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# 1. Obesity and low income facts

The prevalence of overweight and obesity has increased worldwide during the last 30 years (1–6). Following WHO global estimates in 2014, more than 1.9 billion adults, 18 years and older, were overweight. Of these, over 600 million were obese. Overall, about 13% of the world's adult population (11% of men and 15% of women) were obese in 2014. The worldwide prevalence of obesity more than doubled between 1980 and 2014.

In 2013, 42 million children under the age of 5 were overweight or obese. Globally, an estimated 170 million children (aged less than 18 years) are now estimated to be overweight (7). Once considered a high-income country problem, overweight and obesity are now on the rise in low- and middle-income countries, particularly in urban settings. In developing countries with emerging economies (classified by the World Bank as lower- and middle-income countries) the rate of increase of childhood overweight and obesity has been more than 30% higher than that of developed countries (8).

Overweight and obesity are linked to more deaths worldwide than underweight. Most of the world's population lives in countries where overweight and obesity kill more people than underweight (this includes all high-income and most middle-income countries).

Numerous studies show that low-income and obesity are linked together. In particular, in industrialized countries it is children in lower socioeconomic groups who are at greatest risk (9). For example, a 2006 study by the Colorado Health Foundation titled *Income, Education and Obesity* (10) found that 25% of Colorado children living in low-income households with an average income of \$25,000 or less were obese compared to 8% of the children in households with an income of \$75,000 or more who were obese. These results can be found in many developed countries (9).

## 2. Childhood obesity is preventable

Overweight and obesity, as well as their related non-communicable diseases, are largely preventable. Supportive environments and communities are fundamental in shaping people's choices, making the healthier choice of foods and regular physical activity the easiest choice (accessible, available and affordable), and therefore preventing obesity (11).

In order to prevent obesity, its multiple determining factors must be understood with the subtle balancing of genetic make-up, individual behaviours and the impact of the environment (12, 13). On an individual level, weight gain is based on contributing factors such as the absence of breast-feeding, premature weaning, an abundant supply and availability of food, a reduction in physical activity, an excess of proteins in childhood, mediocre sleep quality, pollution, social stress, **socio-economic status**, culture, parenting styles, etc.

Although there are signs of stabilization in children in some age groups in certain countries (14, 15), large-scale, effective prevention of overweight and obesity remains a pressing public health priority given the adverse impact on health and quality of life in childhood (16–19) and the increased risk of obesity and associated health complications in adulthood. Nearly two-thirds of children with obesity will continue to suffer from the condition throughout their adult life (1).

Overweight and obesity in childhood are known to have significant impact on both physical and psychological health. For example, overweight and obesity are associated with dyslipidemia, hypertension, abnormal glucose tolerance and infertility. In addition, psychological disorders such as depression occur with increased frequency in obese children (21). Overweight children followed up for 40 (22) and 55 years (23) were more likely to have cardiovascular and digestive diseases, and die from any cause as compared with those who were lean.

Children are often considered the priority population for intervention strategies because weight loss in adulthood is difficult and there are a greater number of potential interventions for children than for adults. Schools are a natural setting for influencing the food and physical activity environments of children. Therefore, it would be more sensible to initiate prevention and treatment of obesity during childhood. Prevention may be achieved through a variety of interventions targeting built environment, physical activity and diet (24). Over the past 10 years, several studies have provided evidence that the prevention of obesity in children is possible through interventions aimed at modifying eating habits and increasing physical activity (25-27).

To better inform and develop a comprehensive response to childhood obesity in particular, WHO's Director-General established the high-level Commission on Ending Childhood Obesity (ECHO). The Commission will review, build upon and address gaps in existing mandates and strategies, raise awareness and build momentum for action to address childhood obesity (28).

# 3. EPODE: an impact on childhood obesity prevention and health inequities reduction

EPODE (Ensemble, Prévenons l'Obésité Des Enfants, i.e. « Together, let's prevent childhood obesity ») programme started in 1992 with a long-term and whole population approach nutrition education programme. It started in two pilot towns in the North of France (Fleurbaix and Laventie – together about 6,666 inhabitants in 1991) and consisted in community-based interventions over the next 12 years (26). A comparison population was selected from two other towns (CT) of similar demographic and socioeconomic characteristics also situated in Northern France. Results indicate that this community-based intervention programme, in fact, did reduce childhood overweight, with a substantial decrease in the prevalence (1992: 11.4% in FLVS and 12.6% in CT p = 0.6; 2004: 8.8% in FLVS and 17.8% in CT p < 0.0001) (Figure 1). It also appeared that the involvement of the whole community was necessary to reduce the prevalence of childhood obesity (26).



Figure 1: Evolution of children obesity prevalence in EPODE's towns (FLVS) and in comparison towns (CT) between 1992 and 2004.

Finally, this prevention programme proved to be efficient across all socio-economic levels (Figure 2). By taking a series of coordinated societal measures, it was possible to slow down obesity and to improve children's lifestyle and decrease health inequalities (Figure 3).



Figure 2: Obesity and overweight prevalence (%) according to socioeconomic groups in 2004 in EPODE's towns (FLVS) compared to comparison towns (CT). \*p-value<0,01.



# Figure 3: A reduction up to 50% of the health inequities amongst overweight and obesity prevalence (EPODE pilot).

Based on lessons learned from this pilot study, EPODE methodology has been built and implemented in several French pilot towns. In these towns, success to date is measured by a large field mobilization and the encouraging improvements in the body mass index (BMI) of children.

While data available in France at national level shows an overall stabilization in the prevalence of childhood overweight and obesity, results from the French EPODE pilot towns show a significant decrease in overweight and obesity: 9.12% between the years 2005 and 2009, i.e. a reduction from 20.6% in 2005 to 18.8% in 2009

(p < 0.0001) (29). Prevalence in overweight decreased from 15.8% in 2005 to 14.4% in 2009 (p < 0.0001) and prevalence in obesity decreased from 4.8% in 2005 to 4.4% in 2009 (p = 0.056) (29).

The same trend was shown in VIASANO, the Belgian EPODE programme with a reduction of the prevalence of overweight and obesity in two French pilot towns compared to the Belgian French community. After 3 years, a decrease of 22% of the prevalence of overweight in Marche and Mouscron have been observed. These encouraging results confirm the transferability of EPODE methodology (30, 31).

![](_page_4_Figure_2.jpeg)

#### Figure 4: VIASANO results.

Similar results are expected from JOGG programme in the Netherlands, ENERGIZE in New Zealand, OPAL in South Australia, THAO in Spain, Montemorelos Programme in Mexico and others.

### 4. EPODE International Network

EPODE methodology has proven to be able to ensure the sustainability of the programmes. EPODE programme is now implemented at a large scale, with encouraging results.

In light of the encouraging experiences and results and at the expressed request of the international scientific community, EPODE International Network, a nonprofit organisation, was created in 2011 in Brussels (32).

It is a contribution to the response to the need and demand from the global community in the fight against childhood obesity and non-communicable diseases (NCDs), through sustainable and large-sale community-based programmes (CBPs).

- from organisations and community-based programmes: to share best practices and benefit from EPODE methodology and experience;
- from the global scientific community: a global structure to put science into practice;
- from the policy community: the risk-free legitimacy of EPODE to develop strategies for obesity prevention;
- from the private sector: to generate more interest, do more advocacy and dissemination, facilitate implementation of community-based programmes aimed at preventing childhood obesity and NCDs in more countries around the globe;
- from all players: to share experiences and knowledge and to be part of a global approach together with local action.

EPODE International Network's overall objective is to build international capacity and capability for multi-partner community-based programmes (CBPs) in countries by:

- facilitating best practice sharing between EIN member programmes;
- providing EIN members visibility at global level;
- gathering leading political representatives to place and maintain obesity prevention at the top of agendas;
- gathering the leading global experts to build greater scientific and field evidence;
- forging links for greater dialogue between all stakeholders from public, civic and private sectors (civil society, corporate sector, institutions).

# 5. The community-based approaches

#### 5.1. Changing the local environment to change behaviour

This approach is focused on the modification of habits. It has now been convincingly demonstrated that we live in an "obesogenic" environment, and the non-western populations are rapidly creating similar environments. An obesogenic environment typically elicits the consumption of too much energy and discourages physical activity. The environment therefore needs to be changed. It is often seen in traditional prevention efforts that after initial changes, there is a rapid return to earlier behavioural patterns (33-35). In addition, when populations migrate to a new environment, their habits change in a predictable way to adapt to the new situational characteristics (36). Therefore, we have to change the environment to make healthy behaviours the most natural, easy and rewarding response and this includes: physical environment (e.g. the attractiveness of park areas), cost and benefit of behaviour (e.g. the price of food), social norms associated with being physically active, etc. To achieve most of these changes, it is necessary to collaborate with institutions or actors that have control over these environmental factors (37).

Over the past decade, several studies have demonstrated that the obesity prevention in children is possible through community-based interventions, to improve eating and

physical activity habits (25, 27, 32, 38–40). Increasing evidence shows that the most successful interventions are multicomponent, adapted to the local context (cultural and environmental), using the existing local structures and networks of a community, building partnerships and involving the participants in the planning, implementation and evaluation stages. (41, 42).

#### 5.2. The multistakeholder approach

The multifactorial strategy can use different social marketing techniques (43, 44). In any event, it is necessary for the techniques to be seamless and in the correct context, taking into account culture and socio-economic status.

Communication and evaluation are two other basic pillars of these initiatives. The strategy is based on evidence but also on experience. Activities are joined-up, renewable and exportable, and contribute to reducing health inequalities. Activities take place in developed and non-developed areas (town-planning, traffic systems, food provision) and go hand in hand with information and case studies. It concerns both general and targeted activities. Activities are multifactorial and permanent.

An important element of CBPs is the participation of the individual. By participating in the programme, the programme is more likely to succeed and ensure sustainability within a given context and within resources (45). Through participation, people are enabled to choose healthier alternatives. They are given the means and opportunities to do this and are made active partners in the process of change and its outcomes (46); and it is also important in the development of a sense of ownership of the programme (47). The rationale for CBPs is the notion that individuals cannot be considered separately from their social environment and context. Therefore, CBPs incorporate multiple interventions extending beyond the individual level; in doing so, they seem to have more success in changing behaviours than those which do not (48, 49). Other important elements of CBPs are empowerment, social network approach, capacity building, multi-sectoral collaboration and a mix of interventions (49, 50).Empowerment is the ability of people to gain understanding and control over personal, social, economic and political forces in order to take action to improve their life situations (51).

A social network offers social support (emotional, instrumental and informational), it influences through social norms, and presents role models and social comparison principles (46). The diffusion of ideas, knowledge and new norms throughout these networks is considered to be important to achieve community change (46) as well as using ambassadors that can spread the message and motivate people to participate in the community life and the "healthy activities" proposed by the health promotion programme. Another key to success is involving parents and their children together and enhancing peer-to-peer dynamic.

These programmes include the participation of a multitude of stakeholders and bring a common language shared by all (50, 52). In particular, it promotes their involvement

at central level (ministries, health groups, NGOs, and private partners) and local level (political leaders, health professionals, families, teachers, local NGOs, and the local business community) (39).

CBPs require policymakers and legislators to influence the law, the use of methodological frameworks, the participation of decision-makers and politicians. The involvement of local stakeholders must take place at the policy stage and programmes must integrate existing stakeholders at a local and national level. Local government has a leading role: town council can assume leadership in the realization of health promotion projects or interventions in different ways and be able to allocate specific budget for activities and an evaluation plan (39, 50).

The process involves participation of key stakeholder groups such as community leaders, from the implementation of a pre-designed intervention in a local setting to deep community participation in designing and implementing the intervention. By listening and learning from these populations, it is ensured that the interventions address their needs.

Since CBPs must be adapted to local context, it is not possible to provide an exhaustive list of the « mandatory » CBP components (53).

Multi-stakeholder approaches are widely recognised to be necessary in order to tackle obesity epidemics on a large scale (54, 55). No party can tackle the problem alone, joint efforts and cooperation are necessary to meet the challenge. It is important to build common ground where market forces can be mobilised in an appropriate manner to contribute to the achievement of a public health objective. Public-private collaborations are also considered to be more likely to increase the scope of financial and human resources that could be mobilised to serve public health programmes' objectives in an appropriate manner.

#### 5.3. Evaluation of CBP

Several practical guides and frameworks have been developed to assist the planning of the evaluation of community-based health promotion programmes. Examples of such guides are CDC's Framework for Programme Evaluation in Public Health (56), the WHO Framework for Health Promotion Evaluation (57) and the EPIC model (58). EPIC stands for Evaluation Planning Incorporating Context and provides a more contextual approach of the CDC framework (59). These models or frameworks share common ideas of how to tailor an evaluation to a community-based health promotion programme. Shared ideas in the construction of an evaluation plan are:

- engagement of stakeholders in the construction of the evaluation plan, evaluation needs and data collection;
- programme description following a logic model and programme goals and objectives;
- evaluation questions, design, methods and instruments;

- stakeholder involvement in analysis;
- the dissemination of results.

The evaluation is more likely to be successful if there are clearly defined feasible programme goals and objectives (59–61). A programme goal is usually defined as the future outcome of the programme; it is a long-term goal and includes those affected by the CBP (53, 61). To achieve this programme goal, smaller steps are needed; these are called programme objectives. These are measurable actions and should include who is involved, what the desired outcome is, how progress will be measured and the timeframe for achievement (53).

For the evaluation of the process, common indicators are the programme inputs, the implementation activities and stakeholder response to the programme (61). The implementation activities include performance of staff, methods of data collection, activities related to the organisation of the programme (e.g. meetings, contact moments) and media distribution. Stakeholder opinion includes reviews of programme plans, participation level and the response of collaborating partners to the programme (61).

The effect evaluation is an instrument for accountability for local government (administration) and the local stakeholders. It examines the impact and outcomes of the programme and focuses on documentation and evidence (59, 62). It seeks to determine its overall impact and ability to do what it was designed to do (59). For example, the main question of the Dutch Heartbeat programme was whether the programme contributed to the reduction of cardiovascular heart disease; this was supported by evaluations to see change in fat intake, physical activity and smoking (63).

Evidence indicates that key stakeholders participation will even improve the quality, relevance and credibility of evaluation results (64, 65). It will not only increase their sense of ownership in the evaluation process and the results, but will also avoid surprises when the final report is disseminated and helps to foster the process of empowerment and build stakeholders' capacity to address health needs (65).

# 6. EPODE Methodology

EPODE is a coordinated, capacity-building approach aimed at reducing childhood obesity through a societal process in which local environments, childhood settings and family norms are directed and encouraged to facilitate the adoption of healthy lifestyles in children (i.e. the enjoyment of healthy eating, active play and recreation) (27).

The primary EPODE target groups are children from 0 to 12 years old and their families. Because they can initiate micro-changes within the ecological niche of children and their families through concrete initiatives fostering better eating habits and physical activity in everyday life, the local stakeholders are the other target of the programme.

The EPODE philosophy is based on (66):

- a positive approach with no stigmatisation of any culture or individual;
- a concrete and step-by-step learning and experience of healthy lifestyle habits;
- the tailoring of messages and actions to the targeted population (e.g. according to age, socioeconomic status);
- a sustainable implementation of the programme to enable communities to plan actions and environmental changes for the long term.

# 6.1. Strong political will, thanks to the involvement of political representatives

The EPODE methodology relies on the importance of political awareness, willingness and involvement to set up and implement EPODE initiatives. The political representatives express obesity prevention issues at their level (national, regional or local) and are best positioned to initiate and support cross-sectoral prevention dynamics in communities. The political representatives can also build relationships with scientific experts, public and private partners (at national and local level) as well as with European political representatives to foster the set up and the implementation of EPODE-like CBPs in other European countries

# **6.2.** Coordinated organisation and approach based on social marketing methods

Epode approach promotes the involvement of multiple stakeholders at central level, from ministries, health groups, NGOs to private partners. The programme also benefits from the expertise and guidance of an independent expert committee. To put the EPODE methodology into practice, a central coordination team, using social marketing and organisational techniques, trains and coaches a local project manager appointed in each community by the mayor or other local leader able to champion the programme (Figure 5).

EPODE is a combined and coordinated approach with the application of marketing alongside other concepts and techniques to achieve specific behavioural goals to improve health and reduce health inequalities. Social marketing messages are incorporated into strategies aimed at influencing the social and physical environments surrounding individuals. EPODE uses social marketing strategies into a multi-level and multi-stakeholder approach to ultimately reach families in their local environments (67). This approach aims to mobilise local stakeholders within their daily activity (teachers, local NGOs, catering services...) to promote healthy lifestyles and greater physical activity in everyday life, empowering families and individuals in a sustainable way.

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Figure 5: A multi-level, multi-stakeholders approach, involving public and private partners.

#### 6.3. Scientific evaluation and dissemination

The evaluation (68) includes both a monitoring of process and outcomes indicators. The evaluation framework of the EPODE methodology is tailor-made by the central coordination team, with the expertise of a scientific committee and feedback from EPODE local stakeholders (69). Amongst other evaluation criteria, in each EPODE town, the Body Mass Index (BMI) of children from 5 to 12 years old is regularly measured.

#### 6.4. Public-Private Partnerships (PPP)

PPP platform is concerning all scales of programme implementation. All partners are involved in different actions that make sense in the global context of EPODE programme from the local level to the global level (27, 66).

PPP take place within a context of governments being publicly accountable for protecting and promoting the nutritional health of populations. Several UN system organizations identify global food and beverage companies as important stake-

holders to help promote a healthful diet and achieve the human right to food security. It has been suggested that transnational food, beverage and restaurant companies, and their corporate foundations, may be potential collaborators to address global issues such as obesity and NCD (70, 71).

Evaluations of the benefits of PPPs suggest they can raise the visibility of nutrition and health on policy agendas; mobilize funds and advocate for research; strengthen health-policy and food-system processes and delivery systems; facilitate technology transfer; establish treatment protocol standards; expand target populations' access to free or reduced-cost medications, vaccines, healthy food and beverage products; and distribute "essential packages" of nutrition assistance during humanitarian crises (71).

# 7. Conclusion

Obesity is a multifactorial disease that results from complex causes and mechanisms. Thus, using isolated approaches –which are often likely to increase health inequities– cannot efficiently prevent obesity. Multi-stakeholders approaches, such as CBPs have proven their efficiency at a territorial level. EPODE is a gold standard of CBPs whose methodology results from 23 years of experiment. Preventing obesity at a territorial level takes time: implementation of a CBP requires 2 years, and obtaining significant results may require 3 to 4 years.

Nevertheless, the methodology exists and it consists of four pillars (political involvement, coordinated organisation and social marketing-based approach, multi stakeholder approach involving PPP, scientific background, evaluation and dissemination). As obesity and related health inequities are now a worldwide issue, it needs to be tackled at a global level. As EPODE International Network shows, a worldwide movement is underway. Now is the appropriate time to implement community-based programs to reduce both overweight prevalence and health inequities.

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