



## Obesity prevention in children in pre-school years: Policies and evidence

Report of a high-level workshop held in Brussels, 11 April 2014

This document is written for policy-makers, officials and stakeholders concerned with the prevention of obesity, especially in younger children. It summarises the findings of the EU-funded ToyBox project and related research into obesity prevention in children, and reflects the discussions of a workshop involving some 50 senior researchers and clinicians, European Commission officials, and non-governmental organisations, held in Brussels in April 2014.

### The need for action

The prevalence of excess bodyweight among children has risen across Europe in recent decades and affects children of kindergarten age (van Stralen, 2012). Baseline data collected from over 7000 preschool children in the ToyBox-Study during 2012 found a wide variation in the percentage overweight or obese in the six countries studied, as shown in the table (based on IOTF cut-off criteria, using measured BMI, children aged 3.5-5.5 years).

	Germany	Belgium	Poland	Bulgaria	Spain	Greece
Overweight	8.0%	9.5%	10.4%	11.0%	11.9%	14.0%
Obese	1.9%	2.1%	2.4%	4.2%	4.1%	5.7%
<i>Total</i>	<i>9.9%</i>	<i>11.6%</i>	<i>12.8%</i>	<i>15.2%</i>	<i>16.0%</i>	<i>19.7%</i>

There is good evidence that obesity in childhood is a strong predictor of excess weight in adolescence and adulthood, leading to a lifetime of raised risk of chronic disease, including liver disease, diabetes, colon cancer, heart disease and stroke. Once gained, excess bodyweight is difficult to lose, and early moves to prevent excess weight gain and promote healthy diets and plentiful physical activity are needed.

Policy responses to the rise in obesity in Europe have been developed in the last 10 years, with the 2006 European Charter on counteracting obesity, a European Commission 2006 White Paper, a number of national strategy statements, and the most recent European Action Plan on Child Obesity 2014-2020 (European Commission, 2014). At global level, the World Health Organization has proposed a target of no increase on 2010 levels of overweight in children by the year 2025, endorsed by member states at the World Health Assembly in 2012 (WHA, 2012).

### Evidence-informed policies

The implementation of strategies for tackling the challenge of obesity in childhood requires evidence of effective interventions and some evaluation of their relative cost-effectiveness. The present document is designed to help answer this need, and to identify further research areas which require attention. We make the assumption that policies to promote health in early years, including maternal health, breastfeeding protection and the promotion of healthy complementary feeding, are . For present purposes we focus on policies which are aimed at protecting and

promoting healthy weights among children in the pre-school years, around aged 4-6 years, drawing on the experience of interventions in this and older age groups.

Successful behaviour change during childhood can be achieved through a combination of population-based measures, implemented both locally and at the national level. Although local intervention allows action to be tailored to meet the specific context and nature of a problem, only national leadership (and funding) can ensure effectiveness and sustainability of action at a population level through changes in social and behavioural norms (WHO, 2010). These need to be led by government policies, and need to acknowledge the wider social and economic factors which contribute to disease risk.

Ideally, policies should be based on carefully controlled trials showing proof of effect of a specified intervention in comparison with a control group not exposed to the intervention. In practice, many public health interventions cannot be tested through controlled trials, and the controlled trials are run in the most convenient, or 'controllable' situations, such as the school or kindergarten, rather than looking at retail environments, built environments, media content or product formulation. This creates a 'settings bias' in the scientific literature on the effectiveness of interventions (Lobstein & Swinburn, 2007).

In the present document we have used a broader approach, including evidence of the main behavioural and social risk factors leading to excess weight gain in children, evidence of policies which have helped to reduce the influence of these risk factors, as well as evidence from direct intervention trials among parents, infants, children aimed at changing behaviour. Furthermore, we attempt to take into account:

- the likely beneficial impact on nutritional status or behaviour underlying nutritional status
- the rationale and relevance to health policies and programmes
- the risk of increasing under-nourishment or widening health inequalities
- the reach across social groups and penetration within social groups
- the sustainability through changes in cultural norms and standards.

### **Cost and benefits: more than obesity prevention**

Although our main concern here is to tackle the threat of overweight and obesity by protecting and promoting healthy behaviour, we are aware that additional benefits should be taken into account. Improvements in diet and physical activity are linked better health generally, with some evidence that they can also improve educational attainment (Martin, 2014), and better behaviour patterns and psychological development (Eime, 2013).

In this respect, cost-effectiveness evaluations of interventions almost certainly underestimate the benefit side of the equation as they rarely account for additional health, educational and psychological improvements. Older children with overweight and obesity have significantly lower reported mean quality of life scores relative to their healthy weight peers, (Keating et al, 2011a, b) including social discrimination, which is often associated with poor self-esteem and depression, and in turn, lower academic achievement and lower economic productivity (Puhl & Latner, 2007). Translating estimates for the lost quality of life during childhood into economic costs will strengthen the cost-benefit arguments for intervention.

The present document provides a matrix showing different approaches to promoting and protecting young children's health, and the evidence available for its effectiveness in preventing weight gain. We also indicate any evidence of costs or cost-effectiveness, impact on health inequalities, and whether there are any examples of policies already put into practice within the European region. Following that, we summarise the early Toy-Box intervention findings, and comment on research needs to support policy development.

**Summary table: evidence to support policy instruments in the following areas:**

Intervention approach	Evidence of impact?	Health inequalities?	Cost-effectiveness?	Examples of national policies in action*
<p>LOCAL PRE-SCHOOL</p> <p>Provide nutrition education and skills to children, and / or provide nutrition education and skills to parents</p>	<p>Modest effects have been obtained, but sustainability not known. The strongest evidence among pre-schoolers shows the importance of increased physical activity and reduced screen-time / sitting time. (Te Velde, 2012)</p> <p>Interventions that (i) combine high levels of parental involvement and interactive school-based learning; (ii) target physical activity and dietary change; and (iii) include long-term follow-up, appear most effective. (Nixon, 2012)</p> <p>Healthy eating programmes that follow evidence-based teaching practices and a whole school approach have been shown to regularly increase student knowledge about food and diet. However, changes in student eating behaviours have been less successful. Girls tend to benefit more than boys and some quality initiatives have reported a modest increase in vegetable consumption. (Young et al, 2013).</p> <p>On physical activity the evidence suggests that: initiatives in schools are most effective if they adopt a comprehensive approach; e.g. the development of skills, establishing and maintaining suitable physical environments and resources, upholding policies to enable all students to participate. If students collaborate with school staff in deciding the type of physical activity to be undertaken, which could include other activities not viewed as sport, such as dance, then they will be more committed to participation. (Young et al, 2013)</p> <p>Parental involvement is associated with greater weight loss in children. (McLean et al, 2003) Interventions should also focus on children's and parents' perceived competence at making dietary and physical changes. 'Authoritative' parenting more likely to protect against overweight. (Gerards, 2011)</p>	<p>Not known - different age groups, genders and ethnic backgrounds require different approaches (Lytle et al, 2002; Micucci et al, 2002)</p>	<p>Multi-level school approach: school food services, education, PA ver cost effective (dominant) for children 6y. (DHS, 2006)</p> <p>Interventions for reducing TV viewing: very cost-effective (dominant) for children 8-10y (DHS, 2006)</p> <p>Family based interventions: €53 per 1% fall in weight for height, among obese children 7-9y. (Kalavainen et al, 2009)</p>	<p>There is a mixed picture in terms of the amount of physical education being offered to young people in Europe. Many countries have a statutory minimum provision but policy and practice do not always match up (HOPE, 2009).</p> <p>Slovenian national nutrition policy requires nutrition education to be included on school curricula. Nutrition education in primary schools is mainly delivered through science subjects.</p>
<p>LOCAL PRE-SCHOOL</p> <p>Focus on reducing sedentary behaviour at school and at home</p>	<p>An emphasis on decreasing sedentary behaviours is an effective intervention to decrease sedentary behaviours and control weight in children and adolescents. (DeMattia et al, 2007)</p>	<p>SES dimensions not known</p>	<p>If effects are sustained then benefits go well beyond obesity prevention. Likely to be very cost effective (dominant)</p>	
<p>LOCAL PRE-SCHOOL and NATIONAL</p> <p>Focus on healthy food services and food standards in school and pre-school settings</p>	<p>Promising policies and strategies include improvements in nutritional quality of the food supply in schools, and environments and cultural practices that support children eating healthier foods (Waters et al, 2011)</p>	<p>May reduce inequalities (greater improvement for lower SES)</p>	<p>Benefits go well beyond obesity prevention. Likely to be very cost effective (dominant)</p>	<p>25 EU countries participate in the EU School Fruit Scheme, which provides financing (that countries must match) to support national school fruit and vegetable programmes.</p> <p>Norway: has required schools to offer one free piece of fruit or vegetables, 5 days a week to pupils in grades 1-10. (To be replaced by a subsidised programme that requires parents to subscribe.)</p> <p>Estonia: Ministry of Social Affairs adopted updated regulations on nutrition requirements applicable to food served in school and pre-school canteens. These requirements contain upper limits for salt, sugar and fat content.</p> <p>Latvia: Legislation introduced in 2008 sets maximum amounts for sugar, fat and salt in foods sold in schools and pre-schools.</p>
<p>LOCAL PRE-SCHOOL</p> <p>Focus on school education to reduce consumption of sugar-sweetened beverages</p>	<p>An analysis of nine primary research studies is reported and eight of nine studies support that a decrease or reduction in SSBs by youth can have a positive impact on their BMI (older children) (Clabaugh &amp; Neuberger, 2011)</p>	<p>May reduce inequalities (greater improvement for lower SES)</p>	<p>Cost effective (dominant) for children 7-11y (DHS, 2006)</p>	

LOCAL PRE-SCHOOL Focus on school education to reduce TV viewing	Systematic review and meta-analysis did not demonstrate evidence of effectiveness of interventions aimed at reducing screen time in children for reducing BMI and screen time. However, interventions in the preschool age group hold promise. (Schmitz & Jeffrey, 2002)	May increase inequalities if dependent on parental motivation.	Cost effective (dominant) for children 8-10y (DHS, 2006)	
LOCAL PRE-SCHOOL Investing in pre-school staff and curricula for health promotion	Evidence shows benefits from support for teaching staff to implement health promotion (professional development, capacity building) (Waters, 2011; Kreichauf et al, 2012,)	May reduce inequalities if resources well distributed and teachers sensitive to the issues		Macedonian National Nutrition Action Plan (2009-2014) includes education in preschool and school programmes, with guides and training provided for staff. Effects unclear, but some member states have pre-school curricula for physical activity, sedentary behaviour, food standards, play facilities. (Nethe et al 2012)
LOCAL HEALTH CARE Nutrition and PA advice and counselling in health care / GP settings	Some impact in older children, no evidence available for younger children.	May increase inequalities if higher SES use health services more or respond to advice	~€4000 per DALY saved (children 10-11y) (Moodie et al, 2008)	
LOCAL Planning and built environment policies for enhancing neighbourhood facilities to promote PA, to reduce frequency of fast-food outlets, and promote fresh water consumption.	Effects unclear, but lack of policies in member states is evident (Nethe et al, 2012)	May reduce inequalities if lower SES areas are targeted	May be cost effective (dominant) if behaviour changes are found and are sustained	UK: Several local authorities have developed planning policies that restrict the development of hot food takeaways in local centres, and exclude them from areas in vicinity of schools, parks, or other youth centres.
LOCAL and NATIONAL Retail action, e.g. banning sweets and snacks at the check-out and / or promoting fruit and vegetables.	No evidence available for children of any age	Not known	May be cost effective (dominant) if effects on consumption are found	The Change4Life Convenience Stores programme is a partnership between the UK Department of Health and the Association of Convenience Stores to increase the availability of fresh fruit and vegetables in convenience stores. In London, UK, local government authorities manage the “Healthier Catering Commitment for London” scheme to encourage businesses to commit to providing healthier options. UK: Participants of the of Responsibility Deal have pledged ‘responsible promotion’ in stores, to balance the promotion of high fat, sugar, salt foods with healthier options.
NATIONAL Restriction of food advertising and other forms of commercial promotion	Indirect evidence of benefits in food choices and diets among children. (Hastings et al, 2007, Cairns et al, 2010)	May reduce inequalities (lower SES children watch more TV, and are more influenced by adverts) (Cairns et al, 2010)	Cost effective (dominant) for children 0-14y (DHS, 2006)	Ireland and UK: Advertising of unhealthy foods, as defined by a nutrient profiling model, is prohibited during children’s TV Spain: a Law on Nutrition and Food Safety states that kindergartens and schools should be free from advertising. (Implementation is at the discretion of regional authorities). Company-sponsored EU-wide voluntary ‘Pledge’ to restrict certain advertising to children under 12, including sugar-sweetened soft drinks.
NATIONAL Tax and subsidy measures to address food affordability and purchase incentives	Successful behaviour change through price adjustments in canteen and vending (older children), but adjustments must be sustained. (French et al, 2006)	May reduce inequalities if it primarily affects children most sensitive to prices.	May be cost effective (dominant) for children making purchases	In 2012, the French government introduced an excise duty on drinks with added sugar and artificial sweeteners, including sodas, fruit drinks, flavoured waters and light drinks. Hungary: A “public health tax” adopted in 2012 is applied on the salt, sugar and caffeine content of various categories of ready-to-eat foods, including soft drinks (both sugar- and artificially-sweetened), energy drinks, pre-packaged sugar-sweetened products. UK: The Healthy Start programme provides low-income pregnant women and/or families with children under the age of four with weekly vouchers to spend on foods including milk, plain yoghurt, and fresh and frozen fruit and vegetables.
NATIONAL and REGIONAL Public awareness campaign about food and nutrition for children, and related measures to strengthen community understanding and social norms	No evidence either way in children of any age? Problem of sustainability. Public awareness can be increased through celebrity championship (e.g. Jamie Oliver for school food services). Use of TV soaps can support public health messages.	May increase inequalities if higher SES better able to respond to messages	May be cost effective (dominant) if effects are proven and sustained	Change4Life social marketing campaign started in England in 2009, targeting families. It promotes healthy weight, healthy eating, physical activity and lower alcohol consumption using the slogan "eat well, move more, live longer". A sister campaign, Start4Life, is aimed primarily at pregnant women and new mothers.

\* Several examples here are extracted from the ‘NOURISHING’ policy database held by the World Cancer Research Fund International ([www.wcrf.org](http://www.wcrf.org))

## What has the ToyBox-Study shown?

The ToyBox-Study aimed to design and pilot the development of a supportive social and physical environment at kindergartens and home to facilitate behaviour patterns thought to help protect young children (aged 4-6 years) from obesity, at low cost and with the potential to be applied across similar settings in Europe.

Over a nine-month period in 2012-2013, pilot cluster randomised controlled trials were undertaken to encourage healthier diets, increase physical activity and reduced sedentary behaviour, involving 5,000 pre-school children and their families, through programmes conducted in 271 kindergartens in a range of locations in six EU member states (Belgium, Bulgaria, Germany, Greece, Poland and Spain). Further details are available at [www.toybox-study.eu](http://www.toybox-study.eu).

While the results of the ToyBox pilot interventions are being analysed in the summer of 2014, early results can be indicated here:

- At baseline, children in **lower income families** were more likely to be overweight or obese.
- The intervention was **feasible**, and generally well received.
- The intervention achieved significant improvements in dietary behaviour, with **greater consumption of water** and **reduced consumption of confectionery**.
- Similar **improvements were found among parents**, showing that the ToyBox intervention has a positive impact on the health behaviour of families.
- The intervention achieved **significant improvements in physical activity**, with greater numbers of children achieving at least 10,000 steps per day.
- Screen watching behaviour (a proxy for sedentary behaviour) was expected to show an increase as the children became older: this **increase in screen watching was less for the intervention group** than for the control children.
- **Similar effects were found in parents**, particularly an increase in reported vigorous activity, showing again that the ToyBox intervention has a positive impact on health behaviours in families
- The intervention **achieved small reductions in overweight and obesity prevalence** overall, although we would not expect an intervention of this type and duration to have a statistically significant impact on body weight in children of this age.
- Early evidence shows that the **greatest improvements in health behaviours** were achieved among children in kindergartens where teachers were more highly motivated to implement the intervention.
- Early evidence also indicates that the ToyBox intervention **did not increase the risk of health inequalities** across Europe.
- **Costs of the intervention** ranged from €5,000 to €29,000 per 1,000 children participating (€5 to €29 per child) across the six countries.
- A preliminary **economic analysis** indicates that the intervention was likely to be cost effective (the costs are reasonable for the amount of health gained) and to be dominant (the costs are significantly less than the value of the health gained).

## Research priorities to support policy development

- Evidence gaps identified in the table (next page) include evaluation of a range of non-school or kindergarten settings, such as:
  - interventions for pre-school children through family health care services
  - the effects on child physical activity of interventions undertaken through planning policies to improve local green spaces and built environments
  - interventions to reduce the impact of retailers' activities promoting child-oriented energy dense foods at checkouts and in fast-service restaurants
  - interventions to reduce pre-school children's exposure to marketing messages through media, including TV, print and digital media.
- There is a substantial lack of evidence on health inequalities (both socio-economic and ethnic status), and a lack of reporting of the effectiveness of interventions among children of different SES or ethnic group. Researchers should be aware that different age groups, genders and ethnic backgrounds require different approaches (Lytle et al 2002, Micucci et al 2002).
- There is a serious lack of longer-term follow-up to assess how the effects of interventions are sustained after the specific intervention has ceased. Many interventions are of relatively short duration (e.g. 2 months) and the large majority are for less than a single school year (10 months). Follow-up evaluation is essential, not only to ensure that the interventions have achieved significant change in normative behaviour, but also to help ensure that cost-effectiveness estimates are reliable.
- There is a lack of consistency, and often a complete absence, of reporting of the costs of interventions in order to calculate cost-effectiveness. Funding agencies should require costing statements to be reported.
- There is a lack of consistency in the measurement methods and type of indicators reported across the different interventions, which makes comparison between studies and their combination into meta-analyses difficult.
- There is a lack of research on variability, asking why some children show better responses than others, or why interventions may have greater impact in some communities.
- Attention needs to be paid to the motivation of the persons implementing interventions. Greater impact is likely to be associated with greater staff or parent motivation, and this in turn may be enhanced through their early involvement in the design of the intervention.
- The transfer from evidence base to policy is inconsistent. Despite a strong evidence base, policy implementation may be frustrated by a lack of adequate resources, a lack of institutional capacity, or influences on policy, including national economic priorities, lobbying and political influence. Greater attention needs to be paid to the costs of failing to act, and to the conflicting interests of stakeholders and the development of appropriate means to resolve these.
- Research consortia might benefit from the inclusion of a wider range of skills and professions: for example the involvement of local environment planners, school inspection staff, food supply companies and caterers, media companies and media programme designers, non-governmental organisations and community groups, local officials and local politicians.

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