Public health and nutrition economics: the numbers behind prevention

A workshop report
12–13 November 2015 • JRC Ispra • Italy

A. Lafranconi, J. Wollgast, S. Caldeira
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Foreword

The Joint Research Centre (JRC) is the European Commission’s science and knowledge service. Its mission is to support EU policies with independent evidence throughout the whole policy cycle. Among its many activities, the JRC provides policy support in the area of public health to the Directorate-General Health and Food Safety (DG SANTE) and other policy DGs.

On 12-13 November 2015, the Joint Research Centre hosted the workshop ‘Public Health and Nutrition Economics: the numbers behind prevention?’ that brought together participants from governments, academia, and other sectors with expertise in at least one of the three areas addressed (public health, nutrition, and economics). The main aims of the workshop were to explore how economic evaluations of policies and interventions could influence decision making, and to discuss successful examples, knowledge and implementation gaps, and ways forward.

This workshop report summarises the presentations given by the speakers and the exchanges that took place in dedicated breakout sessions. It also presents a qualitative analysis of key elements of successful policies and possible ways forward shared by the participants through a survey.

We would like to thank the participants for their valuable contribution during the survey, the plenary and group discussions, and for their enthusiasm and motivation that made this workshop a success.
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Authors

AL contributed to executing the workshop, co-authored the report, and handled its editing and publication. SC and JW conceived and organised the workshop, contributed to executing it, and co-authored the report.

‘Without evidence of effectiveness, there can be no cost-effectiveness: cost-effectiveness can’t be a way to overcome lack of evidence on effectiveness’.

Giovanni Fattore, workshop participant
Executive summary

The social and economic burden of chronic diseases is on the rise and is projected to show steeper increases in the future, especially in less developed economies and among the poor in middle- and high-income countries. Chronic disease risk factors associated with poor dietary habits are, to a great extent, modifiable and preventable. Interventions aimed at modifying these have the potential to reduce a sizable fraction of chronic disease incidence and prevalence. Economic evaluations of such interventions are important as they can inform and guide decision-making at various levels.

On 12-13 November 2015, the JRC hosted a workshop entitled ‘Public health and nutrition economics: the numbers behind prevention?’ at its site in Ispra, Italy. Thirty one participants from national and international decision-making bodies, academia and non-governmental organizations shared their experience in performing or using economic evaluations in the area of public health, addressed gaps and barriers, and suggested promising ways forward.

The need for more and better action in the area of prevention of chronic diseases was clearly put forward. Beyond the obvious aspiration to build healthier societies where wellbeing goes hand in hand with productivity and growth, there is a financial argument that cannot be overlooked.

Take, for example, the relationship between obesity and economic burden on health systems: patients with obesity use more healthcare services and cost more than patients with a normal weight (8% and 12% more in US and EU, respectively). Along with ageing, obesity will play a key role in shaping the future use of healthcare services. Preventive actions, from education and counselling to regulation and fiscal measures, can have a great impact on national healthcare expenditure.

Albeit the paucity of economic evidence in this area, the majority of public health economic evaluations conducted show that nutrition-based interventions aimed

at reducing incidence of chronic disease are cost-saving or cost-effective, with salt-related interventions being particularly cost-effective and even cost-saving.

**What’s being done**

Economic evaluations have a more prominent role to play in policy-making in this field. At the EU level, for example, they should be included more often in the impact assessments requested for Commission initiatives that are likely to have significant economic, environmental, or social impacts, where policy alternatives should be compared in terms of expected costs and benefits.

Some EU-funded projects such as Economics of Chronic Diseases (EConDa) and the Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life-Cycle (JA-CHRODIS) and Joint Action on Nutrition and Physical Activity (JANPA) are already taking a step in this direction and addressing or including evidence on the economics of chronic diseases to inform the development of future policies. There are methodological challenges to be addressed in this area but also many ideas and great motivation to tackle them.

**What’s next**

To give more impetus to the field, there are four main areas for future action:

• adapt the traditional framework of economic analysis so it is more relevant to public health economics (PHE);
• this will include reconsidering existing methodologies and combining different approaches, to capture costs and benefits for all stakeholders involved;
• rigorously monitor and evaluate public health interventions so that their effectiveness is clear and the data can be used for further economic evaluations, ramping up surveillance efforts at different levels;
• share and disseminate know-how and create platforms and spaces for the field to further develop, e.g. drafting and provision of toolkits and manuals.

The JRC, as the European Commission’s science and knowledge service, will strive to apply sound PHE in its work and support the development of the field.
We hope that all the participants and readers of this report will also contribute, and promote in their settings not only the field of PHE but also use the evidence it generates for better policy making.

**Setting the scene**

**Background**

In both the EU28 and the E&IA countries, the prevalence of non-communicable diseases (NCDs) is worryingly high and public budgets are constrained. The estimated healthcare costs for cardiovascular diseases (CVDs), type 2 diabetes, and various types of cancers were:

- around €106 billion a year for CVDs, in 2009, in the EU;
- around €145 billion for diabetes, in 2015, in the European Region;
- around €51 billion a year for cancers, in 2009, in the EU.

Non-healthcare costs further increase the burden: in the EU, CVDs were responsible for over 45 billion in productivity losses and over 43 billion in informal/family care spending, while cancers cost over €50 billion in productivity losses and €20 billion in informal/family care spending, in 2009. The problem is not limited to Europe and it is expected to worsen; according to the World Economic Forum, ‘over the next 20 years, NCDs will cost more than US$ 30 trillion, representing 48% of global GDP in 2010’.

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2. Within the frame of the E&IA, the countries we are targeting are: New Member State (Croatia), Candidate Countries (Albania, Iceland, Montenegro, Serbia, Turkey and the former Yugoslav Republic of Macedonia), Potential Candidate Countries (Bosnia and Herzegovina, and Kosovo), non-EU Associated Countries to ‘Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020)’ (Israel, Moldova, Norway, and Faroe Islands) as well as European Neighbourhood Policy Partner Countries (Algeria, Armenia, Azerbaijan, Belarus, Egypt, Georgia, Israel, Jordan, Lebanon, Libya, Moldova, Morocco, Occupied Palestinian Territory, Syria, Tunisia, and Ukraine).


Primary prevention of disease has been repeatedly shown to be cost effective, yet health expenditure is only seldom allocated to prevention: according to OECD data, spending on disease prevention accounts for only 3% of total health spending, and between 2009 and 2014, spending on preventive care contracted by 1.9% on an annual basis.7 Economic evaluations of public health policies and interventions could inform decision-making and facilitate an optimum allocation of scarce health resources. In this context, nutrition-economic evaluation studies are very promising.

**Aim and objectives of the workshop**

The workshop aimed at sharing PHE case studies that have informed or influenced decision making, and to identify areas where additional considerations are needed.

Particular relevance was given to issues such as the methodology for the economic evaluation of nutrition interventions and beyond, the choice of health or economic outcome indicators, and types of NCD prevention-related policies or interventions to be tested. In particular, data availability, feasibility of studies in proposed public health areas, assumptions and methodological challenges, robustness of PHE modelling and communication barriers were discussed.

**Specific objectives of the workshop were:**

- to share case studies and best practices in the field of PHE;
- to raise awareness on the methodologies and the potential of such studies to inform policy making;
- to define the areas (on NCDs, public health and prevention) where additional economic considerations are needed to inform decision making;
- to enable real-time reality checks with experts on the feasibility of studies in the defined areas (e.g. availability of data);
- to promote collaboration between different fields, academics and decision makers to trial new PHE studies.

1. Highlights from Plenary Sessions

1.1. Evidence-based decision-making in public health

Avi Israeli (Ministry of Health, Israel) opened the plenary sessions and shared his experience of real-life evidence-based decision-making as a Director-General of the Israel Ministry of Health (2003-2009). His statement: ‘You never have enough data to make a decision, therefore the main question is: to intervene or not to intervene?’ clearly showed the often uncomfortable position of a decision maker. What are the questions one needs to consider when deciding if and how to intervene, and in which form – through regulation, guidelines, incentives, disincentives, education?

Avi’s talk took the audience through many questions that need answers if one is to decide whether or not to intervene: Is there a market failure, for example? What are the health consequences of interfering or not? How many people are affected? How many people will we reach? What are the consequences on vulnerable groups or health inequalities? Can populations or single individuals be ‘hurt’ by the proposed intervention? What is the outcome of a cost-benefit analysis but also risk assessment? What are the barriers for implementation?

The consideration whether to introduce mandatory or promote voluntary fortification (folic acid, iron, iodine or vitamin D) of foodstuffs such as flour, bread, and milk in Israel is a good example to illustrate some of these questions and how they have been answered. Although without an initial consensus among stakeholders, from a public health perspective the need for fortified food was clear, especially for certain sub-populations such as pregnant women (of which 40% suffer from iron-deficiency anemia) as well as Jewish ultra-orthodox and Arabs with low vitamin D levels due to limited exposure to sunlight. Both government and academia began building a consensus at the population level on the need for food fortification and this created the demand for fortified products, which are now available in Israel. Importantly, the preference was towards flour fortification rather than bread as some population sub-groups, such as the Bedouins, prepare their own bread from flour. As a consequence of asking the right questions ahead of time, a possible increase in diet inequalities was averted.
The Israeli ‘2012 Models Law’ (which imposes a minimum BMI of 18.5 on models and also targets ‘Photoshop practices’) was discussed as an example of a decision that was not informed by scientific evidence, as at the time there were no proven effects that such a law would have consequences on anorexia at the population level as a whole. The legislation was not proposed by the Ministry of Health, but was put forward by the Parliament. Avi also discussed cases where the lack of clarity on the health benefits of particular interventions or policies queries the need or the validity of these interventions – one example is exposure to cellular radiation from mobile phones, where, as it stands, it is preferable to use soft regulation instruments, such as guidelines. A contrasting example is the introduction of universal rotavirus immunization in infants, which started in 2010 in Israel: health benefits are clear, in the reduction of rotavirus gastroenteritis hospitalisations and in the reduction of clinic visits performed.

A last consideration which guides decision-making lies in the feasibility of the monitoring processes: while vaccination for example is easily monitored and measured by injected doses and reduced ill-health outcomes, there are other cases where monitoring and enforcement are difficult. Monitoring and evaluation are essential aspects, as any intervention should indeed be evaluated and re-evaluated for better evidence-based decision-making processes at home and internationally.

1.2. The costs of unhealthy diets and physical inactivity

Michele Cecchini (OECD and Imperial College London) started by showing that obesity rates have been increasing over the past years and are predicted to continue increasing worldwide. Indeed, his projections indicate that by 2020 the vast majority of populations in Western countries will be overweight or obese.

His most recent analysis focuses on the economic costs of obesity on healthcare systems; looking at the relative costs of patients in health care settings, Michele showed that patients with obesity use more healthcare services and cost more than patients with a normal weight (8% and 12% more in US and EU, respectively). Along with ageing, obesity will play a key role in shaping the future use of healthcare services – for example taking the year 2000 as a baseline, it is projected that by 2025 the total health expenditure will almost double, and the
contributions of increased BMI and ageing will be approximately 10% and 15%, respectively.\(^8\)

One important way to address this issue is – and will be – through the prevention of chronic diseases. Another study carried out by Michele has found that preventive actions (including education, counseling, but also regulation and fiscal measures) can have a great impact on national healthcare expenditure and the use of healthcare services in the USA. For instance, interventions such as physician and dietician counselling in a primary care setting or long-term drug treatment have the potential to decrease the total healthcare expenditure related to obesity and associated medical conditions by more than 2 billion US-$ per year.\(^9\) Such expenditure reductions are mainly attributable to reduced use and costs of inpatient care, followed by the reduced use of drugs (which shows the highest decrease, if measured as variation of absolute numbers rather than as variation of expenditure).

Along these lines, Michele also discussed an upcoming OECD and European Commission project on the economic burden of obesity on healthcare, whose results may help making the case for further investments in the prevention of overweight and obesity.

### 1.3. Economic evaluation of public health interventions

**Marc Suhrcke** (Centre for Health Economics, University of York) addressed the question of whether public health interventions are good ‘value for money’ and how we can evaluate that. Marc started by making the case that the public expenditure on prevention and public health does not appear to be a top priority – judging by its low levels – and questioned whether one of the reasons could be the scarcity of cost-effectiveness evidence in public health.

> ‘Although there is often evidence on the scientific justification for action and for some specific interventions, there is generally little evidence about the cost-effectiveness of public health and preventative policies or their practical

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Economic evaluations of prevention and public health interventions remain largely unaddressed for reasons such as low funding, low interest from the community, and the difficulties in performing them. Yet, we can define ‘value for money’ through economic evaluations, usually in the form of cost-effective analysis (CEA), which is a comparison of two or more courses of action in terms of both cost and consequences (in this case health outcomes). Marc presented some of the attempts to frame and answer the economic question behind prevention and public health interventions.

For example, a systematic review of cost-effectiveness of 205 nutrition-related interventions\textsuperscript{11} indicates, albeit with a number of caveats related to the interventions, methodology, or publication bias, that the majority of these types of intervention are cost-saving or cost-effective, with salt-related interventions being particularly cost-effective or even cost-saving. Some encouraging evidence suggests particularly favourable cost-effectiveness of population-level interventions.

Economic evaluations of public health interventions are not simple endeavours and Marc listed four issues\textsuperscript{12} that deserve attention:

- How to measure and attribute effects – public health interventions are often targeted at populations rather than at specific individuals, their impacts happen over long time periods and Randomised Controlled Trials (RCTs) for comparing relevant alternatives are rarely undertaken (or applicable).
- How to measure and value outcomes – health outcomes such as Quality-Adjusted Life Years (QALYs) may be inadequate; it may be necessary to measure the effect on individuals not directly targeted by the intervention and non-health benefits are also important in this context.
- Identifying inter-sectoral costs and consequences, such as productivity changes

\textsuperscript{11} Cobiac et al., Annual review of nutrition, 2013, 33, 373-93. \url{https://dx.doi.org/10.1146/annurev-nutr-071812-161133}.
\textsuperscript{12} Weatherly et al., Health policy, 2009, 93(2), 85-92. \url{http://dx.doi.org/10.1016/j.healthpol.2009.07.012}. 
or price changes (for example in the case of nutrient taxes or marketing restrictions), and their impact on the food industry and consumers.

- Incorporating equity considerations, which are not considered by CEA.

Despite the challenges, the conclusions from Marc’s talk were: 1) beyond health gains, public health interventions can truly be cost-effective and cost-saving, and 2) more cost-effectiveness evidence is needed in public health to make this point and better tools are needed to develop it.

1.4. The need to demonstrate impact of EU policies in nutrition and physical activity

Artur Furtado (DG SANTE) started his talk by highlighting – as Avi had previously done – the importance of evaluating and demonstrating the consequences and impacts of implemented policies. This is essential to justify how public money is used and prioritized, but also to allow for learning and continuous policy improvement. Policy-making is constantly competing against inactivity, but inactivity has costs, too. The often repeated request and claim that ‘more research is needed’ is by itself unfortunately of limited value for policy-makers.

In the area of public health and in particular in the areas of nutrition and physical activity, Artur explained that while the subsidiarity principle requires that most health-related matters be handled at national level, there is much EU added-value coming, for example, from sharing best practices, benchmarking, or developing common voluntary approaches. An example is the work done over the years at the High level Group on Nutrition and Physical activity. Initiating action at the EU level requires a series of procedures (roadmaps, impact assessments, and evaluations) that aim at justifying and indeed evaluate (also ex-ante) such action.

Other relevant examples, with a EU remit, of evidence-based assessments of health care systems and policies include the work of the European Health Systems Observatory or the OECD work on economics of prevention (co-financed by the EU). Other projects funded by the EU such as Econda13 or the JA-CHRODIS14

and JANPA\textsuperscript{15} (see contribution from Kevin Balanda, below) and Preparatory Actions have also addressed the economics of chronic disease.

It is important to note here that reducing expenditure is not and should not be the sole goal of interventions in this area. Artur also reflected on areas where more and/or better evidence would be helpful to support stronger and even more ambitious policy making: reduction of sugar in sugar-sweetened beverages (SSB), food reformulation (including increased use of wholegrain), initiatives to make water available in the classrooms, and initiatives to make school sport infrastructures open after hours to the general public.

1.5. Science advice to policy and health economics

Andrea Saltelli (European Centre for Governance in Complexity, University of Bergen, and Universitat Autònoma de Barcelona) opened his talk by asking: how can science give policy advice? And how can it do it at times of science’s crisis?

Andrea explained the concept of post-normal science (PNS), an approach for the use of science on issues where ‘facts are uncertain, values in dispute, stakes high, and decisions urgent’.\textsuperscript{16} PNS challenges absolute truths and brings forward the idea that science is but one among a plurality of relevant knowledge and that, in areas such as science advice to policy, scientists must acknowledge and work within imperfections and adopt a ‘co-production of knowledge’ model, where there is extended participation across disciplines and communities (including citizens, experts and stakeholders). In addition to the points of working deliberatively within imperfections and engaging with new forms of science, including citizen-generated content, Andrea also highlighted the need to foster skills for responsible use of quantitative information. This last point is particularly relevant within the context of public health economics, cost-benefit, cost-effectiveness and other types of analysis or models used in this discipline. For example, quantitative story-telling can

\textsuperscript{15} Janpa. JANPA. http://www.janpa.eu/.
be a valid tool when the alternative is spurious quantification. Beyond sensitivity analysis, sensitivity auditing\(^7\) can also be used in this regard.

### 1.6. Comparing alternative nutrition policies: what else matters?

**Jan Wollgast** (JRC) followed on from Artur to explain one of the EU evaluation tools - Impact Assessments (IA). According to the Commission Better Regulation Agenda, ‘an IA is required for Commission initiatives that are likely to have significant economic, environmental or social impacts’.\(^8\) Science (and quantification) has a crucial role in the IA process, and specifically in: (i) defining and describing a problem, (ii) measuring and quantifying economic, social and environmental impacts, and (iii) comparing different options in terms of economic, environmental, or social impacts, which can benefit from quantifying costs and benefits.

Albeit not representing (yet) a formal impact assessment, the recent European Commission’s report on trans-fatty acids (TFA)\(^9\) was presented as an example of how these 3 points have been addressed. TFA are a nutrition and public health challenge in the EU: while the average population TFA intake is below the threshold recommended by the World Health Organization (WHO) (<1% of total energy intake),\(^10\) certain population sub-groups have a higher exposure than average and, in order to further reduce the exposure for (virtually) all EU citizens, various policy options are currently considered in the EU; these include a legal limit on iTFA content in food, mandatory TFA labelling and voluntary reformulation to reduce iTFA presence in foods. For each, Jan referred to issues that need to be discussed for a proper assessment of their impact such as public health benefits, costs to the public, changes related to trade and internal market, health inequalities, and proportionality of the measure.

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Carlos Martín Saborido (Universidad Francisco de Vitoria) then presented a public health economic analysis of how the three different policy options are projected to act to reduce TFA consumption in the EU population as well as to effect heart disease and future public spending.\(^\text{21}\)

The model that Carlos developed indicates the added value of an EU-level action, either via a legal limit or through voluntary agreements, with the legal limit option producing the highest additional health benefits measured as Disability-Adjusted Life Years (DALYs) and Coronary Heart Disease (CHD) events and deaths averted. The costs calculated were healthcare costs, non-healthcare (loss of productivity and informal care) costs, and costs of policy-associated measures.

In line with Andrea’s suggestions, Carlos devoted a considerable part of his study and talk to explore the uncertainties that underlie the model calculations. Carlos referred to some major sources of potential errors such as the uncertainty around the current iTFA intake estimates or lack of data in some instances, *e.g.* on CHD incidence. To address the first, the study explored different scenarios where baseline intakes from iTFA started at 50 to 230% of the best estimate derived for this study. Lastly, Carlos also explained how a probabilistic sensitivity analysis of the model outcomes was conducted and how the results reassured the initial conclusions.

### 1.7. What is nutrition economics? Building a community of nutrition economics

Iñaki Gutiérrez-Ibarluzea (Basque Office for Health Technology Assessment) explored how Health Technology Assessment (HTA)\(^\text{22}\) tools can be used to address nutrition-related issues. The impacts of nutrition-related diseases and disorders on the healthcare and social systems make nutrition an interesting area for HTA. Yet, Iñaki highlighted a series of methodological challenges that arise when assessing the impact of public health interventions, and nutrition in particular, through HTA.

22. ‘HTA has been defined as the systematic evaluation of the properties and effects of a health technology, addressing the direct and intended effects of this technology, as well as its indirect and unintended consequences, and aimed mainly at informing decision making regarding health technologies; HTA should be conducted by interdisciplinary groups using explicit analytical frameworks drawing from a variety of methods’ (INAHTA 2009).
For example:

- There is a long time-lag between exposure and outcomes (it is often more practical to measure risk factors instead of disease outcomes);
- Lifestyle interventions affect several diseases (or risk factors);
- Many interventions affect the social environment (thus making it difficult to compare to a relevant control group);
- RCTs are often not a valid or feasible option;
- Calculation of Return on Investment (ROI) is challenging for various reasons, such as: the range of people involved in decision-making, the multiple data sources and tools in use, the lack of familiarity with (and understanding of) economic metrics, the different views within and across local authorities, and, last but not least, the fact that different criteria prioritisations lead to different decisions;
- Classical economic metrics may not be applicable to nutrition as it includes also the social dimension.

Iñaki also highlighted another challenge, summarised in the sentence: ‘no prescription, no reimbursement, no interest!’ Much of the mortality and morbidity associated with NCDs is related to nutrition, physical activity, or other lifestyle matters and is preventable: this consideration should be nonetheless enough to call for public action and interest.

As such, the ‘nutrition economics’ field is developing; the term was coined in 2011 to refer to a specific subfield within health economics: ‘the discipline dedicated to researching and characterising health and economic outcomes in nutrition for the benefit of society’. Various HTA stakeholders are coordinating actions in the field and Iñaki mentioned, among others, Initiative for Public Health Outcomes Research & Measurement (InPHORM, an Interest Group of HTAi for individuals who are involved in the research, assessment and/or management of public health interventions with a special focus on nutrition-related health states and socio-economic outcomes, at individual and societal level and whose members

are nutritionists), the health economists of the International Society for Pharmacoeconomics and Outcomes (ISPOR), and other researchers.

1.8. The lifetime cost of childhood obesity

Kevin P Balanda (Institute of Public Health, Ireland) presented JANPA, an initiative contributing to the objectives of the EU Action Plan on Childhood Obesity, and co-funded by the EU Health Programme (2014-2020). Among the seven JANPA work packages, Work Package 4 aims to estimate the lifetime impact and cost of childhood obesity, and to develop an evidence-based economic rationale for action on childhood obesity (this will be done individually for seven EU countries: Portugal, Italy, Slovenia, Croatia, Romania, Greece, and Ireland). Kevin mentioned some of the challenges in this regard, for example related to data scarcity in terms of costs of childhood impacts of obesity or evidence linking childhood obesity and adult health impacts. Also, the difficulty in quantifying psycho-social impacts, the long time-lag between exposure and health outcomes (e.g. 60% of the costs of childhood obesity appear to occur after the age of 60), and the complexity of costs dynamics complicates the model further.

Through an incidence-based approach, which models child Body Mass Index (BMI) trajectories to adulthood, childhood BMI will be linked to adult BMI, which will be linked to diseases, and diseases to costs. Health impact trajectories will be based on a 4-state Markov model formed by combining ‘alive/dead’ and ‘with/without the obesity-related disease’. Data from epidemiological studies will be used to generate transition probabilities. Unfortunately, data for multi-morbidities do not exist in many cases so the model will run under the non-ideal assumption of independent disease processes. Kevin listed some of the fundamental data and variables of the model, such as relative risk and population attributable fraction (PAF) estimates of each obesity-related impact, population profiles and projections, BMI data, incidence of health impacts (morbidity and mortality),

26. An incidence-based economic evaluation follows a disease cohort for the duration of the disease and estimates discounted costs and health gains with alternative interventions.
incidence of other impacts (e.g. lower school attendance and performance, losses incurred by families, productivity losses), healthcare and non-healthcare costs, and utility weights for adults and children. The occurrence of impacts will be estimated with a mixture of three approaches (estimation of PAFs, analysis of healthcare utilisation in cross-sectional studies, and analysis of healthcare utilisation in longitudinal studies).

1.9. Building a framework for long-term nutrition economic evaluations of interventions to address childhood obesity

Lore Pil (University of Ghent, Belgium) presented the ToyBox intervention and its preliminary results. ToyBox (2010-14) aimed at preventing obesity in early childhood (3.5-5.5 years old) by creating a supportive social and physical environment at kindergartens and at home, thought to facilitate desired behaviours.

The intervention was implemented in 6 EU countries (Belgium, Bulgaria, Germany, Greece, Poland, and Spain), during 6 months. It had a focus on 4 behaviors: physical activity (at least 2 times a week), sedentary behaviour (to avoid preschoolers’ sedentary time longer than 30-40 minutes), drinking (every 30-40 minutes), and snacking (fruit morning snack). Materials such as newsletters, tipcards, posters, and hand-puppets were distributed in support of the intervention.

While the preliminary results did not show significant changes in anthropometric indicators (probably related to the short duration of intervention, and the absence of a follow-up) there were significant effects in some of the countries regarding some of the targeted energy balance-related behaviours. Depending on the country, reductions could be seen in the number of hours playing computer/video games or in increased consumption of water and reduced consumption of soft drinks and sweets. Some parental habits also changed, such as reduction in consumption of sweets and increased engagement in vigorous physical activity.

The costs of the intervention were calculated as country-specific costs per child and these behavioural changes were also projected in the long term, and linked to childhood BMI, adult BMI, health outcomes (type 2 diabetes, colorectal cancer,
breast cancer, stroke, and CHD) and health burden, through EQ-5D utilities.\textsuperscript{27} While Lore indicated the preliminary nature of the cost effectiveness data at that stage, she also exemplified cost-savings in some countries noting that these could potentially be increased, should the intervention be implemented more broadly and more often.

1.10. Is there room for improvement in nutrition economics?

Giovanni Fattore (Centre for Research on Health and Social Care Management – CERGAS, Bocconi University) presented a review and assessment of economic evaluation studies conducted on interventions aimed at dietary improvements. Most of the studies included in the review (n=38) concluded that the intervention examined was cost-saving (n=21) or cost-effective (n=10); few articles (n=7) documented that the intervention concerned was not cost-effective or that health outcome improvements were negligible.

Giovanni’s analysis also showed that most studies take quite a narrow healthcare perspective where only direct medical costs are included, followed by a societal perspective where societal costs (e.g. social care and productivity-related losses) are also factored in. Only 3 studies took a wider public sector perspective where costs incurred by government in order to implement the nutrition intervention are included, in the form of media advertising, loss of tax revenues, or food and vegetable food stamps for low-income consumers. Of note, in light of Andreas’ previous talk, most of the studies did test the robustness of their results through a sensitivity analysis and 8 studies used different scenarios to present their results as well.

Some equity aspects were present in several papers: 5 studies conducted sub-group analyses (by race, gender, age, income, education, marital status, and health condition) and another 9 studies focused on ethnic minority or low socio-economic groups; yet, no study discussed the equity implications of interventions that may impose additional private expenditure to households.

\textsuperscript{27} EQ-5D is a standardised instrument used to measure health outcome. It provides utility values for health status.
All in all, Giovanni’s work highlights the paucity of economic evidence in this area; only 38 published studies performing an economic evaluation of interventions aimed at improving nutritional habits have been identified, and most of these studies did not look at the wide socio-economic implications of changes in nutrition habits. Given the potential health gains of these interventions, the paucity of such studies is alarming and signals that economic evidence is not available.

While the methodologies and guidelines developed for the economic evaluation of healthcare interventions are often not appropriate to the economic evaluation of nutrition interventions (as also mentioned by Iñaki), Giovanni offered some reflections on how to improve these for this purpose. For example, Giovanni reflected on the use of cost-benefit analysis (CBA) over CEA. While a ‘wide CEA’ that includes non-healthcare costs is broader and more useful than a standard CEA, it also requires methodological advancements (e.g. how to estimate extra costs attributable to the impact on the industry, if any, or how to take into account that nutrition costs are generally private). In addition, it is difficult to develop a metric to replace QALYs or DALYs with a measure that can capture non health-related quality of life. CBA is a more flexible method that can show distributional effects (who gains and who loses from the intervention). Its use also signals that there are multiple objectives in government decisions (people’s health but also employment, economic growth, etc.) and different social actors (such as patients, tax-payers, corporations), but it is also less developed methodologically and it is likely that for many nutrition-related applications considerable efforts are needed to take it to the level needed for informing policy-making.
2
Learnings from Discussions and Breakout sessions

The breakout sessions were designed to engage with all participants – mostly academics and policy-makers – to tap into their experience and fulfil our workshop objectives of defining the areas (on NCDs, public health and prevention) where additional economic considerations are needed to inform decision-making and provide the space for a real-time reality check with experts on the feasibility of studies in these areas. The following pages summarise the content of these sessions and other discussions; any statements and examples that follow reflect the opinion of one or more workshop participants. The opinions expressed were not always unanimous and the summary presented here does not constitute a formal conclusion from the workshop or a position of the European Commission or any of its services.

2.1. Some examples of public health economic evaluations that informed ‘decision-making’ in public health and prevention of NCDs

The participants discussed cases in the field of public health and prevention of NCDs, in which the economic evaluation of a particular policy or intervention played a key role; two examples are detailed in Table 1.

Table 1. Examples of public health economic evaluations that informed ‘decision-making’ in public health and NCD prevention.

<table>
<thead>
<tr>
<th>Intervention/P Policy</th>
<th>Level</th>
<th>Type of evaluation and by whom?</th>
<th>Cost-effective?</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partially hydrogenated oils (PHO) are no longer ‘generally recognized as safe’ (GRAS) for use in food products in the United States (US)</td>
<td>National level</td>
<td>The US Food and Drug Administration evaluated 20-year costs and benefits related to PHOs (trans-fats) removal[a]</td>
<td>Yes. Also cost-saving.</td>
<td>The expected Net Present Value favored the removal of PHO.</td>
</tr>
</tbody>
</table>

There were, however, several examples cited of policies or interventions that – albeit evaluated and recognised as cost-effective – did not reach the implementation phase. These cases provide important lessons; for example, those performing the evaluations need to ensure that:

1) the economic evaluation is needed and the results will reach those that can implement the intervention it refers to;

2) the economic evaluation is accompanied by a detailed description of the intervention so it can be implemented;

3) all relevant stakeholders are involved so there is a shared understanding of the problem, the intervention and its benefits, as well as of the needs of all stakeholders. These shared understandings can also prevent any vested interests from affecting the implementation process.

The question of ‘Why aren’t there more public health economic evaluations applied to the field of nutrition and physical activity or prevention of chronic diseases?’ arises in this context. Table 2 provides some answers to this question.

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Table 1. (cont.)

<table>
<thead>
<tr>
<th>Intervention/Policies</th>
<th>Level</th>
<th>Type of evaluation and by whom?</th>
<th>Cost effective?</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>South African Strategy for the prevention and control of obesity²⁹</td>
<td>National level</td>
<td>The government and OECD performed cost-effectiveness analyses of various interventions related to nutrition and obesity (salt reduction, food taxes and subsidies, and physician counselling)</td>
<td>Yes. The interventions appeared to be very cost-effective (salt reduction, food taxes, and subsidies), and quite cost-effective (counselling).</td>
<td>Ex-post evaluations on how the government implemented the strategies is to follow.</td>
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<table>
<thead>
<tr>
<th>Barrier</th>
<th>Additional comments</th>
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<tbody>
<tr>
<td>Lack of awareness and understanding of public health economic evaluations, and a consequent lack of demand for this type of evaluations</td>
<td>From a policy-maker perspective, evaluations of the efficacy and efficiency of tools are useful to guide actions. The policy-maker’s demand for public health economic evaluations would increase if these evaluations were more robust (e.g., the conclusion ‘more research is needed’ is of little help to a policy-maker) and/or in the presence of a strong public demand.</td>
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<tr>
<td>Limited health budgets</td>
<td>For example, in some low-income countries, the health-related budget is not necessarily based on public health economic evaluations as the first necessity is to cover the running costs of the health system. Small budgets should however be a major driving factor for these types of evaluations as these are the countries/cases where allocation needs the greatest scrutiny and careful analysis.</td>
</tr>
<tr>
<td>Complexity of multifactorial interventions</td>
<td>Evaluations on the efficacy and efficiency of tools are useful to guide policy-makers; yet, the complexity of cause-effect relationship, as well as that of assessing the impacts on different stakeholders, pose challenges in performing and interpreting public health economic evaluations.</td>
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<tr>
<td>Lack of clear objectives, indicators, or data to measure them</td>
<td>An intervention can yield different results if its outcomes are measured as variation in behaviours, in biomarkers or in disease (the latter being the most difficult outcome to study). Moreover, data are often hard to collect, and therefore ‘borrowed’ from other studies. Finally, assumptions might not be expressed as clearly as needed.</td>
</tr>
<tr>
<td>Solid evaluations may be cumbersome, time-consuming, and even costly</td>
<td>Evaluation may be seen as out of scope for those proposing well-intentioned interventions with limited budgets.</td>
</tr>
<tr>
<td>Often, cases where little resistance is offered by the public and the private sector are felt to not need analysis other than simple cost analyses before proceeding with implementation</td>
<td>Even at national level, there are cases of interventions and policies that have been implemented without ex-ante evaluations.</td>
</tr>
<tr>
<td>Similarly, cases inspired by measures adopted in other countries may proceed to implementation without proper ex-ante evaluations</td>
<td>It was argued that, while guidance and best practices from other countries can indeed be useful, it is still important to understand local key drivers, and whether the intervention environment is comparable between the different settings. Similarly, when actions are taken on the basis of EU or WHO guidance, comparability between model assumptions and the cultural settings, populations, etc. should be verified.</td>
</tr>
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</table>

Table 2. Examples of barriers in performing public health economic evaluations.

Please note that the table is not intended to provide an exhaustive list.
2.2. Areas on NCDs, public health and prevention where additional economic considerations are needed to inform decision-making

Building on their professional experience and the needs they observe in their countries and work settings, participants highlighted specific areas, in the field of NCDs, public health and prevention, where additional economic considerations are needed to inform decision-making. Some of the areas highlighted by the participants are described in Table 3.

Table 3. Examples of areas for which there is a perceived need for public health economic evaluations. The table is not intended to provide an exhaustive list.

<table>
<thead>
<tr>
<th>Area</th>
<th>Example</th>
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<tbody>
<tr>
<td>Food product improvement or reformulation</td>
<td>Public health economic evaluation of voluntary food reformulation schemes, e.g. increased fibre content of foods by different means such as fortification, wider use of wholegrains, use of less-refined flour. Public health economic evaluation of voluntary food reformulation schemes to reduce sugar(s) in foods.</td>
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<tr>
<td>Food-related fiscal policies</td>
<td>Public health economic evaluations of food-relevant fiscal policies such as taxes on SSB, sugar, or saturated fats.</td>
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<tr>
<td>Health literacy</td>
<td>Public health economic evaluations of school-based health literacy programmes for students and their families.</td>
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<tr>
<td>Health-minded governance in schools or workplace</td>
<td>Public health economic evaluations of school-based physical activity promotion programmes and provision of infrastructure (e.g. providing sports equipment, longer/more frequent physical activity classes and opportunities). Public health economic evaluations of implementation of healthier and environmentally-sustainable public procurement practices for foods served in schools and workplaces. Public health economic evaluations of physical activity promotion programmes in the workplace (workplace health promotion).</td>
</tr>
<tr>
<td>Disease prevention</td>
<td>Public health economic evaluations of medicines prescriptions (e.g. statins or metformin) versus lifestyle-based interventions for prevention of CVDs.</td>
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<tr>
<td>Others</td>
<td>Public health economic evaluations of social policies, such as poverty reduction policies. Public health economic evaluations of policies to reduce food waste. Public health economic evaluations of the health component of interventions outside the health domain (such as environmental interventions).</td>
</tr>
</tbody>
</table>
How to perform future economic evaluations of food reformulation initiatives (e.g. increase fibre content of specific foods), food-related taxes, and compare the costs of prescribing drugs such as statins or prescribing lifestyle interventions for CVD prevention were discussed as case studies of concrete and needed public health economic analyses. Policy-makers pragmatically clarified what their needs are or would be, in order to be able to decide whether or not to implement that particular intervention/policy. Nutritionists and healthcare workers contributed with their knowledge on how and which public health data could be used to show the benefits and costs of the intervention or policy in question. The economists in the room called for whole-of-society aspects to be considered, such as costs, benefits, proposed data sources and highlighted data needs for the evaluations at hand. The outcome of this session is not individually reported here but the learnings are reflected on the workshop conclusions below.
Conclusions

These workshop conclusions are the result of participants’ reflections throughout the two intensive days spent together discussing the relevance of public health economic evaluations to decision-making, the major methodological and data gaps in those that target prevention of chronic diseases and, importantly, on how to better establish the field and move it forward.

Four important points were made clear:

- adapt the traditional framework of economic analysis so it is more relevant to PHE;
- this will include reconsidering existing methodologies and combining different approaches, to capture costs and benefits for all stakeholders involved;
- rigorously monitor and evaluate public health interventions so that their effectiveness is clear and the data can be used for further economic evaluations, ramping up surveillance efforts at different levels;
- share and disseminate know-how and create platforms and spaces for the field to further develop, e.g. drafting and provision of toolkits and manuals.

3.1. The call for a better framework

The participants unanimously stated that public health economic evaluations of nutrition and physical activity interventions should:

- incorporate health behaviours in their theoretical framework;
- place emphasis on outcomes other than BMI per se (such as psychosocial effects and productivity);
- address redistribution effects and effects on health inequalities;
- take a societal perspective (with the assessment of relevant outcomes, having clear that costs incurred by private individuals in public health interventions are difficult to factor in, and mimic savings in public sector);
- incorporate sensitivity auditing;
- consider country specificities.
3.2. Reconsidering existing methodologies

While resources and political motivation are very important, there is space for both the economic and the public health communities to push the bar higher. For example:

- Improve **communication** between public health practitioners, nutritionists, health economists, and decision-makers;
- Recognise the current dominating role of the **economic argument** in decision-making, at the expense of other valid criteria;
- Engage in the **combination of different approaches** (cost-benefit analysis or cost-effectiveness analysis, and multi-criteria decision analysis (MCDA) or other ‘qualitative’ methods to best capture the views of all interested stakeholders);
- Have a good understanding of the **likely objections** to the proposed policy/intervention (including, but not limited to, legal aspects);
- Engage with the **private sector** to benefit from their expertise in understanding difficulties and trade-offs of technical alternatives, and in assessing the most feasible (and cost-effective) solutions;
- Explore **unintended effects**, such as substitution effect or spill-over effect;
- Evaluate **synergies**, for instance coming from multi-sectoral public health interventions;
- Measure **costs and challenges for the private sector** (in a food reformulation project this would include investments for research, technical challenges, labelling requirements, market-share analyses), and assess the best way to proceed (gradual vs disruptive change);
- Evaluate intervention costs and benefits separately for different **population subgroups and stakeholders** (assessment of costs to consumers, costs to small-scale and large-scale producers, costs to distributors, and environmental costs; assessment of benefits for producers of substitutes, and benefits for consumers);\(^{30}\)
- Similarly, quantify impacts on **specific sectors** (food industry and agriculture) and **countries**, including impacts on consumers (individuals and families) and on the social system;
- Assess possible **adaptation measures** to be undertaken by key players;

• Work under the mandate to reduce **health inequalities**: intervention should cover the whole population (for example, reformulation efforts should be carried out in all market segments);
• Commit to act with **transparency and honesty** in debates, especially when winners and losers are detected;
• Accept a **compromise** between complexity of the analysis and available resources, in terms of costs and time.

### 3.3. Improving monitoring and surveillance of public health interventions

The effect of public health interventions has to be assessed if the aim is to perform any form of economic evaluation. Often, population-based data is also crucial. Some considerations on monitoring and evaluation of interventions as well as surveillance are listed here:

• Collection of **data** relevant to **baseline** and **monitoring** of interventions needs to be improved (e.g. food composition databases, including data provided by food business operators, household surveys, nutrient intake data), in order to perform economic evaluations with measured data rather than with modelled estimates;
• Longitudinal data should be available at **country level**, especially in order to include children;
• Consequently, a **research infrastructure** should be in place to create and maintain reliable data registries, for example on dietary monitoring;
• When primary data are not available, **secondary sources** need to be critically appraised and justified;
• **Parameter uncertainty** should be estimated;
• **Health benefits** should be expressed in appropriate units (QALYs, BMI, incidence or prevalence of chronic diseases, etc.);
• Health benefits may however be too far down the line to be useful as data sources; reliable **proxies** (variation in exposures, behaviours, or risk factors) should be identified.
3.4. Promoting and expanding the community of practice

Generally speaking, the field would benefit from more ambassadors, visibility and dissemination of tools to grow further. More support can come from those that are familiar with public health economic evaluations to create a common ground that facilitates this practice, for example by producing a public health economic evaluations toolkit or manual, and setting up a formal community of practice and a platform. Existing attempts can be built upon.

Health economists in countries that are not versed in public health economic evaluations should aim to promote these internally, and engage directly with their policy-makers; this may start with high-level conferences, to demonstrate the potential of public health economic evaluations.

Enablers such as toolkits, manuals, and online platforms are strengthened if they have a political mandate behind them, and if a multidisciplinary and inclusive approach is taken.

While some central action is required, local action should not be overlooked, especially in the field of funding and advocacy:

- Prevention of chronic diseases is underfunded, good practices and cases can be useful to support the demand for funding;
- Civil society and NGOs should be on board in advocating for public health interventions and related evaluations.

With sound economic evaluations of public health interventions, which produce ranking and priority actions, decision-making could be effectively informed and directed towards enhancement of population health.
### List of abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>CBA</td>
<td>Cost-Benefit Analysis</td>
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<tr>
<td>CEA</td>
<td>Cost-Effectiveness Analysis</td>
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<tr>
<td>CVD</td>
<td>Cardiovascular Disease</td>
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<tr>
<td>DALY</td>
<td>Disability-Adjusted Life Year</td>
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<tr>
<td>DG</td>
<td>Directorate-General</td>
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<tr>
<td>DG SANTE</td>
<td>Directorate-General Health and Food Safety</td>
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<tr>
<td>EU28</td>
<td>European Union, 28 Countries</td>
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<td>EC</td>
<td>European Commission</td>
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<td>EConDa</td>
<td>Economics of Chronic Diseases</td>
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<td>EQ-5D</td>
<td>EuroQol five dimensions questionnaire</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>E&amp;IA</td>
<td>Countries belonging to the Enlargement and Integration Action group</td>
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<tr>
<td>HLG</td>
<td>High Level Group</td>
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<tr>
<td>HTA</td>
<td>Health Technology Assessment</td>
</tr>
<tr>
<td>IA</td>
<td>Impact Assessment</td>
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<tr>
<td>INAHTA</td>
<td>International Network of Agencies for Health Technology Assessment</td>
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<tr>
<td>InPHORM</td>
<td>Initiative for Public Health Outcomes Research &amp; Measurement</td>
</tr>
<tr>
<td>ISPOR</td>
<td>International Society For Pharmacoeconomics and Outcomes Research</td>
</tr>
<tr>
<td>iTFA</td>
<td>Industrially-produced trans-fatty acid</td>
</tr>
<tr>
<td>JANPA</td>
<td>Joint Action on Nutrition and Physical Activity</td>
</tr>
<tr>
<td>JA-CHRODIS</td>
<td>Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life-Cycle</td>
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<tr>
<td>JRC</td>
<td>Joint Research Centre</td>
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<tr>
<td>MCDA</td>
<td>Multi-criteria decision analysis</td>
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<td>NCD</td>
<td>Non-Communicable Disease</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>PAF</td>
<td>Population Attributable Fraction</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<td>--------------</td>
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<tr>
<td>PHE</td>
<td>Public Health Economics</td>
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<tr>
<td>QALY</td>
<td>Quality-Adjusted Life Year</td>
</tr>
<tr>
<td>ROI</td>
<td>Return on Investment</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomised Controlled Trial</td>
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<tr>
<td>SSB</td>
<td>Sugar-Sweetened Beverages</td>
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<tr>
<td>TFA</td>
<td>Trans fatty acids</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
List of tables

Table 1. Examples of public health economic evaluations that informed ‘decision-making’ in public health and NCD prevention

Table 2. Examples of barriers in performing public health economic evaluations

Table 3. Examples of areas for which there is a perceived need for public health economic evaluations
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