Chapter 1

General introduction
NON-COMMUNICABLE DISEASES (NCDs) AND ASSOCIATED RISK FACTORS IN EUROPE

Non-communicable diseases (NCDs) are the leading causes of death worldwide. The highest NCD burden is observed in the European region [1]. In this region, the four main NCDs – namely cardiovascular diseases, cancers, respiratory diseases and diabetes – account for 77% of the disease burden and for about 86% of premature mortality [1]. Risk factors commonly associated with NCDs are related to lifestyle behaviours such as diet, physical activity, excessive alcohol consumption and smoking [2]. High blood pressure, high blood cholesterol, overweight and obesity are the most prevalent NCD risk factors and are particularly stimulated by physical inactivity and unhealthy diet [1, 3, 4]. Unhealthy dietary patterns include high consumption of saturated fat, trans fat, sugar and salt and low consumption of fruit and vegetables. As healthier lifestyles have been associated with reduced risk of NCDs and a lower NCD burden [5], it is evident that the main NCD risk factors and the respective burden are largely preventable [1, 6]. However, prevention is very difficult, as NCD risk factors and related unhealthy lifestyles are highly influenced by upstream, social determinants related to distribution of power, money and resources. Consequently, this results in health inequalities related to the conditions in which people are born, grow, live, work and age [7, 8]. Firm recommendations, aimed at tackling the social determinants of health in order to tackle NCDs, have stressed the importance of prevention efforts that lead to a reduction of social inequalities in health. Such recommendations are increasingly included in national health plans and/or development strategies of the WHO Member States [1].
OBESITY TRENDS AND DEVELOPMENT

Obesity trends

Obesity is one of the major preventable causes of NCDs. Overweight and obesity are therefore considered to be major public health concerns in the European region [9]. Obesity has been characterised as an epidemic disease over the last two decades with dramatic increases being reported since the 1970s [10]. According to the latest estimates, overweight and obesity have affected approximately 15-25% of the adult population [1] and 25-31% of the child population [11] in the WHO European Region. The current obesity trend in children is 10 times higher compared to estimates in the 1970s and it has been steadily increasing every year since then [1]. Therefore, public health entities have called for immediate action to tackle the public health problem, especially in the child population [12]. Childhood overweight and obesity are not only important risk factors for developing numerous serious metabolic diseases as well as psychosocial disorders during childhood [13], but obesity and its consequences are very likely to continue into adulthood [8, 10, 13-15]. Moreover, adulthood obesity is strongly associated with comorbidities responsible for developing cardiovascular diseases and diabetes [16].

Obesity development

In simple terms, overweight and obesity are the results of prolonged positive imbalance of energy intake and energy expenditure. Energy intake and expenditure are both determined by a number of factors (which interact with each other) stimulated by biological, environmental
and behavioural processes [10]. It is generally accepted that the current rapid increases in overweight and obesity rates are largely attributed to environmental and behavioural changes and not to genetic changes, considering that biological changes require much more time to occur [10, 14, 17]. Environmental determinants affect dietary and physical activity behaviour. This often leads to unhealthy choices and, thus, energy regulation may be disturbed in the long term [10, 14].

CHILDHOOD OBESITY: ENVIRONMENTAL, INDIVIDUAL AND SOCIO-ECONOMIC DETERMINANTS

Environmental and individual determinants: interaction and influence on lifestyle behaviours

Energy balance in children is influenced by several behaviours. Such behaviours – also referred to as energy-balance related behaviours – are low consumption of fruit and vegetables, unhealthy snacking and diet (high in sugar and/or fat content), physical inactivity, high screen time and short sleep duration [18-20]. Globalisation and urbanisation have allowed the perpetuation of such unhealthy lifestyle behaviours through the creation of obesogenic environments. Obesogenic environments are known to be major drivers of the obesity epidemic [6, 10, 12, 21]. Children are exposed to a vast variety of nutrient-poor foods that are ultra-processed, high in fat and sugar, easily accessible, and in low prices [12, 22]. Furthermore, the urban settings provide limited opportunities for physical activity and/or play, resulting in increased indoor activities, which are usually screen-based and sedentary [12, 22].
Aside from these macro-environmental influences, on the micro level, the family environment is very important in influencing the child’s energy-balance related behaviours as well. This is justified by the fact that the children depend to a large extent on their parents’ choices and the home environment their parents have created. Several studies have demonstrated that inadequate parenting practices and health-related behaviours and/or insufficient rules were associated to children’s weight status and related behaviours [18, 22-26]. Therefore, parenting skills, styles and practices are crucial targets for shaping and improving lifestyle behaviours in children.

Parental decisions that impact health-related behaviours are influenced by behavioural intention. And behavioural intention is determined by the individual’s attitudes, subjective norms and self-efficacy [27]. These individual determinants are shaped in a broad range of social and experiential contexts placed in the physical, political, economic and sociocultural environments [28]. In turn, these environments affect one’s behavioural intention and, consequently, their health-related decisions [29]. Moreover, health-related decisions are sensitive to changes, which either arise from the relentless alterations occurring within the various social contexts or are related to the individual’s perspectives (e.g. health status, disposable income) [29]. The socio-economic literature has used several behavioural models to explain health-related decisions, highlighting utility maximisation\(^1\) among other concepts. According to these models, “individuals make decisions about

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1: Economics concept that, when making a purchase decision, a consumer attempts to get the greatest value possible from expenditure of least amount of money. His or her objective is to maximise the total value derived from the available money.  
[http://www.businessdictionary.com/definition/utility-maximization.html](http://www.businessdictionary.com/definition/utility-maximization.html)
diet, physical activity, time allocation and weight to maximise their utility subject to constraints, such as time, resources, genetic predisposition and biological factors” [22]. Typical examples of utility maximisation decisions are the decreased meal preparation time by working mothers and the purchase of cheaper food products, especially in low-income households [30]. Thus, looking beyond the health-related decisions of parents and children and, instead, considering a more comprehensive approach that tackles “the causes of the causes” is of great importance for the prevention of obesity and consequently NCDs [31].

**Socio-economic determinants**

It is currently well-documented that unhealthy behaviours, as well as overweight and obesity rates, are more prevalent in populations with relatively low socio-economic status, as defined by occupational class, educational level and/or income [32-37]. The phenomenon is apparent between and within countries in Europe [33]. Socio-economic inequalities concerning obesity may develop in early childhood and last throughout the later stages of life [8, 15, 16]. Upstream causes that lead to health inequalities result from the unequal distribution of social determinants of health, namely access to health care, living and working conditions, macro-policies, income and assets, and their consequences [30]. Based on these facts, Dove and Lambert (2016) claim that “failure to recognize the complex and iterative nature of these influencers, at the individual, community, and policy levels, with respect to local context, will undermine efforts to prevent and manage the burden of disease” [29].
OBESITY PREVENTION: FROM A SOCIOECOLOGICAL APPROACH TO THE EPODE MODEL

To date, a large number of efforts – policies, programmes, interventions – have been implemented to reverse the increasing obesity trends in all ages. So far, some of these have resulted in a levelling off in some cities and/or countries, and, at the same time, an increased social gap in prevalence of obesity [38]. Roberto et al. (2015) attributed the limited success to: i) a lack of policy actions or of actual implementation of existing policies (excluding the education-related programmes); ii) the preponderance of behaviour change initiatives over environmental ones; iii) failure to adequately engage the food industry in promoting healthier lifestyles [38]. Therefore, in an emerging consensus based on research and practice, the need of a multisectoral approach to a) address individual, environmental and policy levels simultaneously and b) aim at lifestyle, environmental and socio-economic determinants is recognized, in order to sustainably deal with the obesity epidemic. This so-called socio-ecological approach implies that, in the context of childhood obesity prevention, interventions should target various settings that influence the children’s diet, physical activity and weight (e.g. health care, schools, home and family environment, community environment) as well as the related upstream factors mentioned in the previous section of this thesis. As very clearly stated in the WHO report titled Ending childhood obesity – and supported by notable scientific studies – “this requires government commitment and leadership, long-term investment and engagement of the whole of society to protect the rights of children to good health and well-being” [12, 38, 39].
Chapter 1

The EPODE approach

Based on the socio-ecological approach, integrated community-based approaches (ICBAs) have been developed. They are composed of a cluster of strategies, which are implemented in a community setting and have been designed for individual behavioural change towards a healthier lifestyle by means of involving and influencing various institutions, organisations and local stakeholders [40, 41]. An integrated community-based approach that showed promising effects in reducing childhood obesity prevalence in France – the Fleurbaix-Laventie study – gave rise to the EPODE (which stands for ‘Ensemble Prévenons l’Obésité Des Enfants’ and translates to ‘Together let’s prevent childhood obesity’) model, established in 2008 [43]. EPODE is a capacity-building approach aimed at decreasing the prevalence of childhood obesity through involving and influencing community actors, local environments, childhood settings and family norms towards facilitating healthier lifestyles for children. To achieve this, the EPODE approach acts on four critical areas (also mentioned as the four EPODE pillars): (i) political commitment, (ii) social marketing techniques to trigger behavioural change, (iii) public and private partnerships and (iv) scientific monitoring, evaluation and dissemination of the programme [41, 43].

Van Koperen et al. (2011; 2013) constructed the EPODE programme theory, in which the EPODE pillars are integrated in a logic model [40, 44]. Consequently, four levels of action are distinguished, as illustrated in figure 1. Starting from the left side, the first level is the central organisation, which ensures the overall management of the programme. The second level is the local organisation, supported by
the central organisation in order to establish political commitment, public and private partnerships and social marketing principles. The second level provides input for the next level, the community. At this level, activities concerning advocacy, community capacity-building and nutritional and physical activity are taking place. As a result, at the child level, children's behavioural change is anticipated to be attained and healthy weight to be established [44].

**Figure 1.** Levels of the EPODE approach [44].

The EPODE is currently implemented in 43 EPODE-like community-based programmes worldwide, 18 of which are placed in Europe [45]. The strategies are always adjusted to meet each country's particularities as well as local specificities and dynamics.
Chapter 1

From EPODE to European projects

The long term follow-up of the Fleurbaix-Laventie study (1992-2007) showed a 2.6% decrease in obesity prevalence in 12-year-olds, which was more apparent in children of middle and low socio-economic status [42]. Based on these promising results, two European projects emerged, co-funded by the European Commission. Firstly, in 2012, the ‘EPODE for the promotion of Health Equity’ (EPHE) project was launched, to analyse the added value of the implementation of the EPODE approach for the reduction of socio-economic inequalities in health related behaviours of children aged 6 to 12 and their families, living in seven different European communities. Secondly, in 2014, the Obesity Prevention through European Network (OPEN) project was launched, aiming at improving the methods of community-wide approaches through experience sharing and capacity-building training based on the EPODE approach. This thesis is based on both projects (EPHE and OPEN).

AIM OF THE THESIS

For the purposes of this thesis, the EPODE approach and its programme theory are considered in a three-level analysis. Firstly, the programme level is assessed by systematic appraisal of ICBAs for preventing childhood obesity across the European region. Secondly, the effectiveness of the EPODE approach in tackling socio-economic inequalities in childhood lifestyle patterns, as shaped by behaviours and related determinants, is assessed on the population level. Thirdly, due to the scarcity of evidence regarding the influence of the family environment on the water intake of children, the association between
parenting practices towards sugary beverages and the child’s water consumption is illustrated, on the individuals’ level. Consequently, the research questions of this thesis are:

a. Is it possible to identify strengths and weaknesses of integrated community-based approaches targeting childhood obesity prevention by means of their systematic appraisal through the OPEN tool and the Good Practice Appraisal Tool (chapter 2)?

b. Is the EPODE approach able to improve and sustain improvements in energy-balance related behaviours, particularly in the groups of relatively low socio-economic status (chapters 3, 4 and 5)?

c. Is there an association between parenting practices regarding the consumption of sugary beverages and children’s water consumption (chapter 6)?

**OUTLINE OF THE THESIS**

In the second chapter of this thesis we present strengths and weaknesses of the ICBAs, which were analysed in a systematic way through the use of two different appraisal tools, in addition to the strengths and weaknesses of the two appraisal tools we used initially. In chapter 3, we describe the design and methodology of the effect evaluation of the EPHE project, in order to assess the outcomes of the selected EPHE community-based programmes. Further, the baseline differences in energy-balance related behaviours and associated family-environmental determinants, as deduced through comparison between high and low status socio-economic groups in cities across seven
Chapter 1

European countries, are presented in chapter 4. Consequently, changes in these behaviours and determinants within the high as well as the low education groups, as deduced through comparison between baseline (T₀) and measurements after interventions of a nine-month period (T₁), are described in chapter 5. In the same chapter, the sustainability of the identified changes is assessed by comparing the intermediate (T₁) to the final measurements (T₂) obtained one year later. Finally, chapter 6 explores the association between parenting practices towards beverages and the child’s water consumption.
REFERENCES


Chapter 1


