purchase of unhealthy products (such as the tax on sugary drinks, the modification of marketing in supermarkets or the regulation of advertising aimed at children) have proven to be effective in reducing the consumption of these foods. They are postulated as highly valuable tools for the modification of obesogenic environments.

*What are the characteristics of the programmes that have been shown to be most effective? Are there other dimensions that need to be taken into account for their implementation to be more effective?*

The great diversity of programmes makes it difficult to summarise which are the most outstanding features, as it depends on the idiosyncrasy of each intervention. Table 4 summarises some aspects that need to be taken into account in terms of design and implementation that have come up repeatedly in the interventions we have looked at in this study. We will highlight the three most significant ones across the whole spectrum:

1) The complementarity of levels or areas of action makes for a more realistic approach to the complexity of the phenomenon; however, their implementation is also more difficult and requires more resources.

2) behavioural change is a key element in establishing healthy lifestyle habits in the family sphere. Providing parents with strategies and tools for intra-family management and empowerment for change - by establishing personalised goals and plans - is a motivational tool that has repeatedly been included in most family interventions. However, a high degree of adherence and attachment to the programme by the parents is required to obtain results, although they may be more sustained.

3) changes in the environment are effective in stimulating and reinforcing the change in habits promoted by the intervention as well as perpetuating its impact. Some examples are the adaptation of school spaces, the modification of establishments around schools and strategic and marketing changes in supermarkets. They all help and amplify the effect of other coexisting interventions.

## 7. Implications for practice

A healthy diet is essential for optimal cognitive, physical and emotional development. At all ages, but especially in childhood, ensuring appropriate nutrition (in quantity and quality) will provide better health in the present and also in adulthood. The high rates of child poverty in Catalonia (32.5% of children under 18) (Idescat, n.d.) make quality food coverage difficult, and it is estimated that 5.7% of children cannot eat meat, chicken or fish at least every other day (Idescat. Survey of living conditions, n.d.), which results in being overweight, among other pathologies.

That is why it is important to put even more effort into reducing malnutrition in all children, guaranteeing a quality diet and helping to establish healthy eating habits. It is an obligation as a society to invest in children's present to guarantee a good childhood and adolescence and, at the same time, a good adulthood, providing them with tools to change their habits.

In this final section, a set of implications for practice is proposed. They are general recommendations that arise from our study and continuous discussion carried out throughout the research project. Most of them are applicable to any policy that you want to implement for the improvement of child nutrition, and they merit special attention in our context. The spirit of these implications is that they are aspects that encourage reflection and debate when considering, designing, implementing, executing and following any policy aimed at guaranteeing appropriate nutrition for children in poverty.

- **Destigmatisar el fenomen:** policies that apply only to the population at risk of poverty can lead to a stigmatisation of the phenomenon and further blame individuals for the family's vulnerable situation. Policies that are applicable to the entire population help the change to be social, and to create new role models in terms of healthy habits. This vision of public health helps to focus on the responsibility of structural factors in the malnutrition situation of the most vulnerable children.
  
- **Symbolic value of food:** it is a fact that the family's socioeconomic level influences access to healthy food, however it also has an impact

on something less tangible but no less fundamental: the meaning and value of food. The vast majority of families are aware of the importance of good nutrition for their children and how it affects their growth and development. However, food (and, especially, unhealthy food) is often used as a "reward" giving it a sentimental value beyond the nutritional value. This symbolism is much more frequent in families with financial difficulties, where sweets, soft drinks and foods with a high caloric content meet a higher percentage of children's demands (Fielding-Singh, 2017). This gratification has a very significant emotional component, being a moment of joy for both the recipient child and the parents who offer this "gift". The symbolic value of food must be considered both in the design of interventions and in the psychological approach to it.

- **The cultural factor:** as we have previously expanded, one must be aware that values and life perspectives can vary greatly according to the culture of each individual's country of origin. This aspect must be included at each stage of the intervention to ensure good acceptance and adherence to the intervention proposals. The inclusion of multilingual or community agents is a good example to reinforce access and adherence to the intervention for all children.
  
- **The sooner the better:** establishing healthy habits in the child or in the family group is more feasible the less entrenched the unhealthy dynamics are. For this reason, carrying out programmes for healthy parenting already from pregnancy is a strategy that must be taken into account. These programmes - across the health and social spheres - are able to accompany and guide in many aspects related to nutrition (breastfeeding, incorporation of solids) and habits (sedentary lifestyle, hours of sleep, exposure to screens, etc. ). The first thousand days are a window of opportunity that must be taken advantage of, as they allow future problems to be prevented. The implementation of these programmes, however, requires a high degree of coordination between public spheres (social-health), which makes their execution difficult.

- **Follow-up:** the intensity and duration vary considerably according to the intervention, and is a determining factor in its success, although it also makes it difficult for the participants to comply. Despite the difficulty, one aspect that is not taken into account much is follow-up and subsequent continuity. For example, in school canteens: what happens during the summer or holidays?, in individual or family interventions: what happens after completion? Some have approached this with a gradual disconnection through telephone or online contacts, thus increasing the total duration of the intervention. Others have been implemented exclusively during holiday periods, when there is less school coverage and more need. This is a limitation of programmes that run within a framework of public structures (schools, health centres, etc.) with well-established calendars. Otherwise, it would be appropriate to plan what the subsequent monitoring of each intervention will be. Incorporating, on the part of children and families, changes in healthy habits (mostly modest) is not an easy task. The effort invested in the execution of the intervention will be in vain if this perspective is not already incorporated in the initial design phase.
  
- **Simultaneity of the scope of action:** including as many areas of action in a programme as possible reinforces the message and is conducive to a better and longer-lasting result. Repeatedly throughout this study, emphasis has been placed on the need to incorporate in the design of the interventions, as far as possible, actions for change in the family group, the community and in the structural sphere. This is an added difficulty, which increases the complexity of both design and execution. Another strategy is to do two interventions in parallel or take advantage of the social change or political agenda to implement the intervention, and thus take advantage of a greater awareness among the population.
  
- **The community:** childhood overweight and obesity is not an individual problem, it is a general problem among the population as a whole. We emphasise the importance of keeping this vision in mind in the design, implementation and messaging to programme actors

and participants. This work framework destigmatises and promotes the approach to childhood overweight and obesity by including it in all the policies and actions of the community, making it responsible and at the same time a participant in the solution. It is recommended to detect all the community assets and create synergies with the different institutions and organisations of the community to take advantage of the available resources and to the extent possible to help in the sustainability of the actions carried out in the intervention.

- **Sustainability:** global policies and “scalpel” policies. Addressing child malnutrition, as we have seen, is not an easy task. The modest results mean that the economic investment towards these programmes must be reconsidered. A strategy that is proposed is to implement global policies that impact all children (destigmatisation is done and society is re-educated in the reference values) and apply concrete and high-intensity interventions and follow-up to pockets of the population with the greatest need. The aim is to seek maximum sustainability and impact, as well as to establish equity in the process, putting more effort where it is most needed.
  
- **Assessments in Catalonia:** in our region many interventions have been carried out and few have taken into account the socio-economic heterogeneity of the child population in the design and even less in the evaluation; therefore, it is a population with insufficient data to determine its effectiveness. This cycle can be reduced by incorporating in public calls and initial protocols the obligation to include an evaluation plan that incorporates axes of inequality such as gender, socio-economic level and country of origin. Beyond the knowledge that could be obtained for future improvements in these programmes, it is also a responsibility as public resources are used.

## 8. Glossary

### **Obesogenic environment**

It is the sum of influences that the environment, opportunities or living conditions have in promoting obesity in individuals or populations. An obesogenic environment can be conditioned by the sum of different factors: availability and consumption of fast food, ultra-processed foods and sugary drinks, high exposure to advertising of these types of foods, sedentary lifestyle, excessive time in front of screens, sleep disorder, neighbourhoods not suitable for physical exercise... These situations combined and present at the same time in a community or person increase the growing rate of overweight and obesity, which is exacerbated in the population that is in a situation of greater vulnerability.

### **BMI**

Body mass index is a measure that allows one to determine a person's corpulence by relating their mass to their height. The BMI calculation is:  $\text{weight (kg)}/\text{height}^2 \text{ (m}^2\text{)}$ . This metric, among others, helps determine the diagnosis of overweight and obesity.

### **Malnutrition**

Malnutrition is defined as that pathological state that results from incorrect nutrition due to deficiencies, excesses and imbalances in the person's caloric and nutrient intake. There are three main types of malnutrition: malnutrition, over-nutrition and nutritional deficiencies. Malnutrition includes wasting (insufficient weight for height, acute malnutrition), stunting (insufficient height for age, chronic malnutrition) and underweight (insufficient weight for age). Overeating is due to an excess intake, which results in an accumulation of fat harmful to health. The sum of overweight and obesity is considered excessive weight. Nutritional deficiencies are another possible consequence of malnutrition and include the lack or excess of micronutrients (vitamins and minerals).

### **Overweight**

Excessive weight compared with reference values based on height, produced by the abnormal or excessive accumulation of fat that represents a risk to physical, emotional and social health.

The diagnosis of overweight is calculated, among other measurements, with the body mass index (BMI). Overweight is considered when there is a BMI between the 85-94th percentile (from the WHO reference tables) taking into account the child's age and sex. View the WHO specific tables for the child population at:

<https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight> (World Health Organization, n. d.).

### **Obesity**

Obesity is defined as the abnormal or excessive accumulation of fat that poses a risk to physical, emotional and social health. It is a chronic, progressive disease that affects biological, psychological and social aspects of an individual's life. It is associated with a higher risk of developing cardiovascular diseases, an increase in mortality and a decrease in the quality of life.

The diagnosis of obesity is calculated, among other measures, with the body mass index (BMI). Obesity is considered when there is a BMI equal to or greater than the 95th percentile (from the WHO reference tables) taking into account the child's age and sex. View the WHO specific tables for the child population at:

<https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight> (World Health Organization, n. d.).

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