

TOOLS

Papers produced from the Health Inequalities Audit Process

Diet, Nutrition and Obesity

**Task 1. EVIDENCE, RESEARCH
AND ECONOMIC ANALYSIS
OF NUTRITION, OBESITY AND
HEALTH INEQUALITIES.**



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The attached paper has been produced as part of the Health Inequalities Audit process, within the scope of the Joint Action on Health Inequalities – Equity Action.

Diet, nutrition and obesity were identified as priority subjects by an iterative process, considering a range of health and non-health policy areas within the EC which were potentially amendable to a review process considering their contribution to the socio-economic gradient in health status. The review is to inform future discussions in the relevant policy areas of what would help to tackle differences in behaviours, and outcomes across the socio-economic gradient.

The areas covered in this paper were identified in a discussion between the Head of Service, Nutrition and Physical Activity and the lead on Health Inequalities both within DG Health and Consumers (European Commission), and with Chris Brookes, Coordinator of Equity Action, Tim Lobstein of the World Obesity Federation and Aileen Robertson, Public Health Nutritionist at the Metropolitan University College, Copenhagen.

The outcomes are intended to provide a review of the contribution of SES inequalities in aspects of diet, nutrition and obesity and helping to identify the scale of the inequalities, and therefore some of the benefits of addressing them.



TASK 1. EVIDENCE, RESEARCH AND ECONOMIC ANALYSIS OF NUTRITION, OBESITY AND HEALTH INEQUALITIES.

By Tim Lobstein

Task 1.1

State of the art: An examination of recent systematic reviews of the links between socio-economic status and obesity, and the identification of research gaps

1.1.1 Summary of systematic reviews

1.1.2 Research gaps

Task 1.2

Towards an identification of an economic rationale for action on tackling obesity in relation to inequalities

1.2.1 Costs of obesity

1.2.2 Effectiveness of interventions

Task 1.3

Towards an audit of EU-funded research

Author's Profile

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Executive summary

This document is in three sections, and examines three aspects of health inequalities in obesity and their relationships to socioeconomic status (SES). The first section is a narrative report on recent systematic reviews that have been undertaken linking SES to obesity, with a focus on the gaps in the evidence. The second section is a report on the literature on the costs of obesity and the cost-effectiveness of interventions, in relation to SES. The third section considers the EU-funded research projects on obesity and examines whether they have included a focus on inequalities.

The analysis of **systematic reviews** found that these could be classified into eight categories according to their main focus. The eight categories are reported on and the apparent evidence gaps were identified. The research gaps can be summarised here:

Surveillance: There is an absence of routinely collected information on obesity prevalence by social class in most countries in Europe. Even the COSI surveillance does not require information on SES to be collected. There is a lack of information on SES aspects of nutrition and diet for most countries, and few surveys are undertaken routinely. There appears to be no surveillance of national indicators of inequality (such as the Gini Index) in relation to obesity, or how obesity may respond to changes in national economic prosperity. There is a lack of evidence on social attitudes to obesity and the framing of responsibility for health behaviour.

Tracking and modelling: There is a lack of information on how obesity tracks through the life course, differentiated by SES, and how nutritional environments might influence this. There is a need for modelling of policy scenarios (e.g. taxes on soft drinks, or increased school physical activity time) and their differential impacts on SES groups, or the differential impacts on the costs, or time taken to have an impact.

Costs: Considerable evidence gaps exist in how the costs of obesity are differentially borne by SES groups, or how different SES groups cause costs to the health services or to employers.

Community interventions: There is a major gap in the assessment of ‘real life’ community interventions which target lower SES groups but which are only run for a year or two. Longer term effect of these and the larger interventions and national policy initiatives need to be assessed for their differential impact on SES groups.

Treatment: There is a lack of evidence on the social gradient for the differential access, diagnosis, treatment offered, treatment adherence, treatment outcome and readmission rates. There is a need to assess prejudice against obesity among health service staff and whether this differentially affects certain SES groups.

Neighbourhood: Local neighbourhoods need further attention, especially determining what **mediates and moderates the influence of environments** on behaviour and whether these show SES disparities.



Policies and strategies: There is a need for better evidence on the health impact of social transfers and minimum wages. There is a need to reassess policy priorities and ‘what works’ for their impact on health inequalities. There is a need to distinguish policies which should be specifically targeted at lower-income groups and/or minority ethnic groups, which should be applied across all SES groups equally, and which should be adjusted in proportion to the problem: i.e. proportionate universalism.

In the second section, the issue of **costs** and **cost-effective interventions** is examined in relation to SES. There is a remarkable lack of evidence. The report suggests that a number of issues need to be investigated, including (i) how SES gradients in obesity prevalence relate to costs in health services and how they relate to costs for employers; (ii) whether there is evidence that obese individuals from lower SES groups cost more on a *per capita* basis, e.g. because of poor attendance for treatment, or cost less, e.g. because absenteeism or workplace disability is less costly to an employer if the employee is low-paid; and (iii) examining the costs incurred by greater levels of national inequality, which is associated with higher levels of obesity in adults and children.

Further work is needed to take account of costs arising for overweight, non-obese people, and for children over their lifetime, and also estimating the costs of lost opportunities (e.g. through obesity leading to lower educational attainment, lower social capital), and environmental costs (carbon costs for transport, food over-consumption).

Lastly, the third section considers the **EU-funded obesity research projects** and whether these projects include a focus on inequalities. Several of the projects collected data on SES as well as measuring heights and weights, the differential prevalence rates are reported. Definitions of SES group include educational attainment level, occupation and country of birth. Data collected also include diets, sedentary behaviours and physical activity, but differential reporting by SES group is only provided in a few research project publications, such as those from the ENERGY project. Responses to interventions do not appear to have been reported by SES group, although the data may be archived and could then be re-analysed. The TOYBOX project on kindergarten interventions is still reporting, and SES-differentiated responses to the intervention should be provided.

In summary, there are large gaps in the evidence – for example on differential health services usage and associated costs – and several dimensions which are seriously neglected, including the issue of national inequality indices and their association with health behaviour.



Task 1.1 Examine the scientific evidence of links between socio-economic status and obesity and identify research gaps

Step 1 Review databases to identify what has been published in the last 3 years

Summary of actions requested

1. Identify titles and abstracts of potentially relevant systematic reviews in searchable scientific databases.
2. Identify potentially relevant papers in grey literature.
3. Review content for relevance.
4. Summarise findings

Summary report on actions undertaken

The methodology for the database searches for systematic reviews published in peer-reviewed journals and in grey literature is described below. In brief, approximately 2300 potential review papers and 450 grey literature records were identified by search engines. After eliminating duplicates and applying relevant filters, 373 scientific review papers and 61 grey literature documents were accepted for further analysis. The abstracts of the scientific papers and the full texts of the grey literature documents were read for their bearing on the issue of socio-economic inequalities and obesity. A narrative report of the findings is presented, and a summary of evidence gaps and needs is made.



Database search for systematic reviews among scientific papers

Six scientific databases were searched: EMBASE/OVID, PubMed/Medline, ProQuest (Social and Health & Medical), Web of Science (Social Science and Science), the Cochrane Library, and Google Scholar.

Search terms (varied according to the search engine)

- (a) [overweight OR obese OR obesity OR “body mass”]
AND
- (b) [education OR income OR occupation OR “social class” OR deprivation OR poverty OR inequality OR inequalities OR socio-economic OR SES]
AND
- (c) [systematic review OR review OR meta-analysis]
AND
- (d) Date of publication 2008 or later
AND
- (e) Papers in English language only.

Number of records identified

EMBASE = 621

PubMed = 1151

ProQuest = 226

Web of Science = 278

Cochrane = 13

Google Scholar (search term (c) [systematic review]) = 178,000, but date sorted = 52

Added from grey literature search = 3

Filters

Eliminate duplicates

Eliminate if no abstract

Eliminate if focus is on developing economies

Included for analysis

373 papers in peer-reviewed journals

Overview of findings: A wider range of topics were addressed in the review papers than had been anticipated. The papers were divided into eight categories according to their topics, and a narrative summary for each topic is given below. Further details of the papers, including their titles, authors, journal references and abstracts, are given in Annexes 1 – 8 below.



Database search for grey literature

Two popular search engines were used to identify grey literature: Google (UK and US sites, www.google.co.uk and www.google.com) and Bing (www.bing.com).

Search terms

[obesity] AND [inequality] AND [report]

Number of records identified

Initial trawl:

Google.co.uk = 926,000 in all, and >2000 in current year (2014 to date).

Google.com = 924,000

Bing = 6,180,000 (date filter not available).

Revised sample: first 150 items sorted by search engine

Google UK and USA = sorted by relevance within defined time period 2010-2014.

Bing = sorting process not described.

Filters

Eliminate duplicates

Eliminate website material which is not based on published reports

Eliminate peer-reviewed papers included in Step 1

Eliminate if URL not active

Eliminate if not a report from a reputable source (*reputable* includes government authority or agency, research institute or 'think tank', professional society or similar; *non-reputable* includes news agency or media, blog or unreferenced summaries and statements).

Included for analysis

61 authoritative documents

Overview of findings: These documents included surveillance reports, strategy and policy documents, reviews of interventions and local implementation reports. A narrative summary is given below and details of the documents, including links and brief descriptions of the relevant content, are given in Annex 9.



Narrative summaries of the papers and documents

The 373 scientific review papers were divided according to their main topic area. Sixty-three papers were placed in two topic areas because their subject matter was sufficiently detailed in both areas. As the table shows, some 40% of the papers were concerned with assessing the presence of obesity related to inequalities through some sort of surveillance. Second most frequent were interventions in community settings (mainly in schools and workplaces).

Topic area	number of papers
Surveillance including surveys of drivers of obesity (behaviour, diet, family relations, infant feeding) and covering socio-economic status, ethnic minority, education, income and local deprivation indices. Annex 1	156
Tracking including studies of the links between early deprivation and later obesity, early obesity and later disease, and their links to socio-economic status etc. Annex 2	15
Costs and related economic issues, including costs to the economy, employers, health services, and also prices, fiscal impacts and fiscal behaviour. Annex 3	22
Community interventions including those conducted in kindergartens, health centres, schools, workplaces, and also broader health promotion interventions in populations and subgroups. Annex 4	100
Treatment of obesity including access and use of health services, and health professionals' behaviour and practice. Annex 5	31
Neighbourhoods including food environments and food deserts, built environments and green spaces, and neighbourhood security. Annex 6	35
Policies and strategies which address obesity and attend to socio-economic differentials, sub-groups and health inequalities related to overweight and obesity. Annex 7	36
Co-morbidities linked to obesity which implicate socio-economic or related inequalities. Annex 8	34

The grey literature documents (Annex 9) were categorised into the topic areas identified for the scientific findings.

The narrative reviews below cover both sources of material.



1. Surveillance including surveys of drivers of obesity (behaviour, diet, family relations, infant feeding) and covering socio-economic status, ethnic minority, education, income and local deprivation indices. Details in Annex 1 and Annex 9.

Many of the epidemiological findings shown in the review for the European Commission in 2007¹ have been confirmed in subsequent surveys and shown to be applicable in additional countries. For most developed countries there is a gradient in obesity prevalence across socio-economic groups, with higher levels of obesity found among lower SES groups, measured either through household income, neighbourhood deprivation, educational attainment or similar measure, and is stronger for women and children than for men.

However, the 2007 review noted that in some countries the gradient is not significant or is slightly reversed (more often for men, with higher SES groups more likely to show excess bodyweight). These were mostly in Eastern Europe, and were based on surveys from the 1980s and 1990s, a period of significant economic disruption and demographical change. There are few surveys from the later 2000s or early 2010s which would help to clarify if these countries are now becoming more like those of Western Europe, which might be expected as access to low-cost processed foods increases for lower-income families. A study of Rumanian middle-aged adults published in 2011 found obesity more common in lower income, lower educated households.² The Health Behaviour of School Children report of 2009 found that, out of 12 Eastern European countries surveyed, only two (Armenia and Slovakia) showed children in higher income families having significantly higher BMIs than children in lower income families, and then it was only for boys.³

While obesity prevalence trends have continued to rise in many countries, in some there is evidence of an easing of the rise, and a possible decline. Where the trends have been disaggregated by SES, there is evidence of a widening gap between higher and lower SES group, at least in some countries, so that trends for higher-SES groups tend to be declining while those for lower-SES groups continue upwards.

Ethnicity and immigration status are associated with significant variation in obesity prevalence. As a rule, recent immigrants tend to have obesity prevalence levels similar to those of their country of origin, while subsequent generations increasingly adopt the prevalence levels of the host country. However there is a need to distinguish income, education and occupation differences from ethnic differences before assuming one or the other is solely responsible for raised obesity risk.

¹ [Obesity and socio-economic groups in Europe: Evidence review and implications for action](#). A Robertson, T Lobstein, C Knai. European Commission 2007.

² Graur LI, et al. Correlations between anthropometric parameters and cardio-vascular risk factors related to lifestyle in a rural population. *Rev Med Chir Soc Med Nat Iasi*. 2011;115:705-11.

³ *Health Behaviour in School-Aged Children Study: International Report from the 2009/2010 Survey*
http://www.euro.who.int/_data/assets/pdf_file/0003/163857/Social-determinants-of-health-and-well-being-among-young-people.pdf?ua=1



There is continuing evidence that income inequality within a country or region, measured using the Gini Index or similar type of measure, shows a relationship with adult obesity prevalence, with higher levels of inequality associated with higher obesity prevalence in the population as a whole. A similar link between excess bodyweight and measures of national inequality has also been shown for children, with higher levels of overweight found among children in countries with higher levels of household inequality, for both boys and girls and for both younger and older children. Studies of people placed into extreme inequality – in prison – indicate that they may show rapid weight gain, especially female prisoners. The association between income inequality and obesity prevalence appears to be found more in developed economies rather than developing or underdeveloped economies, although a general rise in obesity worldwide is matched by a general rise in inequality *between* countries. Theories of psycho-social stress are offered to explain the association between perceived social status inequality to subsequent health.

Surveys of the social and environmental factors associated with excess bodyweight show higher levels of consumption of sugary and fatty foods, and sedentary behaviour, and lower levels of physical activity, among population groups with higher levels of obesity prevalence, and some correlation between these behavioural patterns and SES. Elmadfa's comparison of food consumption patterns across 14 Member States shows higher SES groups (by educational attainment level) tend to consume smaller amounts of processed foods such as processed meat products and soft drinks, less sugar and other sugary products, and more unprocessed foods such as fresh fruit and vegetables.⁴

It should be noted that some surveys of child overweight have shown that there are national differences in how the behavioural patterns are manifested: in some countries there may be excess soft-drinks consumption, in others a lack of fruit and vegetable consumption, or a high level of sedentary behaviour, or a low level of physical activity. These may in part be contextual, through intermediate variables (cultural norms around soft drinks consumption or use of green spaces, or climate/weather effects on outdoor physical activity). Availability, access and affordability of healthy food supplies, access to play areas and green spaces and their perceived safety, continue to feature as upstream 'drivers' of the trends in weight gain, and linked to SES status. There is a need to use research and analytical methods that allow for clustering of risk factors within individuals, households and/or neighbourhoods.

Encouragement to breastfeed, maternity facilities, maternity leave, and social norms on breastfeeding in public places may all influence infant feeding practices which show significant SES differences. Gestational obesity and gestational weight gain shows SES gradients. Infant complementary feeding and child feeding patterns, meal arrangements and parental control behaviours show SES differentials which may help explain the correlation between parent and child BMIs.

Body image self-perceptions and body shape stigma and prejudice are further factors to be taken into account, especially in self-reported surveys of obesity and health

⁴ Elmadfa i. *European Nutrition and Health Report 2009*. Karger.



behaviours, but also in motivation to improve health and respond to general health promotion messages and specific advice and treatment.

The relationship between educational attainment and obesity prevalence is nuanced, as obesity (or associated nutritional factors or physical activity) may lead to reduced educational progress, while poor educational level may lead to reduced understanding of appropriate health behaviour as well as reduced income and hence reduced ability to purchase healthier foods etc.

2. Tracking including studies of the links between early deprivation and later obesity, early obesity and later disease, and their links to socio-economic status etc. Annex 2 and Annex 9.

Evidence continues to accumulate to show that an overweight child is more likely to be an overweight adult than is a normal weight child, and that the risk of becoming an overweight child is closely associated with the parents' BMI. This indicates the need for a 'lifecourse' approach to obesity intervention, considering the various influences at every stage in the cycle from birth, through childhood and adolescence, adulthood, and pregnancy through to birth again, as each stage transmits a risk to the next. Retirement and old age can also have an influence on the next generation if they shape the resources available for family child care. Modelling of obesity prevalence into future decades suggests that sub-populations with low income or lower educational status may continue to show increases in the prevalence of excess bodyweight, with one Australian model predicting half of all lower-educated adults in the country being obese by 2025 (Backholer, 2012).

The association between parents' BMI and their child's BMI appears to continue into the child's later life, so that parental BMI is still associated with the child's BMI when the child is aged 45 years. There is some evidence that boys' BMIs are more strongly associated with their fathers' BMIs, and girls' BMIs with their mothers'. There is some evidence that the association between parents' and children's BMIs are stronger in the more recent generations than earlier ones. A child's gain in BMI compared with their parents' appears to vary according to family SES status, with children of overweight parents in lower SES households more likely to become obese than the children of overweight parents in higher SES households.

Childhood dietary and physical activity patterns also appear to track into adulthood, and may represent the mediating factor which transmits SES cultural norms through this period of life. Poverty or deprivation in childhood is associated with later risk of obesity in women, but the association is not significant in men. Experience of poor parenting or maltreatment in childhood is associated with being obese in adulthood: this can occur in all SES groups but is more common in lower SES households.



Tracking from young adulthood into older age is also well-recognised, and excess bodyweight in younger decades raises the risk of obesity-related chronic disease in older years, independently of SES status.

Care should be taken on the interpretation of tracking studies, especially those tracking from childhood to adulthood. BMI and definitions of overweight and obesity rely on calculations of weight adjusted for height. Shortness of height in early childhood tracks strongly through later childhood into adulthood, and therefore early child nutritional experiences leading to stunting or short stature might lead to high BMI in adolescence or adulthood because of under-height rather than excess weight.⁵ Care should be taken to identify whether ‘obesity’ and its co-morbidities in adulthood are in fact a reflection of short stature, in turn due to poor infant nutrition.

3. Costs and related economic issues, including costs to the economy, employers, health services, and also prices, fiscal impacts and fiscal behaviour. Annex 3 and Annex 9.

The costs of obesity include medical costs, economic costs through lost productivity, family support costs and generalised social costs (such as the carbon costs of transporting excess bodyweight). The shorter life-expectancy of an obese person can offset some of these costs.

SES differences in access to treatment and to early diagnoses may influence the costs of treatment differentially, as well as the subsequent life expectancy. Also, in so far as poor health behaviours may cluster more commonly among some SES groups, this would further differentiate the costs of obesity and co-morbidities in different SES groups, and differentially affect total life expectancy.

Costs to employers of obesity related ill-health leading to absenteeism and presentee-ism (sub-optimum performance at work) need to be further researched. Lost productivity may be less costly among lower SES groups if their outputs have less value to their employer. Individually-targeted incentives in the workplace for taking up healthy behaviours show some promise and may reduce absenteeism etc, but no SES-differentiated data appear to be available on this issue.

The use of pricing and other fiscal measures, such as taxation of soft drinks, requires further analysis, as price elasticities of sub-groups in the population in different countries are not fully understood, and the translation of an imposed tax into an actual change in price is not necessarily linear, as it depends on the willingness of the manufacturer or retailer to pass on or absorb the cost.

Cost models vary in whether they relate to the direct costs or indirect costs or both, and whether they relate to obesity or to obesity with overweight (the latter being less costly but more common), age group (children are often left out of the models). Models do not

⁵ Denholm R, Power C, Li L. Adverse childhood experiences and child-to-adult height trajectories in the 1958 British birth cohort. *Int J Epidemiol.* 2013 Oct;42(5):1399-409.



normally make adjustments for ongoing changes in the forms of medical interventions and their impact – e.g. improved bariatric surgery for obesity, or treatments for diabetes or cardiovascular disease which may result in longer lifespan and subsequent extended medical costs. Cost modelling papers do not differentiate costs of population sub-groups: if the prevalence of obesity is higher in some SES groups it can be assumed that the associated costs would follow a similar distribution. However, the systematic reviews have not addressed this question.

There are questions about causality: for example lower employment status may lead to poorer health behaviours, just as poor health may lead to poorer employment prospects.

Lastly, the role of social support and ‘social capital’ and ‘cultural capital’ and other forms of non-economic support linked to healthy behaviour need to be further explored.

Further discussion on costs and economic consequences is provided in the report of Task 1.2.1 concerning costs, below.

4. Community interventions including those conducted in kindergartens, health centres, schools, workplaces, and also broader health promotion interventions in populations and subgroups. Details in Annex 4 and Annex 9.

Whilst this area of research has expanded rapidly in the last decade, and while there have been many detailed and extensive reviews of the literature, remarkably few studies have investigated the differential needs of sub-population groups, especially differentiated by socio-economic status. As a general rule, when systematic reviews acknowledge the issue of differential access or differential responses to interventions, they have concluded that sub-groups may need specifically designed interventions, and that interventions need to be tailored to the perceived needs and expectations of the group being targeted – or in the case of children, their families and carers.

The suggestion of tailored interventions is clearly applicable for sub-groups in the population with identifiable cultural or ethnic characteristics, such as recent immigrant families with a common home language or cultural belief system. It is less clear how interventions should be tailored so that they can be applied specifically to children living in more deprived neighbourhoods or with parents of lower educational attainment or occupational status compared with interventions in other groups. Tailoring of interventions using feedback from participants may be improved through computer-assisted interventions, such as those utilising internet or smartphone technology, but this in turn assumes that all participants have easy access to such technology.

Population-based interventions, such as nutrient labelling on foods or restrictions on TV advertising of certain foods to children, have shown the importance of choosing policies which do not increase health inequalities: for example numerical nutrient labelling may not be easily understood by readers with low literacy or numeracy levels, while colour-



coded ‘traffic light’ nutrient labelling may be more broadly understood.⁶ Improved school food standards should beneficially affect all children where schools are the main providers of food during the school day.

Several systematic reviews are underway to investigate specifically the impact of interventions in relation to socio-economic status. A 2013 review by Magnee *al* found mixed results, with media-related health promotion tending to benefit higher SES groups more than lower ones, and the same tended to be true for workplace-based interventions. Two out of six local community interventions showed greater benefits to lower SES groups, and there were no clear differences among school-based interventions. A second review (see Mitchell *et al*, 2013) found that “*universal childhood obesity interventions may be less beneficial for vulnerable children, if at all, as compared to their more advantaged counterparts*”.

Other reviews have considered evidence for successful interventions in lower SES groups: Olsen *et al* (2008) reported successful interventions to prevent excessive weight gain among lower-income women in the USA, but this was not compared to interventions in other groups. Beauchamp *et al* (2014) found that interventions shown to be ineffective in lower SES participants were primarily those based on information provision directed at individual behaviour change, whereas more effective interventions included community-based strategies or policies aimed at structural changes to the environment.

A review currently in press⁷ found individually targeted weight loss programmes among deprived groups, along with weight loss interventions in the community, and diet clubs in the community and workplace, had some effect and that there was no evidence to suggest that these led to an increase in health inequalities. A second review from this group focusing on interventions among children is expected later in 2014. A review registered in the PROSPERO system by Pearson *et al* (Do obesity interventions generate inequalities: a systematic review) was expected in 2013 but remains unpublished.

Evaluation of short-term interventions may be misleading, as longer-term effects are not recorded. These longer term effects may show persisting benefits of some types of intervention, among some groups, which were not apparent in a short study. Equally, short interventions tend to have little impact on the drivers behind the obesity epidemic, and an effect may quickly disappear once the intervention is removed, and such transience of the effects may be differentially distributed across sub-groups.

Further discussion of these issues can be found in the separate document concerned with the differential effects of interventions on SES groups (Task 1.2.2).

⁶ British Market Research Bureau (2009) Comprehension and use of UK nutrition signpost labelling schemes. Report prepared for the Food Standards Agency.

<http://multimedia.food.gov.uk/multimedia/pdfs/pmpreport.pdf>

⁷ Hillier-Brown, FC, Bambra CL, Cairns-Nagi J-M, *et al*. A systematic review of the effectiveness of individual, community and societal level interventions at reducing socioeconomic inequalities in obesity among adults. *Int J Obesity* 2014 (in press).



5. Treatment of obesity including access and use of health services, and health professionals' behaviour and practice. Details in Annex 5 and Annex 9.

In this section we consider individualised management and treatment of people already obese, delivered through various forms of intervention including weight management classes, counselling, medication and surgery.

Despite many papers recognising the importance of socio-economic status associated with the risk for obesity, few papers consider how SES status may affect access to treatment, attendance, drop-out or long-term follow-up factors. Based on the evidence for differential responses to preventative interventions (see above) and the literature on inequalities in treatment adherence for other disorders⁸, it can be anticipated that some SES variation will exist in the outcomes from weight management interventions, pharmaceutical treatments, surgical operations and related services.

Jackson et al (2014) identified inequities in access to bariatric surgery and called for more research to identify the barriers to accessing such surgery. Juckett (2013) found treatment adherence for obesity lower among Latino groups, and proposed, among other suggestions, that *“cultural barriers may be overcome by using the ‘teach back’ technique to ensure that directions are correctly understood”*.

Gauthier and Krajicek (2013) considered the influence of obesogenic environments from which paediatric obesity cases were referred, and to which they would return following treatment. Toussi et al (2009) found poorer weight loss after surgery among lower SES patients, and Junior et al (2011) suggested that attention should be given to depression and low educational level, as these were associated with less long-term weight loss after surgery. Franca et al (2013) noted that adherence by obese adolescents to a dietary regime was poorer in lower SES groups: *“multiple interdependent factors were found ... the majority of these belong to the socioeconomic and cultural dimension, in addition to pointing out cognitive and psychological factors and those associated with health services and professionals.”*

Not mentioned in the reviews found in the present survey, but potentially highly significant in the analysis of possible barriers to treatment and failure of adherence, are the attitudes and practices of the health practitioners and nursing staff in relating to an obese person. There is a growing evidence base showing that health service providers show discrimination and prejudice when dealing with obese patients⁹ with one study finding a quarter of nursing staff admitted that they found obese patients ‘repulsive’ and half of these staff added that they found it difficult to touch an obese person.¹⁰ While a

⁸ Bosworth HB, Odone EZ, Weinberger M (eds). *Patient Treatment Adherence: Concepts, Interventions, and Measurement*. Taylor & Francis, 2008.

⁹ Brown I. Nurses' attitudes towards adult patients who are obese: literature review. *J Adv Nurs*. 2006 Jan;53(2):221-32.

¹⁰ Puhl R, Brownell KD. Bias, discrimination, and obesity. *Obes Res*. 2001 Dec;9(12):788-805.



more recent review has indicated that such attitudes appear to be improving,¹¹ there is little research to show how much they continue to deter obese people from seeking and adhering to treatment, and there is a serious lack of evidence on whether a patient's SES, education or ethnic status increases the prejudice and compounds the problem.

6. Neighbourhoods including food environments and food deserts, built environments and green spaces, and neighbourhood security. Details Annex 7 and Annex 9.

Reviews find stronger links between obesity prevalence and neighbourhood built environments (lack of green spaces or play areas for secure and safe recreation) than between obesity and the quality of local food environments (quality and range of foods available, prices, presence of fast food outlets) but there is evidence supporting the importance of both dimensions. For food, the term 'food deserts' has been applied to urban areas with a lower availability and/or higher prices of fresh and perishable healthier foods compared with less healthy foods – although given the presence of plentiful unhealthy foods, the term food desert has sometimes been replaced with 'food swamp'. Examples of policies to tackle local food supplies include New York City's Green Carts initiative, and several UK local authorities' restrictions on fast food store licenses.

Poor quality environments (lack of green space, poor housing, higher pollution) are strongly associated with a cluster of health problems, including obesity (and have led to terms such as 'environmental inequity' and 'environmental injustice'). The perception of the local environment may be more important to health behaviour than actual environmental quality, especially the perception of the environment in terms of security (e.g. threats from criminal behaviour, drunkenness) and safety (e.g. traffic flow, toxic refuse such as used needles, dog faeces). This may apply particularly to vulnerable groups, including older people and children (where parents' perceptions of the environment are also influential).

Surveys of environmental quality, along with the development of indicators for neighbourhood deprivation, and policies for planning and development of built environments should include measures of access to green spaces, the quality of those spaces, and attention to their perceived safety and security. Community interventions need to include neighbourhood food supplies, prices and access, as well as environmental quality.

Further research needs to be undertaken into the issues of cultural norms (including dietary patterns and physical activity patterns) in different population sub-groups, and how these cluster in deprived areas, along with the relationship between health behaviour and measures of social cohesion or social capital at local community level need to be

¹¹ Budd GM, Mariotti M, Graff D, Falkenstein K. Health care professionals' attitudes about obesity: an integrative review. *Appl Nurs Res.* 2011 Aug;24(3):127-37.



further addressed. A systematic review currently in preparation¹² identified several studies showing social cohesion to show some links to obesity prevalence, but these were tenuous and based on different definitions of cohesion or social capital.

Food sold in outlets close to schools, and the advertising of unhealthy foods and beverages in the near-school environments, have been linked to a raised risk of unhealthy diets. Further research is needed into the influence on health behaviour of the marketing activities by food companies (a) to determine whether sub-groups may be particularly vulnerable, and (b) whether companies target sub-populations with specific products and/or specific forms of messaging.

7. Policies and strategies which address obesity and attend to socio-economic differentials, sub-groups and health inequalities related to overweight and obesity. Details in Annex 7 and Annex 9.

As with other sections already described, the issue of inequalities in obesity prevalence is noted in many of the documents reviewed, but this does not carry forward to the construction of policies specifically to reduce such inequalities. There is some disagreement on whether population-wide interventions can be assumed to help to reduce inequalities and whether specifically targeted interventions would be preferable. In so far as the obesity prevalence disparities tend to be across the social gradient, it is not clear that targeting a single sub-group would adequately reduce the gradient. On the other hand, some population-wide measures appear to have differential affects across SES groups (such as social marketing^{13 14} and information campaigns¹⁵) and therefore may widen inequalities rather than reduce them.

Logically, measures are needed which (a) act across the gradient, (b) have equal effect on all sub-sections, or preferentially affect lower SES groups, and (c) address the underlying drivers of the inequalities so that they are less likely to re-appear after an intervention ceases, or (d) become embedded in social norms so that the intervention operates indefinitely. Systematic reviews in the scientific literature rarely take such a highly prescriptive approach to defining policy success, and rarely consider the differential impacts on SES groups. In the grey literature documents there is a wide recognition of inequalities, but some difficulty in finding the measures necessary for success, possibly due to political compromises, and a serious lack of long-term evaluation of the outcomes of policies.

¹² Glonti K. Associations between neighbourhood social environment and obesity – a systematic review. Presented as part of the EC-funded SPOTLIGHT project at the European Congress on Obesity, Sofia, May 2014.

¹³ Croker H, Lucas R, Wardle J. Cluster-randomised trial to evaluate the 'Change for Life' mass media/ social marketing campaign in the UK. *BMC Public Health*. 2012 Jun 6;12:404.

¹⁴ Miles A, Rapoport L, Wardle J, Afuape T, Duman M. Using the mass-media to target obesity: an analysis of the characteristics and reported behaviour change of participants in the BBC's 'Fighting Fat, Fighting Fit' campaign. *Health Educ Res*. 2001 Jun;16(3):357-72.

¹⁵ See Borch and Roos, 2012, Annex 7.



As noted above, Elmadfa has shown a social gradient in the consumption of processed food products, and this may have consequences for policies based on fiscal interventions. Of the few policy areas most often evaluated in terms of impact on lower SES households, the imposition of taxes on foods, such as a tax on soft drinks or a tax on fat content of food is the most common: the findings have generally been positive in terms of overall impact on health, but with the qualification that a rise in food prices of any product, especially products currently consumed in excess by lower income families, will impact financially on such households – demonstrating a regressive tax affecting poorer households more than higher income households, unless their purchasing behaviour is altered sufficiently to offset the price increase. Alternatively, price subsidies may be a better, if more expensive approach for governments, with evidence from Powell et al (2013) showing that lower fruit and vegetable prices were generally found to be associated with lower body weight outcomes among low-income children and adults.

Other policies, such as front-of-pack nutrition labelling, may be more nuanced. Colour-coded traffic lights may be of assistance to people with low literacy and numeracy but front-of-pack percentage values may be less well understood. (Colour-coding is also believed to encourage manufacturers to re-formulate towards healthier recipes, which would be a public health bonus to all SES groups.) Similarly TV advertising controls which reduce children's exposure to the promotion of foods high in fats and sugars etc should have similar benefits across the SES spectrum, and especially benefitting those that watch most television and/or who might be more susceptible to the messages in such advertising. Further evidence on these matters is urgently needed.

Two documents – both of which derive from a project which compared policies and needs in New York City and London – make explicit recommendations for municipal-level actions that the authors believe will reduce child obesity risk and lessen child obesity inequalities (Freudenberg et al, 2010; *A Tale of Two ObesCities*, 2011). The recommendations include a range of planning and zoning controls to encourage green space use, active transport, building design and local food diversity, the use of standards for food provision in schools and municipal services, free school meals and school drinking water provision, and the development of data services to track obesity and evaluate interventions and service provision.

Several documents highlight the need to intervene on a 'life-course' basis, which recognises the transmission of health inequalities from one life stage to the next, and promote policies which focus on maternal and infant health, where national policies and community-led support services (e.g. maternity pay and maternity leave rights, welfare support and child care facilities) may have most impact. They also recognise that interventions are not the responsibility of the government's health department or local health services alone, but need a broader 'health in all policies' approach, supported by methods for the assessment of the health impacts of policies.

Several documents explicitly state the need to continue and extend the monitoring of inequalities, and most other documents implicitly depend on surveys of inequalities to underpin their inequality reduction strategies. There is, however, a serious deficiency in



the breadth and depth of studies on health inequalities, including in service provision (treatment and outcome measures) and inequalities in obesity-related chronic disease, but also in the social and economic costs of health inequalities, and in the main drivers of obesity: for example, differentials in food prices and availability, in support measures for health behaviour, including maternity leave and child health monitoring, or in the provision of local amenities for play and recreation. Reducing inequalities in the environments – physical, social, financial – should reduce inequalities in the behavioural responses to these environments.

8. Co-morbidities linked to obesity which show socio-economic or related inequalities. Details in Annex 8 and Annex 9.

While the focus of this report is on the relationships between SES and health inequalities with a focus on obesity, the search for scientific papers showed that obesity was often referred to in the context of several related conditions, or as part of a more complex but clearly defined cluster of conditions known as the metabolic syndrome. This section reflects briefly on this aspect of SES and health inequalities.

A comprehensive list of co-morbidities can be provided, but here we report those which emerged in the survey of systematic reviews of obesity and inequalities, grey literature and related material. These are:

- Gestational diabetes, stillbirth, caesarean section delivery, other neonatal conditions, infant death.
- Psychological conditions, depression, psychiatric conditions
- Bowel cancer, kidney cancer, endometrial cancer, gall-bladder cancer
- Non-alcohol-related liver disease
- Diabetes
- Sleep deficiency
- Strokes, heart disease
- Dental caries
- Some infectious diseases, including pneumonia and influenza
- Osteoarthritis and lower back pain

In so far as obesity is a risk factor for the development of other diseases, or co-morbidities, it can be expected that SES-related inequalities in the prevalence of obesity should be reflected in inequalities in the prevalence and possibly incidence of such co-morbidities. Several of the conditions may further affect the responses to interventions to manage obesity – for example depression may lead to withdrawal from treatment.

From a health services perspective and from a social and economic perspective, the impact, service needs and costs of excess obesity among lower SES groups should also include the service needs and costs arising from the consequential excess co-morbidities. Estimates of the true scale of the impact of obesity inequality should take these co-morbidity costs fully into account.



Equally, interventions to reduce weight will have spin-off benefits to reduce the risk of subsequent co-morbidities. The extent to which obesity interventions are differentially effective across SES groups, so the co-morbidity burden may be differentially reduced.

Lastly, although not strictly a co-morbidity, obesity can be a problem for health service functioning through its impact on diagnosis and treatment of unrelated conditions. Several papers note that obesity can make diagnosis and treatment more difficult, for example due to difficulties gaining X-ray or MRI images from obese patients (Glanc et al, 2012), or requiring adjustments to dosages for medications.¹⁶ It can be assumed that these obesity-related health service issues arise in proportion to the distribution of obesity – especially extreme or morbid obesity – differentially across SES groups. These issues need further elucidation.

1.1.2 Evidence gaps and needs

The narrative report above has referred to several of the most salient gaps in the evidence. In this section we bring them together and elaborate on specific points. Some of them may be suitable for systematic reviews – subject to discussion with the HAPI and European Commission leads.

Surveillance:

- Current surveillance is patchy across the EU, with much better data available in some countries than in others. The WHO-EU COSI programme is helping with children, but leaves **major gaps for infants, adolescents, adults and older people**.
- Surveillance of the SES differentials is especially valuable in the present context, as indications that the rapid rise in obesity prevalence has abated may be masking a **potential widening of disparities** between prevalence rates in different SES groups, with a fall for higher SES groups and a continuing rise among lower SES groups. (Systematic review of data available?)
- Surveillance of the **drivers of obesity** – dietary and physical activity behaviours – and surveillance of the obesogenic components of the environments which shape these behaviours are also very uneven across member states. At best, surveys only partially explore SES disparities and how these may cluster in certain groups, and how they relate to a raised risk of NCDs and obesity. (Systematic review of what current surveys can supply might be useful here, especially regarding clustering?)
- The issue of **national indices of inequality** – such as the Gini Index, or national measures of household resource inequality – and their relation to ill health and obesity risk remain very poorly explored. For example, is an increase in the Gini Index related to a rise in obesity prevalence for all SES groups or only for some? How does a reduction in the Gini Index affect health, and over what period? (Systematic review of data available?)
- **Surveys of social attitudes** towards excess bodyweight, the presence of prejudice and stigma, and the way in which obesity is framed and reported in mass media, need attention, so that policy initiatives can be set in a context and a framework that will

¹⁶ Janson B, Thursky K. Dosing of antibiotics in obesity. *Curr Opin Infect Dis*. 2012 Dec;25(6):634-49.



gain public support. Neither ‘genetics’ nor ‘personal responsibility’ have proven to be helpful frameworks, but ‘obesogenic environments’ still holds promise. (Systematic review of several of these issues is needed?)

Tracking and modelling

- **Tracking through the life course** – from pre-conceptual stages through gestation, infancy, childhood, adulthood and older age, within social groups and across social groups – remains seriously under-researched. It is an expensive process, and most current data is based on the tracking of people born half-a-century or more ago, when lifestyles and environments were significantly different, and when obesity affected only small percentages of the population. High quality studies tracking behaviour patterns as well as health and nutritional status are needed, with the power to differentiate social groups and the impacts of their environments. (Systematic review of data available?)
- **‘What if’ scenarios** which model the likely impact of different policies on different population sub-groups also needs further development. One EU-funded project (DYNAMO-HIA – Dynamic modelling for health impact assessment) made some progress in this field but more is needed. *What if* sugar intake were reduced to a population average of 5% dietary energy (following WHO and UK recommendations), and who would benefit most? *What if* salt intakes were reduced to recommended levels, and who would benefit? *What if* sedentary behaviour or physical activity levels were meeting national guidelines, or gestational weight gain were reduced to guidelines levels, or breastfeeding/complementary feeding patterns met WHO target?
- Following these ‘*What if*’ scenarios is the second question policy makers need to know: Can we model the **economic value of these measures**, and what are the costs of their implementation, in order to know whether they would be cost-effective?
- The third question usually asked concerns the **time taken to show an impact** following changes in policy. The ‘*What if*’ modelling needs to show likely rates of change from the current status quo to the proposed scenarios, and whether these are likely to reduce or widen SES disparities as they proceed, either transiently or sustained. (Systematic review of response times to policy change?)

Costs

- Considerable evidence gaps exist. Further work needs to be undertaken to make **comparable estimates of national costs**, given that treatment costs for obese individuals vary according to the form of health service provided in a member state, and costs to employers depend in part on the prevailing employment legislation regarding sick leave, pension arrangements etc. (Systematic review of data available?)
- Further elaboration of the **full costs of obesity and obesity-related ill-health** need to be undertaken, taking into account costs arising for overweight, non-obese people, and for children over their lifetime and accounting for opportunity costs (lower educational attainment, lower social capital), and environmental costs (carbon costs for transport, food over-consumption). These proposals are expanded in the separate report costs (Task 1.2.1).



Community interventions

- These need to be kept under review, as new evidence emerges. The major research gap in the reviews of community interventions is in **the assessment of uncontrolled interventions** (interventions that have no control group for comparison) including many national policy initiatives such as controls on TV advertising, food labelling, catering menu labelling, and tax or subsidy interventions. (Systematic review of data available?)
- For all forms of community intervention, from small, school-based projects to national policy measures, there is a serious lack of evidence on the **longer-term outcomes for behaviour change and for changes in BMI** or obesity prevalence. (Systematic review of long-term impacts?)

Treatment

- There is a marked lack of good evidence concerning the differential **access, adherence, responses and follow-up characteristics** for different social groups needing obesity treatment. (Systematic review needed here?)
- There is a continuing need to monitor and tackle **prejudice among clinical staff** against obese people, not only when they seek treatment for obesity but when they attend for any service. A pan-European survey of health staff, able to assess prejudice, could be a valuable step forward in reducing inequalities in health. (Systematic review of data required?)

Neighbourhoods

- Local neighbourhood environments have received increasing attention and have attracted new technologies for surveillance. It is not clear **what mediates and moderates the influence of environments** on behaviour and whether these show SES disparities. (A systematic review of data available?)
- Concerns about the potential **clustering of health behaviours** in local neighbourhoods requires further analysis and the policy implications described. (A systematic review here?)
- Similarly, issues of cultural norms clustering in groups raises questions about **the relative impacts** of neighbourhood environments, group norms, socio-economic resources, measures of social capital and other influences on behaviour need better analyses. (A systematic review here, showing the policy implications?)

Policies and strategies

- The World Economic Forum and WHO's listing of **'Best Buys'** in policy proposals to tackle NCDs ¹⁷ needs **re-assessment in the context of current national and Community policies**, specifically for the European context. (Systematic review for a background policy paper?)
- There is considerable interest in the **differential impact of policies** (especially fiscal policies such as taxation of sugar-containing beverages) on different income groups,

¹⁷ From Burden to "Best Buys": Reducing the Economic Impact of Non-Communicable Diseases in Low- and Middle-Income Countries <http://apps.who.int/medicinedocs/documents/s18804en/s18804en.pdf>



and whether these would have the intended effect or would widen social inequalities. (Systematic review of modelling results?)

- Similarly, there is a need for better evidence on the **health impact of social transfers** and minimum wages that have an impact on nutrition – e.g. food basket component of social support payments, supplements for maternal and infant nutrition, subsidies for school meals. (Systematic review of data available and research needs?)
- A further question is whether **targeted or universal approaches** are needed. Modelling of policies needs to consider which types of policy should be specifically targeted at lower-income groups and/or minority ethnic groups, which should be applied across all SES groups equally, and which should be adjusted in proportion to the problem: i.e. proportionate universalism.¹⁸ (Systematic review of approaches?)

¹⁸ “...actions must be universal, but with a scale and intensity that is proportionate to the level of disadvantage.” Marmot et al 2013, *Health Inequalities in the EU*, European Commission. (p139).



Annexes in separate document

Scientific papers

- Annex 1 Surveillance including surveys of drivers of obesity (behaviour, diet, family relations, infant feeding) and covering socio-economic status, ethnic minority, education, income and local deprivation indices. Titles, authors, journal references and abstracts of 156 papers.
- Annex 2 Tracking including studies of the links between early deprivation and later obesity, early obesity and later disease, and their links to socio-economic status etc. Titles, authors, journal references and abstracts of 15 papers.
- Annex 3 Costs and related economic issues, including costs to the economy, employers, health services, and also prices, fiscal impacts and fiscal behaviour. Titles, authors, journal references and abstracts of 22 papers.
- Annex 4 Community interventions including those conducted in kindergartens, health centres, schools, workplaces, and also broader health promotion interventions in populations and subgroups. Titles, authors, journal references and abstracts of 100 papers.
- Annex 5 Treatment of obesity including access and use of health services, and health professionals' behaviour and practice. Titles, authors, journal references and abstracts of 31 papers.
- Annex 6 Neighbourhoods including food environments and food deserts, built environments and green spaces, and neighbourhood security. Titles, authors, journal references and abstracts of 35 papers.
- Annex 7 Policies and strategies which address obesity and attend to socio-economic differentials, sub-groups and health inequalities related to overweight and obesity. Titles, authors, journal references and abstracts of 36 papers.
- Annex 8 Co-morbidities linked to obesity which implicate socio-economic or related inequalities. Titles, authors, journal references and abstracts of 34 papers.

Grey literature documents

- Annex 9 Links and brief descriptions of the relevant content of 61 documents.



Task 1.2. Identifying the economic rationale for action on tackling obesity

1.2.1 Identify recent studies carried out on the costs of obesity by SES

There are three interpretations of this question. The first is to assess the raised risk and prevalence of obesity among certain SES groups, to assume that the total national costs of obesity can be allocated according to prevalence, and thereby to estimate the costs attributable to specific SES groups. These are differential costs according to sub-group prevalence rates.

The second is to ask whether specific SES sub-groups have higher than average costs on an individual basis: whether, for example, lower-income obese adults are gaining access to health services at a later stage in the development of co-morbidities and thereby causing greater expenditure, compared with higher SES obese adults. These are differential costs per person, defined within SES groups.

The third approach is to take the findings of higher obesity rates in countries with higher income inequalities, assessed through measures such as the Gini Index, to compare their national estimates of the costs of obesity, and to thereby to estimate the degree to which national-level income inequalities are having an impact on obesity-related costs. These are differential costs of obesity compared cross-nationally (e.g. per 1000 population, comparing countries) attributable to income inequality.

All three interpretations were adopted in the present search of the literature. The meaning of the word ‘costs’ here includes *direct costs* of health and medical services for the treatment of obesity and a proportion of the costs for the treatment of co-morbidities linked to obesity, and to *indirect costs* which refers to the wider social and economic impact, including family and social support costs, and workplace productivity losses.

Scientific papers

An initial trawl of scientific papers linking ‘obesity’ to ‘costs’ produced over 2700 papers published in the last five years (to 20 June 2014) using Medline and EBSCO-EconLit search engines. Requiring that the papers also use the word ‘socioeconomic’ reduced the number of papers to 329 papers, published in the last five years, including 39 review papers and some 260 papers with raw data. The abstracts of these papers were inspected and only those which provided actual financial estimates of the costs relating to income inequality or to SES group were retained. Papers referring to costs in regions other than Europe, North America and Australia and New Zealand were excluded.

The results of this search produced only one paper with relevant data. Many papers acknowledged the importance of SES in determining obesity risk, and many papers acknowledged the direct and indirect costs attributable to obesity, but they did not



analyse how they affected each other. Several papers that inspected the details of costs reported that they measured SES as an input variable, but this was then adjusted for in the results. Adjusting for SES meant that no data were presented showing the underlying SES differences: this applied in several papers, including ones estimating surgery costs in different age groups or using different surgical techniques, and ones estimating productivity costs due to lost days of work. Several papers also noted significant disparities according to race, income, education level, and insurance status in gaining access to treatment for obesity and disparities in the need for readmission after surgery, but did not estimate any costs consequent upon these disparities.

The one paper with relevant data is shown in Annex 10, below. It estimates the costs of treating severe obesity, and asks whether severely obese adults with low socioeconomic status (SES) have higher costs than those with higher SES due, for example, to having more co-morbidities. It finds the opposite, with treatment costs significantly higher for those with the higher SES. The presence of co-morbidities did not account for this difference. Costs were estimated from the data obtained from telephone interviews asking patients to recall visits to physicians, inpatient days in hospital, and received and purchased medication over a period of six months. No estimate is made of the degree of benefit from the treatment, or what drop-out rates were found, or what further follow-up medical attention was needed, all of which might have affected the interpretation of the results.

We are also aware of a second scientific paper, which has not been published. This was drafted and submitted to the British Medical Journal by the National Heart Forum (now UK Health Forum) modelling team around 2011. It showed the results of modelling of SES obesity prevalence trends in England over time and showed that it was feasible to predict the future costs of obesity according to SES sub-group. The paper gave some initial estimates of the outcomes, but both the modelling methods and the database for making predictions have changed since those estimates were made, and a fresh analysis is now recommended.

Grey literature

The search for documents in the grey literature (using Google UK, limited to 2010-2014) produced 306 ‘hits’. Applying filters to remove non-authoritative sources (see report of task 1.1) led to further examination of 36 documents. Of these, only one had relevant information. As with the scientific papers, many of the grey literature documents referred to inequalities in obesity prevalence according to socio-economic status or other socio-demographic differences, and these and other documents also referred to the economic costs of obesity to individuals and/or to society, but only one provided an analyses relating SES directly to costs: this was a study of the direct costs for health services treating the co-morbidities of obesity among the First Nation peoples of Canada – see Annex 10 below. The document estimated the costs to be at least CA\$100m in the year 2003.



It is remarkable that so few papers have been published which consider the differential costs of obesity according to SES dimensions. Given the commitments by member states and the European Commission to reducing health inequalities, and given the recognised high level of direct and indirect costs attributable to preventable conditions such as obesity, there is a strong case to be made for examining the disparities in costs across different SES groups, and particularly to examine whether sub-groups show costs beyond those expected from their obesity prevalence rates. Questions include: What is the extra cost to health services attributable to the raised obesity risk in lower SES groups, or in groups with lower educational attainment? What are the differences in costs per person, separated into SES sub-groups? Any such disparities revealed could justify targeted measures to equalise the costs across the groups, either through changes in the forms of service provided or through stronger obesity prevention measures, designed to reduce the disparities in prevalence.

Evidence gaps

In order to guide further investigation, we offer here a short list of areas which might prove fruitful for further investigation for potential differential costs and burdens according to an individual's SES status. Per-person and group differences need to be distinguished: on a per-person basis, a low SES absentee might cost a company less than a high-SES absentee. On a group basis, higher prevalence of obesity would suggest that lower SES groups have greater absenteeism costs. These issues need detailed elaboration.

It should also be noted that some of the costs listed here might not be net costs: for example, higher travel insurance premiums for an obese person might reflect a cost to the individual paying them, but be a benefit to the insurance company or lead to reduced premiums for non-obese people.

Treatment costs

- Initiation of treatment (earlier versus later / lower versus higher BMI at start of treatment) and consequential higher treatment costs
- Access to treatment services
- Adherence to treatment regime
- Post-treatment maintenance
- Readmission or re-treatment
- Training of staff for handling obese patients, and for avoiding prejudice

Other medical costs

- Access, later diagnoses, treatment adherence or readmission costs for obesity-related co-morbidities
- Indirect costs, e.g. when obesity requires extra staff, specialised equipment, higher medication dosage, repeated radiography

Costs to the individual, household and family

- Costs of fitting specialised furnishings, equipment or fittings for lifting etc.
- Costs of domiciliary professional assistance and related social services



- Burdens on family members: care and support, additional costs for extra food, medication and insurances; reduced total household income if the obese individual has a reduced income
- Higher insurance costs for health, travel, life.
- Higher food costs
- Costs of caring

Costs to economic operators

- Costs arise from absenteeism, presenteeism, disability and premature mortality. These might apply to obese people differentially according to income grade or educational status. Indicators might include:
 - Numbers of days on certified sick leave
 - Numbers of days on leave without sickness certification
 - Numbers of days with reduced hours output or poor performance
 - Claims made on work-provided insurance
 - Workers' compensation payments
 - Use of workplace health service staff
 - Uptake of workplace health-promotion facilities
 - Lost opportunity: ability to travel, to represent the employer, to gain professional skills
- Additional costs may arise from discrimination, e.g. failing to appoint, promote or fully utilise a highly competent obese individual, which might affect obese people at different income grades differentially
- Costs due to early retirement, and higher costs to company pension funds

Wider social costs

- Social security payment, pension payments and other social transfers
- Consumption of vehicle-miles or air-miles and consequent environmental costs
- Consumption of excess food, especially foods with high carbon costs
- Consumption of domestic fuel for heating and consequential environmental costs

Costing estimates should also pay attention to:

Costs of overweight

- Overweight adults have lower average direct costs than obese adults, but the number of such adults is much higher, even exceeding the number of normal-weight adults in several countries. Evaluations of SES differential patterns and associated costs for obesity should be extended to include the costs of overweight.

Costs of obesity and overweight in children

- Children are rarely included in general statements about national burdens of obesity. Excess weight in childhood has immediate costs as well as later costs, and also leads to spin-off costs from reduced educational attainment, reduced social participation etc. It might be assumed that the potential SES differential patterns identified above would all apply to this group also, but better empirical evidence is needed.



1.2.2 Identify recent studies carried out on effectiveness of obesity interventions by SES

Because of the potential for this work to include a large number of interventions that do not have obesity as their primary target, and a wide range of policy papers that refer to the issue but do not add to the evidence base, a decision was made to include only primary data sources and only interventions that state they are concerned with tackling obesity.

Review literature

It will be recalled from the earlier paper (Task 1.1: Systematic reviews, and Annex 4) that Magnee et al (2013) found mixed results, with evidence that media-related health promotion tended to benefit higher SES groups more than lower ones, and this also applied to workplace-based interventions. Two out of six community-centred interventions showed greater benefits to lower SES groups, and there were no clear differences among school-based interventions. Olsen et al (2008) reported successful interventions to prevent excessive weight gain among lower-income women in the USA, but this was not compared to the effects in other groups. Beauchamp et al (2014) found that interventions shown to be ineffective in lower SEP participants were primarily based on information provision directed at individual behaviour change, whereas more effective interventions included community-based strategies or policies aimed at structural changes to the environment.

A review currently in press¹⁹ found individually targeted weight loss programmes among deprived groups, along with weight loss interventions in the community, and diet clubs in the community and workplace, had some effect and that there was no evidence to suggest that these led to an increase in health inequalities. A second review from this group focusing on interventions among children is expected later in 2014. A review registered in the PROSPERO system by Pearson et al (Do obesity interventions generate inequalities: a systematic review) was expected in 2013 but remains unpublished.

Evaluation of short-term interventions may be misleading, as longer-term effects are not recorded. These longer term effects may show persisting benefits of some types of intervention, among some groups, which were not apparent in a short study. Equally, short interventions tend to have little impact on the drivers behind the obesity epidemic, and an effect may quickly disappear once the intervention is removed, and such transience of the effects may be differentially distributed across sub-groups.

A US\$20m research program has been launched in the USA “to determine the real-world comparative effectiveness of obesity treatment options set in primary care, in adults for

¹⁹ Hillier-Brown, FC, Bambra CL, Cairns-Nagi J-M, et al. A systematic review of the effectiveness of individual, community and societal level interventions at reducing socioeconomic inequalities in obesity among adults. *Int J Obesity* 2014 (in press).



racial/ethnic minorities, populations with low socioeconomic status, and/or rural populations”²⁰.

Scientific studies

A search using the Medline database with search terms ‘obesity’, ‘intervention(s)’, ‘socioeconomic’, and ‘effect(s)’ published after January 2010 produced 162 papers and examination of the systematic reviews of effective of interventions revealed a further 22 potentially relevant papers published after January 2010. The abstracts of these papers were inspected. Several papers measured SES but then reported results after adjusting for this variable, and made no comparison between SES groups. Thirty papers remained shown in Annex 11.

Interventions that targeted only lower SES groups were included, as these may be of interest to policy-makers, but such evidence cannot indicate whether obesity inequalities are reduced or widened by such interventions. Even if an intervention shows some success among lower SES groups it is possible that higher SES groups would have shown even greater benefit, widening the gap. Of greater value are reports of interventions that compare SES groups and can assess the differential impact the interventions have, and whether the intervention could help to reduce obesity inequalities.

Fourteen papers considered interventions in lower SES groups only, and 16 had comparison across more than one SES group. Summary tables are as follows:

Low SES only		
Source	Title	Main SES finding
Black MM et al Pediatrics. 2010	Challenge! Health promotion/obesity prevention mentorship model among urban, black adolescents.	USA: Some effects on diet and PA but no effects on BMI
Chang MW et al J Nutr Educ Behav 2010	Design and outcomes of a Mothers In Motion behavioral intervention pilot study.	USA: Culturally sensitive educational messages showed no significant effects.
Dewar DL et al Am J Prev Med. 2013	The nutrition and enjoyable activity for teen girls study: a cluster randomized controlled trial.	Australia: Two year intervention on nutrition and PA showed no effects on BMI.
Elbel B et al Int J Obes (Lond). 2011	Child and adolescent fast-food choice and the influence of calorie labeling: a natural experiment.	USA: Take-away calorie labelling is noticed but did not appear to influence behaviour.
Haines J et al JAMA Pediatr. 2013	Healthy Habits, Happy Homes: randomized trial to improve household routines for obesity prevention among preschool-aged children.	USA: 6-month intervention to improve sleep duration and reduce TV watching showed some behavioural effects compared with controls.
Hawthorne A et al J Sch Nurs. 2011	Grand Canyon Trekkers: school-based lunchtime walking program.	USA: School PA programme showed no impact on BMI but better cardiovascular fitness.
HEALTHY Study Group et al N Engl J Med. 2010	A school-based intervention for diabetes risk reduction.	USA: Multi-component intervention led to beneficial BMI changes.
Hollar D et al J	Effective multi-level, multi-sector, school-based	USA: School multi-component interventions led to

²⁰ Patient-Centered Outcomes Research Institute. *Obesity Treatment Options Set in Primary Care for Underserved Populations: Pragmatic Clinical Trials to Evaluate Real-World Comparative Effectiveness*. Washington DC, 2014. <http://www.pcori.org/assets/2014/02/PCORI-PFA-2014-Spring-Obesity.pdf>



Health Care 2010	obesity prevention programming improves weight, blood pressure, and academic performance, especially among low-income, minority children.	improved BMI.
Hollar D et al Am J Public Health 2010	Effect of a Two-Year Obesity Prevention Intervention on Percentile Changes in Body Mass Index and Academic Performance in Low-Income Elementary School Children.	USA: Multi-component school intervention led to small improvements in BMI. (Same study as above)
Jansen W et al Int J Pediatr Obes 2011	Effectiveness of a primary school-based intervention to reduce overweight	The Netherlands: School children in multi-component intervention, led to improvements in BMI
Lubans DR et al Arch Ped Adol Med. 2012	Preventing Obesity Among Adolescent Girls: One-Year Outcomes of the Nutrition and Enjoyable Activity for Teen Girls (NEAT Girls) Cluster Randomized Controlled Trial.	Australia: Girls showed no improvement in BMI after 12-month multi-component school intervention
Nemet D et al J Pediatr. 2011	Health promotion intervention in low socioeconomic kindergarten children.	Israel: Kindergarten children showed no BMI improvement after a multi-component intervention.
Olvera N et al Obesity (Silver Spring) 2010;	BOUNCE: a community-based mother-daughter healthy lifestyle intervention for low-income Latino families	USA: Latino mothers and daughters, no effect on BMI of a multi-component intervention.
Puma J et al J Nutr Educ Behav. 2013	Long-term student outcomes of the Integrated Nutrition and Physical Activity Program.	USA: School multi-component intervention had no impact on BMI and 'limited lasting effects' on behaviour.

SES groups compared		
Source	Title	Main SES finding
Cameron AJ et al Prev Med. 2014	Variation in outcomes of the Melbourne Infant, Feeding, Activity and Nutrition Trial (InFANT) Program according to maternal education and age.	Australia: Higher educated mothers showed greater response to educational messages to improve infants snack and vegetable feeding, while lower educated mothers showed greater response to educational messages to give water.
Croker H et al BMC Public Health. 2012	Cluster-randomised trial to evaluate the 'Change for Life' mass media/ social marketing campaign in the UK.	UK: Social marketing campaign to reduce child TV and increase PA. Low take-up among all groups. No change in low-income families, and change for the worse in higher-income families.
De Coen V et al Public Health Nutr. 2012	Effects of a 2-year healthy eating and physical activity intervention for 3-6-year-olds in communities of high and low socio-economic status: the POP project.	Belgium: 2-year school intervention showed small BMI benefit for children in lower SES but not for children in higher SES households.
Fairclough SJ et al BMC Public Health. 2013	Promoting healthy weight in primary school children through physical activity and nutrition education: a pragmatic evaluation of the CHANGE! randomised intervention study.	UK 20-week school intervention, some indicators suggested more effective for children in higher SES families.
Grydeland M et al Int J Behav Nutr Phys Act. 2013	Intervention effects on physical activity: the HEIA study - a cluster randomized controlled trial.	Norway: 20-month PA intervention for adolescents, most effect in children from middle income families, compared with lower or higher.
Jouret B et al Int J Obes (Lond). 2009	Prevention of overweight in preschool children: results of kindergarten-based interventions.	France: Monitoring of kindergarten children and basic information for parents led to BMI improvements for children in under-privileged areas, but no effect in better-off areas.
Levy DE et al. Am J Prev Med. 2012	Food choices of minority and low-income employees: a cafeteria intervention.	USA: Colour-coded nutrition labelling improved food selection across employees from all racial and socioeconomic backgrounds, despite different base line choice patterns.



McGeary KA. Soc Sci Med. 2013 Apr;82:67-78.	The impact of state-level nutrition-education program funding on BMI: evidence from the behavioral risk factor surveillance system.	USA: Funding of nutrition-education programmes is related to reduced obesity levels, especially for higher-income SES.
Muckelbauer R et al Obesity (Silver Spring). 2010	Immigrational background affects the effectiveness of a school-based overweight prevention program promoting water consumption.	Germany: Children from immigrant families showed less improvement in water consumption after water fountains introduced, compared with children from non-immigrant families.
Plachta-Danielzik S et al Bund. Ges. Gesund. 2011	15 years of the Kiel Obesity Prevention Study (KOPS). Results and its importance for obesity prevention in children and adolescents.	Germany: 4 and 8-year follow-up shows the multi-component KOPS school and family interventions had modest effects on BMI of children from higher SES families, and no effect on children from low SES families.
Plachta-Danielzik S et al Obes Facts 2011	Eight-Year Follow-Up of School-Based Intervention on Childhood Overweight – the Kiel Obesity Prevention Study	Germany: Multi-component school-based health promotion has favourable and sustained effects on 8-year changes in BMI especially for children of high SES families. (Same study as above)
Robroek SJ et al Health Educ Res. 2012	Cost-effectiveness of a long-term Internet-delivered worksite health promotion programme on physical activity and nutrition: a cluster randomized controlled trial.	The Netherlands: Workplace intervention using internet resources in addition to PA and nutrition programme, led to no improvement for any of the SES groups.
Taber DR et al JAMA Pediatr. 2013	Association between state laws governing school meal nutrition content and student weight status: implications for new USDA school meal standards.	USA: Econometric data for school food services show that better standards are associated with improved BMI particularly among welfare children (eligible for subsidised meals).
van Stralen MM et al Ann Behav Med 2010	Exploring the efficacy and moderators of two computer-tailored physical activity interventions for older adults: a randomized controlled trial	The Netherlands: PA promotion with local information increased PA in elderly people, especially lower SES.
Wang X et al Popul Health Manag. 2012	Alliance for a Healthy Border: factors related to weight reduction and glycemic success.	US-Mexico border, low SES less likely to achieve weight loss than higher SES, but no difference at 6-month follow-up.
Wilson DK et al Am J Prev Med. 2011	Neighborhood and parental supports for physical activity in minority adolescents.	USA: PA promotion among adolescents more effective if they live in neighbourhoods with support for PA (parks, lighting).

The findings from these individual studies are not easily summarised. Contradictory findings were found in studies which only examined lower-SES groups, which are presumably due to differences in the types of intervention, the extent and maintenance of the changes, and the characteristics of the SES groups being targeted. There is generally less support for educational, message-based interventions among lower SES groups, with the possible exception of mothers and young (pre-school-age) children.

In papers which compare the results of interventions between different SES groups there are few examples of interventions which benefit lower SES groups more than higher SES groups, and more examples which show higher SES groups gaining the greater benefit. However, again the differences in the types of intervention, its maintenance, and the groups being targeted, will make a difference.

Across all the papers, there are several reports of successful short-term changes in behaviour but few reports of sustained changes in BMI, and while this applies across all SES groups it is perhaps more particularly the case for lower SES groups.



Grey literature

This task was adjusted from the original description for two reasons. Firstly, researchers in the EC-funded SPOTLIGHT project (see www.spotlightproject.eu), in which we are participating, have undertaken an evaluation of community projects in Europe designed to promote health and prevent obesity, and involving or targeting lower-income groups. This research has been published as a map-based survey of 78 such projects which were active at the time of data collection (September 2012 - March 2014) (see www.worldobesity.org/what-we-do/policy-prevention/projects/spotlight/intervention-atlas/). The material collected includes an assessment of the degree to which these projects have evaluated their effectiveness. Of the 78 projects, 34 (43%) have reported on the outcomes of the project in terms of their effect (on diet, physical activity, body-weight etc) although the quality of the evaluations is highly variable, and differentiation between SES groups is either not attempted or not reported consistently, and no follow-up, longer-term assessments were available.

On this basis we took the view that grey literature documents on the effectiveness of obesity interventions at local community level are unlikely to provide reliable, validated assessments on which policies should be based. While these projects show the viability and feasibility of undertaking the projects and designing them for lower income groups, they are not able to give coherent answers on their effectiveness. This is a major evidence gap, which may only be partly filled by the scientific studies of similar projects.

Grey literature on the impact of population-wide interventions on different SES groups was undertaken through a Google search (www.google.co.uk) using terms including 'obesity', 'intervention', 'population', 'effective' and 'socioeconomic', limited to documents after January 2010. The resulting 249 records were scanned for content and 45 records downloaded as potentially relevant.

Many of the leading policy documents originating from WHO, OECD, the European Commission, national government agencies referred to interventions and noted the importance of not widening health inequalities. For the purposes of the present review, the decision was made to include only those documents which contained *original data* on effectiveness *differentiated by SES*.

This restriction narrowed the documents down considerably: examination of the documents found that none of them contained new evidence of effectiveness of interventions, although many of them referred to the need for effectiveness studies, and also to the higher levels of need among lower SES groups. Only a few documents specifically referred to the available evidence for assessing the differential effectiveness of interventions and recognised the paucity of evidence available. The most recent document (Loring and Robertson, 2014²¹) acknowledges that '*few interventions have been evaluated for their effectiveness in low socioeconomic groups*' (p9).

²¹ Loring B, Robertson A. *Obesity and inequities: Guidance for addressing inequities in obesity and overweight*. WHO EURO, 2014. http://www.euro.who.int/_data/assets/pdf_file/0003/247638/obesity-090514.pdf



Restricting the analysis to only those documents that specifically address obesity may have led to the exclusion of other valuable documents. As suggested in the discussion on the scientific papers, a broader sweep of the grey literature may be able to capture more useful, policy-relevant material. For example, the assessment of the different forms of front-of-pack labelling commissioned by the UK Food Standards Agency makes explicit reference to the problems likely to be faced by individuals with low literacy and numeracy skills.²² Similarly, there may be grey literature documents evaluating interventions concerning neighbourhood food access (e.g. using vouchers for healthier products), physical activity (e.g. providing sports coaching or self-defence training for children) or breastfeeding promotion (e.g. providing work-place support facilities), and these would be expected to show differential SES impacts. A wider set of search terms would be needed to capture such valuable material.

Concluding points

Both sections of this report have identified serious shortfalls in the evidence base for making policies. The subject of **costs of obesity** differentiated by SES appears to be devoid of any serious research. Little modelling has been undertaken to show the differential costs due to the increased likelihood of obesity among lower SES groups, and hardly any evidence is available on the differential costs per person which might pertain to individuals from different SES groups. Yet these are important pieces of information if rational policy decisions are to be made.

The subject of **effectiveness of interventions** differentiated by SES group has been looked at in several papers, but the findings are of limited generalisability. Only 15 papers were found which made comparisons between the responses of SES groups defined in some form (including ethnicity, immigration status) to interventions. A further 14 papers reported the effectiveness of interventions within a lower SES group, but did not compare the results with any other SES group. There was some evidence that educational approaches showed effectiveness among lower SES groups when targeted at mothers and young (pre-school) children, but otherwise was not effective for lower SES groups, but possibly effective for higher SES groups. Multi-component interventions, often implemented in schools, had mixed results, with some evidence of short-term behaviour change in all SES groups, but little evidence of effects on BMI or obesity, and poor long-term effectiveness overall.

Further investment is needed into gathering directly relevant data on these issues. The current and recent EU-funded may provide some of the material needed, but further investment in data-gathering will be needed.

²² British Market Research Bureau (2009) Comprehension and use of UK nutrition signpost labelling schemes. Report prepared for the Food Standards Agency.
<http://multimedia.food.gov.uk/multimedia/pdfs/pmpreport.pdf>



Task 1.3 Towards an audit of EU research

Narrative report

A search was undertaken to identify EU-funded research projects which investigated obesity-related issues and included an inequalities focus. Approximately 600 titles of research projects from DG Research (FP5, FP6 and FP7 programmes) and DG Sanco (primarily funded through the Public Health Executive Agency / Executive Agency for Health and Consumers / Consumers, Health and Food Executive Agency). From these titles, 34 projects were further examined for the potential to show SES-related information, and these are listed in the table (Table 1) below.

Few projects specifically addressed the issue. The HOPE project had a specific workpackage devoted to reviewing SES and obesity risk. Several projects have included or will include SES variables in their surveillance – including the COSI, ENERGY, TOYBOX, IDEFICS and I-FAMILY studies, all of which relate to children. The EPIC study has the potential to show similar relationships for middle-aged adults. Several of these studies will have the data to cross-analyse the socio-economic status variables with the measures of dietary habits, physical activity and sedentary behaviour, and possibly some of the indices of neighbourhood obesogenicity. A review of the data archives from these projects may be able to show what material is available.

Many other projects included SES or related criteria as part of their input variables in their analyses of treatments or interventions but do not specify that they have, or will, differentially analyse the results by this variable. More detailed inspection of the published papers from these projects would be needed to assess the evidence they are producing. Again, even if they have not reported differential outcomes according to SES, the data may be available in the archived records of these studies, and a review of the archives could be recommended. The TOYBOX project includes a workpackage assessing cost-effectiveness of the intervention in kindergartens, and this could be utilised to estimate the differential costs according to SES group if there are SES-related disparities in response to the intervention.

Several projects (DYNAMO-HIA, ECONDA) have the potential to support modelling of the effects of SES on obesity-related health outcomes, including life expectancies and comorbidities.

Table 1. 32 EU research-related projects which may provide evidence concerning obesity and inequalities

Project	Full title	Dates	Potential SES information	Link
CHANCE	Low cost technologies and traditional ingredients for the production of affordable, nutritionally correct foods improving health in population groups at risk of poverty	2011 – 2014	Aims to develop “appealing, affordable and healthy food products that could prevent common nutritional problems among those vulnerable to poverty The population groups at greatest risk of poverty in Europe will be identified. By analysing food intake data, weight, height and other body measurements as well as bio-markers collected from volunteers from these groups their specific nutrition-related issues and needs will be clarified.”	http://www.chancefood.eu/about_2.html
COSI	Child Obesity Surveillance Initiative	2005--	Coordinated through WHO-EURO. Measured heights and weights of samples of children 6-9yrs old, 13+ countries SES of children’s family is optional.	http://www.euro.who.int/en/home
DALI	Vitamin D And Lifestyle Intervention for Gestational Diabetes Mellitus (GDM) Prevention	2010-2014	Intervention strategies for gestational diabetes. Potential to identify SES disparities in responses to interventions	http://www.dali-project.eu/
DRIVERS	Tackling the Gradient: Applying Public Health Policies to Effectively Reduce Health Inequalities amongst Families and Children	2012-2014	Continues the GRADIENT project. It aims to promote health equity through policy and practice in early childhood development, employment & working conditions, and income & social protection.	http://health-gradient.eu/
DYNAMO-HIA	Dynamic modelling for health impact assessment	2006-2010	Software to model the effects of policy scenarios on health, including impact of obesity targets on life expectancy and co-morbidities. Potential to model differential SES impacts.	http://www.dynamo-hia.eu/
EATWELL	Interventions to promote healthy eating habits: Evaluation and recommendations	2009-2013	“Ongoing analysis of the data obtained from this survey will generate socioeconomic, demographic and lifestyle determinants across Europe”	http://www.eatwellproject.eu/en/
ECONDA	Economics of Chronic Diseases	2012--	“Consensus will be sought on the best methods, using a microsimulation model to estimate the evolution of the costs of chronic diseases in at least seven EU countries.” Potential to model forecasts of obesity burden by SES.	http://www.econdaproject.eu/index.php
ENERGY	European Energy balance Research to prevent excessive weight Gain among Youth	2009-2013	Children aged 10-12yrs, surveyed and interventions in schools and families, with SES, diet, PA and measured anthropometric data	http://www.projectenergy.eu/flash.html
EPIC	European Prospective Investigation into Cancer, Chronic Diseases, Nutrition and Lifestyle	2005-2009	Cohort of more than 500 000 middle-aged adults with data on diet, anthropometry, blood samples, SES, health outcomes.	http://epic.iarc.fr/
Equity Action	Joint Action between the EU and Member States	2011-2014	(Not clear what SES dimensions relating to obesity are included.)	http://www.equityaction-project.eu/



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EPODE-EEN	EPODE International Network	2008-2011	Evaluation of the EPODE series of community intervention initiatives for preventing obesity in childhood.	http://www.epode-european-network.com/
EuroHeart	Mapping of heart health promotion and cardiovascular disease prevention measures	2007-2010	"The study revealed significant inequalities in both national prevention policies and levels of cardiovascular mortality."	http://www.ehnheart.org/projects/euroheart/about.html
EURO-PREVOB	Tackling the social and economic determinants of nutrition and physical activity for the prevention of obesity in Europe	2007-2013	Policy analysis and the development of environmental indicators survey tools. SES neighbourhood indicators.	http://prevob.lshtm.ac.uk/
EYTO	European Youth Tackling Obesity	2012--	Analyse the efficacy of social marketing campaigns with adolescents in different communities.	http://www.ncb.org.uk/health/promoting-healthy-lifestyles/european-youth-tackling-obesity
FOOD	Fighting Obesity through Offer and Demand	--2011	Health promotion at the workplace and aims at changing bad habits and lifestyles of the employees.	http://www.food-programme.eu/en/
FOODOB	Food Consumption and Obesity: Public Policy Measures	2010-2011	Modelling of the "impact of a range of tax policies, including different forms of taxes on saturated fat and sugar ... a final objective will focus on the relationship between obesity and the demographic characteristics and food purchasing behaviour of households"	http://cordis.europa.eu/projects/rcn/95656_en.html
GRaDient	Tackling the Gradient: Applying Public Health Policies to Effectively Reduce Health Inequalities amongst Families and Children	2009-2012	See DRIVERS	http://health-gradient.eu/
HEALTH25	Harnessing the Power of Sport and Physical Activity for Health Promotion.	2011--	Training programme for engaging 'disadvantaged young people' in engaging with PA and sport	http://www.health25.eu
HEPCOM	Promoting healthy eating and physical activity in local communities	2012--	Barriers and successes in promoting PA in children and youth	http://hepcom.eu/
HITT	Health in times of transition	--2008	Trends in population health and health policies in nine CIS countries.	http://cordis.europa.eu/result/report/rcn/57665_en.html
HOPE	Health-promotion through obesity prevention across Europe	2007-2009	Systematic reviews of obesogenic determinants, including SES	http://www.worldobesity.org/what-we-do/policy-prevention/projects/eu-projects/hopeproject/
IDEFICS	Identification and prevention of Dietary- and lifestyle-induced health Effects In Children and infantS	2006-2012	Diet, lifestyle, anthropometric measures, intervention effects, and SES variables for 16 000 children aged 2-11yrs.	http://www.ideficsstudy.eu/
I.FAMILY	Determinants of eating behaviour in European children, adolescents and their parents	2012-2017	Follows on IDEFICS. Monitoring a large cohort of children, including SES samples 1600 children, 8 countries	http://www.ifamilystudy.eu/

MeDCHaM Ps	MEDiterranean studies of Cardiovascular disease and Hyperglycaemia: Analytical Modelling of Population Socio-economic transitions	2009-2012	Possible source of information on the impact of economic conditions on chronic disease	http://research.ncl.ac.uk/medchamps/
NOPA	WHO European Database on Nutrition, Obesity and Physical Activity	2008-2011	Database of policy documents related to NOPA topics, by country. Possible source of policy initiatives relating to reducing health disparities	http://data.euro.who.int/nopa/
OBESCLAIM	Fighting against obesity in Europe : The role of health related-claim labels in food products.	2013-2017	"...how health-related claim labels in food products lead consumers to choose healthier food diet ... taken into account also consumers personal characteristics (socio-demographic, economic, nutritional and health status etc) and psychological and emotional factors."	http://cordis.europa.eu/projects/rcn/108338_en.html
OPEN	Obesity Prevention through European Network	2013-2016	(Spin-off from EPODE-EEN) "The project will scale-up and increase capacity of the Coordination Teams (CTs) in terms of scope of action, design, implementation and evaluation methods. The objective is also to support the CTs in widening their target groups scope, including adolescents living in deprived areas."	http://www.epode-european-network.com/
PHYBEHI	Physical built environments and health inequalities	2011-2016	Aims to investigate the role of various environmental characteristics in shaping health inequalities.	http://www.ed.ac.uk/home
RICHE	A platform and inventory for child health research in Europe	2010-2013	Collates information sheets about EU initiatives on child health – may include further projects linking obesity and SES	http://www.childhealthresearch.eu
RODAM	Type 2 diabetes and obesity among sub-Saharan African native and migrant populations: dissection of environment and endogenous predisposition	2011-2014	Collecting information on minority ethnic group and obesity prevalence, and potential environmental drivers of obesity	http://www.rod-am.eu/
SPOTLIGHT	Sustainable prevention of obesity through integrated strategies	2012-2016	Includes surveys of initiatives underway in EU to tackle obesity in lower-income groups, and analysis of neighbourhood environments for obesogenic indicators.	https://www.spotlightproject.eu/
TEMPEST	Temptations to Eat Moderated by Personal and Environmental Self-regulatory Tools	2009-2013	Includes studies of the influences on attitudes and food choices, by SES and national economic indicators.	http://www.tempestproject.eu/
TICD	Tailored implementation for chronic diseases	2012-2016	Comparative evaluations of treatments, focusing on five chronic conditions: chronic heart failure, obesity, mental health, asthma and COPD	http://www.ticd.umed.lodz.pl/index.php/summary
TOYBOX	Multifactorial evidence based approach using behavioural models in understanding and promoting fun, healthy food, play and policy for the prevention of obesity in early childhood	2010-2014	Pre-school children, anthropometric and lifestyle measures, SES, and interventions in kindergartens and families, with cost-effectiveness calculations	http://www.toybox-study.eu/

