EuroHeart II
BUILDING ACTION on HEART DISEASE and STROKE

UNIVERSITY OF LIVERPOOL

Identifying the most effective and cost effective public health nutrition policy options for CVD prevention

Euroheart II Work Package 5

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Executive Summary

Cardiovascular Disease (CVD) is the main cause of death in Europe. Each year CVD causes just over 1.9 million deaths in the European Union and over 4 million deaths across Europe. CVD causes 40% of all deaths in the EU and 47% across Europe. Overall CVD is estimated to cost the EU economy €196 billion a year (EuroHeart II work package 4; Nichols et al, 2012).

This report presents the findings of EuroHeart II Work Package 5, where the specific objective was "Identifying the most effective and cost-effective CVD prevention policies". The project started in August 2011 and ended in February 2013. This work package was conducted in co-ordination with Work Package 4 (on reporting and analysing of data on CVD), and helped determine different policy scenarios for the work conducted in Work Package 6 on predicting future CVD trends under different policy scenarios in the EU.

Work Package 5 aimed to acquire comprehensive and comparable information on current public health nutrition policies, plans and actions that would impact on cardiovascular health and CVD prevention, and also to test the hypothesis *"The countries with the largest number of established, effective CVD prevention policies have achieved the biggest reductions in population smoking, blood pressure and cholesterol levels".*

The specific objective was addressed through a number of projects:

- updating previous literature reviews of nutrition policy interventions, focussing on peer reviewed and grey literature up to February 2013;
- creating a database to summarise food policies in 30 countries across Europe;
- interviewing policy-makers and thought-leaders from 14 diverse countries to elicit their views on a wide range of possible strategies and policy options;
- categorising public health nutrition policies using a novel framework; and
- analysing and modelling recent data to explicitly test the hypothesis.

Rapid scoping reviews of the effectiveness of population-wide nutrition policy interventions were conducted. The literature was assessed and categorised using the *"4Ps"* framework: Price, Product, Promotion and Place. The studies were synthesised as narrative reviews. Individual reviews were produced for salt; fats (trans fats, saturated fats and total fats); fruit and vegetables; and generic healthy eating initiatives.

A database was created to summarise public health nutrition policy for 30 European countries (EU 27 plus Iceland, Norway and Switzerland). Using the *"4Ps"* conceptual framework, textual data regarding nutrition policies and actions for each country were catalogued. Policy-makers and thought-leaders in 14 diverse European countries gave their views of different policy options for public health nutrition (in Belgium, Czech Republic, Estonia, Finland, Germany, Greece, Iceland, Ireland, Italy, Malta, Poland, Portugal, Slovenia and England).

This report provides an overview of public health nutrition policies in 30 European countries. It then presents a deeper analysis of nutrition policy actions relating to cardiovascular disease prevention in 14 of those European countries. Information was gathered through country visits and interviews with a diverse range of national experts and stakeholders.

Population-wide policy actions to promote a healthy diet potentially offer large benefits in terms of reducing the CVD burden. However, not all interventions are equally effective. The evidence suggests that the largest effects could be achieved by *"upstream"* comprehensive, multi-level interventions, (for instance targeted at decreasing salt and trans fats, or increasing fruit and vegetable consumption). Mandatory approaches generally appear

more powerful than voluntary approaches for tobacco control, alcohol control, and dietary reductions in salt or trans fats. Effective population-wide interventions appear to be consistently cost saving (NICE 2010).

This project is not without its limitations. This analysis provides a potentially useful description of activities up to February 2013. However, we also recognise that developments are on-going and our data are inevitably a "snapshot". We therefore plan future work to identify and evaluate population-based policy actions carried out in the WHO European Region. The policy actions identified will then provide an evidence base on which to develop, pilot and validate a nutrition policy assessment tool.

Public health nutrition policies represent a complex, dynamic and rapidly changing environment. It is therefore very encouraging to observe that the majority of European countries are engaged in activities to improve public health nutrition. However, many European countries fall short of optimal activities. Furthermore, the promotion, implementation and evaluation of effective policies remain patchy and variable, from non-existent to extensive. Within the EuroHeart II work package 5, Finland, Iceland, Portugal and perhaps England demonstrate notable progress. France and Hungary also demonstrate progress.

Introduction

Cardiovascular disease (CVD) is the main cause of death in Europe. Each year CVD causes over 4 million deaths in Europe and over 1.9 million deaths in the European Union. CVD causes 47% of all deaths in Europe and 40% in the EU. Overall CVD is estimated to cost the EU economy almost €196 billion a year (EuroHeart II, work package 4; Nichols et al 2012)).

CVD is largely preventable. The World Health Organization (WHO) estimates that modest population-wide and simultaneous reductions in blood pressure, obesity, cholesterol and tobacco use would more than halve the incidence of CVD (WHO 2005). Although impressive reductions in CVD mortality have been achieved in the past decades, a recent levelling in mortality rates in younger age groups has been observed in a few countries and an increase in mortality has been observed in Greece and Lithuania (EuroHeart II work package 4; Nichols et al 2012).

There is political will in the European Union to address CVD, notably the European Council Conclusions on Promoting Heart Health (2004) and the European Heart Health Charter (2007). The European Parliament Resolution of 12 July 2007 on action to tackle cardiovascular disease calls for:

- Member States to further develop their action plans on lifestyle related health determinants in order to promote healthy lifestyles
- The European Commission to encourage initiatives and collaborations with interested stakeholders which aim to promote better cardiovascular health
- Continued financial support for further research into preventing cardiovascular disease and promoting cardiovascular health at local, national and European levels

Background

To address the significant burden of CVD in Europe and to determine specific areas of intervention to contribute to preventing avoidable deaths and disability, the European Society of Cardiology and the European Heart Network undertook the EuroHeart project (EuroHeart: European Heart Health Strategy 2007-10). Work package 5 of that project provided a valuable overview of policies, plans, and legislation on public health, CVD, coronary heart disease (CHD), stroke, hypertension, hyperlipidaemia, obesity, diabetes, alcohol, food, tobacco, physical activity, stress, and inequalities in 16 European countries.

The WHO report *"Gaining health - Analysis of policy development in European countries for tackling non-communicable diseases"* (2009) described NCD (non communicable disease) policy developments in eight European countries: Albania, Finland, France, Greece, Hungary, Ireland, Kyrgyzstan and Lithuania.

Building on the knowledge generated by EuroHeart and the WHO report, the EuroHeart II Project was established in 2011 and runs until 2014. The general objective is to contribute to addressing diseases of the heart and circulatory system (CVD). The specific aims are to:

- Update the relevant information and statistics from EuroHeart
- Empower relevant stakeholders, allowing them a larger impact on health-related nutrition and physical activity, as well as health-care related policies across societies in Europe

The main outcomes of EuroHeart II are to:

- Provide the most up to date statistics on CVD in Europe (including a cost of disease study in the EU) and analysing these data (work package 4)

- Identify the most effective and cost effective CVD prevention public health policies (work package 5 – this report)
- Predict future coronary heart disease (CHD) trends (work package 6)
- Share knowledge on nutrition, physical activity and the prevention of cardiovascular diseases in Europe (work package 7)
- Build capacity in the cardiovascular patients' community (work package 8)
- Evaluate the ESC-EASD guideline on prevention of cardiovascular disease in diabetic patients (work package 9).

Through the specific aims, it is expected that, with up to date information, decision makers will be better able to develop effective CVD prevention policies; stakeholders will be empowered to assess and address the situation in their countries; in particular, that the CVD Non-Governmental Organisations (NGO) sector will have a larger impact on health-related nutrition and physical activity policies in their countries; that the impact of the CVD patients' community in decision making procedures will be strengthened; and that a contribution will be made to improve outcomes of diabetic patients with CVD.

This report presents the findings of work package 5, *"Identifying the most effective and cost effective CVD prevention policies"*. One of the aims is to provide a snapshot of public health nutrition policy actions across 14 diverse countries in Europe: Belgium, Czech Republic, Estonia, Finland, Germany, Greece, Iceland, Ireland, Italy, Malta, Poland, Portugal, Slovenia and England. The mapping project started in August 2011 and ended in February 2013. This work package was conducted in co-ordination with work package 4 (on reporting and analysing of data on CVD) and helped determine different policy scenarios for the work being conducted in work package 6, predicting future CVD trends under different policy scenarios in the EU.

Work package 5 aimed to acquire comprehensive and comparable information on current public health nutrition policies, plans and actions that would impact on cardiovascular health and CVD prevention and to test the hypothesis *"The countries with the largest number of established, effective CVD prevention policies have achieved the biggest reductions in population smoking, blood pressure and cholesterol levels".* The work did not include policies addressing smoking as this has been comprehensively addressed elsewhere (Joossens and Raw 2006, Stilmann et al 2006).

Work undertaken to achieve the specific WP5 objectives involved:

- updating previous literature reviews of policy interventions, focussing on the most recent publications in peer reviewed and grey literature;
- creating a database to summarise food policies in 30 countries across Europe;
- interviewing policy-makers and thought-leaders from 14 diverse countries to elicit their views on a wide range of possible strategies and policy options;
- categorising public health nutrition policies using a novel framework; and
- analysing and modelling recent data to test the hypothesis: "The countries with the largest number of established, effective CVD prevention policies have achieved the biggest reductions in population smoking, blood pressure and cholesterol levels".

Study design

This is a comparative, mixed methods study (quantitative and qualitative), that provides an overview of the current situation across Europe regarding CVD prevention nutrition policies and their effectiveness.

Methods

An advisory group was established and met on a monthly basis for the duration of work package 5. Group membership comprised the project team together with academics with expertise in quantitative and qualitative methodology, food policy and public health policy analysis (Appendix 1). The group advised upon the design and development of data collection tools, project progress, analysis and reporting of findings and dissemination.

Conceptual framework

In order to maintain a coherent approach to the work package, a conceptual framework was developed. We looked at a wide range of candidate frameworks, as well as developing some from scratch. The tobacco control approach appeared useful (3As: Affordability, Acceptability, and Accessibility). However, after extensive piloting and discussions, we agreed that the most practical and coherent approach was that used by the European Heart Network (EHN) in *"Diet, physical activity and cardiovascular disease prevention in Europe"* (European Heart Network, November 2011) which is based on the traditional marketing *"4Ps"* approach: Price, Product, Promotion & Place. Marketers use this model, also known as the "marketing mix", to assess how well products match their target market by considering factors to do with price, product, place and promotion. The EHN publication and its *"4Ps"* framework are used in the implementation of this work package and work package 7 of EuroHeart II.

Box 1: The "4Ps" marketing mix

Price: taxes; subsidies; or other economic incentives

Product: reformulation; or new products

Promotion: restricting marketing to children and adults (advertising controls); nutritional food labelling; nutritional information on menus; public information campaigns; and health education

Place: availability of foodstuffs in schools, workplaces, community, retail settings etc
("Multi-component interventions" might involve a combination of several approaches)

Literature review

We conducted rapid scoping reviews of the effectiveness of population-wide nutrition policy interventions. We searched six electronic databases. Recent systematic reviews and primary studies provided the main sources of data. In stage one, we sought systematic reviews. Where there were none, we next sought primary studies analysing empirical data, and then modelling studies. All items were assessed systematically for inclusion. Reference lists were screened and key informants identified additional evidence. The literature was assessed and categorised using the *"4Ps"* framework explained above. Interventions that involved a combination of these approaches were included under a 5th heading: *"Multi-component interventions"*.

The studies included were too heterogeneous to combine quantitatively in a meta-analysis, so they were synthesised as narrative reviews. Individual reviews were produced for salt; fats (including trans fats, saturated fats and total fats); fruit and vegetables; and generic healthy eating initiatives (i.e. those that did not focus specifically on one nutrient category) (Appendix 2).

Interviews with key informants

Ethical approval for the interviews was granted by the Institute of Psychology, Health and Society Research Ethics Committee at the University of Liverpool in July 2011. Policy-makers, thought-leaders and others active in the field of public health nutrition at the national level were interviewed in all EuroHeart II work package 5 countries, in order to elicit their views on a wide range of possible strategies and policy options covering the entire spectrum of public health nutrition focused on CVD prevention.

Questions were developed and piloted with key experts in England. This ensured the inclusion of relevant questions, which would provide a comprehensive overview of current and potential future national nutrition policy actions within the 14 work package 5 countries. Participants were identified through various sources, for example, the European Heart Network and within European countries via national Heart Foundations. Key informants were also identified via published literature, the internet and the 'snowballing technique' by means of expert colleagues. Potential participants were contacted by email explaining the EuroHeart II project and requesting their participation as experts in public health nutrition policies in their country. Interviews were conducted with participants in all countries. Participants included high level policy makers and experts in the field from a diverse range of institutions, for example, Ministries of Health, Education, Social Welfare/Affairs; Chief Executives of large health statistics organisations; National Institutes of Public Health; Universities; National Nutrition Councils and Heart Foundations; Obesity and Diabetes Societies; Consumer Organisations; CINDI Programme officials; Preventive Cardiologists; and Food and Veterinary Authorities. Over half the participants were employed in Government Ministries or Universities (approximately 60%); about a quarter of the participants represented NGOs and about one in ten of the participants had dual roles, actively participating in or leading NGOs as well as formal government employment.

Prior to interviews, participants were emailed an information sheet, a consent form, the interview questions and a summary of public health nutrition policies and related initiatives in their country (see Appendices 3-6). The latter two enabled familiarity with the interview content and format. The interviews were conducted either in person, by telephone or Skype. All interviews except one were digitally recorded. The interviews typically lasted between 45 minutes and one hour. In total 71 interviews were conducted. The interviews were transcribed and entered into NVIVO software, to aid analysis.

Table 1: Number of key informant interviews across 14 countries

Country	Number of interviews
Belgium	4
Czech Republic	4
England (pilot)	7
Estonia	4
Finland	6
Germany	4
Greece	4
Ireland	4
Iceland	8
Malta	5
Italy	6
Poland	4
Portugal	4
Slovenia	6
Europe-wide perspective	1
Total	**71**

Data analysis

The project team at the Department of Public Health, University of Liverpool, UK, undertook all data analyses. The interview transcripts were analysed using the 'Framework approach', which is particularly useful for applied policy research (Pope et al 2000, Ritchie, Spencer and O'Connor 2003). It involves a systematic process of sifting the data, charting and sorting material according to key themes and issues. A hierarchical thematic framework of main themes was developed, subdivided by a succession of related subtopics. Data were classified and organised according to the themes, concepts and emergent categories. Data were charted by completing a matrix or table where each case (individual participant) has its own row, and columns represent the subtopics. Cells contain relevant summaries from the data set. The charts were then used to examine and interpret the data for patterns and connections.

The key steps in the Framework approach are:

1. **Familiarisation**

   The researcher gains an overview of the data and becomes familiar with the range, depth and diversity of data gathered. Key ideas and recurrent themes are listed.

2. **Identifying a thematic framework**

   Key issues, concepts and themes are examined, referenced and developed further into a thematic framework. The framework draws upon:

   - a priori issues (those informed by the original research aims and introduced into the interviews via the topic guide)
   - emergent issues, raised by the participants themselves
   - analytical themes arising from the recurrence or patterning of particular views or experiences

   The framework is further refined as it is applied to transcripts.

3. Indexing

This is the process whereby the thematic framework is systematically applied to the textual data. All data are read and annotated according to the thematic framework. Indexing references are recorded on the margins of each transcript that then link back to the framework.

4. Charting

Once the thematic framework is applied to individual transcripts, the picture of the data as a whole is built up. This is done by 'lifting' data from their original context and rearranging them according to the appropriate thematic reference. Charts can then be devised with headings and sub-headings that are drawn from a range of sources, including the thematic framework itself; from a priori research questions; or according to considerations about how best to write up the study.

5. Mapping and interpretation

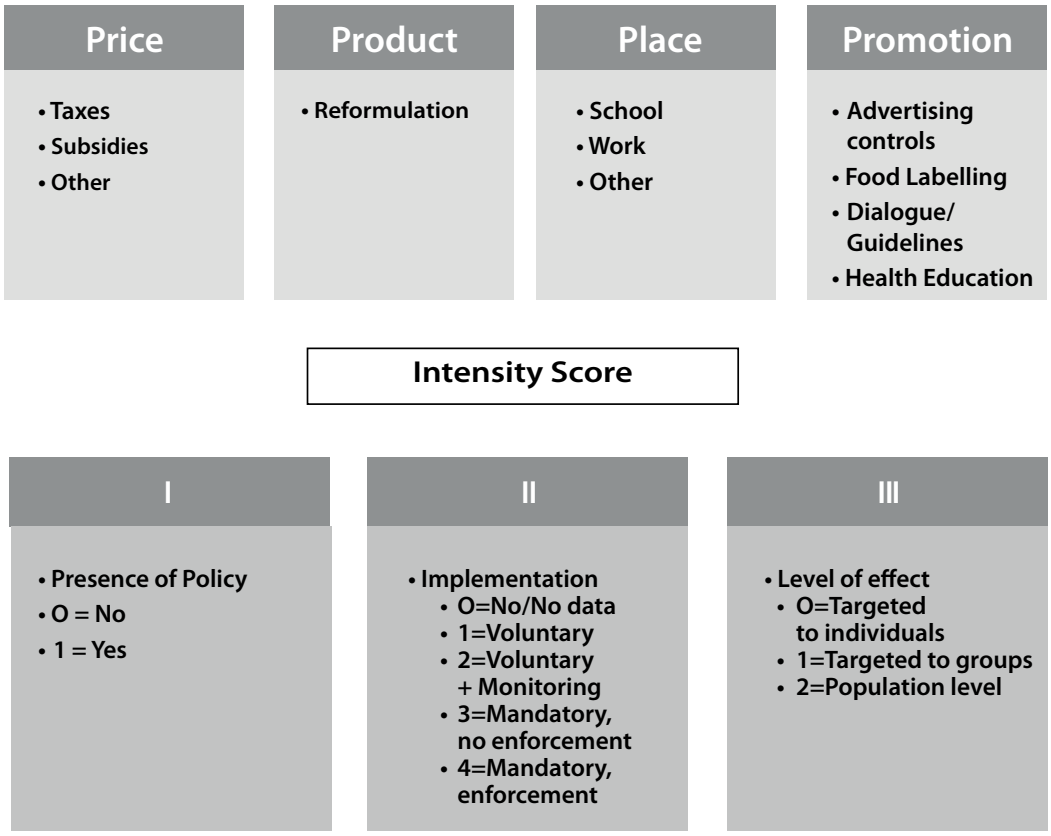
Finally, when all the data have been sifted and charted according to core themes, key characteristics of the data are pulled out, and the data set is mapped and interpreted as a whole. This is a systematic process whereby charts and research notes are reviewed, data (e.g. perceptions, accounts or experiences) are compared and contrasted, and patterns and connections are examined.

Policy modelling: developing a pilot study for a Diet Policy Intensity Score at the national level

It could be hypothesised that countries with a) more evidence based policies; b) policies with higher level of implementation and/or enforcement and c) acting at the population level (as opposed to target groups or individuals) have a "policy environment" that should result in decreased CVD burden, based on our current understanding of the control of the CVD epidemic.

Any useful policy score is composed of domains and sub-domains. For each sub-domain, an "intensity score" is calculated. The domains reflect the *"4Ps"* framework used in this work package, the sub-domains identify types of actions/interventions. The "intensity score" tries to capture the effectiveness of each sub-domain (Figure 1).

Figure 1 Policy Modelling: Domains and Intensity Score



To obtain a country score, each domain (each *"P"* of the framework) is scored, based on data extracted from the country profiles. An average for the domain is then calculated and the sum of the average individual domain scores is used to estimate the "average" policy intensity score. The presence of policies has been scored arbitrarily lower in order to give less weight to this compared to implementation and level of effect domains when comparing overall scores.

In order to explore the correlation between the Policy Intensity Score and important CVD related outcomes, we performed correlations of the average total score with risk factor level change over the period (1990-94 to 2007) (total cholesterol and systolic blood pressure), fruit & vegetable intake and trends in age adjusted CHD mortality rates.

Results

1. Literature review on effectiveness of dietary interventions

This section of the report reviews briefly the evidence for the effects of policy interventions to promote a healthy diet, and highlights the most promising options. It offers two perspectives: firstly an analysis by Price, Product, Place then Promotion, then a more detailed analysis of interventions targeting specific nutrients: Salt, Fats, Fruit and Vegetables.

Analysis using the Price, Product, Place and Promotion approach

PRICE: Evidence for fiscal interventions to promote a healthy diet

Price interventions include: taxes, subsidies, price promotions and other economic incentives. The potential impact of taxes and subsides has been assessed using both models and empirical analysis (of real life data). Econometric modelling studies show promise and should be considered as a component of future public health nutrition policy. Eight empirical and 16 modelling studies were reviewed by Thow et al (2010). Although study quality was mixed, taxes and subsidies could substantially reduce the consumption of salt and saturated fat, and increase the intake of fruit and vegetables.

Whilst studies evaluating the effects of interventions targeting a single food/nutrient may over-estimate impact by failing to take into account shifts in consumption of other foods, there is some emerging evidence to suggest that the introduction of taxes and subsidies may be effective in reducing salt (1 modelling study; Smith-Spangler 2010) and fat intake (2 modelling studies; Mytton 2007; Allais 2009). For example, the introduction of a "fat tax" (targeting a wide range of foods) could avert around 3 200 cardiovascular deaths per annum in the UK (a 1.7% reduction) (Mytton 2007). Fruit and vegetable subsidies may be effective at increasing fresh fruit and vegetable (FFV) consumption (1 modelling study; Cash 2005), (Barton 2010; Mytton 2012; Sustain 2013).

PRODUCT: Product interventions to promote a healthy diet

Product interventions include reformulation and healthier product development. Eliminating certain "unhealthy" nutrients from the market shows promise. One notable success is the progressive elimination of industrial trans fats in Denmark. Increasing public and political pressure on industry resulted in reformulation of margarines and then other dietary fats, and was subsequently underpinned by national legislation (Stender 2006). A number of European countries have now followed suit, including Austria, Switzerland, and Iceland and it is under consideration in Sweden. Product reformulation may also be effective notably for salt, sugars and fats. The salt reduction effects appear greatest when reductions are mandatory rather than voluntary (2 modelling studies; Smith-Spangler 2010; Nakamura 2003). Similarly, replacing saturated fat with poly-unsaturated fat in school meals has shown some improvements (the proportion of polyunsaturated fats consumed increased by 75% (from 0.53 to 0.93) in boys and by 53% (from 0.64 to 0.98) in girls) when interventions were enforced (2 primary studies; Ellison 1990; Fisher 1999). However, most evidence is only available for small-scale interventions. The impact at a population level may be larger, on the basis of evidence from natural experiments in Finland, Poland, The Czech Republic, Mauritius and elsewhere (Puska 1998; Zatonski et al 2008; Dhowse BMJ 1995).

PROMOTION: Interventions to encourage a healthy diet

Promotion interventions include advertising, labelling, public information campaigns and health education. National health promotion campaigns show some promise in terms of modestly increasing fruit and vegetable

intake across a range of European countries. For example, the UK's "5-a-day" information campaign (targeting consumers and market agents) increased fruit and vegetable consumption by an estimated 0.3 portions on average (Capacci & Mazzochi 2009). However, there was evidence of a bigger impact in higher income groups (0.7 versus 0.2 portions in more deprived groups). Targeted nutritional education in the community and workplace appears less effective (3 primary studies; Buller 1999; Connell 2004; Engbers 2006). The use of nutrition labels can promote healthier diets (1 systematic review including 120 studies; Campos 2011); however, the effects vary across subgroups, with lower use among children, adolescents, and older adults who are obese. Calorie labelling on restaurant menus has also been evaluated in diverse settings. Any benefits appear weak and inconsistent (1 systematic review including 11 studies; Harnack 2008; Swartz 2011; Jebb 2012).

Food marketing to children is controversial. Most studies found an influence on children's food preferences and their purchase behaviour and a clear link between television viewing and diet, obesity and cholesterol levels, while some apparently did not (2 systematic reviews including over 100 studies; Hastings 2003; IASO 2012). However the commercial stakes are high, and there are similarities with previous industry attempts to undermine the evidence for tobacco and alcohol advertising (Gilmore et al PHJ 2011; Hastings 2012;). A longitudinal analysis of US data by Chou (2008) suggested that a ban on television fast food restaurant advertising might reduce the number of overweight children aged 3-11 by 18% and adolescents aged 12-18 by 14%.

Evidence for the long-term effects of dietary advice on salt consumption is also contested. On combining the results from 11 studies, Hooper (2009) found a 2g-2.3g per day reduction in salt consumption and a 1.1mmHg decrease in systolic blood pressure but apparently not diastolic blood pressure at 13 and 60 months. However, He and McGregor (2011) re-analysed the data, and found there was a significant reduction in cardiovascular events by 20% when combining results for hypertensives and normotensives.

PLACE: Place-based interventions to promote a healthy diet

Place interventions aim to modify product availability in specific settings including schools, workplaces and retail. A number of interventions have been developed targeting the settings where people consume food, including schools, workplaces and community/neighbourhood environments. Some show promise of effectiveness, others do not.

School interventions (involving education, behavioural skills, gardens and provision of free fruit and vegetables) appear to be most effective when involving multiple components (Van Cauwenberghe 2010). Further, they are generally more successful at increasing fruit rather than vegetable intake (Reynolds 2000; Wells 2004; Coyle 2009; Davis 2009; Parmer 2009; Somerset 2009; Bere 2010). For example, the English National School Fruit Scheme, which provides one free piece of fruit each school day to children aged 4 to 6 years, was found to increase consumption by 50g per day. Similarly positive reviews have come from a range of European countries including Denmark and Norway. Workplace interventions seem to have a positive effect on dietary behaviour (two systematic reviews including 47 studies; Maes 2011); this was maintained long term in some studies (Maes 2011).

In the community, accessibility of local food stores and fast food outlets may impact on fruit and vegetable consumption (2 primary studies; Rose 2004; Bodor 2008). In one small study, closer proximity to a local food store resulted in an increase in fruit consumption of 84g per adult per day although the result was not statistically significant and therefore may be due to chance (Rose 2004). Furthermore, other studies have shown that effects are not always in the direction expected, with closer proximity to stores leading to unhealthier food choices (Jago 2007). Involvement in community gardens or participation in farmers' markets may both increase fresh fruit and vegetable consumption (2 systematic reviews including a total of 23 studies; McCormack 2010; Robinson-O'Brien 2010).

Multi-component interventions

Comprehensive national multi-component programmes to promote healthy eating appear to show the greatest promise for nutrition policy. Interventions appear particularly effective when they simultaneously target many levels, or provide a comprehensive approach to foods or nutrients. One paper summarised data from two studies, implemented in two different community settings: North Karelia, Finland and the Stanford 5 City Project, America. The multi-component interventions included health education, screening, and a hypertension control and treatment programme in these community settings (Gaziano et al 2007). During the 1970s in North Karelia, comprehensive interventions were developed. They consisted of community-based strategies to change dietary habits based on epidemiological/medical knowledge and social/behavioural theories, flexible to local situations, with community ownership and people's participation as key elements. This programme was subsequently extended across Finland. By 1997, adult serum cholesterol had decreased by 18% (Puska 1998), while diastolic blood pressure decreased by 5% in men and 13% in women. The age-standardised CVD mortality rate decreased by 73% (from 672 to 185). There was also a drop in the rest of Finland over the 25-year follow up period. In the Stanford 5 City Project, there were also useful reductions in cholesterol, blood pressure and smoking rates compared to sites that did not have the intervention.

Supporting evidence also comes from the successful elimination of industrial trans fats in Denmark. Careful analysis reveals that the substantial reduction in trans fats reflects a combination of scientific, medical social and political interventions. Subsequent legislation then underpinned these achievements (Stender 2006).

The UK Food Standards Agency co-ordinated a comprehensive salt reduction programme including media campaigns, education and pressure on industry to reformulate. This resulted in a 1.5g/day reduction in average salt consumption by 2011 (Sadler 2012).

Detailed scoping review of interventions targeting specific nutrients: Salt, Fats, Fruit and Vegetables and Healthier Eating Initiatives

The previous section summarises the literature on the evidence for interventions to encourage a healthier diet, using the "4Ps" framework: Price, Product, Promotion and Place. As noted, a fifth category (multi-component interventions) was added in order to capture and discuss interventions that spanned more than one of the 4Ps.

This next section of the report builds on the previous section by retaining the "4Ps" framework and reviewing the literature for individual nutrients (dietary components), namely salt, fats, fruit and vegetables and healthier eating initiatives.

Scoping review of population-wide policies to reduce dietary SALT intake: evidence summary

PRICE

Evidence from the US suggests a sodium excise tax may be effective at reducing sodium intake (by 6%), systolic blood pressure (by 0.93mmHg), stroke (by 327 892 events) and myocardial infarction (by 306 137 events) over the lifetime of those aged 40 - 85 (Smith-Spangler 2010).

PRODUCT

One modelling study estimated significant reductions in sodium intake (9.5%), blood pressure (1.25mmHg), myocardial infarction (-5%) and stroke (-10%) over the lifetime of those aged 40 – 85 following the introduction of voluntary salt limits in the US (Smith-Spangler 2010). However, another modelling study estimated

that a similar intervention in the Australian setting would avert less than 1% of the cardiovascular disease burden, whereas mandatory salt limits would avert 18% (Cobiac 2010). Further, a randomised controlled trial evaluating the use of low-sodium soy sauce and miso in the Japanese population over a 6 week period found a 6.4mmHg net reduction in diastolic blood pressure in those aged 40 and older (Nakamura 2003).

PROMOTION

A systematic review assessing the long term effects of advice to restrict dietary sodium found a significant reduction in urinary sodium excretion (35.5mmol/24 hours) and systolic blood pressure (1.1mmHg) at 13 and 60 months (Hooper 2009). He and MacGregor (2011) re-analysed the data, combining results for hypertensives and normotensives together and found that with a reduction in salt intake of 2·0g–2·3g per day, there was a significant reduction in cardiovascular events by 20% ($p<0.05$) and a non-significant reduction in all-cause mortality (5–7%).

PLACE

We identified no reviews of the effects of place-based intervention targeting salt.

MULTI-COMPONENT INTERVENTIONS

A number of interventions involved multiple components. In Finland, survey data from 1979 – 2002 show that a comprehensive nutrition intervention (targeting price and product and place and promotion) reduced urinary sodium excretion from 13g to 10g/day in men and from 10.5g to 7.5g/day in women (Laatikainen 2006). One UK survey found that the UK Food Standard Agency's salt campaign (targeting product and promotion) increased the number of people claiming to have made a special effort to reduce salt in their diet from 34% to 43% (Wyness 2011). A later observational study found that the same campaign had reduced salt intake by approximately 10% (Shankar 2012). Furthermore, secondary analysis of data from the Health Survey for England revealed that during the national strategy there were significant reductions in salt intake (1.5g/day per year). Self-reported use of salt added at the table also reduced significantly during the study period (56.5% to 40.2%) (Millett 2012). However, there was evidence of differential impact by age, ethnicity and social class.

A WHO modelling study estimated that a similar batch of interventions in low- and middle-income countries would achieve a 15% reduction in salt consumption and avert 8.5 million deaths over a 10-year period (Asaria 2007). A further modelling study estimated that 21 million disability-adjusted life years could be averted every year by introducing similar, non-personal, health interventions on a worldwide scale (Murray 2003). One modelling study estimated that adding taxes and subsidies on top of product interventions would reduce the daily salt intake by 6g and increase life expectancy by 1.8 months in men and 1.4 months in women in Norway (Selmer 2000).

Cost-effectiveness: the example of salt reductions

The studies that have used modelling techniques have suggested that legislation for reducing salt intake appears more effective than voluntary agreements (Murray et al 2004). In America, government collaboration with the food industry was modelled assuming a decrease in sodium intake of 9.5%. It was estimated that over two million QALYs (quality ajusted life years) and over $32 billion in medical costs could be saved (Smith Spangler 2010). Another US study quantified the benefits of a population-wide reduction in salt of up to 3g per day, and estimated annual savings of $10 billion to $24 billion and 44 000 fewer deaths (Bibbins Domingo 2010). A recent UK analysis estimated that reducing daily salt intake by 3g could result in a substantial gain in QALYs and savings in health care expenditure (Barton et al 2011). However, this study did not consider exactly how such salt reductions might actually be achieved. In contrast, a recent study conducted in four Eastern Mediterranean countries explicitly compared three policies to reduce salt intake: a health promotion campaign, labelling of food packaging and mandatory reduction of salt content in processed foods. The majority of these policies appeared to be cost saving compared with the baseline of doing nothing (Mason et al 2012).

CONCLUSIONS: salt

Emerging evidence suggests the introduction of taxes and subsidies may be effective in reducing salt intake; product reformulation may also be effective, and is most promising when reductions are mandatory rather than voluntary. There is mixed evidence for the effects of dietary advice. Multi-component interventions may also be particularly powerful, and appear promising. There is compelling evidence from Finland that comprehensive interventions incorporating all of the 4Ps have led to substantial reductions in sodium intake. Effective policy interventions are generally cost saving.

There is limited evidence on the effectiveness of other interventions to reduce dietary salt intake. Notable gaps include the effects of place-based interventions (targeting schools, workplaces and community settings). Here, lessons can perhaps be learnt from the impact of generic healthy eating campaigns (targeting school dinners, vending machines, etc.).

Scoping review of population-wide policies to reduce dietary FAT intake: evidence summary

PRICE

One UK modelling study estimated the effects of three different tax regimes (Mytton 2007). It found that: (1) Taxing only the principal sources of dietary saturated fat is unlikely to reduce the incidence of cardiovascular disease because the reduction in saturated fat is offset by a rise in salt consumption; (2) Taxing unhealthy foods, defined by SSCg3d score, might avert around 2 300 deaths per annum, primarily by reducing salt intake; and (3) Taxing a wider range of foods could avert up to 3 200 cardiovascular deaths in the UK per annum (a 1.7% reduction). A further econometric study estimated that a 10% “fat tax” on high calorie food (cheese/butter/cream; prepared meals; sugar-fat products) in France would reduce total calories purchased by an individual, living in a well-off or modest household, on average by 16.65 and 17.58; 19.30 and 19.25; 10.69 and 18.0 calories per day, respectively (Allais 2009). It was estimated that if these small effects were persistent they would have an effect on weight in the long run.

PRODUCT

A US controlled before and after study found that the introduction of fat-modified products (in which some of the saturated fat was replaced by polyunsaturated fat) into school dining halls increased the proportion of polyunsaturated fats consumed by 75% (from 0.53 to 0.93) for males and by 53% (from 0.64 to 0.98) for females. During control years the proportion decreased by 6% for males and increased by 6% for females (Ellison 1990).
A cross-sectional survey in New York county revealed a strong positive relationship between the proportion of low-fat milk in stores and the prevalence of low-fat milk consumption in households within the same zip codes (Fisher 1999). This study also found a higher use of whole milk in low SES (Socioeconomic Status) households.

PROMOTION

In the Netherlands, a controlled trial of a worksite intervention providing product information to facilitate healthier food choices showed no differences in change in fat intake between the intervention group and the control group at 3 or 12 months. The information provided was the caloric value of foods translated into the number of minutes of certain occupational activities required to burn them off (Engbers 2006).

PLACE

No reviews of relevant interventions/evaluations were identified.

MULTI-COMPONENT PROGRAMMES

A number of interventions were multi-component, spanning at least two of the four 'P' categories.

In the USA, a before and after study found that reducing the price of low fat snacks by 50% and clearly identifying them with the use of a bright orange price label and sign (to indicate that they contained 3g of fat or less) for 3 weeks significantly increased the proportion of low fat snacks purchased from vending machines, but this effect was reversed post-intervention (25.7% before, 45.8% during and 22.8% after; $p<0.01$) (French 1997).

A US controlled before and after study found that price reductions of 10%, 25% and 50% on low-fat snacks were associated with significant increases in low-fat snack sales (of 9%, 39% and 93%, respectively) from vending machines in schools and workplaces (French 2001). Promotional signage (low fat label and promotional sign) was independently - but weakly - associated with increases in low-fat snack sales.

CONCLUSIONS: fats

Population-wide policies to reduce dietary fat intake have not been widely evaluated. All studies report consumption, rather than health outcomes. Modelling studies suggest that pricing interventions may be effective in certain settings. There is some evidence for the effects of product interventions (reformulation). There is mixed evidence, from weak studies (uncontrolled, brief intervention period and follow-up), for the effects of multi-component interventions.

Scoping review of population-wide policies to increase fresh FRUIT AND VEGETABLES intake: evidence summary

PRICE

A modelling study estimated that a one per cent subsidy in the average price of all fruits and vegetables in the USA could lead to a mean decrease of 6 903 cases of coronary heart disease and 3 022 ischemic strokes (Cash 2005).

PRODUCT

As expected, no product-type interventions (e.g., reformulation or elimination) have been evaluated for fruits and vegetables.

PROMOTION

Public awareness campaigns

In Australia a prospective cohort study collected data in four annual surveys (Dixon 1998). Findings showed that among those exposed to the Victorian "2 Fruits 'n' 5 Veg Every Day" campaign (based on communication and social marketing), patterns in the level of public awareness, reported consumption, and beliefs about appropriate levels of consumption tended to parallel changes in the level of mass media investment. During the campaign's most intense period of promotional activity, significant increases in all of these variables occurred (+0.18 servings of fruit per day and +0.36 servings of vegetables; $p<0.05$). These increases were maintained (but not built upon) in subsequent years.

Nutritional education

A controlled before and after study evaluated audiotapes for nutritional education and in-store public service announcements with information about fruits and vegetables (Connell 2004). The study showed that these led to a significantly higher increase in self-reported fruit and vegetable intake in the intervention group and compared with controls (+0.0.82 servings vs +0.21 servings; p<0.05).

In the USA, peer education in the workplace led to significant increases in intake recall (increase of 0.77 total daily servings; p<.0001) and food-frequency (increase of 0.46 total daily servings; p = .002) compared with education via standard communication channels (for example, emails, cafeteria promotions). These effects persisted at 6 months for intake recall but not for food-frequency (Buller 1999). A further workplace intervention (translating the caloric value of foods into the number of minutes to perform a certain (occupational) activity to burn these calories) in The Netherlands was assessed in a controlled trial. This study reported no effects on self-reported fruit and vegetable intake at 3 or 12 months (Engbers 2006). Mixed effects on psychosocial determinants of dietary behaviour (including self-efficacy) were also found.

PLACE

Community

A cross-sectional survey in the USA found that residing further from a small food store was associated with increased fruit and juice and low fat vegetable consumption (p=0.002). Residing closer to a fast food outlet led to the reverse association (p=0.006) (Jago 2007). On the other hand, secondary analysis of data from the USA's National Food Stamp Program Survey (low income participants) found that easy access to a supermarket was significantly associated with increased household use of fruits (84g per adult per day; 95% CI 5 – 162.). Similar (non-significant) patterns were seen with vegetable use (Rose 2004). A cross-sectional survey in the USA found that greater fresh vegetable availability within 100 metres of a residence was a positive predictor of vegetable intake, and that each additional metre of shelf space was associated with 0.35 servings per day of increased intake. However, fresh fruit availability was not associated with intake. Having a small food store within this same distance was a marginal predictor of fruit consumption (Bodor 2008).

One US cross-sectional survey found that urban adults with a household member who participated in a community garden consumed fruits and vegetables 1.4 times more per day than those who did not participate, and they were 3.5 times more likely to consume fruits and vegetables at least 5 times daily (Alaimo 2008).

Schools

Two studies evaluated the effects of school garden interventions. In a mixed method study in the USA, Parmer (2009) found that those who received nutrition education and a gardening intervention were more likely to choose and consume vegetables in a lunchroom setting than those who received just education or no intervention. In fact, when post-test was compared to pre-test, the control group ate significantly fewer vegetables (-0.33 portions per day; p < .001); those who received the education and gardening intervention ate significantly more vegetables (+0.3; p <.01) and there was no difference in the education only group. When compared with a historical control, Somerset (2009) found that teacher co-ordinated garden activities among Australian school children led to changes in perceived fruit and vegetable consumption among peers, this change was significant for grade 5 but not grade 7 (+21%; p=0.01). The intervention also enhanced self-efficacy/skills/competency but decreased interest in trying new fruits.

Four studies evaluated the effects of providing free fresh fruit and vegetables to school children. In the USA, a cross-sectional survey found that compared with control school students, intervention school students were more likely to report eating fruit and drinking 100% fruit juice at least two times per day (39.3% vs 27.3%; p=0.05) (Davis 2009). They were also more likely to consume fruit, juice, and vegetables five or more times per day in the preceding 7 days (22% vs 18.4%; p=0.05); and to consume fruit at least one time per day (59.1% vs 40.9%; p=0.05). There were no group differences in vegetable intake. In a pre-test post-test design

study, Coyle (2009) also found increased consumption of fruit (+0.61 servings per day) but not vegetables, among 8th- and 10th-grade students in the USA ($p<0.001$). This study also demonstrated positives effects on self-efficacy/skills/competency ($p<0.001$). In a cross-sectional study with matched controls, the English National School Fruit Scheme, which provides one free piece of fruit each school day to children aged 4 to 6 years, was found to increase fruit consumption by 50g per day ($p<0{\cdot}001$). However, consumption in juniors who had received free fruit at school as infants did not differ from those who had not (Wells 2004). A repeated cross-sectional survey evaluated the effects of the Norwegian free school fruit programme (pupils receive a piece of fruit or a carrot each school day) (Bere 2010). There was a 0.49 increase in fruit intake per day ($p<0{\cdot}001$).

One cluster-RCT (Randomised Controlled Trial) in the USA evaluated the effects of an intervention, based on Social Cognitive Theory (SCT) (Reynolds 2000). The intervention was designed using the principle of reciprocal determinism including outcome expectancies, perceived self-efficacy, social norms, behavioural skills, reinforcement, and environmental factors such as availability (including classroom, parent, and cafeteria components). After one year, mean daily consumption of fruit and vegetables was higher (+1.35 servings) for the intervention children compared with controls ($X0_t = 3.96$, $X_c = 2.28$) but the effect disappeared after two years ($X_t = 3.20$, $X_c = 2.21$).

Workplace

Evaluations of workplace interventions tend to focus on the effects of health promotion and education (rather than modification of the food environment). These have been summarised in the relevant section below.

MULTI-COMPONENT PROGRAMMES

An RCT of a multi-component intervention (involving behavioural curricula in classrooms, parental involvement, school food service changes, and industry support and involvement) was conducted in the USA. It found a significant and favourable intervention effect among girls for vegetable consumption at lunch (+0.81 servings per day, $p < .05$) but not among boys (Perry 1998). An RCT of a similar intervention (involving media campaign, classroom workshops, school meal modification, and parental support), also in the USA, revealed usual daily servings of fruit/vegetables increased 14% in the intervention, compared to the control group ($p<0.001$) during the first three years. At follow-up, consumption within the control group also increased, resulting in no significant difference between groups. However, intervention group knowledge scores and awareness indicators were significantly higher than those of the control group (Niklas 1998).

A further study modelled four years of UK data to estimate the potential impact of the 5-a-day campaign (Capacci 2011). This campaign funds several activities, such as the National School Fruit Scheme (where schoolchildren aged between 4 and 6 years receive a free piece of fruit or vegetable daily), a multi-media communications campaign, and collaboration with private and public partners. The study found that the programme may have increased fruit and vegetable consumption by 0.3 portions, on average.

CONCLUSIONS: fruits and vegetables

Estimates using existing data suggest fruit and vegetable subsidies may be effective at reducing cardiovascular disease. Involvement in community gardens may increase fresh fruit and vegetable consumption. School interventions (involving education, behavioural skills, gardens and provision of free fruit and vegetables) appear to increase the intake of fresh produce, possibly more for fruits than for vegetables. Health promotion campaigns (such as "5–a-day") appear to be effective at increasing fruit and vegetable intake. However, the effects of education (in the community and the workplace) appear less effective. Multi-component interventions are often effective at increasing fruit and vegetable intake. Although accessibility of local food stores and fast food outlets may affect fruit and vegetable consumption, effects are not always in the expected direction.

Scoping review of population-wide policies to promote HEALTHY EATING: evidence summary

PRICE

Thow et al (2010) conducted a systematic review to assess the effects of food taxes and subsidies (including 8 empirical and 16 modelling studies). In general, taxes and subsidies influenced consumption in the desired direction, with larger taxes being associated with more significant changes in consumption, body weight and disease incidence. However, studies that focused on a single target food or nutrient may have overestimated the impact of taxes by failing to take into account shifts in consumption to other foods. The quality of the evidence was generally low.

An econometric study published more recently estimated that there were strong relationships between fast food consumption and prices of fast food and soda, that varied by gender and race/ethnicity (Gordon-Larsen 2011). There was greater price sensitivity for soda versus burgers. The association was strongest in black males, for whom a 20% increase in the price of soda was associated with a decrease of 0.25 visits to a fast food restaurant per week.

PRODUCT

Product interventions have been included under the relevant nutrient-specific review.

PROMOTION

Nutritional food labelling

Campos et al (2011) reviewed data on the use and effectiveness of nutrition labels (120 studies included overall). There appeared to be a consistent link between the use of nutrition labels and healthier diets. However, the use of labels varies considerably across subgroups, with lower use among children, adolescents and older adults who are obese. Research also highlights challenges in terms of consumer understanding and appropriate use of labelling information. Most included studies were from high income countries, particularly North America (Campos et al, 2011).

Nutritional information on menus

Harnack and French (2008) conducted a systematic review to evaluate calorie labelling of cafeteria or restaurant menu items. Six studies were identified that met the selection criteria. Results from five of these studies provide some evidence consistent with the hypothesis that calorie information may influence food choices in a cafeteria or restaurant setting. However, results from most of these studies suggest the effect may be weak or inconsistent. One study found no evidence of an effect of calorie labelling on food choices. Each of the studies had at least one major methodological shortcoming.

Swartz et al (2011) updated this review, seeking articles published between 2006 and 2011. Five articles reported on natural experiments of calorie menu label implementation in real world settings and two involved researcher manipulated variables in laboratory settings. Two studies reported that calorie menu labels reduced the calories purchased, one reported significant reductions in calories purchased at some chains (but not others), three reported no effect on calories purchased and one reported a slight increase in calories purchased. Two studies found no significant difference in consumption or sales volume.

Food marketing to children

Hastings et al (2003) conducted a series of systematic reviews to examine the effects of food promotion to children (51 studies). Some included studies found that food promotion influences children's food preferences and their purchase behaviour; and that there is a clear link between television viewing and diet, obesity, and cholesterol levels.

A few studies have been published since this systematic review. Chou et al (2008) conducted a longitudinal analysis of individual-level US data sets to estimate the effects of television fast food restaurant advertising on children and adolescents with respect to being overweight. They found that a ban on these advertisements would reduce the number of overweight children aged 3–11 in a fixed population by 18 per cent and would reduce the number of overweight adolescents aged 12–18 by 14 per cent. Veerman et al (2009) built a mathematical simulation model to estimate how much of the childhood obesity prevalence (among 6 to 12 year olds) in the USA is attributable to food advertising on television. The model predicts that reducing the exposure to zero would decrease the average BMI by 0.38 kg/m and lower the prevalence of obesity from 17.8 to 15.2% (95% uncertainty interval 14.8–15.6) for boys and from 15.9% to 13.5% (13.1–13.8) for girls. Bayliss and Dhar (2007) conducted an econometric modelling study to explore whether the ban on advertising to children under the age of 13 affected consumer food choice in Quebec. For Francophones, the model estimates an expected increase of $27.6 million in fast food sales in Quebec per year without the advertising ban. For Anglophones, the ban decreased the probability of consumption by 8.8 per cent, which translates into an expected decrease of $52 million. They estimate that the ban decreased expenditure on fast food in Quebec between $13.73 and $31.27 million per year in the 1980s and early 1990s. At an average cost of $3.88 per meal, that means that the ban decreased the number of fast food meals in Quebec by between 3.5 and 8.1 million per year.

Public information campaigns

Beaudoin (2007) conducted two cross-sectional surveys to evaluate the first phase of a media campaign in New Orleans (USA) that attempted to promote a healthy diet and physical activity. From baseline, consumption behaviours did not change significantly.

Health education

One systematic review evaluated the effectiveness of school-based nutrition education in children and adolescents (Silveira 2011). Twenty-four studies were included. There is evidence of a positive effect on anthropometry and on fruit and vegetable consumption. Characteristics of the interventions that demonstrated effectiveness are: duration of more than one year, introduction into the regular activities of the school, parental involvement, introduction of nutrition education into the regular curriculum, and provision of fruits and vegetables by school food services.

Two systematic reviews summarised the evidence for tailored individual-level nutrition education for adults. On reviewing 15 studies, Eyles and Mhurch (2009) found evidence that the intervention was a promising strategy for improving the diets of adults (including those in priority population groups) over the long term. A further systematic review by the same authors (Eyles et al 2012) explored the impact of the same intervention on consumption outcomes. Results from three studies evaluating supermarket interventions were negative in terms of effects on fat, fibre, fruit and vegetable consumption. A further study conducted with online shoppers found positive results in terms of fat consumption (-0.66% of total energy at 5 months intervention compared to control).

PLACE

Schools

Van Cauwenbergh et al (2010) summarised the European literature on the effectiveness of school-based interventions to promote a healthy diet in children (6-12 years old) and adolescents (13-18 years old). In children (9 studies), strong evidence of effect was found for multi-component interventions on fruit and vegetable intakes. Limited evidence of effect was found for educational interventions on behaviour, and for environmental interventions on fruit and vegetable intakes. Interventions that specifically targeted children from lower socio-economic status groups showed limited evidence of effect on behaviour. In adolescents (13 studies), moderate evidence of effect was found for educational interventions on behaviour and limited evidence of effect for multi-component programmes on behaviour. Most of the studies included in the review were conducted in countries from Western and Northern parts of Europe.

Workplace

There are two recent systematic reviews of diet-related worksite health interventions. Jensen (2011) found several studies (n=30) suggesting that diet-related worksite interventions have positive impacts on employees' nutritional knowledge, food intake and health and on the firm's profitability, mainly in terms of reduced absenteeism and presenteeism. Maes et al (2011) only included 17 European studies that focused solely on the promotion of a healthy diet. Eight were educational, one used worksite environmental change strategies, and eight used a combination of both (multi-component). The reviewed studies show moderate evidence for effects on diet. One programme, using only educational materials reported a long-term effect on BMI in the positive direction. However, one study implementing a multi-component intervention showed a small effect on BMI in the wrong direction. An environmental-only study reported a significant effect on the consumption of fruit and vegetables during lunch. Out of seven multi-component studies focussing on the effectiveness regarding dietary behaviour, six reported positive changes and in three programmes a sustained effect at the long term was detected.

Community

There are two recent systematic reviews of diet-related community health interventions in the USA. McCormack et al (2010) examined the impact of farmers' markets (12 studies), including the use of fruit and vegetable vouchers (6 studies), and community gardens (4 studies). Six studies reported that participation in a farmers' market programme or a community garden was associated with greater intake of fruits and vegetables. An additional three studies found an association with increased intake of vegetables but not fruit. One study reported that increased fruit and vegetable intake was only associated with voucher programme participation and coupon provision if participants spent additional resources at the farmers' market and/or they returned to the farmers' market after having used their coupons. Robinson-O'Brien et al (2010) reviewed the effects of garden-based youth nutrition intervention programmes. Five studies took place on school grounds and were integrated into the school curriculum, three studies were conducted as part of an afterschool program, and three studies were conducted within the community. Findings from this review suggest that garden-based nutrition intervention programs may have the potential to promote increased fruit and vegetable intake among youth. Three studies reported that exposure to garden-based nutrition education was associated with increased fruit and vegetable intake or vegetable intake among youth. One study reported that significant increases in fruit and vegetable intake were only seen in boys. One study reported no improvements in fruit and vegetable intake.

MULTI-COMPONENT PROGRAMMES

Various longitudinal analyses have been designed to evaluate the effects of the North Karelia Project (Finland), which was launched in the early 1970s. The intervention involves comprehensive community-based strategies to change the general dietary habits based on epidemiological/medical knowledge and social/behavioural theories. Although following set objectives and a general framework, the intervention was flexible to local situations and to emerging possibilities. Community ownership and people's participation were the key elements in the activities.

In the late 1970s, about 60% of Finns reported using mostly butter on bread, falling to only 5% in 1998. In 1978, 44% of men and 35% of women used fatty milk, whereas in 1998 the respective proportions were only 9% and 4%. Only 1–2% of people used vegetable oil for cooking in 1972, about 34% of them reported using mainly vegetable oil in cooking in 1997. As a result of the nutrition programme, the share of saturated fats from energy decreased from 21% in 1972 to 14% in 1997, and the share of polyunsaturated fats increased from 3.5% to 5%, respectively. This has resulted in a substantial increase in the ratio of polyunsaturated to saturated fats. Also, the energy percentage from total fat decreased from 39% to 33%. The share of trans fatty acids from energy was only 0.9% in men and 0.8% in women in 1997. The serum cholesterol levels of both genders decreased by 18% in North Karelia between 1972 and 1997. At the same time, diastolic blood pressure decreased by 5% in men and 13% in women. The age-standardised mortality rate of ischaemic heart disease (age group 35–64 years) decreased by 73% in North Karelia and by 65% in the whole country from 1971 to 1995. From 1969-71 to 1995 the age-standardised CHD mortality (per 100 000) decreased in

North Karelia by 73% (from 672 to 185) and nationwide by 65% (from 465 to 165). The reduction in CVD mortality was of the same magnitude (Puska 1998 & 2002).

Bhalla et al (2006) used data from two cross-sectional surveys to estimate the impact of a national non-communicable disease prevention programme "National Healthy Lifestyle Programme" 12 years after its introduction in Singapore. The age-standardised prevalence of hypertension in Singapore residents aged 30-69 years decreased from 28.0 per cent in 1998 to 24.0 per cent (p-value is less than 0.001) in 2004. The prevalence of high total cholesterol among those aged 18-69 years fell from 26.0 per cent in 1998 to 18.1 per cent (p-value is less than 0.001) in 2004. The prevalence of diabetes mellitus in residents aged 18-69 years in 2004 was 7.8 per cent, compared to the 1998 level of 9.5 per cent (p-value is less than 0.01). The level of obesity increased slightly from 6.2 per cent in 1998 to 6.8 per cent (p-value equals 0.1627).

CONCLUSIONS: healthy eating

Taxes and subsidies appear to be highly effective at reducing consumption of unhealthy foods and drinks. The larger the taxes/subsidies, the greater the effects. There is also consistent evidence for the positive effects of national multi-component interventions in terms of consumption and CVD outcomes.

There is mixed evidence for the effects of school interventions. They appear most effective when they comprise many components. Workplace interventions seem to have a positive effect on dietary behaviour, in some studies this was maintained in the long term. More studies are needed to determine the effects on BMI. There is some evidence to suggest that farmers' markets and community gardens are effective at promoting healthy eating in adults and youth, although they may have more of an impact on vegetable, rather than fruit, intake.

There appears to be a consistent link between the use of nutrition labels and healthier diets. However, the effect varies across subgroups. There is some weak and inconsistent evidence for the effects of calorie labelling of cafeteria or restaurant menu items. Evidence for the effects of food marketing to children is contested. More evidence is needed to examine the possible effects of public information campaigns. Health education for children appears to have positive effects on anthropometry. However, health education in adults does not seem to affect consumption.

2. Categorising public health nutrition policy using a novel framework

We identified and categorised public health nutrition policy actions in 30 Central and Western European countries (EU 27 plus Switzerland, Norway and Iceland) and summarised them in an Excel database. We identified key policy documents in the 30 European countries by searching policy documents, grey literature, nationally important websites, for example National Institutes of Public Health, Ministries of Health; and National Nutrition Councils and the WHO European Nutrition, Obesity and Physical Activity (NOPA) database. We created a database in Microsoft Excel to summarise public health nutrition policy for 30 European countries; EU 27 plus Iceland, Norway and Switzerland (including the 14 countries that were part of work package 5).

National policy actions were classified according to the '4Ps' conceptual framework: Product (reformulation, elimination, new healthier products); Price (taxes, subsidises, other economic incentives); Promotion (advertising to children/general population, food labelling and health education/health promotion initiatives) and Place (availability and quality of products in schools, workplaces, community settings) (see results section, Table 2).

This 30-country EuroHeart II work package 5 database contained information about national and regional initiatives regarding food policy that was more detailed and up-to-date than the information that was publically available on the NOPA database. For the countries participating in work package 5 of EuroHeart II, this information was then cross-checked and validated with key informants during interviews.

The **NOPA database**[1] compiles information for the WHO European Member States to monitor progress on nutrition, diet, physical activity and obesity. At present, the publically accessible database contains information on policy documents in the 53 Member States in the WHO European Region. It outlines what policies exist and some detail about each policy e.g., whether there is a budget, and any coordinating mechanism. NOPA also contains further details (some not publically available at the time of writing this report), including country information, national and subnational surveillance data, policy documents, action to implement policy and examples of good practice in programmes and interventions. It is continuously updated and expanded with data on nutritional status, food consumption, nutrient intake, physical-activity levels and policy implementation in each Member State. However, these details are not available on the public-facing website. As a monitoring tool, the NOPA database thus has potential to stimulate policy-makers to identify gaps and needs in data collection and policy development, or to show progress in their fight against obesity.

3. Key informant interviews

This section of the report draws out the main themes and views of those taking part in the key informant interviews. The aim was to elicit participants' views on a wide range of possible strategies and policy options covering the entire spectrum of public health nutrition focused on CVD prevention. Each of the 14 countries that took part is reported in detail. Each is structured in the same way, starting with a brief country synopsis, followed by participants' views on: the most effective policy options; their perceptions of the effectiveness of regulatory versus voluntary approaches; the most cost-effective policy options; most achievable policy options for the specific country; current challenges to implementing policies; what is being done well and what areas need to be developed further.

The interviews provide a rich, in-depth, expert commentary on the current state of play in each country. We warmly thank all participants from the 14 countries and confirm that their anonymity is respected and preserved.

BELGIUM

Public health in Belgium is the responsibility of the three regional communities (Flemish, French and German-speaking). There are Ministers for Public Health at both the federal and regional government levels. According to 2012 estimates, the average life expectancy is 79.65 years. Fat makes up 40% or more of the total energy in the food supply of Belgium, however, vegetable consumption is common: 87% of women and 67% of men report consuming vegetables at least daily.

Most effective policy options

Participants perceived regulation, legislation, de-taxation of healthy foods, and reformulation as the most effective policy options. In addition, they also felt that information and education campaigns were important for supporting change. One participant mentioned that information to consumers was helpful; however all participants raised the issue of how legislation/regulation would do more for reducing inequalities than any of the other policy options.

> *…legislation and regulation. Because with voluntary actions you will get little wins in the short term but not all actors will be moving and with regulation you get one rule for everyone so there is less inequity and yeah… erm so the salt levels for example could maybe expand to other food categories, but that is what I would do. And then for example also minimum standards for the school meals, for the hospital meals. I think it's interesting to have also regulation for that. (Bel 2)*

> *Information & education is still definitely the determinant of this for sure… In terms of taxation, I would go for de-taxation of healthy foods - fruit and vegetables for instance. I think in some countries there have been the proposals to tax the fatty foods, is it Denmark? (Bel 3)*

1 http://data.euro.who.int/nopa/Default.aspx

It's difficult to select one because I think it's a combination of all of them. But the one which is most important I think is education; not education campaigns, education programmes in the food supply at school and at work... all that needs to be known by the kids and by the teenagers and also supported by a really good meal offer at school; and also at home of course but in the first instance at school or at work and like that you would have a continuous message.... (Bel 4)

Interviewer: OK. So if you were the Minister and you had the power, what would you regulate?

(Pause) Erm I would regulate probably the level of salt, sugar and trans fatty acid in the food. (Bel 4)

Effectiveness of regulatory vs voluntary approaches

Participants recognised that approaches to improving nutrition in the population were a complex and contested area and they argued that the EU should lead any nutrition issues that crossed trans-national boundaries. Discussions regarding the effectiveness of regulatory vs voluntary approaches in public health nutrition interventions showed a range of views. One informant stated regulation is needed, one stated that voluntary approaches are more effective, as they are easier to implement and one stated both approaches are required to be effective.

No it might be effective (voluntary reformulation) but I'm not sure that it is being done in a substantial way. It's only being done for those food products where the company can use it as an additional unique selling point, to say that they have less fat content than the other company. So it will work for a number of foods but it will not work for the vast majority of foods. Regulating the levels of fat and sugar in foods would be more effective, forcing food companies to do it. (Bel 1)

Well you can do that for instance for the smoking ban and things like that, where you can control, but regulating the food intake of individuals is so difficult and also there I think some people will oppose that, not only because it is not important for public health but just for reasons of privacy and the government shouldn't lead too much in the choices of individuals. They can make a healthy choice, the food IS there, and that should not be regulated from the top, but done from the bottom with information campaigns and then potentially financial incentives that could be given to healthy food. Of course they could do it for instance in schools and also in occupational aspects, like the meals that are served in schools and big companies; there you could put some regulation and try to promote healthy foods and regulate for instance that in the schools or that just outside of the schools the children are not able to buy coke and other soft drinks. So there regulation can I think be helpful to a certain extent, but not at the level of the individual I think. (Bel 3)

Er you can't regulate everything. So this is not regulatory on one hand and on the other voluntary; you need both again. (Bel 4)

Cost-effectiveness of approaches

Participants agreed that legislation/regulation was more cost-effective than voluntary approaches; salt reduction initiatives were seen as particularly cost effective. One participant described attempts to quantify the cost-effectiveness of this:

Again there have been some attempts to answer that question in the field of salt and CVD. If what has been estimated by the Americans, I think to reduce 1g of salt or even a little bit more than that would be more cost effective than all the money that we spend on antihypertensive medications. So if you look at the cost effectiveness analysis then I would say that public health aspects like salt and probably also prevention of obesity and some other aspects of nutrition would be much more cost effective in the long run, not in the short term. But the point of the question is are they feasible?

Are we able to reduce the salt intake? Can we prevent obesity in the young? If it is feasible then I am sure it will be more cost effective than whatever we can do with drugs or whatever…(Bel 1)

[Regulatory approaches are]…probably more cost effective because if you are limiting products with high fat, sugar and salt of course you will diminish the consumption of it so if the consumption is diminishing, you will have less sick people. So in that way yes but my previous answer has defined that it is really complicated to have that regulatory approach, except taxation for some, very few countries in Europe, I will ask you where you find so strong mandatory approaches in a country in the world. It's not so easy to find it. (Bel 4)

Most achievable policy option

The most common achievable policy option cited was information and education campaigns. Reasons cited include, because it gives the government a raised profile and reformulation. There was mention that there was not the appetite within Belgium to introduce legislation in the food arena.

Interviewer: Which ones [policy options] do you think your policy makers or your Government will let happen?

Oh erm they will certainly support reformulation because it doesn't cost them anything. They will certainly have some information and education campaigns because that always helps for a good press conference. But I'm doubtful that they will have, for the reasons that I stated that if you regulate something which will impact on people's choice, I'm doubtful that that would happen on a very - it might happen on some, for example limiting trans fats, that is something that people won't notice, but really for example increasing the price of fatty foods is something that is I'm guessing won't happen quickly. (Bel 1)

Current challenges to implementing policies

The overwhelming response to this question was the lack of high quality, timely data at the national level. Belgium has a national nutrition plan, however there does not seem to be a system for monitoring the health of the population over time. One participant highlighted that there are no up-to-date mortality statistics available and another pointed out the lack of data on Body Mass Index (BMI) and on children. One respondent described this as a

…lack of an early warning system…it is not possible to monitor the health of the population" (Bel 1)

Other barriers to implementing policy at the national level included an uncertain political situation; lack of intense and sustained approaches to behaviour change; and lack of detail and competing interests between organisations. The distribution of public health nutrition competencies at the national and regional levels also made collaboration difficult and exacerbated a lack of cohesion between stakeholders. Participants also identified lack of financial support and political will as current barriers to policy implementation.

Not sure that there is one key barrier; there is an entire cluster of key barriers that we all face when we are trying to change behaviour.

Interviewer: Such as?

Erm that you have to make it clear to people why they need to change behaviour, you have to make it clear how they can change behaviour, you have to keep stressing that on a continuous basis that the behaviour has to be changed, so you need to change policies, you need to erm a saturation bombing campaign basically. And that is not being done. I mean we are getting messages about healthy lifestyle on a reasonably regular basis, just as in any European country, but these messages are often very generic and that means that the impact is quite limited. (Bel 1)

Interviewer: What kinds of difficulties or challenges were there in developing the [national food] plan?

You have opposite partners so for instance if you take the group of breastfeeding issues and food of young infants, of course, you have the side of the food industry and on the opposite side, you have the breastfeeding associations, paediatricians and this is very unbalanced of course because they have different goals. So we had to manage the different opinions, but at the end of course they had different recommendations for us but we had selected which recommendation we wanted to reach and not because of the interest of the food industry, that was not the point. So we had to adapt some of the recommendations but at the end this is the fruit of consensus. So even if we adapted some issue, the food industry agreed to follow the strategy. It's a sort of compromise.(Bel 4)

Yes indeed was in fact also part of the evaluation that it was fairly clear that we were dealing with a very difficult political situation so in some areas, for example especially in the area of communication and information, where we were dealing with, we were conducting a lot of information or communication campaigns to the general public and we developed food guides and food brochures, food leaflets but the communities didn't appreciate that at all. Especially the community of Flanders and in fact after the launch of those brochures they didn't want to collaborate anymore at the federal level… Because they saw it as their competency. Everything was to do with competencies. In fact according to them, all campaigns are prevention and should be dealt with by them. (Bel 2)

…So the point is that the federal government is still responsible for the very large majority of the finances that are related to healthcare, the communities are responsible for public health but the financial support that they receive for that is really minimal and not sufficient to develop really good national and community health programmes relating to nutrition… (Bel 3)

But for our part here in Belgium it was difficult because since 2006 we have a very uncertain political situation and it was quite complicated for one health minister to have a very strong position on a specific domain… it was difficult even to have media action because it was interpreted as a way to profile one minister or a way to make an event on one minister; but it wasn't the purpose - it was the purpose to make an event of the subject but it was complicated. So the French community for instance boycotted one of our actions on salt and in the Flemish part there were a lot of articles in the media and TV broadcasts, but in the French part that was interpreted as a political campaign. So you see, with regard to the media it was difficult really to have a strong presence, to be very visible was a problem for us during the last 5 years, due to tension and also due to that stupid difficult political situation… (Bel 4)

What is being done well?

- National legislation since 1985 on maximum levels of salt in bread
- Actions on targeting children
- Data from recent MONICA update survey shows cholesterol levels in the population decreasing

Areas to be considered for development

- More clarity about public health nutrition responsibilities between the federal and community levels
- Regulations on the marketing of unhealthy food and beverages to children only partly implemented

CZECH REPUBLIC

Departments within the regional Public Health Institutes and regional Public Health Authorities - which are governed by the Ministry of Health - specifically focus on nutrition and related issues, ensuring correct implementation of policy at local level. A new Food Safety and Nutrition Strategy for 2010 – 2013 was developed at the beginning of 2010, however, it is largely focused on food safety.

Most effective policy options

Legislation, regulation, taxation and food labelling were identified as the most effective policy options. One participant commented that laws are in place for tobacco and alcohol consumption, therefore why not unhealthy foods? Informants also welcomed the EU directive on food labelling, as this was perceived as a cheap and constructive method of informing consumers.

> *To me, the only way to change the dietary habits would be through some regulations like it happened unintentionally due to quitting subsidies so let's say to regulate very strictly the salt content. I wouldn't fight any liberalism. I would say just the highest amount of salt which would be allowed to be in this product is...and this would be strictly defined…I mean there is no [public health nutrition] policy and what's applied is not OK. You have seen that what is being offered is mostly unhealthy. And I mean you haven't seen ordinary people, particularly those who have lower education, they still eat a lot of unhealthy food. So the only way to change them is through regulation, because they don't want to do it freely. (Ch 1)*

> *If we have high income tax on smoking and on alcohol, why couldn't we have high taxation on illicitly unhealthy food? And on the contrary, why shouldn't there be some support for healthy food? Why should we have taxation on medical commodities in this country? (Ch 2)*

> *I think the regulation through the laws, through the legislation…I would legislate of course on the control of...first I have to have it labelled, I have to see what is in foods and I have obligatory... obligatory, compulsory food labelling. At the moment I have labelling and people should be instructed what is good and what is not good and further legislative steps should be taken against unhealthy food and in this people are not very happy about the EU, but it is quite clear that without the EU things would be even worse. (Ch 1)*

> *I think it is necessary to adopt more laws because the people don't want to eat (laughs) more healthier. Of course it may be one reason is also money because, or not law, maybe taxes on, higher taxes on junk food and therefore the healthier food would be cheaper. (Ch 3)*

> *… I think er nutritional recommendations for school canteens and it is necessary to adopt in law I think. Not only recommendations but law for nutritional content of lunches. And to ban vending, some content of vending machines in schools. Erm (pause) maybe (pause) so I would recommend that many companies also, so many companies use for children's food er signs or labelling like they write, "This food is suitable for children," and sometimes it is not suitable for children and we have no recommendation or no documents which is suitable for children. Companies can use it. (Ch 3)*

> *...Er actually legislation and taxation go together. So er (pause) taxation that is sure because you have many positive things and you pay nothing. The taxation gives you some financial profit and it changes the customers' habits. The labelling is fantastic for informed people and they have to be educated first and once you get them educated they can make their own choices and so you are always respecting their liberty, always respecting their own choice but having them really informed. What we do until now is like to treat someone without letting him sign informed consent. (Ch 4)*

Effectiveness of regulatory vs voluntary approaches

Informants regarded regulation, legislation and taxation as the most effective policy options. Regulation in schools and the workplace was mentioned as a way to target specific groups. Information and education campaigns together with food labelling were also perceived as being effective for direct targeting of the population.

> *I think the regulation through the laws, through the legislation…I would legislate of course on the control of…first I have to have it labelled, I have to see what is in foods and I have obligatory... Obligatory, compulsory food labelling. At the moment I have labelling and people should be instructed what is good and what is not good and further legislative steps should be taken against unhealthy food and in this people are not very happy about the EU, but it is quite clear that without the EU things would be even worse. (Ch 1)*

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Cost effectiveness of regulatory vs voluntary approaches

Regulation was perceived as being more cost effective. It was deemed to be cheaper and in the long term more effective than voluntary approaches.

> *Interviewer: [Do] you think regulatory approaches would be more effective than voluntary approaches?*

> *Sure, definitely. That is the cheapest way, the quickest way and definitely the most cost effective. (Ch 4)*

Most achievable policy options

Respondents felt that information and education campaigns would be the most achievable policy options. Legislation in relation to trans fat, salt and fruit and vegetables were seen as achievable, albeit harder to achieve. This was due to implementation by volunteers, teachers and health professionals, and therefore not having to rely upon the Government.

> *Interviewer: Looking at the list for question 17 again, what do you think the Czech Republic could achieve in terms of public health nutrition policy options?*

> *Which of the policy tools is the most achievable isn't it! I think that information and education*

campaigns because it's not really depending on the good will and financial possibilities and political will but rather on the good...I mean it's not depending on the good will of some elected people but mostly on the good will of some volunteers or teachers or health professionals and I think in the small sample size we can really have probably the most achievable target in the information and education campaigns. Fruits & vegetables because it is agreeable for most of our citizens to have an apple and plus it makes you no problem. And actually all 5 of them, all first 5 of them [in the list of options provided] means you have to decrease the consumption of something, compared with the last one where you have first of all increased consumption of fruits and vegetables.

Interviewer: So is that, you're saying it's a positive?

Absolutely it is.

Interviewer: Rather than a negative?

And you are not forbidding something to someone but you are recommending to increase the consumption and people like to be positive rather than negative. And more of us have not any limitation, or rarely some limitation with fruits and vegetables. (Ch 4)

I think that information and education campaigns because it's not really depending on the good will and financial possibilities and political will but rather on the good...I mean it's not depending on the good will of some elected people but mostly on the good will of some volunteers or teachers or health professionals and I think in the small sample size we can really have probably the most achievable target in the information and education campaigns. (Ch 4)

Current challenges to implementing policies

A lack of political will was identified as the main challenge to developing and implementing policies.

We both agree there is basically nothing done intentionally by the Government regarding healthy food. Everything is driven by lobbyism you know.... (Ch 2)

Of course financing to support the prevention would be very reasonable and money-saving, but this is against the thinking of this Government. This is no conservative government; this is a liberal government that rules. And conservative people have some values and they are not against the poor people and so on; they have some sort of responsibility. But these do not have any responsibility for the public good. (Ch 2)

...and others opened up a question of regulating the market and putting through sensible health policies, and the Minister was basically not interested... he must know that it would be good to have it but I would say he is under political pressure....It is in the hands of the Finance Minister, who is leading the party and effectively rules the other ministers from this party and maybe from others as well in the Government; he is very strong this Minister of Finance and he is definitely the sort of man for getting money in his pocket and getting liberal policies; so this will not be a man pushing prevention...(Ch 4)

What is being done well?

- Where nutrition labelling is used, it must follow the 2004 Ministry of Health decree (80%+ food producers implement the decree)
- Nutritional standards in schools established by Decree Number 107/2005 and compliance monitored by the Czech Schools Inspectorate
- Total cholesterol levels are substantially decreasing in the population
- Meat consumption declining and fruit and vegetable consumption increasing due to changes in social subsidies in the early 1990s

Areas to be considered for development

- High alcohol consumption
- Salt and saturated fat reformulation
- Increase interest and activity in reformulation of products
- Nutritional standards in schools not always compliant especially with fruit, vegetables and legumes

ENGLAND

England is part of the United Kingdom (England, Northern Ireland, Scotland, Wales). The average life expectancy of people in England is 77.5 years for men and 81.7 years for women. Cardiovascular disease is the main cause of death in England. In 2007, cardiovascular disease led to nearly 159 000 deaths (accounting for nearly 34% of all deaths in England). This includes 74 185 deaths from coronary heart disease (CHD) and 43 539 from stroke. Despite recent improvements, death rates in the UK from CVD are relatively high compared with other developed countries (only Ireland and Finland have higher rates). The current UK government promotes voluntary agreements with industry under the "Responsibility Deal" scheme. Public health groups are united under the obesity prevention banner in arguing for more effective policies such as taxing sugary drinks, and further restrictions on the marketing to children of junk food and sugary drinks.

Most effective policy options

The 2010 NICE report on cardiovascular disease prevention in populations focussed on promoting healthy diets. The recommendations stated that regulatory interventions are more effective than voluntary approaches. Legislation, reformulation and taxation were perceived as the most effective policy options. One respondent also commented upon information and education campaigns and labelling being effective for directly informing the population.

> *Well I suppose the answer to that is they will be the policy options which operate at the population level, and that's what the evidence supports. And that points to reformulation of processed foods, price, availability, marketing. So the sorts of things, and food standards. So the standards for school food for example, standards for public procurement of food in public institutions (Eng 1)*

> *Oh probably some kind of tax and I would no way know the detail of all that but if you could price unhealthier food higher, I think that particularly currently more so, and more so in the future again, the price of food is incredibly important so people always whinge, sometimes rightly, sometimes wrongly that healthier food costs more so it should be the other way round; unhealthy food should cost more, if we could any way achieve that I think that would be the most powerful. (Eng 2)*

> *It's about trying to tackle whole populations rather than individual approaches. So just by the nature of that, because that's what I think is the right approach, because there's an inequality issue and all that sort of stuff, and I suppose I'm more pro-regulation legislation and reformulation and stuff that gets everybody rather than asking people to make individual choices. It's about saying OK of course people have the right to information, and obviously quite a lot of the work that I've done has been around things like food labelling; I think if you're going to provide people with that sort of information it should be understandable and usable and appropriate. You have to do other stuff that means that people can make those choices in a context where they're able to make a healthy choice if they want to. I think they should also implement traffic light labelling probably. So those would be effective in some way about helping to change the landscape a bit. (Eng 4)*

> *Taxation of foods in relationship to their health and we could reform VAT and that wouldn't be too politically unacceptable. We could have a soft drink tax as they're proposing in France. I think it is possible to make certain changes to certain areas. I don't think these changes are gonna happen in the next few years but possibly thereafter, midterm of this Government. (Eng 5)*

...but I think that kind of information basically empowering people to make healthier choices, well not even to make healthier choices but to understand the choices that they are making in the first place and then if they choose to make an unhealthy choice at least it's an informed choice. I think that's one of the most effective ways. Rather than, because I think generally on the whole people are aware of what is and isn't healthy to an extent. I mean there's obviously some things that they continue to be surprised by like household cheap bread but generally people know that fruit and veg is good for you and kind of a greasy fry-up's not so good. But it's about kind of how can they understand how to eat a balanced diet and if you have some unhealthy food what could you have to counteract it and is everything you're eating healthy? So I think labelling is really important. (Eng 6)

Effectiveness of regulatory vs voluntary approaches

Regulatory approaches were perceived as being more effective than voluntary approaches although voluntary approaches were perceived as being easier to achieve.

I don't think legislation is necessarily more effective than voluntary action. I don't think education is less effective than changing the price of foods. I think if you're thinking that, I know some people who think that, and coming from where I am coming from you might expect me to think that legislation's more effective than voluntary restriction or that price changes are more effective than taxation, or more effective than education. I just don't know. I think it's almost impossible to say to be honest. But I think the distinction here, the 2 axes that you might think about here is the voluntary versus mandatory and things which do stuff about or try to change, get people to change through giving them information and some change which involves trying to change the environment in which people are making choices. (Eng 5)

I think they're (the government) unlikely to go for legislation or taxation. I think they're more likely to be interested in kind of voluntary activity from industry and I think possibly kind of influencing and action at a local level is perhaps more likely to be happening rather than a centralised approach. (Eng 6)

Cost-effectiveness of regulatory vs voluntary approaches

Generally regulatory approaches were seen as more cost-effective than voluntary approaches, and that the most important diet-related risk factors to target were saturated fats and salt.

I think labelling is probably, well mmm, I think labelling is cost effective but then I don't work in the industry so I don't know how much it costs...I think legislation is also cost effective but again it could be that the costs are borne by others. I'm sure they're not borne by the Government. I guess it depends what you're measuring in terms of cost effectiveness. If you're measuring the cost to the public purse then a lot of legislation and restrictions on the food industry are going to be cost effective. See I think legislation to erm limit market of unhealthy food is probably quite cost effective and possibly legislation around reformulation could potentially be cost effective as well. (Eng 06)

My perception is this, my perception is that saturated fat and salt are the most important, the most effective and cost effective modifiable diet-related risk factors to target however I think the most important diet-related risk factor to target is fruit and vegetables intake because by changing fruit and vegetable intake, we're going to have the greatest health benefits.

Most achievable policy options

Banning trans fats and introducing food labelling (additional to the EU scheme) were perceived as the most achievable policy options. Other achievable policy options included pre-school nutrition and controlling food advertising. Some participants acknowledged that regulation would be feasible for TFA (Trans fatty acid) elimination, but currently prefer voluntary approaches.

I suspect the pre-school nutrition might be actually, if we worked on that a bit because we've gone a long way towards that And there is more awareness of it and the very fact we've achieved it in school; I'm not saying school's perfect but it's a lot better, but I suspect we could possibly achieve that in pre-school. I also can't really see why trans fats can't be banned either. I mean I think that's a political choice more than anything else. Also labelling, it is to a certain extent the European Union function, but this Government could still have its own scheme so it could be done. So I'm aware there's national and European confidence too, but anyway. (Eng 2)

Stronger control over marketing of unhealthy foods to children, I would certainly put that high as a priority. It's controllable, it's achievable so when you ask me about most achievable, I'd actually possibly put that up there as perhaps the most achievable. It clearly can be done through control over advertising. So that should be there. (Eng 3)

Yeah I think some of the lessons on salt could be applied here and also labelling would potentially help as well. And possibly restrictions on marketing could help. So things around labelling and marketing and secondary to those would be reformulation.... I think they're achievable but I'm not sure there is the political appetite. I don't think there's any insurmountable barriers to them but I'm not sure there is political appetite for them at the moment and obviously there is the economic side of things in terms of policy context and there is an understandable reluctance to do anything which could be perceived as anti-business, anti-growth. (Eng 6)

Current challenges to implementing policies

Responses regarding barriers to implementing policies were mixed. Perceived barriers included lack of political will, support, consensus, resources and research evidence, together with the food industry having too much influence over political decisions.

I suppose it's about resources, it's about political will, it's about whether or not there's consensus, even in your own community, whether there are territorial differences; I don't know.(Eng 1)

...Government at the moment is that I would argue that they're working far too closely with food producers. I'm not at all against encouraging food producers to change what they do and we're seeing some quite positive changes, but I think they're addressing a market need more than actually being pushed to do things because of health.

...it was quite shocking the lack of knowledge and understanding of how the CAP could impact on health I have to say... So I still feel, and because of the focus upon obesity as opposed to healthy eating, there is a block because professionals don't always see food or poor diet as a bigger risk factor as it is for NCD. When you see fast food companies paying the kind of money they are to be associated with the Olympics, you can see how important it is for them to have that kind of image. So you know, the food industry will fight tooth and nail for any kind of regulation really...(Eng 2)

So you know there's a broad issue in food about how do you get the industry to work in support of public health goals and the challenge in doing that is a barrier for pretty well all the food policy work you want to do. However at the level of individual policies, the barriers are all going to be different. In salt there is a toxicology issue, there's a safety issue, there's a consumer palatability issue, there's in some cases a technical challenge in reducing salt. Those are all barriers but when you're talking about trans fats then actually for the vast majority of products those are not issues, it's a matter of cost. That would be the biggest barrier to that. And it's about effective audit strategies and it's about reach; how do you get to the kebab fan? So the barriers for each policy are going to be different. (Eng 3)

You know there's almost no food policy frankly, let alone evaluation of that or implementation of information and once you've got that, evaluation that's sensible and not rubbish. Because quite a lot of it's incredibly poor quality when you get to read them. What's the point of doing that evaluation anyway? And actually quite often that evaluation doesn't include any element of cost effectiveness at all....So you can understand why things don't get funded but it's incredibly frustrating because then of course people always say, "Well what's effective then?" Well if you're not gonna fund the studies that tell you that, then how can you tell policy makers what's effective or not? And you just end up getting back to asking the same experts what they think. (Eng 4)

I think there is issues around the consensus of what needs to be done and it's an interesting one because on the one hand there's a lot of anxiety from all policy makers and all politicians of all parties, certainly in England, anxiety about rising levels of obesity but then there isn't a consequential urgency and you know there's been various obesity strategies and public health documents, but there hasn't been anything really, really (sighs) I don't know, really, really radical I guess...(Eng 6)

What is being done well?

- Front of pack nutrition labelling, including development of the original "traffic light" system, and the subsequent compromise hybrid system also showing GDAs (Guideline Daily Amounts). This work was led by the UK Food Standards Agency (FSA).
- Salt reduction; led by the FSA, this "voluntary" scheme involved extensive work with the industry reinforced by political pressure from health ministers over several years.
- Industrial trans fat reduction; a recommendation for TFA elimination by NICE in 2010 represented the culmination of progressive scientific work and lobbying over the previous decade. TFA elimination has been identified as a target in the current governments voluntary "Responsibility Deal" with industry
- School food. The UK government has introduced interventions to regulate the quality of food in primary and secondary schools; however, there are many exemptions and current implementation is limited and patchy
- Voluntary food based guidelines for pre-school settings
- Some OFCOM regulation of advertising of high fat, sugar and salt (HSSF) foods during children's TV programmes

Areas to be considered for development

- Further salt reduction targets
- Trans fat regulations
- Further restrictions of marketing of HSSF foods to children
- Taxation of sugary drinks
- Rationalisation of the current VAT system, which is full of inconsistencies
- Legislation requiring mandatory "front of pack" labelling and/or signposting of foods with nutritional information.

ESTONIA

Cardiovascular diseases (CVD) are the main reasons for early loss of work capacity and death (at age <65) in Estonia. Estonia is leading in CVD caused deaths in Europe. Each year, at least 250 men and 80 women of every 100 000 die of CVD before the age of 65. The average life expectancy in Estonia is 73.2, while the European Union average is 78. The rate of deaths from diseases of the circulatory organs in Estonia is 3.5 times higher than that of 'old' Europe.

Most effective policy options

Legislation, regulation, taxation and subsidies were identified as the best policy options; with food labelling and information/education campaigns also being valuable.

> *Legislation/subsidies and Information/education campaigns - vegetables should be subsidised they are too expensive. Estonia needs nutrition curriculum, we do not have possibility to study nutrition in Estonia. (Est 1)*

> *Through legislation, regulations and subsidies to make healthy food more available and accessible for people. (Est 2)*

> *OK it is somehow difficult to…I mean if there is taxation or subsidies, there should be legislation and regulation, so you can't divide them. There is also one thing with regulation and legislation, like for example for school fruit scheme we need legislation as well. But I think that subsidies might be one possibility just to offer cheaper healthy foods. Or to subsidise to influence farmers to grow fruit. (Est 3)*

> *It's very hard to evaluate for me but legislation is important and regulation regarding children's nutrition habits, and labelling also is important. And of course information & education campaigns are good. (Est 4)*

Effectiveness of regulatory vs voluntary approaches

All respondents perceived regulatory approaches to be more effective than voluntary approaches.

> *Yes I think because the developments in national health in recent years have been positive. Life expectancy has increased more rapidly than the other European countries. And the progress over the last decade has also seen the national healthcare system become one of the most cost effective on the continent. (Est 1)*

> *They might be because Estonia has a history of regulatory measures from the Soviet Union and some are willing to have legislation and regulation and after that voluntary actions, for example by the food industry or by the restaurants. It depends on how informed the population are. If they are willing to have the healthier products then they would do those kinds of things but that's why for example for reformulation and subsidies, I think the regulatory is better. (Est 2)*

Cost effectiveness of regulatory vs voluntary approaches

Generally, most Estonian participants perceived regulatory approaches as being more cost effective than voluntary ones. One participant was unsure about which approach would be more cost effective.

> *Interviewer: And in your view, do you think regulation would generally be more cost effective than voluntary approaches in Estonia?*

> *(Long pause) Yes I think because the developments in national health in recent years have been positive. Life expectancy has increased more rapidly than the other European countries. And the progress low over the last decade has also seen the national healthcare system become one of the most cost effective on the continent. (Est 1)*

Interviewer: Do you think regulation would generally be more cost effective than voluntary measures?

Erm difficult to stay; it depends on policy but they might be. But as I said if the question is fortification for example, er when this…it's an easy way to ensure that all these products are fortified regardless, like salt in some countries. (Est 2)

I think that regulatory approaches would be from one side - more cost-effective and from other side - more effective. (Est 4)

Most achievable policy options

All informants regarded information/education campaigns as being the most achievable policy options, but regulation, taxation and subsidies were regarded as being the most effective and cost effective.

…Information/education campaigns… (Est 1)

It depends from political will and priorities of the government. If there would be political will – all these policy options would be achievable. (Est 2)

I think we need to continue with education so if the population is informed it is a prerequisite that they do the healthy choice. So continue with nutrition topics in terms of pregnancy and the whole life cycle. (Est 3)

Current challenges to implementing policies

Lack of political will, lack of financial and human resources and lack of collaboration were regarded as being the main barriers to developing and implementing policies.

Political will. Our country is lead by the ultraliberal goverment their opinion is that health is individual responsibility – the government will not intervene… (Est 2)

…it depends on possibilities, on money, on willingness and how such actions are implemented. I think the barriers, the biggest barrier is lack of competent personnel in the area of food and nutrition. We have key curricula of food technology and nursing, teaching, but we really do not have curricular health & nutrition and there are very limited number of experts working in this field. And that makes it also difficult to have good analytical papers, have good campaigns, have opinion leaders, spokesmen and so on. (Est 3)

I just thought about it and I think the problem might be if there are several policies with the same aims, like in Estonia we had this; that's why ministries should be more integrated as a whole and I think the collaboration between the Government and these organisations and the private sector is very important. (Est 4)

What is being done well?

- Nutrition is considered as a key component of the National Health Development Plan (2009-2020)
- An increasing number of food/drink producers have committed to the GDA (Guideline Daily Amounts) labelling scheme
- Vending machines are not allowed on school premises
- Current advertising law prohibits advertising in schools
- Mandatory inclusion of nutrition education in schools

Areas to be considered for development

- Regulation/Reformulation of products to reduce salt, saturated fat and trans fats
- Regulations on marketing/advertising of unhealthy food and drinks to children beyond the school setting

FINLAND

Dietary changes in Finland during the last 30-40 years have been pronounced (less fat, saturated fat, salt, 3-4 times more fruit and vegetables). The most recent FinDIET data (2007) show mean serum cholesterol levels have decreased by 20% since 1975 with changes in dietary fat composition explaining 60-65% of the decline. The 1982-1997 age-adjusted CHD mortality declined by 63%. 37% of this decline was estimated to result from serum cholesterol lowering.

Most effective policy options

Taxation and legislation/regulation featured prominently in the interviews. Subsidies and reformulation were also mentioned. One respondent talked about information and education campaigns and labelling, although their relative ineffectiveness was clearly acknowledged.

> *Erm I think we need all of those because we need to have a package of different tools and they are different kinds of tools, which all have their own place. So I don't know that any one should not be included. I think sometimes it's more; it's too much focus on this information and educational campaigns. We need those too but these don't work alone, so we need these kind of structural solutions. It's hard to say, it's hard to say which one. I think we need legislation and regulations because those working within the food industry need some carrots as well as sticks; that's important. Reformulation is really important too. We need products which have better fat contents and this applies especially for salt content; it's really important. And labelling is too important for some people but I think this is not the solution for all. We need the information but we have many people who don't read the labels and that's why we need the labelling on the front of packages and the symbols are important. And of course information and education campaigns are also important. (Fin 1)*

> *To tax the unhealthy products and subsidise for example vegetables because people are really looking at the prices when they buy food. Reformulation has gone a long way already in Finland. I don't know how would they, because we have a lot of low fat, low salt products. What else could we do? I don't know. Labelling comes from the EU (laughs) and we can't do very much about it. Information and education campaigns, campaigns are very good but they are so short. You have a campaign for 2 months or 1 year and then it stops and then nobody remembers after that. (Fin 2)*

> *What should ideally be done? I think we should do something that is combined with previous activities and I think guiding catering in day care, schools and work sites is a very good area and we could really do something. And you have heard about this catering guiding system? And in schools I think this assessment of the school lunch is indeed something that should be done above regulation. It should be part of how you, I don't know what they call those teaching programmes, education policy? It should be something combined with that. (Fin 3)*

> *I do think that in some areas we should get more regulation here again, with salt and also I hope that we could move in the taxation issue with saturated fat, salt and sugar. (Fin 4)*

> *I think the taxation is very effective. I would go to taxation of the sugar because it is how it is used now and how people drink the soft drinks and eat candies so I would tax it more. And I would subsidise the food from Finland, but it is not possible in the EU (laughs) so these subsidies we have to agree with the EU. I would go for information and education campaigns because those are maybe in the long run the most effective ways. (Fin 5)*

Effectiveness of regulatory vs voluntary approaches

Views on the effectiveness of regulatory versus voluntary approaches were mixed. The majority of informants believed regulatory approaches were more effective than voluntary approaches. However, it depended upon the issue (i.e. some issues benefit from regulation, for example labelling of unhealthy food as the food

industry would never agree to implement it voluntarily). Regulation was seen as being more effective by another informant, but may not be welcomed by the general population.

> *It depends. When we are talking about regulations in terms of for example labelling something which is not that healthy, so then we need mandatory regulations because industry wouldn't like to label or give the information if it's not that good for them. But those erm both of these things could be voluntary. For example this heart symbol system that we have is voluntary and I think it works. So that's, it depends on the issue. (Fin 1)*

> *Erm I think on EU level the regulation of consumer information on labelling on food items and food control and erm all those things, they are erm they are making the environment of food production and giving regulation, how to organise that. And I have nothing against it. I think that is a good way to organise it and then I think what comes to the promotion of healthy food items, the voluntary efforts of the food industry are the best way. It is a tool for competition… But then I think this regulatory approach is needed in the good tradition of Finnish catering, like day-care and schools and work site restaurants and I think we are in a situation that we should evaluate those regulations needed. Last week it was in the biggest national newspaper an article on children's meals in day-care and in schools. The article was asking if it is as easy to get a vegetarian meal in day-care and schools in all areas of Finland and the answer was that it is not equal in some areas...(Fin 3)*

> *It is a question of regulation and voluntary activities and what is the balance? The balance depends very much on what the people are, how much the people are ready, how strong the argument is, how can you persuade the politicians? And so of course I feel that we need, I would like to see much more regulation, much more, but it's not so easy. (Fin 4)*

> *Regulatory approaches could work in, as I said in public catering services, in lunches and school meals, hospital meals and I think that has to be, there has to be regulation and information to the service providers. In salt the regulation started to work because it put the bakeries into a different position and labelling is very powerful and I think you have to go through regulatory means to start labelling foods. That is very powerful. (Fin 5)*

Cost effectiveness of regulatory vs voluntary approaches

Regulatory approaches were highlighted as being more cost-effective, particularly in public catering services. There was strong support for regulation to be introduced or strengthened for salt, sugar and saturated fat. Challenges to achieving regulation included getting enough support both from the general public and from politicians. The contested and complex field of cost evaluations was also discussed.

> *Interviewer: One of the questions that we wanted to ask people…is around the cost effectiveness of policies. And the question that is around which policies have been most cost effective in terms of numbers of CVD prevented or deaths from CVD prevented. Do you have any thoughts on that?*

> *Well I mean we have a unit here for Health Economics, Health & Social Economics and we have a lot of information on how much these things cost and that is interesting to people and the newspapers like to cite that. But then when we go to policies of course we read some of the very fancy studies from all over the world about cost effectiveness, best buys or whatever they are but first of all there are so many of the theoretical assumptions that you have to make and so that my feeling is that the politicians are not interested. It is too complicated for them. You see political decision-making is never made on comprehensive, rational thinking; it goes through certain specific issues. Of course it must have good arguments behind it that people support but generally the argument that we are making in this policy field in nutrition, alcohol, tobacco etc; the policy decisions are cheap and they don't cost money. Actually if you use a tax then the Government gets money. In comparison with preventative work in the Health Service and campaigns, that all costs money. And so the strongest argument that we have is that we don't have to look at cost effectiveness, just the er just they are cheap; effective and cheap. The politicians*

are interested in how much intervention costs and is it effective and I think they generally pretty well believe all the effectiveness but the question is that we have already discussed there are so many counter arguments. (Fin 4)

Most achievable policy option

Legislation was perceived as being difficult to achieve. However, taxation was perceived as being achievable together with information and education and better food labelling, in particular the use of the Finnish Heart Symbol.

Erm from our experience of the formulation of this heart symbol system we have administrated since 2000, I think reformulation is, erm we have had good progress in reformulation, that's one. Er legislation during these days is not that easy anymore because we have this EU legislation and I will have to say this beforehand but erm that has been one barrier for Finland because we have been ahead of this food policy and nutrition policies and an example is the salt legislation. We had a good national salt legislation concerning carrots for industry, they could label the foods with the sign of less salt or erm I don't remember what was the correct word they could use, but because of EU legislation we had to get rid of that. (Fin 1)

Taxation would be achievable, which they are now thinking of. Because it brings money and all the taxation systems are not for the health, they are for the money. Which isn't a nice thing but...(Fin 2)

...I think actually information and education campaigns and labelling would be the most achievable. Obviously regarding labelling we always have to remember the EU legislation (laughs.)... But for example this heart symbol is national and the EU is aware of that and we have permission to use it so, and the European Food Safety Authority is currently working on the health claims and I think that work also will help the consumers and it's part of the labelling issue... Legislation is so, it's like a tanker at the moment, it's very difficult to turn because of this EU legislation system. It's very hard to affect that and it takes time. It takes a lot of time so it's not very flexible at the moment. (Fin 6)

Current challenges to implementing policies

Barriers to implementing policies were many and varied. There was a general view that the authorities have not taken proposed fiscal measures seriously but have instead considered agricultural and economic policies more important than health policy. Other views included the power of the media, including social media to shape people's opinions and actions; European legislation replacing already effective national legislation; the influence of food companies; and a lack of collaboration.

Mmm er I think one, I don't know if it's a barrier, maybe you could call it a barrier, it's that there are so many stakeholders and we do not have any...So sometimes when we're talking about healthy heart policies, other ministries are more powerful because they have the money. So it's not that powerful... And one thing is that in Finland that most decisions are made at local level and that's the most important challenge at the moment. At the Government level there might be good co-operation with different ministries and different policies, but when we go to local level, so when we promote the idea of healthy policies, they might not see that in that way at all... (Fin 1)

I think indeed the unofficial activity of the social media and the media in general is something that is making the nutrition education so very difficult at the moment, in Finland. Yes and food marketing also because I think a good example is energy drinks. They have started some weeks ago in Finland an advertisement campaign concerning energy drinks for 7 year old children. The Finnish recommendations I mentioned here, it is recommending that children under 15 should not drink energy drinks. But then those food enterprises, they are starting production that is focussed on children who are 7 years old and so they are making somehow an illustration that even children need energy drinks and when they get familiar drinks with energy drinks at that age, they will continue and continue and continue. And this is only one example... (Fin 3)

But the problem is that when you have to move to specific legislation or taxation, then the competing interest comes across strongly. So well let's take this candy and soft drink taxation. Of course the industry concerned was lobbying very heavily against that and fortunately they could not overcome so we got the tax; it's still fairly small so we hope to increase...actually the Government is increasing the tax, which is good. But then when we go to any specific legislation so there are all kinds of barriers, much of that is economic companies and it's the same kind of thing that you are discussing in the UK. Industry is always against regulation or new regulations. They are pretty powerful to the civil servants and specific legislation is not so easy. There is inertia and change and all kinds of problems for the civil servants. We find out that whenever we get the new legislation to the Parliament, the Parliament is much more pro-health because they listen to people, but the civil servants are in the middle of all kinds of constraints. So that is where the problem is. (Fin 4)

…one of the problems with the nutrition policy that it is so much linked to the Common Agricultural Policy of the EU so that is an additional issue that we have to follow EU policies. …We had just persuaded the Finnish schools to serve mainly skimmed milk and low fat cheese and the EU came and said, "Hey schools, you will get money if you serve fatty milk and fatty cheese." And so the Finnish members of the European Parliament were lobbying for several years before it was changed and of course the EU tries to have various kinds of things so that the excess fat is eaten by people. (Fin 4)

In Finland currently I would say there is this stupid discussion about nutrition. It involves so many people who are not experts and do not know the field and just have their own opinions and the media is considering them as experts so in Finland we really have a big problem currently. (Fin 6)

What is being done well?

- Taxation of soft drinks, sweets and chocolate (discussions under way as to whether to increase the tax)
- Quality of school, college and university food regulated by Ministry of Education and Culture (school meals are free, colleges and university are subsidised)
- Tax agreements and subsidies in workplace canteens
- Legislation on compulsory warning of high salt foods since 1980s, tightened up in 2009

Areas to be considered for development

- Consider more actions on marketing to children

GERMANY

The German National Nutrition Survey II (NVS II), a representative survey on the nutrient and energy intake of 14–80-year-olds, determined that one in five Germans is obese (BMI ≥ 30). Analyses on current food consumption, lifestyle and eating behaviour demonstrated that 36% men and 31% women exceeded the guidelines for daily energy intake for median physical activity. Of even more concern are the results for the daily fat intake: 80% men and 76% women exceed the daily fat intake recommendations (30% of total energy intake) (NVS II, 2008).

Most effective policy options

Legislation, regulation and food labelling were identified as the best policy options within Germany by all key informants.

I think from the point of view of legislation and regulation, we would need some initiatives to have

a change because we rely on companies and trade to do something voluntarily and this has not been effective in the past 10 or 20 or 30 years... (G1)

Well there has been great discussion on this traffic light thing, to put the red or yellow or green marks on food items, specifically salt or fat or sugar but this has been blocked at present and is not pursued.... (G2)

Taxation was regarded as a negative option. This was due to uncertainty about consumers' reaction and the current financial crisis:

To obtain a tax for example is difficult nowadays in Germany. People are very critical about paying more because of the financial crisis they feel they have to pay for the whole of Europe, and politicians won´t win the elections next year with the political target to raise taxes on food. (G4)

Effectiveness of regulatory vs voluntary approaches

All respondents perceived regulation to be more effective that voluntary measures. One respondent stated that voluntary actions have been in place for over 30 years with limited effect. However, resistance to regulation was perceived as being strong:

Yeah but erm there's also a great...I mean there are great restrictions for regulating diet and I think the resistance would be strong in many parties and I don't see that real regulation...maybe aside from the trans fatty acid issue...will be coming. I don't think so.(G1)

Definitely, yes. I think so. The ideology of freedom of choice is highly appreciated here which of course is good but I think it merely is the freedom to get ill today (laughs). It is the freedom to having the choice between different bad opportunities, that's often the reality. People don't see that prevention is also about taking away some of the bad options and enabling more freedom to healthier options. (G2)

Cost effectiveness of regulatory vs voluntary approaches

One informant commented that the existing evidence regarding trans fats regulation and reductions in morbidity and mortality demonstrated cost effectiveness. However, three informants expressed uncertainty about the cost effectiveness of regulatory approaches due to lack of evidence and the difficulty of measuring outcomes of preventive measures.

Interviewer: Do you think that regulatory approaches would generally be more cost effective than voluntary ones for your country?

Well of course there would...I mean it has been er...there have been calculations that the trans fatty acids regulation is very cost effective in terms of decreasing morbidity and mortality but politicians are not really interested in this issue. They don't really care. (G1)

Most effective immediately and cost effective is taxation of unhealthy food and changing consumer habits via price sensitivities, I guess. If these taxes have to be paid by producers, industry and retailers there would also be a strong motivation to improve nutrient profiles with nearly no extra costs. Labelling of nutrient profiles in combination with easy counselling illustration should also help but I guess cost more . In the long run, health education, healthy environments in schools, e.g. will be effectful. I think individual nutrition counselling is most expensive, though it can be effective. (G2)

Interviewer: And in your view, do you think that regulatory approaches, so legislation, regulation would be more cost effective than voluntary ones in Germany?

I don't know because I'm not familiar with costs of regulation but it is evident that treatment costs

are incredibly higher than prevention costs and prevention. (G3)

Interviewer: Do you think regulatory approaches would be more cost effective than voluntary ones as well?

Well erm (pause) this is an interesting question. I could imagine it is more cost effective but I'd have to say obviously this is clearly a very economic question and certainly one would need probably more economic evaluation before one can draw a clear conclusion. (G4)

Most achievable policy options

Two informants regarded education and information campaigns as the most achievable policy options, although not necessarily the most effective.

Certainly the Government would be most willing to do, would be giving some money for education and information campaigns, which in my opinion would be the least effective. (G1)

Forcing the food industry via legislation and regulation to reformulate food was thought to be achievable and one of the cheapest ways for government to achieve improvements in health. However, informants were uncertain if political will existed to enforce such measures.

... legislation, reformulation and therefore forcing the industry to change their products would be one of the possible solutions. (G3)

Right. And how feasible do you think that would be to achieve?(interviewer)

Er no idea. it would be possibly the cheapest way for the government to change something, how feasible this is depends strongly on their will/commitment to do it. (G3)

Current challenges to implementing policies

All key informants felt that political will was the main barrier to developing and implementing policies:

I think there is a lack of political will or let's say there are always more important issues. So in the political parties, to get organised everything else, but food and prevention has a low priority. (G2)

I think first Governmental attitude, namely the promotion of self-regulatory approach, especially the Government at this time, especially the party FDP; they are very, very erm keen on having self-regulatory approaches. They want that everyone is responsible for himself and they don't want any regulations made by Government...(G3)

There is a lack of political will; I think this is really crucial and in Germany the prevention strategies are mostly based on individual measures...(G4)

What is being done well?

- Nutrition is considered as a comprehensive approach within the line of the national "In Form" Action Plan (2008-2020)
- Joint initiative of the German Food Sector and the Ministry of Nutrition, Agriculture and Consumer Protection (BMELV) concerning "Guidelines to minimize trans fatty acids (TFA) in food"
- Salt Intake: recommendations to reduce salt intake included in all national quality standards for meals in schools, kindergartens, homes for the elderly, canteens at the work place, food on wheels-services
- Advertising: The German Advertising Federation has a Code of Conduct for children stipulating that they should not be induced to abusive purchases and excessive consumption by exploiting their confidence
- Optional voluntary labelling, on top of that required by EU law, is encouraged, including guidelines for consumers and food companies.

Areas to be considered for development

- Reformulation of products to reduce salt and saturated fat
- Mandatory action regarding the availability and quality of foods available in school canteens and vending machines
- Regulations on marketing of unhealthy food and drinks to children.

GREECE

The dietary habits of the Greek population have changed considerably throughout the past years. There has been an increasing trend towards the adoption of more "western type" diets with the majority of the population failing to meet the Greek nutrition guidelines. The gradual decline of the traditional Greek Mediterranean diet - which is globally accepted as one of the healthiest diets – combined with the significant reduction of physical activity, have resulted in increasing obesity levels and other nutrition-related disorders. Greece is reported to have one of the highest prevalences in childhood obesity with significant rising trends. Greece is also experiencing a net increase in age-standardised CHD mortality rates for those aged less than 45 years.

Most effective policy options

Greek key informants varied in their perceptions of the best policy options for their country. Three felt that education and information campaigns were key, although two acknowledged that this should be supported by legislation, taxation reformulation and/or food labelling reform.

> *I think legislation as you mentioned there, when it comes to food advertisement to kids or promotion of food... there should be some regulation for the food allowed in schools. There should be a supportive environment, like facilities for food preparation in schools.... The other issue is also taxation. I think that the taxes on healthy foods like fruits and vegetables should be lower and taxation should be higher on unhealthy snacks. (Gr1)*

> *I think the most important is information and education campaigns. The second could be reformulation of the products. Now labelling is something that is evolving because the regulation on labelling has changed so the information on the label will be much clearer in the next 2 years. And if all these don't work, I think the next step is legislation and taxation. (Gr3)*

> *Of course we have to improve for example something in relation to information and education of the public in relation to healthy diet. Then I'm sure that some taxation issues and legislation issues...Of course, of course we need, we definitely need legislation because I think it will very much help to implement a lot of our policies. Maybe some issues related to the price of the food so some taxation issues also would be important to look at more closely. (Gr 4)*

One informant commented that legislation administered at the European level was sufficient and translated into National policy:

> *We are OK with the European Union, we are obliged to transpose European legislation in our national legislation. We don't need anything more about that. (Gr2)*

Effectiveness of regulatory vs voluntary approaches

Respondents were mixed in their views of the effectiveness of regulatory versus voluntary approaches. Two respondents felt that voluntary approaches were not effective and regulation was needed. One respondent commented that both approaches were required and one respondent felt that regulatory approaches are effective for children and schools, but not everything can be regulated and probably not effective for industry.

Well I don't believe in voluntary approaches. I have a bitter experience, not only in the food sector, but several sectors. We are involved in a long time with no results and my feeling, or better OUR feeling, and other consumer organisations in Europe, we have the same feeling and they have found to not implement their own decisions. So if we need something, some regulation, I think this should be er obligatory. (Gr 1)

I think this is tricky because erm I think for some issues that we believe that there is a population that is let's say sensitive, such as children, and maybe infants and some people that are in particular stages of their lives, there we could use regulatory approaches like the one that I told you that we used at the schools for example. There we have a regulatory approach and we don't permit some foods to be sold there. But because we are in a society that is a free society, you cannot regulate everything. It is important to...I'm not sure that the regulatory approach would be effective for the industry for example. I'm not sure we could use it there because it's the free market. (Gr 2)

Because erm (pause) if you leave it voluntarily, what I have seen from my experience before is the most educated parents and the most wealthy in society, the upper economic groups, they are more sensitive to health promotion, to health issues. If you leave it voluntarily, they certainly will adopt it. So again you need, that's what I am saying. And I think our record should be to minimise social inequality and health inequality. So we need to ensure that we start with the most vulnerable in society. (Gr 4)

Cost effectiveness of regulatory vs voluntary approaches

Informants varied in their responses. Two felt regulation was the more cost effective option. One informant found it difficult to answer due to the response by the food industry that regulation was a financial burden upon their industry. One respondent felt that voluntary approaches were easier to administer.

Interviewer: Do you think regulatory approaches would generally be more cost effective than voluntary ones?

Do you mean the cost?

Interviewer: Yes, the financial cost of the policy compared to the number of CVD prevented.

I don't think so.

Interviewer: So you think voluntary has the same effect as regulation?

It's quite a difficult one. It's very difficult. I say voluntary would be more effective and more cost effective than regulation because regulation you do that, it is written in law and I don't know how it is implemented. But with a voluntary scheme normally behind voluntary schemes are also campaigns and information so it's more communicated to the people.

Interviewer: So in developing national policies in Greece, what would be the most effective and most cost effective modifiable diet-related risk factors to target in relation to calories, saturated fats, trans fats, sugar, salt and fruit & veg?

The most effective would be calories and the most cost effective would be the others.

Interviewer: So why do you say that?

For example to reduce or quantify saturated or trans fats in food, there is a need of cost; for sugar and salt. Behind there is a cost in the industry point of view but that means also that sometimes maybe if the salt is lower or the sugar lower then maybe the food also is expensive. (Gr 3)

Interviewer: Do you think regulation would be more cost effective than just having voluntary guidelines?

Erm again I think you need both.

Interviewer: And why do you say that? Is that for a similar reason as previously?

I mean because if you leave it voluntarily, this is what commonly a kid says, if there is a campaign and I have chocolate as a food option and an apple, I will go for the chocolate. So I think this is common for all of us. I mean if I go to a restaurant and I smell pizza (laughs) and before entering the restaurant I thought I would go for a salad, then I will go for the pizza; because if you put the temptation in front of us, this is the physical environment and it is more likely that we will go for this. (Gr 4)

Most achievable policy options

Although difficult to achieve, informants felt that targeted legislation, regulation and taxation would have the greatest health impact and should be pursued.

...a very easy thing to do, would be if you isolate toys from food but I feel there would be a lot of complaints by the food industry on this issue. The most effective tools in most cases are the most difficult I would say. ...legislation for schools and school programmes for health promotion and catering in schools and facilities in schools like a freezer, and to devote a certain time, you know one hour per day for a healthy lunch, could be achievable I would say. (Gr3)

Legislation, maybe it's not so much achievable for example information and education campaigns are more achievable. Legislation is sometimes not very easy to do, although it would be very effective. (Gr 4)

Current challenges to implementing policies

Political will was identified as a key barrier to developing and implementing policies together with a lack of scientific evidence, and lack of time and resources.

There is no political will. They have no interest in people's health. What they care about is their personal promotion and their personal presentation in the mass media and being seen to be doing something, but they never outline a serious policy. They never have some indexes to estimate the results... my general aspect is that my Government have no official health or nutrition policy. (Gr 2)

The only thing is that the people, the industry are unwilling to implement the policies that we develop. It's very difficult to get the scientific data to prove that it is good to develop the policy. This is the most important barrier. (Gr 3)

I have, from my experience, because I have been involved in one policy... I think there were problems in there was a committee that developed the policy but there were, I could say there was lack of time to be prepared for, to prepare the policy, lack of time and resources, both in relation to expertise. There were few people who had the background and the knowledge to contribute and also because these committees were set up by themselves and we had to work you know extra time to develop this policy, I mean besides our work.... There were not a lot of people from the Ministry that could help us. So I think that was the main barrier for me. (Gr 4)

What is being done well?

- EFET (Hellenic Food Authority) working with food manufacturers to reformulate processed products high in salt
- Legislation on maximum levels of salt allowed in certain foodstuffs
- Law on the availability and quality of foods available in school canteens (vending machines are not allowed in schools)
- Mandatory inclusion of nutrition education in schools
- Draft ministerial decree on the nutritional-health provisions in public catering
- The Ministry of Health and Social Welfare established National Nutrition Policy Committee in order to address the issue of childhood obesity

Areas to be considered for development

- Regulation regarding reformulation of products to reduce salt and saturated fat
- Regulations on marketing of unhealthy food and drinks to children

ICELAND

Since the 1970s there has been a sharp decline in whole milk, butter, lamb, mutton and fish consumption, mainly replaced by chicken, pork, vegetable oils as well as increased fruit & vegetable consumption. Since the collapse of the banks in October 2008, Icelanders have lower purchasing power and face increased prices. From October 2008 to October 2009, vegetable prices rose by 45%. Other commodities rose less. (Steingrimsdottir 2011).

Most effective policy options

Legislation/regulation, taxation and subsidies (particularly for fruit and vegetables) were the most consistently identified policy options. Reformulation, labelling and information and education campaigns were also mentioned, but much less frequently. Most participants recognised the difficulties in legislating/regulating for example the powerful interests of the food industry and the 'short-termism' inherent in the political system. Legislation, regulation, taxation, subsidies and Information and education campaigns were perceived as the most effective policy options.

> *Well starting from the bottom of the list, I think we could strike out education and information campaigns. OK they are good but they are not going to be very effective. So I think the most effective points would be legislation, regulation and taxation. Top of the list. And of course subsidies, that's politically...it comes and goes...So that's always, those things are always changing but taxation of course and regulation yes. (Ice 1)*

> *I think legislation and of course good information to consumers and I think it's very important. It's education in the schools, how to live a better life, how to eat to be healthier and so on. It's very much discussed here in Iceland that young people are eating something that they shouldn't eat so much like fast food for example, and they are sitting when they come home from school and they sit down in front of the computer and they are sitting there and they should have more motion. And the young people in Iceland, it is more and more a problem that the young people here in Iceland are too fat and I think one of the reasons is the food they are eating. And also that they don't exercise. So I think we need more education in schools about this, how important it is to choose the right food and to exercise. So we call on that in schools. But also it's important information for older people too so we need information and education not just for children, but also adults. (Ice 2)*

> *To tell you the truth I couldn't tell. There has been a lot of discussion about this so taxation of course we know that if you have to pay more for the food you are less likely to buy it so in a way that will surely work and actually it works for smoking. We know that. Subsidies, subsiding something is another thing. If you pay for...if the healthy food gets cheaper yeah but then you have to fight also the industry, so why are you reducing my success of surviving as a company by giving that other company something? So there is a lot of tricky things in there... And then information and education campaigns. Well I know why but I think continuous information and lobbyism rather than campaigns about let's eat more fruit now. But it delivers. It seeps into the minds of the people and they may not eat 5 fruits a day, but they may eat 3 rather than 1. (Ice 3)*

> *Well it is of course like legislation and regulation on trans fatty acids; of course it has an effect. And you don't have to educate people or anything. (Ice 4)*

> *... If there is the legislation to have information on nutrition on all packages and if it's legislation*

to label some kind of health labelling, you know, all different kinds of stuff; I think they take it very seriously. It's important but it has to be a majority understanding for it. Otherwise it will become unpopular. So honestly I cannot decide from my point of view right now because my point of view is only the thing that I would try to find out, which would be the most important for the population; which would be the most powerful. I think all can be used. (Ice 5)

Effectiveness of regulatory versus voluntary approaches

Legislation/regulation, taxation and subsidies were perceived as the most effective, with some respondents perceiving information and education campaigns as also being important to support regulatory changes.

Because these things, the freedom of choice isn't all that free. The choices, you know the default options are made for us everywhere. We are not aware of it but the decisions are already made for us and I think we have to...especially regarding the kids and there is nothing in the Icelandic law that says that you are not allowed to advertise in the media junk food to kids. (Ice 1)

We have an agreement that is like you were saying non-regulatory, or self-regulation, and they say "We will, we will do that" but they don't do it. So we have many examples of those things, about marketing to children and they have said they are not going to market to children and still they do it. So we don't trust industry on that...Yeah so we say it just has to be in the laws or in the regulations. (Ice 2)

The change in dietary habits all over the world are because of lobbyism or information to the people and to believe that doesn't work is not true. We have evidence. We have evidence for dietary habits but now we are faced with different sorts of problems with this increased obesity and the consequences of that, which is diabetes. And I think we should not underestimate the importance of obtaining information and relaying the information to the people. It may not be enough but it surely is going to be the core of what's being done because you can put all the regulations and rules you like, and if the people don't like those rules, they don't follow them. So rules are meaningless unless you do something to accompany them with respect to informing the public. (Ice 3)

Erm (pause) of course you can get the effect right way if you use the legislation (sighs) but er well I'll just think about the relation between the Government and the industry (pause) so this er (pause) it would be ideal to keep the relation good and have the voluntary way and...but of course if the industry doesn't do those things, then it would be necessary to use legislation. (Ice 4)

Cost effectiveness of regulatory versus voluntary approaches

There was a mix of responses to this question. Some respondents thought that a voluntary approach would be the ideal, and 'have the right effect on the industry'. This, however, does not answer the question of cost-effectiveness. Others felt that legislation would be more cost effective than self-regulation or voluntary approaches.

Interviewer: OK so which of those would you think would be most cost effective for the population?

Well that's er, erm...

Interviewer: And that's in terms of numbers of CVD prevented.

Yeah. Well I think it's about the same thing; it's the top 3 here - taxation, regulation. It doesn't cost much, the same as the smoking ban; it doesn't cost anything but it saves a lot of lives. Trans fats doesn't cost much but saves a lot of lives... (Ice 1)

interviewer: OK. And do you think that legislation would be more cost effective than self-regulation or voluntary approaches to food?

Yeah.

Interviewer: So would it save more lives?

Yeah. Yeah. Yeah. Yeah. I'm sure about that.

Interviewer: Why?

I can't prove it but I'm sure.

I have never believed in self-regulation. If they get more money out of it, the industry, then they will come with us with self-regulation; but if they are losing profit and so on, no they don't. They are not interested. Maybe I'm a little bit negative to the industry but I don't trust it completely. (Ice 2)

Most achievable policy options

Legislation, regulation and information and education campaigns were perceived as being the most achievable policy options.

We use a lot of sugar here in Iceland. We are consuming a lot of sugar. I think it's very important to try to influence consumers to use less sugar than they do today. (Ice 2)

I think it is more information to consumers. We call for information number one, how to live healthier lives when you use less sugar and salt. I don't believe in taxation. I think information is more important than taxation on sugar. Maybe I'm wrong but the organisation is against more taxation on food because food prices here in Iceland are high enough. So we talk more about good information, good campaigns against the use of too much sugar and salt. And it has started already in schools to tell the children how unhealthy it is to use too much sugar and salt. I think we've got more out of it with information already in schools than a little bit of a higher price. The people would buy it anyway. I think it would have much more effect to have good campaigns and good information. I think it's the best way. (Ice 3)

Salt is not difficult to improve on if you just put up some regulations. (Ice 5)

Current challenges to implementing policies

The influence of industry was perceived as being a key barrier to implementing policy, and political will being a strong second challenge. The food industry was identified particularly as a barrier when they did not agree with suggested policy actions or approaches:

"…they have more money to lobby against what we are saying so that's maybe the biggest barrier when they don't agree with us". (Ice 2)

The political system is still recovering from the crash in 2009 and is still quite fragile. Understandably, the government appears pre-occupied with the economic situation and the economic issues. This also affects how interested the politicians are.

Erm very unstable politics I guess. We have Government that has been ruling since the crash in 2008, I think from 2009. They are er they are very occupied of course with the economic situation or the economic issues…and they didn't care; they didn't…you know you couldn't get access. Others were very accessible, you could get an appointment and we sat down and talked about things like tobacco and cholesterol and stuff and policy based prevention, but then before you knew it they were out of office and then a new guy came in and you had to start all over… (Ice 1)

Sometimes industry is stronger at…they have more money to lobby against what we are saying so that's maybe the biggest barrier when they don't agree with us. (Ice 2)

I might guess that it was part industry and lobbyism with politicians (against a sugar tax) so lobbyism is crucial. We look at it as useful when it is us who are lobbying for better lives and health of the nation, but the other people have alternative motives, although they will never admit that and actually if you talk with the individuals, they are equally concerned as you and me but leaving their brain on the shelf when they go to work. So these guys lobby also for their own interests. (Ice 3)

I think the old difficulties, which may be changing now, I'm not sure though, are those related to that we have to do what is the best for industry. This is actually the old view I think, that you have a kind of er local industry, or industries in each country which are probably strong and companies maybe have been important in giving taxes and finances to the official finances of the Government (Ice 5)

What is being done well?

- Trans fats maximum content regulated since August 2011
- Ministry of Education directive on healthy food in elementary and secondary schools
- Media legislation: advertisements are not permitted to air adjacent to programmes intended for children under 12 years
- Good nutritional data on children and adults

Areas to be considered for development

- Increase fruit and vegetable consumption
- Increase the pressure to reformulate salt, sugar and fats

IRELAND

Cardiovascular disease remains the most common cause of death in Ireland, currently accounting for one-third of all deaths and one in five premature deaths. However, there has been substantial progress. Age-standardised death rates from cardiovascular disease have decreased by two-thirds over the past 30 years. As mortality rates have reduced, demand on health services has intensified.

Most effective policy options

Reformulation plus taxation and subsidies were seen as the most effective policy options. There was clear support for regulatory approaches over voluntary ones.

I would, in terms of powerful options, I'd say I'd probably go for reformulation with the whole fiscal measures as being kind of a close second behind. Not giving an equivocal answer! I think because reformulation can be so broad reaching but in saying that there's obviously technical challenges but in terms of the potential power I would think I would go for reformulation. (Ire 1)

Well I think we need to use all of those tools (legislation/regulation, taxation etc); it's which are the highest priority. Obviously there has been a good bit of work done on the food labelling issue and we are to some extent hamstrung by the EU consensus and by what I regard as the absurd guideline daily amount regime that we are subjected to. And I think that we need to continue to lobby for a traffic light system. (Ire 2)

It's a balance. It's like tobacco. There's no silver bullet. There's no one answer; it's gonna take combinations of them all. Where appropriate like we have been pushing for the tax rises on soft drinks and I suppose we all got undermined with the change in policy in Denmark. In fact it wasn't a change in policy at all when you looked at it, they had also put taxes on 5 a day products and

then withdrew them because they got the model wrong, but they actually didn't remove the taxing function on sugary drinks, although we all have the perception that they did. So there's issues like that, so taxation and some of those issues should matter… (Ire 3)

Well we've very little legislation around food. We have voluntary calories on menus; taxation we really have none - in fact our current taxation system is already an anomaly because under our current VAT we have a medium tax or a mid-tax. Our full tax is around 20% or 12% and we actually have a lesser tax for products like croissants and banoffee and some amazingly high sugar and high fat foods. So our taxation is an anomaly and yet the Minister of Finance feels that because there's VAT on many of the foods, junk foods we're talking about, that he feels it's not necessary. He's missing the point. We need a health related levy. (Ire 4)

Effectiveness of regulatory vs voluntary approaches

Regulatory approaches especially relating to taxing sugary drinks and foods high in saturated fats were perceived as being most effective.

No I don't think they are because your day to day with the food sector focuses on increasing sales and profits ultimately and they make token efforts but we have learned this down the years when you're dealing from a public health perspective, whether you're dealing with the tobacco industry or the asbestos sector or the alcohol sector, the food sector is not fundamentally different. They work within whatever regulatory regime is out in place but in the absence of regulation they will maximise return to their shareholders. Regulation is just; the idea of voluntary codes just buys time for the industry. (Ire 2)

Yes absolutely. Public health legislation nearly always has a failed voluntary approach before it, whatever it is - smoking bans were all voluntary - never happened. You bring it in. Drink driving education campaigns, when we brought in eventually random breath testing - completely changed. It was amazing… But where you have legislative issues that are doable as well, then that's clear. (Ire 3)

Cost effectiveness of regulatory vs voluntary approaches

Regulatory approaches, for example, taxes and subsidies were seen as cost effective, particularly where the revenue was ploughed back into positive health interventions. It was also pointed out that reformulating across key nutrients and portion sizes would potentially be cost effective in terms of reduction of chronic diseases.

Interviewer: Do you think the regulatory approach would be generally more cost effective than voluntary ones? i.e. would the outcomes on cardiovascular disease be cost saving?

Yeah again yes potentially because I think there's potential for them to be more cost effective because I suppose if there is that statutory basis, I think everyone has to be involved in that particular regulatory approach and I think there's greater scope for cost effectiveness and there's a greater range of stakeholders involved in whatever the regulatory approach is, so everyone's involved in it so there's kind of greater momentum there may be and greater scope for change so I would like to think that that then would have a knock-on effect in terms of health. (Ire 1)

Interviewer: Do you think regulatory approaches would generally be more cost effective than voluntary ones?

Absolutely because legislation, well the Government doesn't cost, the cost goes elsewhere or whatever to make the changes and voluntary codes are very, very difficult, and very difficult to enforce. You have lots of people trying to police them because they are voluntary and there's no sanction. (Ire 3)

Most achievable policy options

Fiscal measures, including taxing sugary drinks and other products high in sugar and salt were perceived as being most achievable. Information and education campaigns for increasing fruit and vegetable consumption were also mentioned.

> *In terms of achievable I would go with the fiscal measure and the sugar tax because that seems to be quite likely to be actually something seriously proposed by the Minister in the next, the budget is coming up in a month's time and I understand it's going to be proposed as part of that. (Ire 1)*

> *No I think in terms of developing national policies, I think that salt is still the most feasible and practical because we can do a lot directly, you know we can say to industry we are putting a cap on the amount of salt that you can add to bread and cereal and so on. We can through public sector purchasing both in the health sector and in local government etc. (Ire 2)*

> *Yeah I think you probably could get taxation on sugary drinks, and that would be hard but I think we could…Yeah I think information campaigns or whatever on improving consumption of fruit & veg is practical and feasible. I do think the argument around sugar is coming our way. I think it's moving in the direction that I think you could make some inroads there. (Ire 3)*

> *I think the sugar ultimately because sugar is no nutrient and I think the evidence is building about the evidence around high consumption of sugar and then sugar linked with obesity, weight and as I say empty calories. So I think sugar is one, and fruit & veg. (Ire 4)*

Current challenges to implementing policies

Views on current challenges varied. Informants commented upon a lack of a National Nutritional policy since 2004; a lack of resources, leadership and intersectoral working; a lack of expertise and public health capacity and the power of the food industry. There was the view that the people with the most expertise and commitment have little ability to make decisions, and that the people with the ability to make decisions did not have the required level of expertise and engagement. Participants suggested that progress would be most rapid when there was widespread concern about public health nutrition issues, generating a willingness to take collective action.

> *I would think resources, which is a very important issue at the moment needless to say, and even back in the boom times it still was an issue to some extent, but very much so now. But also even outside of resourcing, I think the lack of leadership in implementing the policies came out very strongly in our Obesity taskforce Report in 2005 where there was a recommendation that the Department of the Taoiseach, our Prime Minister, should really lead out because of the cross sectoral nature of the solution if you like to obesity, and that didn't happen; it really fell back to the DoH and there hasn't been that cross sectoral approach to tackling obesity and I think that's been replicated in other areas… (Ire 1)*

> *…So you have this scenario of lots of committees and expert bodies and reports and documents and a degree of if you like churning in terms of the policy cycles. But the people with the most expertise and the most commitment having no ability to make decisions and then the people with the ability to make decisions not having the required level of expertise and engagement. (Ire 2)*

> *Yes and food, the food and nutrition lobby is really, really big in Ireland because it is such an integral part of our export. (Ire 3)*

> *…but our challenge really is that industry is very powerful in Ireland and the Irish food industry is even very powerful at European level. Yeah and I mean like we still find, as you're probably aware the other day, the new study citing a causal link between daily consumption of sugary sweets and drinks and obesity, but industry are still kind of saying…well really ignoring it completely and well it's down to individual choice you know? So it's a very frustrating environment. (Ire 4)*

What is being done well?

- From September 2013, TV and radio advertising of food and drinks with high fat, salt and sugar content during children's programmes will be prohibited
- Good workplace initiatives
- Reformulation on salt and trans fats

Areas to be considered for development

- Reformulation of saturated fats

ITALY

As in many other western countries, Italy is seeing an increase in the proportion of overweight and obese people. A shift away from the traditional Mediterranean diet has developed, and is reflected by an increase in the prevalence of obesity, especially in the younger population. Obesity rates for females and males are 29% and 18.8% respectively.

Most effective policy options

Italian key informants varied in their views of the most effective policy options for their country. Four informants stated that education and information campaigns were needed although not necessarily the most important option. Three also felt that legislation/regulation and labelling was required and one informant commented upon the current work already being done with industry to reduce salt in bread and pasta and to reduce trans fats.

> *My opinion we need to do something related to regulation and legislation together for some food goods like for example the trans fats. We do not have any legislation for that so probably we need to do that. And we need to do like we did with smoking habits. And the other thing in my opinion is the labelling of food groups. We didn't have a real policy or law for food labelling so probably we need to change and we need to reformulate our policies for labelling foods. And of course the educational campaigns, but first of all legislation. I think regulation and legislation for some foods and some nutrients like trans fats for example. (It 1)*

> *In particular labelling I think is very important. Both implementing a regulation which forces somehow the industry to improve their labelling information on their products and also on the side of the population, making the population more aware…I think the negotiation with the industry for food reformulation in different areas, not just salt, should be implemented and in Italy I am sure there is much to be done in this regard because I know that these negotiations are not as intense and systematic as I think they should be to achieve a good result as soon as possible. (It 2)*

> *I would say that information & education campaigns are still the first, although there are problems but still they have first place because we need to reach the population. Regulation if we have in mind regulation in terms of for instance giving rules for the school meals. In Italy there are no rules for school meals; each school may give different meals and also for instance the presence or not of vending machines in schools is not regulated. So this would be in my opinion important. Labelling is important but after information and education because if you are not informed, you are not able to read the labels. (It 3)*

> *Italy is active in the last year with the food industry to obtain agreement in reformulation of food we are working on salt reduction. We are making agreements with bakers of pasta and the whole*

industry to reduce the salt in bread. And also we are working with the other producers to reduce salt in other kinds of production. We are working with the food industry also to reduce the content of trans fats in products but we don't have specific agreements to reduce sugar for example in er beverages and soft drinks because we think it is very important for the prevention of obesity and general other problems. (It 4)

Effectiveness of regulatory vs voluntary approaches

All respondents perceived regulatory approaches to be more effective than voluntary ones. Voluntary reformulation was used as an example that had not worked, and regulation on the ban on smoking on public places was given as example of how effective regulation can be. However, comments were made about the difficulty of evaluating the effectiveness of regulation and the need for incentives.

Erm (pause) I think so yes in some of them, related to what we were talking about before for some regulation, we need to do something for health related regulations like smoking campaigns, the smoking ban and the same thing is for trans fats or for fat or for sugar or for salt. We need to do something about the regulation because if we leave it to the voluntary, it will be very, very low. If you say to a person just avoid the trans fats, often times we don't have any effect. (It 2)

In the first instance I would say yes, but this measure, this regulation should be accompanied by for instance subsidies, money. You need to give money to the lower parts of the population to increase for instance the consumption of healthy foods, otherwise I can do what I want in terms of suggested regulations but they will not follow us. But regulation is effective because for instance the example of smoking in Italy. When smoking was banned from cinemas and restaurants and bars and public places, in general it worked. It even worked in Naples which perhaps is not a Nordic city (laughs) but nobody will smoke in restaurants. So regulation is very good and this case however is quite easy to give this regulation - if you smoke you have to pay. But for food, for nutrition it's different. We need incentives to increase the adherence to the rules. (It 4)

Cost effectiveness of regulatory vs voluntary approaches

Informants felt there was a lack of evidence to currently comment. However, cost-effectiveness could be measured in the future if regulation was implemented.

Interviewer: Right. And do you think regulatory approaches would be more cost effective than voluntary ones?

(Pause) Erm yes I think so because, especially in 5 or 10 years' time, we will have a cost effective result of course. We need to wait and we need to have a plan which is at least 10 years to have some result. But I think the example from other countries says that we need to wait but in the end we will have a result. (It 2)

Interviewer: Right. And do you think regulation would generally be more cost effective than voluntary approaches in Italy?

Er I don't know. I don't have the instruments to say yes or no here. Er (pause) perhaps feasible and practical is salt because we already discussed this; it is cost effective, it is not so difficult; it does not require an important sacrifice from the population. (It 4)

Most achievable policy options

Reformulation and education and information campaigns were perceived as the most achievable policy options, albeit due to actions already being carried out in these areas. Legislation and regulation were also perceived as being achievable if opposition from food companies could be addressed.

> *…In terms of fat and trans fat, I think … legislation would be achievable because it is quite sensible to discuss that. So we just need some legislation saying that we need to reduce the content of this fat and so on. So probably it should be achieved. Now we don't have any legislation…I mean the problem is always the food companies. They are quite powerful here in Italy so they are probably trying to reach half way between the political will and the will of the food companies. (It 1)*

Current challenges to implementing policies

Lack of political will and a lack of resources were identified as the key barriers to developing and implementing policies.

> *…I think the most important barrier is the political will, as always…so when you say to politicians that it will take 5 years, they say OK but probably I won't be here anymore in 5 years… So the problem first of all is political will. Then of course in this year it is money, lack of money. (It 1)*

> *Well I think that of course there is much to do in this regard. We are only at the very beginning….A working group has been developed to convince the Ministry of Health that we need to develop a full national strategy for reduction of salt intake and this requires the implementation of different activities and different steps. And one of the things which should be done absolutely, but it has not yet been done, is the definition of targets for salt content over different food categories….which are of course very important for negotiation with the food industry, in order that they reformulate their products to reduce the salt content. The problem of the budget is a very important one… we have a widespread economic crisis…and this of course means there has been created a big problem particularly in the field of prevention because when you have to make cuts in the budget you will of course have more difficulty in cutting therapies and treatment which will save lives… (It 4)*

What is being done well?

- National "Salt reduction initiative", a voluntary agreement between the national associations of craft bakers, the associations of plant bakeries and the Ministry of Health to reduce salt content in some of their products
- The National Plan of Prevention (NPP) and the regional "Gaining health" schemes endorse several projects to promote healthy nutrition or physical activity in the workplace
- A specific working group at the Ministry of Health established to plan out, in agreement with the associations of food and beverages producers, a document to regulate advertisements and avoid incorrect and misleading messages, especially those targeted at children.

Areas to be considered for development

- Reformulation of products to reduce salt, saturated fat and trans fats
- Mandatory inclusion of nutrition education in schools
- Mandatory action regarding the availability and quality of foods available in school canteens and vending machines
- Regulations on marketing of unhealthy food and drinks to children.

MALTA

Although a small island in the central Mediterranean, Malta does not have a diet that is characteristic of the rest of the Mediterranean region. In fact, the Maltese diet has for historical reasons many traits in common with that of Northern Europe. Malta does not produce much of its own food - most food is imported. MHEC (Ministry for Health, the Elderly and Community Care) has identified a national "obesity epidemic"; and promotes an inter-ministerial and multi-sectoral approach, so that changes are made to the living environment, which shift it from one that promotes weight gain (obesogenic) to one that promotes healthy choices and a healthy weight for all.

Most effective policy options

Reformulation, taxation subsidies in combination with education, legislation and regulation were deemed the most effective policy options.

> *I think erm probably taxation and incentives, so both sides of the...will be effective. There will be elements of effectiveness in that, so I think those will be...I think especially erm things like people are...well they tell us this is all intuitive, not backed by a lot of evidence, but basically the cost of everything is rising and especially fresh fruit & vegetables and so on, have been going up in recent years...(Mal 3)*

> *I'm more inclined to go more for subsidies rather than taxes, at least even as an interim measure. But not subsidies alone. I think there always needs to be education around things, through schools, through the media; the practical hints are so important for people, whatever their age group, practical things to make things easier for them. And obviously part of it was voluntary guidelines for industry and again erm you know I (pause) it's again a complicated thing but ultimately I think regulation in Malta, this is again a bit of a sweeping statement, but when something is legislated I think it kind of has more impact in Malta, rather than sort of voluntary. (Mal 4)*

> *...the reformulation of products will have one of the greatest impacts because if you get reformulation of foods... in Malta we know that people eat a lot of bread so we like get the salt within the bread slowly reduced in the bread they're gonna eat, and that doesn't really need behaviour change because they are eating whatever they are finding available. So we reduce like the trans fats within the products which are available and then they are eating less trans fats. So that maybe one of the easiest approaches but we have to tackle industry. (Mal 5)*

Effectiveness of regulatory vs voluntary approaches

Regulatory approaches in the form of taxation and reformulation were perceived as being most effective.

Cost effectiveness of regulatory vs voluntary approaches

Regulatory approaches are now viewed as more cost-effective than voluntary approaches, although it has taken some time to come to this realisation.

Most achievable policy options

There was limited data on the most achievable options. Education was cited by one participant.

Current challenges to implementing policies

A lack of human and financial resources were perceived as the main barrier. Other barriers included a lack of political will, research evidence, collaboration and the power of the food industry.

> *First it is finance, financing of the action plans that came out of the strategies but another one*

is also human resources, because being a small country, we have very few resources who work in this area. So that's the next problem. Those are the 2 major problems... (Mal 1)

One of the problems we have at the moment, which is causing us a problem in terms of knowing exactly where to pitch our action and how to prioritise our actions, and actually implement our food and nutrition policy, is that we have no food consumption data. There's no good scientific base of food consumption in Malta. ... our first action that needs to be done the moment we get the money next year is to review all our plans and get a proper food consumption survey done and make sure that we have the baseline data on which to pitch our policies and know where to...I mean I can't go to the industry and say we need to cut trans fats if I don't know which industry has the most trans fats and how much trans fats is in the food that they are producing. So we need the data. If we don't have the data...so I think for next year that is going to be our base - getting the data and then building on that. (Mal 2)

What is being done well?

- Vending machines not allowed in public and most private schools
- Food products high in fats, sugar and salt, are not allowed to be used as sponsors for health campaigns or any initiative that takes place within schools or that involves children
- Reformulation of products to reduce salt

Areas to be considered for development

- Wider work on reformulation needed (currently just salt)
- Better data needed
- Lack of capacity to conduct required surveys/monitoring

POLAND

Poland is the largest country in central and eastern Europe in both population (38.1 million) and area (312 685 km^2). Since the successful transition to a freely elected parliament and a market economy after 1989, Poland is now a stable democracy with constant economic growth and is well represented within political and economic organisations in Europe and worldwide. The transition period of the 1990s saw a considerable improvement in the health status of the Polish population. Average life expectancy at birth reached 80.2 years for women and 71.6 years for men in 2009, but there is still a vast gap in life expectancy between Poland and western EU countries and between life expectancy overall and the expected number of years without illness or disability.

Most Effective Policy Options

Legislation/regulation, taxation and subsidies to increase fish consumption (as fish is currently expensive) were perceived as the most effective policy options. Food labelling was also deemed important although its effectiveness was questioned. Increased dissemination of information regarding good nutrition to the population, especially children was also believed to be important.

Taxation was perceived as the most effective policy option, with some informants also mentioning reformulation, education and information, labelling, banning trans fats and restricting the marketing of fizzy drinks to children.

...maybe taxation could be most cost effective, however there is a problem of political costs of such activity. Taxing probably products rich in saturated fats. Then I (long pause) I think about products like sweeties which are high in calories and also which are rich in saturated fat and sugar. But I am not quite sure whether it is a good option to tax these products, but maybe. (Pol 2)

Effectiveness of regulatory vs voluntary approaches

Regulatory approaches were seen as being more effective. One informant stated that in order to be effective, political support needs to exist.

> *Interviewer: OK. And of those policies, which do you think would be most effective?*
>
> *Well it is not easy to answer this question. Maybe labelling would be important, but I don't know whether it would be the most effective. I mean also taxation, maybe taxation could be most cost effective, however there is a problem of political costs of such activity....Certainly there is the problem of the nanny state and discussion in this area, there are many people who don't accept such regulatory approaches of the government. But from the health point of view, it is a good approach however if supported by the majority of citizens, so first there is a need for political support for such regulatory approaches. And then to do this, that is my opinion. (Pol 2)*

Cost Effectiveness of regulatory vs voluntary approaches

There were varying views regarding the cost effectiveness of regulatory approaches vs voluntary ones. Regulation, especially taxes on unhealthy foods, were sometimes, but not always, perceived as being more cost effective. It was pointed out that population support is required in order to address the perceived negative connotation of a "nanny state". Some participants expressed no opinion as to whether voluntary approaches were more cost effective than regulatory ones and some stated that the issue hadn't been investigated yet.

> *Interviewer: And do you think that regulatory approaches would be more cost effective than voluntary approaches?*
>
> *(Pause) Er well I think so. I think so because if there is political support and support by the majority of society, support by the media for this kind of activity, it could be really very cost effective and useful. (Pol 2)*
>
> *We didn't analyses [sic] that...(Pol 3)*

Most Achievable Policy Options

Prior to legislation/regulation, population wide information/education campaigns were perceived as a necessity and more achievable as Polish eating habits are traditionally very high in fat and sugar. A ban on trans fats and salt reduction were perceived as the most achievable and possibly taxing processed foods high in saturated fats. One participant highlighted that labelling and education were the most achievable options.

> *...I mean a ban on trans fats like in other countries and a reduction of salt, which is very important because hypertension frequency is very high in Poland and consumption of salt is also very high. So they are the two most important and I think realistic targets. Certainly it would be fine to change consumption of sat fats and sugar however I am not sure whether it would be achievable in my country, especially if we think about the tradition of the Polish kitchen, which is rich in sat fats and sugar... (Pol 2)*

Current Challenges to Implementing Policies

There is an overall lack of political will. The Government is perceived as being more interested in food safety as opposed to food consumption and curative care as opposed to disease prevention. There is a strong lobby by food producers and distributors to prevent change in policy. Population support for state intervention is also required.

> *However sometimes the interest you know of the politicians in Poland is in opposition to the interest, the health interests and in opposition maybe to the EU policy. And for Polish politicians, being oriented on the great number of people living in the country and having their farms and*

their families, well I mean the government and the parliament members are not eager to change the situation. (Pol 2)

What is being done well?

- Free/subsidised school meals are provided (an action plan on the provision of free or subsidised school fruit and vegetable schemes is planned)
- Salt reduction programme

Areas to be considered for development

- Mass catering sector needs to engage more in salt reduction initiatives

PORTUGAL

Research has shown that Portuguese households have reduced their diet quality and decreased their adherence to a Mediterranean food pattern. The first data collection from the Childhood Obesity Surveillance Initiative Portugal, which took place during the 2007/2008 school year across Portugal, with children aged 6–8 years, found prevalence of overweight and obesity to be 32% and 15% respectively based upon the Centre for Disease Control and Prevention.

Portuguese informants felt that all policy options were important for improving public health nutrition in Portugal. There was consensus that regulation of food available in schools was a priority, together with legislation regarding fat content in food. Informants also highlighted that there was current activity concerning advertising restrictions, food labelling and food availability in schools:

I think all the subjects are very important and we are working in almost all of them. Like in advertising, a consensus paper has been written with the food industry about advertising… and in terms of labelling and other issues, it has been until now difficult to legislate so we have worked in terms of consensus, trying to have some consensus. But we will try in the future, when it will be possible to have some legislation… like labelling and the contents of some fat or even salt and so on. We have done that in the schools, in the schools it is not possible to have the fat in food; it is not possible to sell it. And sugar is not possible to sell…that is a regulation for schools. But not for the population in general. (Port 2)

I think legislation regarding maximum theoretical values of fat for instance, those kinds of regulations could be improved in Portugal… Also I think that there is a lot to be done with taxation. If you think of tobacco for instance and although I know this is a very sensitive issue, but I think there is still something that can be done as a result of taxation to regulate a little bit. (Port 3)

Effectiveness of regulatory vs voluntary approaches

All respondents felt that regulatory approaches were more effective than voluntary ones. Reasons included having a greater and automatic impact on the majority of the population and a perception that voluntary actions are not working as the population may know what to do, but choose not to change behaviour.

Well because I think the potential impact is larger, at least in terms of the kind of expenses that the Government would have with regulatory measures but those wouldn't be too big when you compare them to the potential benefits so I think they would be more cost effective I think. (Port 1)

Sometimes people don't comply with voluntary things so it's always progressive changing. It's also

what I said to you about the culture. Even people who are ill and they know it's important not to have salt in food, but I always see people in restaurants saying, "I know it's not good, but it's just a little bit." So in terms of culture, it's always possible to have some flexibility and we have to deal with that, so it's not easy…. (Port 3)

Cost effectiveness of regulatory vs voluntary approaches

Three key informants felt that regulatory approaches would be most cost effective, especially by the reduction of salt and saturated fat. One informant was uncertain due to a lack of evidence.

Interviewer: Do you think regulatory approaches would generally be more cost effective than voluntary ones?

Yes I think so.

Interviewer: Why do you say that?

(Sighs) (Pause) Well because I think the potential impact is larger, at least in terms of the kind of expenses that the Government would have with regulatory measures but those wouldn't be too big when you compare them to the potential benefits so I think they would be more cost effective I think.

Interviewer: OK. And from those policy tools I listed, what do you think could be most effective?

Can you repeat them?

Interviewer: Legislation, regulation, taxation, subsidies, reformulation, labelling and information & education campaigns.

Probably taxation and regulation.

Interviewer: Do you want to expand on that?

No. I'm just reinforcing this is my point of view (laughs). (Port 1)

Interviewer: And do you think regulatory approaches would generally be more cost effective than voluntary ones in Portugal? So in terms of the financial and other costs of the policy compared with the numbers of CVD prevented.

Erm (pause) yes in some ways for instance it will be er more important that people don't consume salted things or fatty things and if we can decrease that in the industry terms, like the selling... the food they are selling should have low content. So the regulatory could be a very good way to deal with this subject but even because of the answer I said before, some of these things in the EU, they have already decreased...even McDonalds and Pizza Hut have decreased in England the content of salt and fat and they have not done that yet in Portugal so I think they always understand the culture and use that. But I think regulatory is perhaps one of the best approaches and also literacy. (Port 2)

There are no cost-effectiveness studies available…(Port 3)

Most achievable policy options

The most achievable policy options were identified as being education and information campaigns as they were easier to develop and implement. Legislation and food labelling were also deemed important, however education and information campaigns were required to underpin such changes to ensure the population understood and accepted legislation:

So sometimes you have to have both; not only legislation but also try to have information and education and also try to work with parents and teachers and so on. It's also important to help with labelling because they do not often know how to read the labelling; so we should try to work on labelling but also try to increase literacy on reading labelling... But we are a country where people don't deal very well with rigid regulations. It's one of the problems in the EU in that the cultures are so different and something that is very normal or accepted by some is not so easy for the Portuguese... We have to try and have consensus as well as trying to legislate. But when we have legislation like the tobacco law, we had a lot of people not agreeing and they contest it in the papers and so on but now it is impossible to get it back as it was before the law. (Port 2)

Current challenges to implementing policies

There is a lack of consensus among different stakeholders and it is difficult to motivate the private sector to take action. Political will and the political agenda doesn´t seem to have flexibility on the implementation of its own policies and this causes a serious problem in implementation and evaluation. Also, the allocation of money is a problem since it is continuously scarce. (Port 1)

…I believe that the main barriers will be first the lack of money and resources at this moment and we are in the middle of this crisis and we are very short of money to implement anything new… barriers of money and resources and human resources too. And this is also related to the complex administrative questions at the moment…it is more difficult to implement some projects because bureaucratic and administrative pressures have increased. Other barriers that are more structural barriers,...we don't have a tradition of involving other ministries in these types of programmes. For example the Ministry of Agriculture will be essential to this type of implementation and the national action plan was not used to work with the questions of nutrition and health and they were more interested in the past with funds for farmers and things like that. So ministries like the Ministry of Agriculture and the Ministry of the Environment & Social Affairs, all of them are very important to this but we don't have a tradition of working together involving questions of health and these types of problems. (Port 2)

Probably budget. I think it's safe to say because of the present crisis in Portugal that budget is a huge problem. For you to convince policy makers to invest in such things, it's not the best time to do it so monetary constraints are definitely one problem, one barrier. (Port 3)

Finland, Norway, Denmark and the UK were perceived as having the most effective public health nutrition policies. The named Nordic countries were perceived as having successful policies due to a coordinated approach to development, implementation and monitoring of nutrition policies. The UK in particular was highlighted as having successful salt reduction initiatives by working with industry to reformulate food products:

Finland, Norway and Denmark because these countries have a balance where they include regulation, stakeholder action, proper mechanisms for implementation and for evaluation. Their national policies well describe indicators, targets, timeframe, resource allocation and budget, accountability, and intersectoral action. (Port 1)

I think, well United Kingdom is a good example and in many ways even working with industry, when we are in the meetings or in networks, we know that companies like Kellogg's or others are much more resistant to decrease the salt or sugar in other countries because there is no...the consumers' associations are not so strong in countries like Portugal. So even in some ways, in some issues, we are working together with the Spanish because we have a common culture more or less and some enterprises...but I think UK is a best example in terms of salt as well as the general approach related to nutrition. (Port 2)

What is being done well?

- Mandatory to list the salt content of food and restriction on sodium content in bread and processed foods
- Value added tax on salty products
- Code on advertising of food and beverage directed to children
- Developments to increase availability of processed foods with reduced content of total fat and/or sugar through the National Action Plan for Nutrition (established 2012)
- Mandatory inclusion of nutrition education in schools
- Guidelines for the labelling of pre-packaged foods
- Voluntary initiatives from the food industry regarding labelling enforced
- Guidelines for restaurants (Best Nutritional Practices in Food and Beverage Services: Guidelines and Checklist) as part of Platform Against Obesity

Areas to be considered for development

- Regulation/Reformulation of products to reduce saturated fat and trans fats
- Regulation of the availability and quality of foods available in school canteens and vending machines

SLOVENIA

Most effective policy options

The majority of key informants perceived legislation and regulation as the most effective policy options. Legislation was perceived as being particularly important for trans fats and salt. Higher taxation was advocated for foods high in salt, sugar and saturated fat.

Two informants felt all policy options were important, as a combined approach is required for successful implementation.

One informant commented that food labelling was effective, but only when combined with information campaigns to encourage the public to read and interpret them correctly. Another informant also felt that legislation and regulation might be less successful than taxation as taxation is more easily enforceable.

> *Legislation and then taxation and erm yeah of course I think everywhere when you can succeed with a systematic approach, when you build a system; you know information is also very important but you know just with information you can't reach much; you have to have the support from the legislation and taxation. I think these two are the most important. (Slov 3)*

> *Legislation would be effective, well with experience with the tobacco ban, in legislation, let's say the structure of food should be healthy and for example banning the selling of soft drinks in schools would be very easy to achieve. On the other side with taxation or eliminating the use of salt and sugar, so I feel. (Slov 4)*

> *...we already did quite a lot, but for taxation we need the legislation so yes of course yes, there is still room. For example, we were also thinking of regulating the advertising of food for children and some restrictions here. (Slov 5)*

> *If you say OK but on my priority list I see that soft drinks are awfully problematic, it's definitely something that I have to legislate on and I have to somehow limit the excess to this product. And on the other side you can probably do something also with taxation. You definitely can go with subsidies because you can't just go pushing down something; you can also increase the importance of something else because then you work more on the positive side. If you want to get*

industry on board then they would be completely resistant if you just legislate; you have to give them a chance to reformulate. (Slov 6)

Effectiveness of regulatory vs voluntary approaches

Informants felt that either regulatory approaches were more effective, or a combination of both was required.

As usual regulation is more efficient than voluntary because they are forced to do that. Because they have reformulated their products and it costs money and we know that salt is the cheapest erm (pause) preservative. (Slov 4)

Personally I think that regulation is a powerful tool but it depends if it is possible to pass the laws because of the different interests before. Self-regulation can be in a way useful and also successful but in some areas it has been proven that it is not, for example in the area of alcohol this doesn't work. So it's very difficult to say. But on the other hand it's very difficult to regulate everything and then it depends how much agreement is amongst the politicians to come with the strong and effective regulations. So it's a trade off all the time. (Slov 5)

Cost effectiveness of regulatory vs voluntary approaches

Regulatory approaches were perceived as being more cost effective. Some informants gave examples of large and expensive information/education campaigns which when evaluated were not effective and therefore not cost effective. However, there was a view that regulation had to be supported by information for and education of the consumer in order for legislation to be accepted and successful.

Interviewer: OK. And so in terms of CVD prevention and numbers of CVD prevented, would you go for a regulatory approach or a voluntary approach? Which one would be more cost effective?

Yes I think of course legislative. Because for soft approaches you need more money. But I think you have to use both. You have to use labelling or education, information, communication; you have to use these because at the same time you have also to educate people about what is healthy, how to choose healthy food and of course you can't just use legislation and forget about the softer approaches. But I think it's not so cost effective if you use just soft approaches and it's not effective, or it's not so effective. You need more time, more energy, more money, everything. (Slo 2)

Interviewer: And do you think the regulatory approaches would be more cost effective in terms of lives or CVD prevented?

Yeah but we know that regulation approaches are not costly. For example if you look at the tobacco you know passing the law is not very costly.

Interviewer: And what about implementing it?

Implementing it, it depends. It depends about how we monitor but according to the research into alcohol, the legislation is the least costly tool. The massive campaigns are really expensive but if they are the only measure, they are not successful unfortunately. (Slo 4)

Most achievable policy options

Banning trans fats and a taxation on products high in salt and sugary drinks were perceived as being most achievable. Reformulation was also perceived as being achievable, but only with the support of the food industry. Regulation and taxation were seen as achievable; however, they need to be accompanied by information/education campaigns to reassure the population that the change is for the better.

If you want to achieve healthy nutrition concerning consumption of less salt or to consume less trans

fatty acids, it's just impossible to achieve if you don't have collaboration of the food industry because sources of salt and trans fatty acids is coming through these unhealthy products. So if they don't collaborate enough you can't achieve this, so legislation could be very supportive, especially when you are tackling some kind of partners who, let's say, are crucial for achieving a healthy offer. (Slov 2)

Well with experience with the tobacco ban, in legislation, let's say the structure of food should be healthy and for example banning the selling of soft drinks in schools would be very easy to achieve. On the other side with taxation of salt and sugar in drinks and alcohol for example it would be also much easier to achieve eliminating the use of salt and sugar, so I feel. (Slov 4)

Erm (pause) probably the easiest and cost effective would be trans fats really because with quite a limited burden, administrative and all the other burdens, you would get an outcome. (Slov 6)

Current challenges to implementing policies

At the time of the study, there had been a recent change in government, and there was uncertainty concerning how future planned policies would be taken forward. Informants also commented upon the economic crisis facing Slovenia and how this would affect the development and implementation of food and nutrition policies. Other barriers mentioned were lack of time and capacity, and the power of the food industry to prevent food polices being developed and implemented. Informants also commented upon resistance from the food industry to adopt legislation to reduce salt in food products and their resistance to collaborate.

There are some countries who spend less money and have better results. I don't know why, because this is another field, I'm not talking about food only, but this might be the reason. I don't know, we have a new Government now and there are so many things which depend on the Government, and this is one of the obstacles I think. (Slo 1)

What is being done well?

- Vending machines in primary and secondary schools banned since 2010
- Regulation (2002) and Rules on subsidy of students nutrition (2007)
- Act on audiovisual media service (2011); include an obligation for operators to adhere to rules for advertising to children that must be according to nutrition guidelines
- Free/subsidised school meals in all schools, regulated nationally by the Ministry of Education and Sport
- Legislation regarding maximum levels of salt in bread and meat products.

Summary Tables

TABLE 1. MAPPING OF EXISTING AND PLANNED ACTION BY POLICY ACTION WITHIN ALL 14 COUNTRIES PROFILED

Country	Legislation/ Regulation	Taxation	Subsi-dies[a]	Reformulation (V/M)*	Labelling (V/M)*	Guidelines[b]	Advertising Controls to children (V/M)*	Campaigns
Belgium	√[1]	X	X	V/M	V	√	M	√
Czech Republic	X[2]	X	X	V	V	√	V	√
England	√[16]	X	X	V	M[17]	√	M	√
Estonia	√[3]	X	X	V	V	X	V[4]	√
Finland	√[5]	√[6]	X	√ V	V	√	V	√
Germany	X	X	X	X?	V[l]	√	V	√
Greece	√[7]	X	X	V	X	√	V	√
Iceland	√[8]	X	X	V	VI	√	M	√
Ireland	X	X[9]	X	V	V[10]	√	M[11]	√
Italy	X	X	X	V	X	√	V	√
Malta	X	X	X	V	o	√	o	√
Poland	X	X	X	V	V	√	X[12]	√
Portugal	√	√[13]	X	√	V	√	V	√
Slovenia	√[14]	X	X	V/M	V	√	V/M[15]	√

√ = Yes X = No o = Unclear V = Voluntary M = Mandatory

Notes for Table 1

a. This table does not include information about the EU School Fruit/Milk Schemes or school food subsidies and vending machines in schools.
b. This includes Food Based Dietary Guidelines as well as other guidelines e.g. Guidelines for healthy nutrition in primary schools or hospitals.
1. Maximum salt levels in bread since 1985. There are regulations on advertising to children, but they are only partly implemented.
2. Labelling in Czech Republic is voluntary, but when used, it must comply with the 2004 Ministerial Decree. Over 80% of food producers implement the decree.
3. Food labelling in Estonia is voluntary
4. Mandatory advertising controls being considered. Current advertising law prohibits advertising in schools.
5. Legislation on compulsory warning of high salt foods since 1980s, tightened up in 2009. National legislation on products entitled to EU's subsidies (School Milk Scheme): upper limit to salt content of eligible products (cheese is 1.3%).
6. Tax on confectionery products.
7. There is a legal requirement for the maximum level of salt permitted in bread, tomato juice and tomato concentrates/purees since 1971. Nutrient profiles that serve as the scientific basis for legislation regarding the list of foods allowed to be sold in school canteens include maximum sodium levels in biscuits (0.5g/100g). This is currently being revised.
8. Legislation regarding trans-fatty acids since August 2011 (less than 2% per 100g fat). In April 2011, Icelandic Parliament passed a new Media law where advertisements are not permitted to air adjacent to programmes intended for children under 12 years. It is prohibited in commercial communications and teleshopping to encourage minors to consume food and beverages that may be considered as unhealthy.
9. Tax on fizzy drinks considered 2011/12 but this was not approved on the basis that there is already 23% VAT on fizzy drinks and bottled water and milk are VAT free.
10. November 2011 - Minister for Health is said to be considering a voluntary scheme involving provision of calorie information on takeaway menus. No concrete proposal announced yet.
11. February 2013 - ban on advertising High Fat Sugar and Salt foods on children's TV from July 2013. Also measures in the Broadcasting Bill 2009 to prohibit TV and radio advertising of high fat, sugar and salt products subject to public concern in respect to the general public health interests of children.
12. No legislation or voluntary initiatives. Aggressive adverts to children mentioned as an unfair market practice in Act on Unfair Marketing Practices 2007 and Broadcasting Act 1992.There is a code on Advertising ethics developed by industry and media but it does not specifically address food.
13. VAT on salty products introduced 2012
14. Slovenia introduced regulation regarding maximum levels of salt for infants, kindergartens, schools, students, workers at the workplace and hospitals and maximum salt content in bread and meat products in 2010.
15. Although there is self-regulation and national legislation, it is unclear how compliant industry is with the regulation.
16. Advertising unhealthy food (as defined by the Food Standards Agency) to children under the age of 16 restricted since 2007.
17. Food labelling regulations since 1996

TABLE 2. MAPPING OF EXISTING AND PLANNED LEGISLATION BY NUTRIENT AND FOODS WITHIN ALL 14 COUNTRIES PROFILED

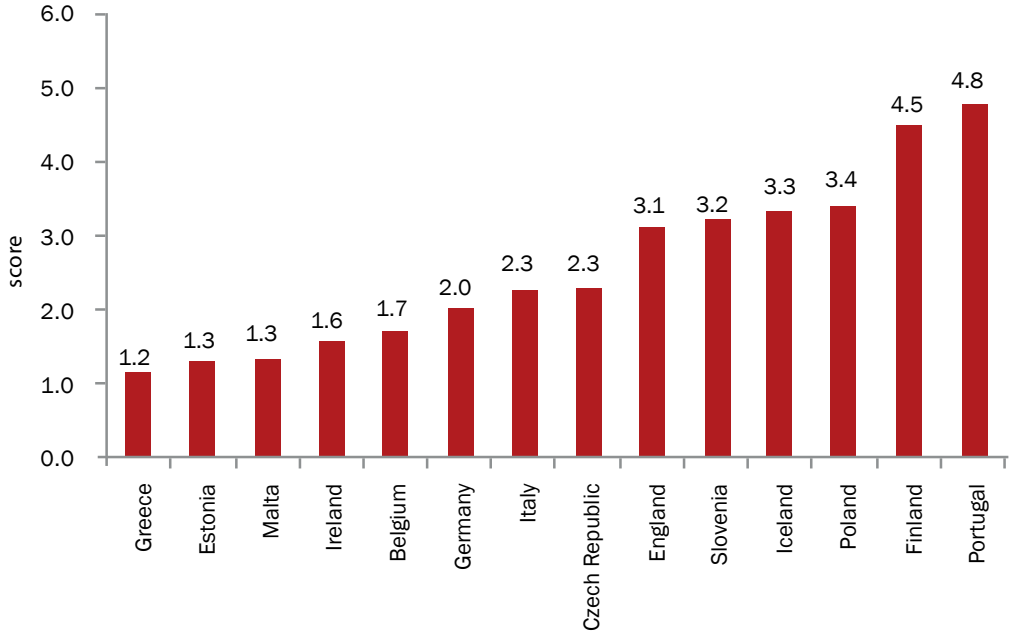
Country	Salt	Saturated Fat	Trans Fats	Sugar	Fruit and Vegetables
Belgium	√	x	x	x	x
Czech Republic	x	x	x	x	x
England	√	x	x	x	x
Estonia	x	x	x	x	x
Finland	√	x	x	√	x
Germany	x	x	x	x	x
Greece	x	x	x	x	x
Iceland	x	x	√	x	x
Ireland	x	x	x	x	x
Italy	x	x	x	x	x
Malta	x	x	x	x	x
Poland	x	x	x	x	x
Portugal	√	•	x	•	x
Slovenia	√	x	x	x	x

√ = Yes x = No • = Being prepared

4. Policy modelling

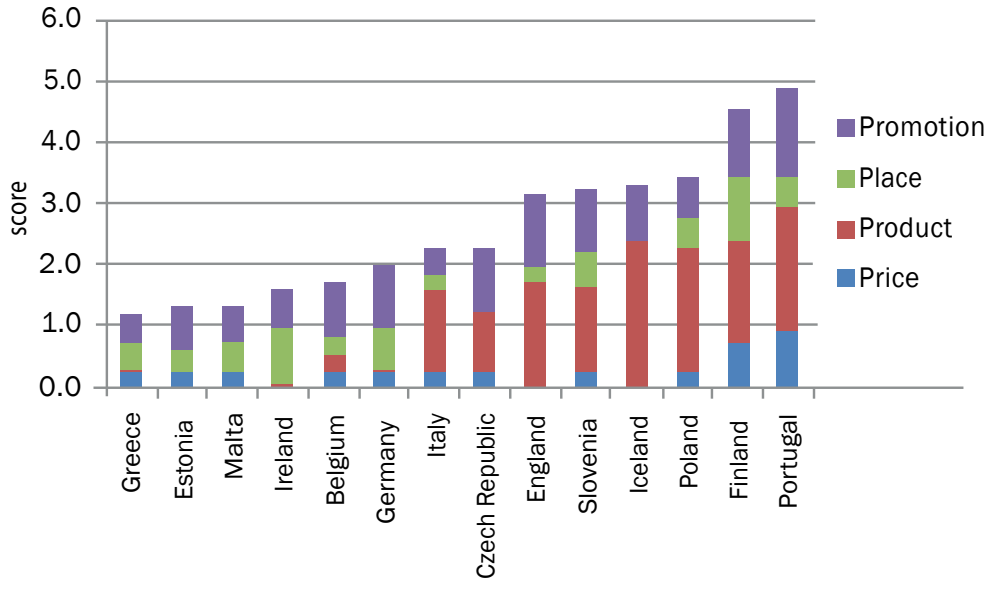
The cumulative policy scores for each country are presented in figure M1. The average scores ranged from 1.2 to 4.8, with a median of 2.3. The highest ranking countries were Portugal and Finland, with an average total score of 4.8 and 4.5 respectively, while the lowest ranking countries were Greece and Estonia (1.2 and 1.3 respectively).

Figure M1 Average scores for the participating countries



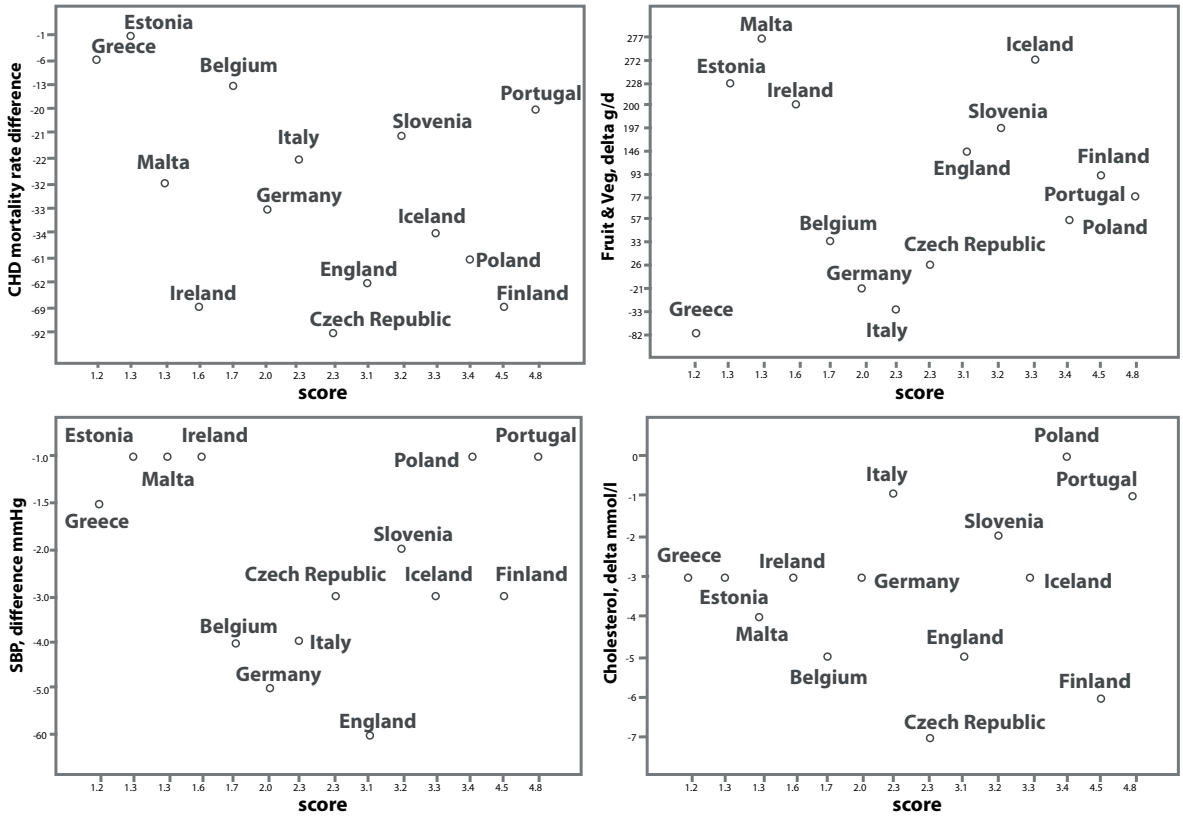
In general, those countries above the median score more points on the 'Product' and 'Promotion' domains, usually because of enforced legislation on product reformulation and various population level mandatory health promotion and education actions. (Figure M2)

Figure M2: Policy scores for the participating countries



None of the selected outcomes show statistically significant correlations with the average total scores (Figure M1).

Figure M3: Correlation of the policy score with the change in cholesterol, systolic blood pressure, fruit & vegetable intake and absolute CHD mortality change.



Discussion

1. Literature review on effectiveness of dietary interventions

The literature is complex and often difficult to interpret. The primary objective of the literature review was to assess the evidence of the effectiveness of actions to improve healthy eating. This was done using the 4Ps framework. Because of its complexity, the literature was 'sliced' in two different ways – firstly, the 4Ps framework was used to assess the effectiveness of different policy tools (legislation, information campaigns, etc). Secondly, the 4Ps framework was used to assess policy actions on different dietary components (salt, fats, fruit and vegetables and healthy eating initiatives).

Price

Emerging evidence that suggests the introduction of taxes and subsidies may be effective in reducing salt and fat intake. Fruit and vegetable subsidies may also be effective at increasing consumption.

Product

Eliminating certain "unhealthy" nutrients from the market shows promise, for example, trans fats. Product reformulation may also be effective notably for salt, sugars and fats. The salt reduction effects appear greatest when reductions are mandatory rather than voluntary. Most of the evidence is from small-scale interventions only. The impact at a population level may be larger, based on evidence from natural experiments in Finland, Poland, the Czech Republic, Mauritius and elsewhere.

Promotion

National health promotion campaigns show some promise in terms of modestly increasing fruit and vegetable intake across a range of European countries. However, there is evidence for a bigger impact in higher income groups. Targeted nutritional education in the community and workplace appears less effective. The use of nutrition labels can promote healthier diets however, the effects vary across subgroups, with lower use among children, adolescents, and older adults who are obese.

Most (but not all) of the research on food marketing to children shows that marketing affects children's food preferences and their purchase behaviour and that there is a clear link between television viewing and diet, obesity and cholesterol levels. The commercial stakes are high, and there are similarities with previous industry attempts to undermine the evidence for tobacco and alcohol.

Place

Studies show that some interventions to modify product availability in specific settings show promise of effectiveness, whilst others do not. School interventions are most effective when involving multiple components. Workplace interventions seem to have a positive effect on dietary behaviour. Involvement in community gardens or participation in farmers' markets increases both fresh fruit and vegetable consumption.

Multi-component interventions

Comprehensive national multi-component programmes to promote healthy eating appear to show the greatest promise for nutrition policy. These interventions are most effective when they simultaneously target many levels, or provide a comprehensive approach to foods or nutrients as in Finland.

Salt

Emerging evidence suggests the introduction of taxes and subsidies may be effective in reducing salt intake;

product reformulation may also be effective, but is most promising when reductions are mandatory rather than voluntary; and there is mixed evidence for the effects of dietary advice. Multi-component interventions may also be powerful, and appear promising. There is compelling evidence from Finland that comprehensive interventions incorporating all of the four P's have led to substantial reductions in sodium intake. There is limited evidence on the effectiveness of other interventions to reduce dietary salt intake. Notable gaps include the effects of place-based interventions (targeting schools, workplaces and community settings). Here, lessons can perhaps be learnt from the impact of generic healthy eating campaigns (targeting school dinners, vending machines, etc.).

Fats

Population-wide policies to reduce dietary fat intake have not been widely evaluated, apart from trans fat bans, detailed below. All studies report consumption, rather than health outcomes. Modelling studies suggest that pricing interventions may be effective in certain settings. There is some evidence for the effects of product interventions (reformulation). There is mixed evidence, from weak studies (uncontrolled, brief intervention period and follow-up), for the effects of multi-component interventions.

Fruit and vegetables

Estimates using existing data suggest fruit and vegetable subsidies may be effective at reducing cardiovascular disease. Accessibility of local food stores and fast food outlets may impact on fruit and vegetable consumption. However, effects are not always in the direction expected. Involvement in community gardens may increase fresh fruit and vegetable consumption. School interventions (involving education, behavioural skills, gardens and provision of free fruit and vegetables) appeared to increase the intake of fresh produce, possibly more for fruits than for vegetables. Health promotion campaigns (such as "5 a day") appear to be effective at increasing fruit and vegetable intake. However, the effects of education (in the community and the workplace) appear less effective. Multi-component interventions are often effective at increasing fruit and vegetable intake.

Healthy eating initiatives

Taxes and subsidies appear to be highly effective at reducing consumption of unhealthy foods and drinks. The larger the taxes/subsidies the greater the effects. There is mixed evidence for the effects of school interventions. They appear most effective when they comprise many components. Workplace interventions seem to have a positive effect on dietary behaviour, in some studies this was maintained in the long term. More studies are needed to determine the effects on BMI. There is some evidence to suggest that farmers' markets and community gardens are effective at promoting healthy eating in adults and youth; although they may have more of an impact on vegetable, rather than fruit, intake. There appears to be a consistent link between the use of nutrition labels and healthier diets. However, the effect varies across subgroups. There is some weak and inconsistent evidence for the effects of calorie labelling of cafeteria or restaurant menu items. In the last few years, scientific research has strengthened the evidence base demonstrating links between the exposure of children to marketing messages and consequential changes in their dietary behaviour, thus reinforcing the case for intervention (WHO 2013). More evidence is needed to examine the possible effects of public information campaigns. Health education for children appears to have positive effects on anthropometry. However, health education does not seem to affect consumption among adults. There is consistent evidence for the positive effects of national multi-component interventions in terms of consumption and CVD outcomes.

In summary, population-wide policy actions to promote a healthy diet offer potentially large benefits in terms of reducing the CVD burden. However, not all interventions are equally effective. Furthermore, the complex nature of developing and implementing these policies leads to a lack of data on their effectiveness. The evidence is most convincing for comprehensive, multi-nutrient interventions, especially those targeted at decreasing salt or saturated fats or from increasing fruit and vegetable consumption.

2. Literature review on cost-effectiveness of dietary interventions

There was neither time nor resources to conduct a full systematic literature review on this complex topic. However, other, recent reviews suggest that effective population-wide interventions consistently appear to be cost saving (NICE 2010; Barton et al 2011; Scarborough et al 2011; Bibbins-Domingo et al 2012).

3. Nutrition database and interviews with key informants

The 30 European countries included in the database part of the study are at very different stages of addressing diet-related aspects of cardiovascular disease prevention. Success of policy implementation is very variable. In addition, participants lamented the fact that very few policies in their countries had been evaluated rigorously, even where they had been successfully implemented.

Price

Food taxes are currently used in some of the 14 countries studied. Finland taxes sugary food items (soft drinks, ice cream, and chocolate). Portugal has a value added tax on salty products. Other European countries that levy taxes, include Norway (which taxes sugar and chocolate) Hungary (since 2011, Hungary taxes foods with high salt and sugar levels -initially salty or sweet biscuits, chocolates, ice creams, energy drinks, pre-packaged cakes and crisps); and France (sugar sweetened beverages since 2012).

Subsidies for fruit and vegetables in schools are almost universal across Europe, commonly through the EU School Fruit Scheme (voluntary and requiring government-matched funding). Implementation of the Scheme differs across EU countries, for example coordination at national level versus coordination at regional level.

There was clear support from the interview participants regarding price-based interventions. The commonest support was for taxes on products high in sugar (including sugar-sweetened beverages) and subsidies for fruit and vegetables. Many of the participants noted the challenges to taxing these products, such as the current financial crisis and resistance from the food industry.

Product

The nutritional quality of all food, including mainstream foods is coming under increasing scrutiny. Voluntary reformulation of foods by both transnational and national food industries is common across Europe, especially for salt, sugar and total fat.

Some countries have taken a legislative approach to salt reduction, particularly in bread (Belgium, Bulgaria, Greece, Hungary, Netherlands, Portugal, Slovenia). Other products being reformulated via a legislative approach include processed meat and dairy products (Bulgaria, Finland, Latvia, Slovenia). Legislation limiting the amount of industrially produced trans fatty acids exists in Denmark, Iceland, Austria and Switzerland. Hungary and Norway have notified the European Commission that they will introduce regulatory limits (Hungary from 1/1/2014).

Interview participants generally agreed that mandatory measures regarding the reformulation of products were more effective, but currently are still limited to relatively few European countries.

Interview participants noted that initiatives for labelling of certain foodstuffs as healthy have been implemented in their countries, for example, the Nordic Keyhole symbol and the Finnish Heart symbol. However, they felt that labelling presentation and the information provided vary widely. Some key informants commented that surveys had been conducted to ascertain consumers' use and understanding of nutrition labelling. Findings indicated that although consumers may look at nutrition labelling, they remain confused by the information presented. Other countries, where interviews were not conducted also have national labelling schemes for healthier food, e.g. the Netherlands.

Promotion

Dialogue with the food industry and other key stakeholders is common, as are recommendations and guidelines. Information and education campaigns are widespread and are aimed at both the general population as well as more targeted groups such as school children. Many include general healthy eating messages; some countries have also highlighted specific nutritional topics such as salt or fruit and vegetables.

Interview participants mostly noted the importance of health education and promotion campaigns but were quick to point out that they were only really effective if used in conjunction with other more powerful interventions. There was a general view that health promotion campaigns were relatively easy (i.e. not controversial) and politically feasible to undertake.

Place

The physical locations where we eat or buy food has an important impact on our diets. Actions in schools are common but vary between countries. They include subsidised or free school lunches; bans on vending machines in schools and removing energy-dense foods from school lunches. Nutritional guidelines for schools are also common. Workplace interventions are less common. Some countries have guidelines or requirements for foods consumed or vended in public institutions other than schools, for example, Wales has mandatory requirements for foods vended in hospitals, requiring caterers to vend lower salt products; and Finland has nutritional guidelines for Universities and older people's establishments.

Interview participants noted that more could be done to improve the availability of healthier foods in public institutions, including prisons, sports, and leisure facilities. There was a general feeling that more should be done regarding procurement of healthier foodstuffs for all public institutions. Participants also linked procurement into issues of sustainability and food security.

4. Policy modeling

Our original hypothesis stated *"the countries with the largest number of established, effective CVD prevention policies have achieved the biggest reductions in population smoking, blood pressure and cholesterol levels".* There are many potential explanations for the absence of strong correlations. First, we considered a relatively small sample of countries that then has limited statistical power to detect weak or moderate correlations. Secondly, the present scoring system does not weight the individual domains – the "4Ps". For example, the "health education" domain is assumed to have the same effect as limiting trans fats or decreasing the amount of salt in processed food, whereas their population impact is likely to be different. Furthermore, the temporal relationships between policies and outcomes was not explicitly modelled. Many policies might be only recently introduced/implemented or in development, and thus with limited or no effects on CVD outcomes. Thus an intensity score might correlate better with FUTURE trends and not necessarily with past trends. For example, most of the central European decline in CHD mortality happened when the large subsidies for meat and fat collapsed (Zatonski et al 2008), rather than as a result of the more recent adoption of evidence based diet policies. This is not proof of lack of effect of evidence based policies, but highlights that the temporal evolution of the CVD epidemic is complex. Many determinants are operating simultaneously, making attribution of effects to specific policies or events very difficult and perhaps ambitious. However, this Polish example, and many other natural experiments consistently suggest that policies which "emulate" those population-wide events could result in rapid and substantial decreases in disease burden (Capewell and O'Flaherty 2011; Mozaffarian 2011).

The preliminary models score the implementation of a given policy very crudely. For instance, the enforcement of a given legislation could be in place, but it is plausible that differing capacity levels for enforcement might result in very different effect sizes attributable to a given policy. Capacity level is recognised to be an important feature of the tobacco policy scores (Joossens and Raw 2006), (Stilman et al 2006). And defining capacity levels for food policy enforcement, development or implementation is clearly going to be far more complicated than tobacco control.

Indeed, the causal relationship between food-related policies and outcomes is likely to be very complex. A policy intensity score might not correlate with a single risk factor (e.g. two countries can have similar scores but based on policies aimed at two different determinants). In addition, there could be different lag times or complex confounding pathways linked to key determinants. It is therefore perhaps too early to refute or confirm this hypothesis on the basis of the sparse and limited results thus far available from these initial pilot studies. However, this is a very preliminary analysis, and the results should therefore be treated with caution. The hypothesis remains plausible and attractive, and represents a high priority for future work.

Conclusions

Work package 5 of EuroHeart II proved a very ambitious project. Though not perfect, we suggest that the emerging findings might still offer potentially valuable pointers when formulating future CVD prevention strategies, particularly in terms of promoting healthier diets.

Information on the effectiveness of population-wide nutrition policy interventions was reviewed, assessed and categorised using the "4Ps" framework: Price, Product, Promotion & Place. Individual reviews were produced for salt; fats (including trans fats, saturated fats and total fats); fruit and vegetables and generic healthy eating initiatives.

The aim of population-based nutrition strategies is to shift towards healthy eating becoming the norm. The evidence suggests that population-wide policy actions to promote a healthy diet offer potentially large benefits in terms of reducing the CVD burden. Population-based approaches also take into account the social and economic determinants of health, and recognise (as did most participants in this project) that the responsibility for tackling major risks lies with governments as well as individuals (European Heart Network 2011).

The existing studies suggest that not all interventions are equally effective, and that the largest effects might be achieved by "upstream" comprehensive, multi-level interventions (such as those targeted at decreasing salt and trans fats, or increasing fruit and vegetable consumption). Mandatory approaches generally appear more powerful than voluntary approaches for tobacco control, alcohol control, and dietary reductions in salt or trans fats (Capewell 2013). Furthermore, effective population-wide interventions appear to be consistently cost saving (Vos et al 2010, NICE 2010, Barton 2011, Bibbins Domingo 2012).

This work provides a 2012 "snap-shot" and analysis of policy actions relating to public health nutrition for the prevention of cardiovascular diseases across Europe. First, by creating a database of food policies across all 30 European countries. In 14 European countries we performed detailed policy analysis, visits and interviews with a diverse range of local experts and stakeholders. The inclusion of visits and interviews enabled us to elicit rich detail around the extent of implementation of specific policies, and the progress towards targets specified by the individual countries.

Clearly, this project has limitations. It provides only a snapshot of activities up until 2012. We recognise that developments are ongoing and that our data may therefore not be complete, and will certainly require regular updating (in collaboration with colleagues).

However, this report clearly demonstrates that public health nutrition policies in Europe represent a complex, dynamic and rapidly changing environment. It is thus encouraging to observe that the majority of European countries are energetically engaged in activities to improve their public health nutrition. EuroHeart II work package 5 countries that demonstrate notable progress include Finland, Iceland, Portugal and perhaps England. France and Hungary also demonstrate progress.

We therefore now propose future work to identify and evaluate population-based policy actions carried out across the entire WHO European Region. The policy actions identified will then expand and refine the existing evidence base. This information could then support the development of a nutrition policy assessment tool for each country to use to promote healthier food strategies.

Meanwhile, there is no room for complacency. The coverage and implementation of existing policies remains patchy and variable, from non-existent to extensive. Furthermore, many European countries fall well short in their use of the most effective and powerful upstream interventions. Yet evidence suggests that the largest effects might be achieved by upstream, comprehensive multi-level interventions: legislation, regulation, taxation and subsidies.

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Appendices

Appendix 1. Advisory Group Membership

Dr Elspeth Anwar, Academic Clinical Fellow, University of Liverpool

Dr Helen Bromley, Research Fellow, University of Liverpool

Nicola Calder, Research Associate, University of Liverpool

Professor Simon Capewell, Professor of Clinical Epidemiology, University of Liverpool

Dr Maria Guzman Castillo, Research Fellow, University of Liverpool

Dr Corinna Hawkes, Head of Policy and Public Affairs, World Cancer Research Fund International

Dr Ffion Lloyd-Williams, Research Fellow, University of Liverpool

Dr Rory McGill, Research Associate, University of Liverpool

Dr May Moonan, Clinical Lecturer, University of Liverpool

Dr Martin O'Flaherty, Senior Lecturer, University of Liverpool

Dr Lois Orton, Research Associate, University of Liverpool

Dr Mike Rayner, HPRG, University of Oxford

Dr David Taylor-Robinson, Clinical Lecturer, University of Liverpool.

Appendix 2. Literature Review Protocol

Effectiveness of dietary actions to improve healthy eating
An umbrella Review
PROTOCOL

Objectives

The primary objective is to review the evidence on the effectiveness of actions to improve healthy eating. Secondary objectives are to review the evidence on the equity and unintended effects of actions to improve healthy eating.

Criteria for considering studies for this review

In order to address the review objectives we will seek existing systematic reviews to address a range of actions to improve healthy eating in terms of the dietary factors of salt, sugar, trans fats, saturated fat, total fat and fruit and vegetables, based on the following framework (adapted from the four P's of marketing):

- Price – taxes, subsidies, economic incentives
- Product – reformulation
- Place – schools (e.g. vending machines), work places, planning (e.g., supermarkets)
- Promotion – advertising/marketing, labelling, recommendations/guidelines;

Where systematic reviews do not exist, an overview of primary studies will be provided.
Inclusion and exclusion criteria are detailed below.

Include:

- Systematic reviews/studies reporting a quantitative assessment of the effectiveness (in terms of consumption, clinical/physiological, behavioural, knowledge or self-efficacy/skills/competency outcomes), equity (differential effects by group) or unintended effects of action to improve healthy eating.
- Actions must involve a policy, programme, pledge or strategy to improve people's healthy eating OR to change awareness, knowledge and/or attitudes towards healthy eating, improve self-efficacy, skill or competency concerning these behaviours.

Exclude:

- Non-systematic overviews and opinion articles will be used only as a source of primary studies (where systematic reviews do not exist or are out of date).
- Qualitative evaluations.
- Reviews/studies of under-nutrition.

Search strategy for identification of studies

Stage One: Key informants will be asked to highlight key studies for the range of actions for each dietary factor. In addition, key websites will be screened, including: the National Heart Forum, the European Heart Network, the World Health Organisation (including PAHO and ECHP), the World Bank, the Kings Fund, the Cochrane Collaboration, the Campbell Collaboration, the Centre for Reviews and Dissemination, and Bandolier.

Stage two: Once key studies have been identified for each action and dietary factor, these papers will be used to identify terms to be used in targeted searches of the following electronic databases: MEDLINE; SCI; AGRICOLA; EMERALD; ERIC; SCOPUS; PsychInfo, CDSR; The Campbell Library; CRD Wider Public Health database; EPPI Centre database of health promotion and public health studies. Targeted searches will also be conducted in Google Scholar. Reference lists of included articles will also be scanned.

Screening of potentially eligible studies

LO will screen titles and abstracts of all items retrieved to identify potentially eligible studies based on the inclusion/exclusion criteria. All articles deemed potentially eligible will be retrieved in full text. Full text articles will be screened for inclusion by LO and SC based on the inclusion/exclusion criteria, above.

Data extraction

Data will be extracted into pre-designed and piloted forms. Data to be extracted include: study aim; methods; participants; policies analysed; geographical scope; length of follow-up; and outcomes (effect/response). Owing to logistical and time constraints, it will not be possible to contact study authors for any unclear, missing or additional data.

Assessment of methodological quality

For systematic review, the following ten criteria will be rated as "met," "unclear/partly met," or "not met" (adapted from Moe 2007):

1. Does the review address a clearly defined question?
2. Is the search strategy described in enough detail for the search to be reproducible?
3. Was the search for evidence reasonably comprehensive?
4. Were the criteria used for deciding which studies to include in the review reported?
5. Was bias in the selection of articles avoided?
6. Were the criteria used for assessing the validity of the studies that were reviewed reported?
7. Was the validity of all of the studies referred to in the text assessed using appropriate criteria in analysing the studies that are cited?
8. Were the methods used to combine the findings of the relevant studies (to reach a conclusion) reported?
9. Were the findings of the relevant studies combined (or not combined) and analysed appropriately relative to the primary question the review addresses and the available data?
10. Were the conclusions made by the author(s) supported by the data or the analysis reported in the review?

Data synthesis

The data from included studies will be synthesised as a narrative review (Mays 2005; Popay 2003), including the following features:

- Data will be analysed thematically.
- Data will be organised by healthy eating action (and then nutrient?).
- Contradictory findings will be explained in terms of the methods used, study quality and samples accessed/setting.
- Data will be presented narratively, with tables and graphical displays (where appropriate).

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Appendix 3. Interviewee information sheet

Identifying exemplar effective and cost-effective cardiovascular disease prevention policies across the EU: a mixed methods study

PARTICIPANT INFORMATION SHEET

Dear Participant,

You are being asked to take part in a research project. Before you make a decision, it is important that you understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. If there is anything that is unclear, or if you would like more information, please ask. Take time to decide whether or not you wish to take part.

Thank you for reading this letter.

1. **What is the purpose of the study?**

   The aim is to explore the effectiveness and cost-effectiveness of cardiovascular disease (CVD) prevention policies in your country.

2. **Why have I been invited?**

   You have been invited because you are involved at the national level in activities relevant to cardiovascular disease prevention.

3. **Do I have to take part?**

   You can decide whether or not you want to take part. If you decide to take part you will be given this information sheet to keep and will be asked to sign a consent form. If you decide to take part you are still free to stop taking part at any time without giving a reason.

4. **What will happen to me if I take part?**

   You will be asked some questions about the CVD prevention and food policies that exist in your country and your opinions on their effectiveness and cost-effectiveness. These will be asked by the researcher. There are no right or wrong answers; we are interested to hear about your experiences and perceptions. This interview should take no longer than 1 hour (but can take longer if you wish). If you agree, your views will be audio-taped and listened to by the research team from the University of Liverpool. Otherwise, written notes will be taken. All material will remain confidential and will be made anonymous.

5. **What will I have to do?**

   You will simply have a discussion with the researcher. You can end this discussion at any time.

6. **What are the possible disadvantages and risks of taking part?**

   There are few risks to taking part in this study. However, if you wish to stop at any point we will end the session.

7. **What are the possible benefits of taking part?**

   There are no direct benefits from taking part. However, we hope you will find the discussion interesting. We also hope the information we get from this study will help improve evidence-based planning for CVD prevention across Europe.

8. **What if something goes wrong?**

   If you wish to make a complaint about this study you may contact Dr Helen Bromley or Professor Simon Capewell. Their contact details are included at the end of this form. In the event of a complaint that you do not wish to take to Dr Bromley or Professor Capewell, you can contact the University Research

Governance Officer, currently Sarah Fletcher, Email: ethics@liv.ac.uk

9. Will my taking part in the study be kept confidential?

Yes. We will follow ethical and legal practice. All information about you will be handled in confidence. All information which is collected about you during the course of the research will be kept strictly confidential. Any information about you will have your name and address removed so that you cannot be recognised.

10. What will happen to the results of the research study?

The results of this study will be published as a detailed study report and as part of the EuroHeart II report. They will also be sent to national policy makers. The results will also be published in policy and medical journals. If you request them, you will be sent a copy of the papers. You will not be named in any report or publication. Only the researchers will know what you have said. None of the data from this study will be passed on. Your name and any other personal details will be removed from the information you provide. All information you provide will be seen only by the researchers and will be kept securely so no-one else can access it.

11. Who is organising and funding the research?

The European Union has funded this research, which is being carried out within the Health Inequalities Research Group, Department of Public Health and Policy, Institute of Psychology, Health and Society, University of Liverpool, UK.

12. Who has reviewed the ethical issues around this study?

The study has been reviewed by the University of Liverpool Institute of Psychology, Health and Society Ethics Committee.

13. Contact for further information

You can contact Dr Helen Bromley on 0151 794 5118 or at h.bromley@liverpool.ac.uk should you wish to ask more questions.

Thank you very much for spending time to read this information sheet.

Appendix 4. Interviewee consent form

UNIVERSITY OF LIVERPOOL

Identifying exemplar effective and cost-effective cardiovascular disease prevention policies across the EU: a mixed methods study

CONSENT TO PARTICIPATE IN RESEARCH

I confirm that I understand the information provided on the above study. I have had the opportunity to consider the information, ask questions, and have had these answered satisfactorily.

I understand that my taking part is voluntary and that I am free to withdraw at any time, without giving any reason.

I understand that my views will be audio-taped and confidentially listened to by researchers from the University of Liverpool. I give permission for these individuals to listen to the tape recordings of my views.
I understand that direct quotations may be used in published documents. I understand that any such quotation would be anonymised so that I could not be identified.

I understand that, under the Data Protection Act, I can at any time ask for access to the information I provide and I can also request the destruction of that information if I wish.

I agree to take part in the above study.

Participant identification number:

Name (BLOCK CAPITALS) .....

Signature .....

Date .....

Signature of researcher .....

Appendix 5. Interview questions

TOPIC GUIDE

Brief background of EH2. Preamble/explanations to key informant and a reminder that we are particularly interested in policies and actions on public health nutrition policy, including salt, ITFAs, saturated fats, sugar, whole grains, nuts, pulses fish, and fruit and vegetable consumption, including agricultural policies, marketing to kids etc. The aim is to interview key informants at the national level to **elicit their views on the most powerful policy options for cardiovascular disease (CVD) prevention and discuss a wide range of possible prevention strategies**

Consent

INTRODUCTION

1. *What interest does your organisation have in food and nutrition policies to prevent CVD and other non-communicable diseases?*

2. *In what ways is your country/government interested in food and nutrition policies to address cardiovascular disease and its risk factors?*

   Probe: when did the country start getting interested in food polices? Why?

3. *Is your government interested or involved with policies to address CVD etc which are non-food related?*

4. *What do you think your government is most concerned about with regard to nutrition in your country? (and why this is)*

5. *What other actors are interested in food and nutrition policies to address CVD in your country? (Probe: government entities, organisations, private sector etc)*

   (Probe: in what ways are they interested?)

EXISTING POLICIES AND ACTIONS

6. We have prepared a list of the food and nutrition policies and actions in your country to address CVD and other NCDs and their risk factors.

   (Probe: have you had a chance to look at it? Do you have it in front of you now? Is it correct? Complete? Up to date? What new developments have appeared? Has anything changed or disappeared?)

7. Have you been involved in the development and/or implementation of any of these policies? Please describe the policies and the role you play(ed).

8. In your experience, what are the key barriers to developing policies? And implementing them?

9. In your experience, what are the key things that help develop policies? And implementing them?

   (For Question 10 and 11: Probe: resources, political will, whether or not there was consensus – even in your own community, territorial differences, get them to describe examples. what kinds of. Institutions/factions and by what means? (e.g. was it played out in the media, was it commercial lobbying, was it direct attacks on the evidence?)

10. For each of the policies and actions we have listed in front of us (and any more highlighted in this interview), in your view, what have been the **effects** of each policy/action?

    (Probe: Intended and unintended effects both positive and negative

    - *What do you think the effects have been on:*
        - *health outcomes?*
        - *consumption of the targeted food/nutrient/calories (making sure you name the nutrients AND calories)*
        - *knowledge, attitudes and behaviours towards the food/nutrient/ calories,*
        - *the food environment (e.g. whether a ban on soft drinks has actually led to less soft drinks being consumed in schools)?"*

11. In your view, were/are the policies/actions **effective** in reaching their **stated objective**?

    (It is expected that some policies/actions may be more effective than others. The intention here is to draw out these differences and explore reasons why this may be so)

12. Do you think the effects of the policy are/have been **equitable** across different parts/sub-groups of the population? E.g. young/old; rich/poor; ethnic minorities etc

    (Probe for reasons why)

13. In your view, do the policies/actions represent good **value for money**?

    (Probe: in what way? Or why not?)

14. Have any of the policies/actions been **evaluated**?

    (Probe: who conducted it; what outcomes were considered; what were the conclusions; did the evaluation take equity into account; are the data publically available; where to find out further information?)

15. In your view, what are your country's **best/exemplar** food and nutrition policies/ to address CVDs?

    (Probe: Why do you think this/they are the best (reasons for choosing)?

    Which do you think was the most feasible to develop? Why?

    Which do you think is most practical to implement? Why

    Which do you think is most effective? Why?)

16. In your view, which **European** country (or countries) has (have) the best policies/actions in public health nutrition policy?

    (Probe: Why do you think this/these are the best?)

POTENTIAL POLICIES

17. What more do you think **ideally** needs to be done to improve diet in **your country**? Please select from these policy options:
    a. Legislation
    b. Regulation
    c. Taxation
    d. Subsidies
    e. Reformulation
    f. Labelling
    g. Information/education campaigns

    (Probe: Why?)

18. Which of the policy tools above do you think are the most **effective**?
19. Which of the policy tools above do you think are the most **achievable** in your country?

    (Probe: which ones are policy makers are most likely to buy into? Why? How feasible re they? How practical?)
20. In your view, do you think regulatory approaches would generally be more **effective** than voluntary ones for your country? *Why?*
21. In your view, do you think regulatory approaches would generally be more **cost-effective** than voluntary ones for your country? *Why? (By cost-effective we mean the financial and other costs of the policy compared with the numbers of CVD prevented)*
22. In developing national policies for **your country**, what would be the most **effective and cost-effective** modifiable diet-related risk factors to target? *Why?*
    a. Calories
    b. Sat fats
    c. Trans fats
    d. Sugar
    e. Salt
    f. F&V
23. In developing national policies for **your country,** what would be the most **feasible and practical** modifiable diet-related risk factors to target? *Why?*
    a. Calories
    b. Sat fats
    c. Trans fats
    d. Sugar
    e. Salt
    f. F&V

CONCLUSION

24. Is there **anything else** you would like to tell me about cardiovascular disease or public health nutrition policy in your country that we haven't yet spoken about?
25. Would you be **happy to talk to us again** if we have more questions?
    a. By email? Skype or telephone?
26. Is there anyone else in your country you think we should be talking to?
    a. (Probe – contact details for them)

Thank you very much. In terms of closing – state what will happen next - we transcribe the interview, send back to them to agree true representation, follow up any further questions as necessary.

Appendix 6. Policy actions summary

Background

Features of the system; Current nutritional challenges; Information and risk factors

Population:	Actual	Target
Mean calories available/day		
Mean calories consumed		
Fruit and vegetable consumption g/day		
Total fat		
Sat fat		
Trans fat		
Sugar (added)		
Salt		
Proportion of total population overweight		
Proportion of total population obese		

A: National Acts, Laws, legislation, Ministerial Decrees (or equivalent, that affect salt, sugar, fat, fruit and vegetables composition or consumption)

B: National public health nutrition policies/strategies/plans

C: National programmes

D: National guidelines/standards

E: Summary of actions by policy tool and nutrient (options: legislation; taxation; subsidy; reformulation; labelling; "dialogue"/recommendations/guidelines; no action

Policy tool	Action	Comments
Legislation		
Taxes		
Subsidies		
Reformulation		
Labelling		
Guidelines		
Advertising		
IEC		

F: Action by nutrient

Nutrient	Action	Comments
Salt		
Sugar		
Total fat		
Sat fat		
Trans fat		
F&V		

G: National targets, monitoring and evaluation

H: Dietary information in XX

I: Challenges to policy/activity development and M&E

J: Challenges for policy

K: Challenges for M&E

G: Actions

PRICE	
Taxes	
Subsidies	
Other	
PRODUCT	
Reformulation: mandatory (legislation or regulation)	
Reformulation: non-mandatory (government guidelines)	
Reformulation: voluntary (government-led/industry-led)	
PLACE	
Schools: mandatory (legislation or regulation)	
non-mandatory (government guidelines)	
voluntary (government-led/industry-led)	
Workplaces: mandatory (legislation or regulation)	
non-mandatory (government guidelines)	
voluntary (government-led/industry-led)	
Other settings: mandatory (legislation or regulation)	
non-mandatory (government guidelines)	
voluntary (government-led/industry-led)	
PROMOTION	
Advertising controls: children	
mandatory	
government guidelines	
voluntary	
Advertising controls: general population	
mandatory	
government guidelines	
voluntary	
Food labelling:	
mandatory	
government guidelines	
voluntary	
Dialogue/recommendations/guidelines	
HEALTH PROMOTION	
Education in schools:	
mandatory	
government guidelines	
voluntary	
Generic health education/campaigns	