

[David McDaid](#)

Using economic evidence to help make the case for investing in health promotion and disease prevention

Report

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HEALTH SYSTEMS FOR PROSPERITY AND SOLIDARITY
Hans Kluge & Josep Figueras (eds.)

POLICY BRIEF

Using economic evidence to help make the case for investing in health promotion and disease prevention

David McDaid



Keywords:

Health promotion – economics

Primary Prevention – economics

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– economics

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What is a Policy Brief?

A policy brief is a short publication specifically designed to provide policy makers with evidence on a policy question or priority. Policy briefs

- Bring together existing evidence and present it in an accessible format
- Use systematic methods and make these transparent so that users can have confidence in the material
- Tailor the way evidence is identified and synthesised to reflect the nature of the policy question and the evidence available
- Are underpinned by a formal and rigorous open peer review process to ensure the independence of the evidence presented.

Each brief has a one page key messages section; a two page executive summary giving a succinct overview of the findings; and a 20 page review setting out the evidence. The idea is to provide instant access to key information and additional detail for those involved in drafting, informing or advising on the policy issue.

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Contents

	page
Boxes, figures and tables	3
Key messages	5
Executive summary	7
Introduction	9
What do we know about overall disease burden in the WHO European Region?	9
What are the costs of avoidable poor health?	10
How much do we invest in health promotion and disease prevention?	12
How can we make the economic case for investment in health promotion and disease prevention?	12
What types of action can be taken?	12
What do we know about the economic case?	14
Interpreting results	17
Making it happen: using economic evidence to help overcome barriers to implementation	18
Conclusions	23
Appendix	24
References	29

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In addition, Bente Mikkelsen provided comprehensive comments on the final version of this brief.

Boxes, figures and tables

Boxes

Box 1: Defining cost saving and cost-effective interventions	14
Box 2: Use of return on investment tools to aid local decision-making in England	19

Figures

Figure 1: Percentage of total DALYs in WHO European Region, 10 leading contributors of disease burden 2015 and their contribution in 2000	10
Figure 2: Percentage of total YLDs in the WHO European Region, 10 leading contributors in 2015 and their contribution in 2000	11
Figure 3: A framework for determinants of health and potential avenues for action	13

Tables

Table 1: Illustrative examples of cost saving and highly cost-effective actions to promote health and prevent disease	15
Table 2a: Examples of barriers to investing in health promotion and disease prevention and how they can be overcome	21
Table 2b: Examples of barriers to investing in health promotion and disease prevention and how they can be overcome	22

Key messages

- Noncommunicable diseases (NCDs) and mental disorders are the leading contributors to disease burden in the WHO European Region
- This burden can to some extent be avoided through investing in evidence-informed health promotion or disease prevention interventions within and beyond the health system
- There is a substantial evidence base suggesting that many health promotion and disease prevention interventions, delivered within the health system as well as in partnership with other sectors, are highly cost-effective, although very little of this evidence is from the eastern part of the WHO European Region
- Despite this evidence, the level of investment in health promotion and disease activities remains stubbornly low in many countries
- Ministries of health as well as ministries of finance can play pivotal roles in increasing investment within and outside the health system; however, simply increasing the volume of economic evidence is unlikely to make a dramatic impact on overall levels of investment
- Barriers to investing are many and include scepticism over the effectiveness of interventions and the reluctance to invest in actions which decision-makers may think will not generate positive benefits for many years
- However, there are important contributions that economics can directly make:
 - More evidence should be generated on the economic benefits of interventions with short, as well as mid and long-term returns on investment
 - More evidence is also needed on economic benefits in different country contexts, taking account of the challenges of implementation and equity implications
 - Return on investment models can be used, alongside conventional economic evaluation methods, to communicate economic costs and benefits to different sectors over different time scales
- There also needs to be a much greater focus on the way in which evidence is *communicated* with policy-makers; this includes placing more attention on identifying and communicating the economic benefits of better non-health specific outcomes measures when the health sector seeks to influence or work with other sectors

Executive summary

The 2008 Tallinn Charter: Health Systems for Health and Wealth recognized that investing in health means investing in human development, social well-being and wealth. It stated that 'health systems are more than health care and include disease prevention, health promotion and efforts to influence other sectors to address health concerns in their policies'. Ten years on, **investment in health promotion and disease prevention activities**, at least within the health sector, **remains stubbornly low in many countries**. For instance, OECD countries typically allocate between 2% and 4% of total health sector spending to these activities. Moreover, between 2009/2010 and 2012/2013 on average spending fell in real terms and still in 2014/2015 was only growing at around 2% per annum, a rate that is much lower than before the onset of the global economic crisis.

There are many different reasons for this, but undoubtedly **some budget holders in health systems are sceptical** about the case for focusing more on public health, contending that there is **insufficient evidence** available to justify such an investment. In this policy brief we argue that this scepticism about the evidence is overstated. Moreover, the existing evidence base can in fact be adapted to be useful in many different systems and country contexts across the WHO European Region.

Potential economic benefits of addressing disease burden

The 10 **leading contributors to disease burden in the WHO European Region in 2015 were all NCDs or mental disorders**. All of these conditions are amenable to health promotion and disease prevention interventions. They include actions to reduce the lifetime risks of Alzheimer's disease and other dementias that have now become leading contributors to the disease burden.

These conditions not only translate into **health care costs** but also have broader **personal, social and economic costs**. Indeed much of the costs of poor health fall outside health care systems, for example 45% of the costs of cardiovascular diseases and 59% of the costs of major depression. This is due to productivity losses mainly arising from greater levels of sickness absence and premature withdrawal from the labour market because of chronic health problems over the life-course. Back/neck pain and depressive disorders, the leading reasons for years lived with disability (YLDs), are also leading reasons for long-term sickness absence from employment and premature retirement.

All of these conditions, as well as injuries, should to some extent be **avoidable through investment in evidence-based actions to counter risks to health**, including interventions to help change lifestyles, as well as measures to ensure more safe and healthy living and working environments and to tackle socioeconomic inequalities. Risks to health associated with the most common behavioural risk factors (smoking, harmful drinking, a lack of physical activity and poor diet) impact directly on all 10 of the leading contributors to the burden of disease in 2015.

There is an economic case for investment

Economic arguments have been used successfully to help influence the ways in which health and other policy-makers **allocate resources to health care and public health programmes** in many country contexts. Illustrative examples of the case for action within and outside health care systems were identified in recent literature reviews. **Within health care systems** these include brief physician advice interventions, such as those to protect the mental health of people with physical health problems and screening programmes for hazardous drinking.

Many of the risks to health are addressed through cost-effective actions delivered **outside health systems**. They include the use of taxation and other fiscal measures, restrictions on retail access and advertising, as well as media campaigns, to reduce risks from harmful behaviours including tobacco and alcohol consumption. Packages combining measures within the health care system such as brief advice interventions, alongside some of these measures in other sectors, are likely to be more cost-effective than individual measures in isolation. Combining some of these measures, alongside initiatives such as product reformulation and increased opportunities for physical activity, for example by investing in cycling schemes, can also be cost-effective in different contexts when looking to influence diet and physical activity.

Other illustrative examples include early intervention during the perinatal period to support mothers and their infants. Health systems can work with schools to promote cost-effective emotional resilience, better health literacy and anti-bullying measures targeted at children. Health systems can also benefit by collaborating with workplaces, particularly small- and medium-sized workplaces that may have limited occupational health services to promote physical and mental well-being in the workplace. There is also a strong economic case for the health sector to continue to work with the transport and justice sectors, as well as the automobile industry, for enhanced enforcement of safety measures such as traffic calming and speed reduction measures, increased use of seat belts and more safety features installed into vehicles, all of which can be cost saving.

What we do not know

While there is a sound economic case for investing in measures to promote health and prevent disease and injury, **methods used in economic evaluation differ, making comparisons between studies difficult**. There are also many gaps in the evidence base, including much less information on the economic case for action in the **eastern part of the WHO European Region** and a need for more on interventions with **short-term as well as long-term impacts**. Little is known about the economic case for investing in many **behavioural psychology influenced interventions** despite their raised profile in recent years. Moreover, much of the existing literature does not directly look at the **equity implications of interventions**; this is also important to evaluate in order to reduce the risk of inadvertently widening health inequalities by failing to reach those segments of the population in most need.

However, simply increasing the volume of economic evidence is unlikely to be sufficient to make a dramatic impact on overall levels of investment. This requires much more attention to be placed on the **way in which evidence can be translated into practice**. Ministries of health as well as ministries of finance can play pivotal roles in incentivizing different actors within and outside the health system to invest in disease prevention. Some of this is about implementation and political science, but there are important contributions that economics can directly make. These include devoting more efforts to the generation of **return on investment analyses** that place as much (if not more) emphasis on the value of non-health benefits to

sectors that the health system wishes to influence or partner with. This needs to go beyond a focus solely on benefits to ministries of finance but should consider **how best to work with many more sectors**, such as housing, education, social welfare, justice and transport. It also involves collaborating with occupational health services in the public and private sectors. Financial and other economic incentives, as well as contracts and other regulatory arrangements, can be used to stimulate new partnerships and shared budgets between the health system and other sectors. The same approach might also be used to stimulate even more partnerships working between public health professionals and other actors within health systems.

Introduction

The 2008 Tallinn Charter: Health Systems for Health and Wealth recognized that investing in health means investing in human development, social well-being and wealth. It also stated that 'health systems are more than health care and include disease prevention, health promotion and efforts to influence other sectors to address health concerns in their policies'[1].

Ten years on, investment in health promotion and disease activities, at least within the health system, remains stubbornly low in many countries. There are many different reasons for this, but some budget holders in health systems remain sceptical about the case for focusing more on public health, contending that there is insufficient evidence available to justify such an investment. They may further argue that, even when evidence is available, it is not relevant to their local context, and may serve only to divert valuable resources away from clinical activity where more health benefits to society can be realized. Health promotion and disease prevention budgets are among the most vulnerable areas of health system spending when resources are tight. Some health care service providers may even be fearful of their own security should more resources be diverted to public health, especially at a time when public sector spending in many countries in the WHO European Region remains under great pressure.

In this policy brief we argue that this scepticism over the evidence is overstated; moreover, that this evidence base can also be adapted to be useful in many different systems and country contexts across the WHO European Region. Throughout the brief we also recognize that investing in health requires investment in health promotion and disease prevention, both within and outside the health system, because our health is influenced by many different factors, not all of which can be addressed by health care professionals. Our health is partly determined by our genes, while access to and the quality of health care services also play a critical role. Yet much of our health is dependent on 'upstream' risk factors. These include health behaviours, such as our levels of physical activity and our diets, as well as environmental factors, including our working and school environments. Our levels of education, socioeconomic status, including poverty rates and income inequalities, are also critical. Nor can we overlook differences in cultural values, attitudes to gender and ageing, as well as social cohesiveness in different country settings, as these may also impact on the ways in which populations engage with health promotion and disease prevention activities.

Given that the health system on its own cannot cover all aspects of disease prevention, it is also essential to have convincing arguments to sustain actions outside the health system. It is about identifying common objectives and goals with other sectors. This means prioritizing the language and relevant impacts to those sectors rather than just communicating about health benefits. Yet health systems have not always been effective in communicating sector specific benefits, for example improved school performance and classroom atmosphere that arise from school-based health promotion actions. Nor do they highlight often enough spillover benefits from health promoting actions in one sector, for example education, that positively affect another.

One example of this could be investing in school-based mental health promotion and supported education programmes, which in turn can help reduce the risk of young people ending up not in education, employment or training (NEET) when they reach adulthood. Around 15% of young people aged 15-29 in the EU alone fall into this category [2]. Reducing the level of NEETs in Europe in turn should have benefits for welfare systems and more broadly for economic productivity [2].

Therefore in the brief we first set out the current challenge, looking at changing patterns in disease burden, all of which are amenable to public health actions. We then set out why alleviating some of this burden can have economic benefits and how these benefits can be assessed. We describe some of the different types of actions that can be taken and provide illustrations of some that are either cost saving or highly cost-effective in different contexts. The strengths and limitations of approaches used to generate this evidence base are then considered before we conclude by returning to some of the challenges that have hindered implementation and suggesting ways in which these challenges may be overcome.

What do we know about overall disease burden in the WHO European Region?

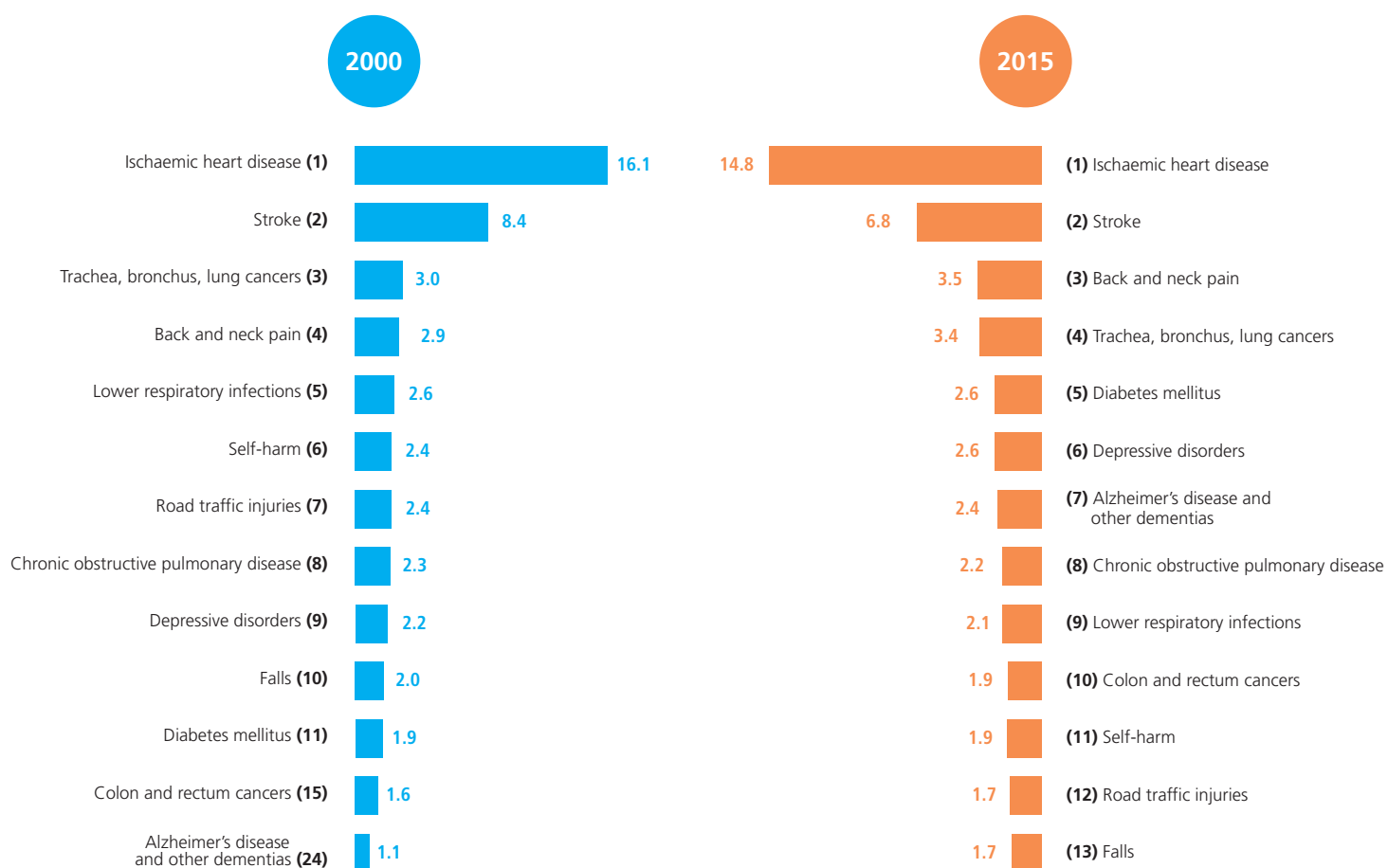
The 10 leading contributors to the total burden of disease in the WHO European Region are NCDs or mental disorders

Before looking at the economic case for investment, first, let us look at the changing nature of the burden of disease. Figure 1 shows the 10 leading contributors to the total burden of disease in 2015 and 2000 in the WHO European Region (measured using disability-adjusted life years (DALYs), which take account of morbidity and mortality). In 2015 these were all NCDs and mental disorders, with the top three contributors being ischaemic heart disease, stroke and back/neck pain.

The most striking trends over the last 15 years are the emergence of Alzheimer's disease among these 10 main contributors and the fall in the burden of road traffic injuries

The relative importance of these risk factors vary from country to country across the WHO European Region, but the top two contributors to disease burden, ischaemic heart disease and stroke, remain unchanged although they accounted for a slightly lower share of disease burden, 21.3%, in 2015 compared with 24.5% in 2000. Overall, the most striking change over this 15-year period has been the emergence of Alzheimer's disease and other dementias as one of the leading contributors to disease burden. This group of dementias only accounted for 1.1% of disease burden in 2000 compared with 2.4% of total disease burden in 2015; it is likely to increase further as a share of disease burden as the European population ages, bringing new challenges for public health policy. Yet at least 35% of the risk factors for dementia are potentially modifiable across the life-course [3]. Other notable changes at a European Regional level include the fall in the burden of road traffic injuries from 2.7% of disease burden in 2000 to 1.7% of disease burden by 2015 (ranking 12th in 2015 compared to 7th in 2000), while diabetes has increased to 2.6% of total burden (ranking 5th) in 2015 from 1.9% in 2000 (ranking 11th).

Figure 1: Percentage of total DALYs in WHO European Region, 10 leading contributors of disease burden 2015 and their contribution in 2000



Source: Adapted from [4]

Figure 2 shows the number of years lived with disability (YLDs) due to disease and injury in 2000 and 2015. There has been no change in the leading contributors over this time period, with back/neck pain and depressive disorders together accounting for 18.6% of all YLDs in 2015 compared to 18.2% in 2000. Anxiety disorders also still feature; another reminder of the importance of actions to prevent mental as well as physical health problems, while fall-related injuries also remain in the top 10 YLDs, being particularly an issue among older people.

DALYs and YLDs are not just issues for health systems. As we illustrate in a later section of this brief, they have profound economic impacts, much of which, from a societal perspective, fall outside the health care system, mainly by affecting participation in employment and other paid and unpaid productive activities by people of all ages. For instance, back/neck pain and depressive disorders are leading reasons for long-term sickness absence from employment and premature retirement. There are also impacts on the economic productivity of family members who need to devote time and energy to supporting loved ones living with health problems. This is a particular challenge now in Europe given the rise in the number of cases of diagnosed dementia, as this group of diseases often places a great and long-lasting strain on families, to say nothing of the impacts on social and long-term care services.

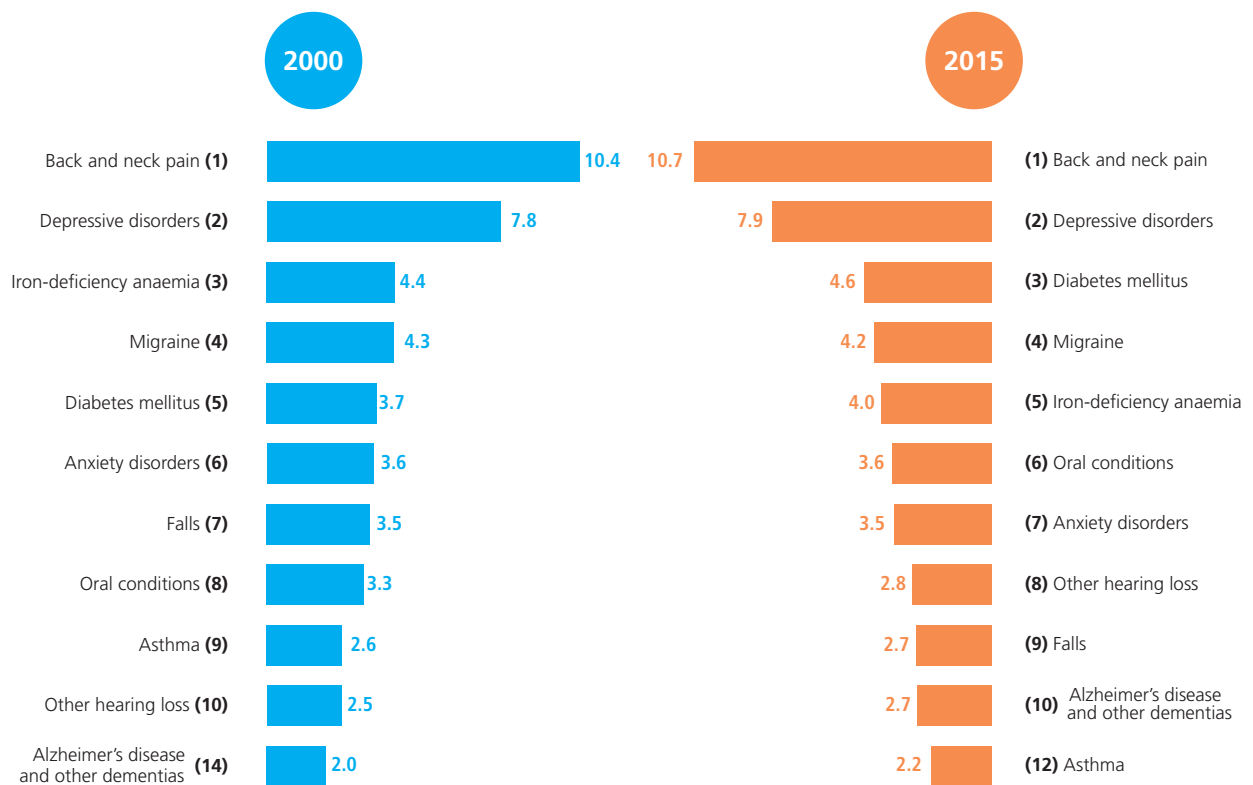
All of these disease burdens are to some extent avoidable through investing in evidence-based health promotion or disease prevention interventions

All of these burdens (and many others, including injuries) should to some extent be avoidable through investing in evidence-based actions to counter risks to health, including interventions to help change lifestyles, as well as measures to ensure more safe and healthy living and working environments and tackling socioeconomic inequalities. It is also important to be mindful of inequalities linked to gender, ethnicity and culture, for instance to tackle the substantial and persistent differences in life expectancy by gender between the eastern and western parts of the WHO European Region. Risks to health associated with the most common behavioural risk factors, smoking, harmful drinking, a lack of physical activity and poor diet, impact directly on all 10 of the leading contributors to disease burden in 2015.

What are the costs of avoidable poor health?

Effective interventions that could avoid a tiny fraction of these health problems might help substantially boost economic output in the region

While estimates of costs vary due to inconsistency in how studies measure and report costs, there is no doubt that the costs of poor health are enormous and long-lasting.

Figure 2: Percentage of total YLDs in the WHO European Region, 10 leading contributors in 2015 and their contribution in 2000

Source: Adapted from [5]

Furthermore, much of these costs are incurred beyond the boundaries of the health system, including lost productivity in the workforce, as well as lost human capital acquisition and future productivity as a result of poor performance while at school. For example in the WHO European Region it has been estimated that productivity costs accounted for 45% of all the annual costs associated with cardiovascular diseases [6], while for depression in western Europe¹ productivity losses have been estimated to account for 59% of total costs [7].

The WHO's EPIC (Projecting the Economic Cost of Ill-health) tool can be used to calculate the value of economic lost output due to illness, including impacts on health care consumption and lost productivity. One analysis estimated overall costs for five disease categories in high-income countries between 2011 and 2030: diabetes, cardiovascular diseases, chronic respiratory disease, cancer and mental illness [6]. They incurred costs of \$25.5 trillion, with 35% (\$9.0 trillion) due to mental illness, and 33% (\$8.5 trillion) due to cardiovascular diseases. To put these very large figures into context – the entire economic output of the European Union (EU) in 2016 was approximately \$17.8 trillion.

As well as estimates of the economic costs of different diseases, some of the costs associated with poor health behaviours have been estimated. Again, these estimates may be made in different ways, so caution should be exercised in making direct comparisons between studies. Nonetheless, the potential economic benefits of directly addressing some of the upstream risk factors for poor health can be seen by looking at impacts on costs, as well as on life expectancy and premature mortality. Alcohol consumption has been

estimated to cost some 2–3% of gross domestic product (GDP), mostly from lost productivity [8], a figure likely to double if the costs to people other than the drinker are included [9]. Smoking is the cause of 1.25 million deaths in Europe each year, around 21% of all deaths. There is at least a 10-year difference in life expectancy between current smokers and those who have never smoked [10]. Even if smokers stop smoking between the ages of 55 and 65 they can still gain four years of additional life expectancy compared to individuals who continue to smoke. All of these additional years of life gained potentially add to economic output in the region.

Physical inactivity is also a major risk factor for obesity and other poor physical and mental health and premature mortality; one detailed economic analysis estimated total health-related costs in the WHO European Region in 2013 to be \$11.7 billion with a further \$3.8 billion in lost productivity as a result of poor health [11]. Unhealthy diets, particularly those involving an excessive consumption of salt, sugar and fat, energy-dense, nutrient-poor foods and sugary drinks, as well as limited intake of fruit and vegetables and whole-grains, also contribute to NCDs, including the major disease burden in Europe from cardiovascular diseases, stroke, some cancers and diabetes.

In all European countries therefore, economic benefits within and outside health systems can potentially be realized if some of this burden of disease can be avoided. Effective disease prevention measures that reduce the burden by a tiny fraction might not only reduce pressure on health systems but also potentially boost economic output in the region.

¹ All EU countries except Croatia, plus Iceland, Norway and Switzerland.

How much do we invest in health promotion and disease prevention?

Only a small proportion of health expenditure is spent on health promotion and disease prevention interventions, with this share falling after the global economic crisis

Despite an increased emphasis in policy documents and strategic plans on health promotion and disease prevention in European countries, levels of spending appear to be low. For instance, it is estimated that OECD countries typically only allocate between 2% and 4% of total health spending to these activities [12]. Of OECD countries in the European region, the highest expenditure on disease prevention was in the United Kingdom, 5.2% of current health expenditure, with only Finland and Italy also spending at least 4% per annum on disease prevention. Moreover, between 2009/2010 and 2012/2013 on average spending fell in real terms and still in 2014/2015 was only growing at around 2% per annum in OECD countries, a rate that is much lower than before the onset of the global economic crisis.

These estimates are likely to be a significant underestimate of total spending on actions to reduce risks to health in many countries as they do not capture all investment outside the health sector. Countries do not measure disease prevention and health promotion spending in a consistent way. Some costs directly related to health actions such as the implementation and administrative costs of new legislation or taxes to improve health, including those related to alcohol and tobacco consumption, as well as mass media campaigns not funded by the health sector, are likely to be excluded from estimates of spending. Investments by public and private sector employers in workplace health promotion programmes, or by ministries of sports or local government in better access to sports facilities or green spaces, or of the education sector in health promotion programmes, are further examples of programmes that usually do not appear in spending estimates. Welfare programmes that help alleviate or reduce the risks of poverty can, for example, reduce the risk of suicidal behaviour [13, 14], but they are also unlikely to be included in estimates of national spending on disease prevention and public health.

How can we make the economic case for investment in health promotion and disease prevention?

Policy-makers want to know how to prioritize investments for health promotion and disease prevention, and economic evaluation can help with these decisions

As above, the leading causes of poor health are likely to be amenable to preventive actions. Equally, there are substantial costs associated with avoidable poor health. It is therefore helpful to put forward an economic case to policy-makers to support investment in health promotion and disease prevention. Certainly, economic arguments have been successfully used to influence the ways in which health and other policy-makers allocate resources to health care and public health programmes in some country contexts. In England, for example, since 2005 the National Institute for Health and Care Excellence has used economic models to inform its public health intervention guidance [15].

There are several different approaches to economic evaluation and detailed discussions of their strengths and

weaknesses for health promotion and disease prevention are available [16]. As with estimates of changes in the costs of poor health, making comparisons between the results of economic evaluations can be challenging depending on the precise approach adopted. In essence, all involve an assessment of effectiveness and the costs of two or more interventions, potentially including a no-action option, as well as changes in subsequent costs to health care systems resulting from intervention. Evaluations may also look at broader costs and benefits to other sectors (some of which potentially may fund or implement relevant services) and the economy as a whole.

Some evaluations compare changes in costs with some topic specific outcome measure, for example deaths avoided (a cost-effectiveness analysis), or a metric that can be used for all health problems such as changes in quality-adjusted life years (QALYs) or DALYs (cost-utility analysis). Each country will determine how much it is willing to pay for these improved health outcomes, for instance one crude approach might be to make this equivalent to one or more multiples of GDP per capita in a country (a proxy threshold that has been used by WHO in some of their economic work) [17].

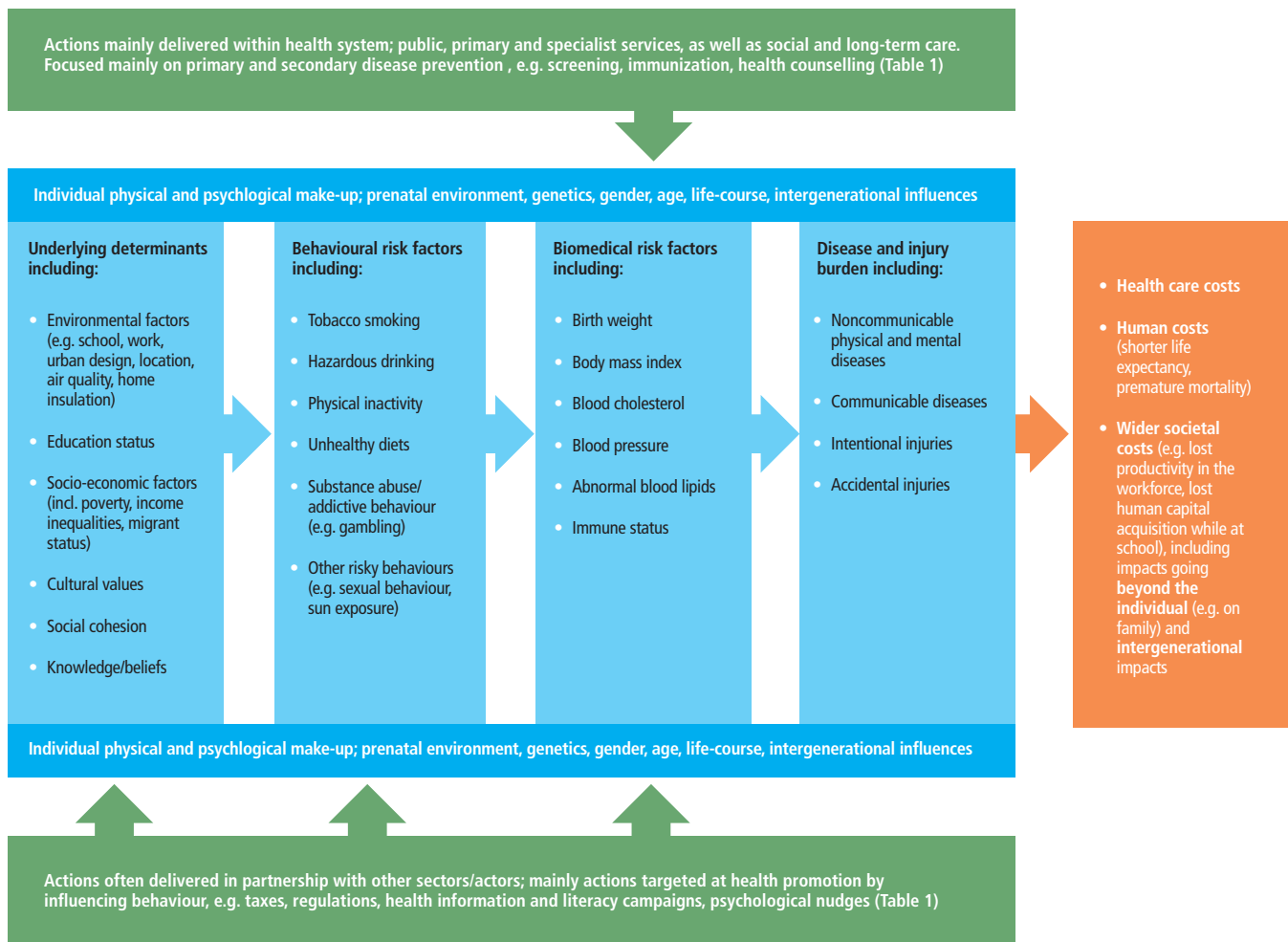
Health promotion and disease prevention interventions may also be assessed using an approach known as cost-benefit analysis, where both costs and benefits across health and other sectors are measured in monetary terms. If benefits are greater than costs then the intervention is a worthwhile investment. A similar approach to cost-benefit analysis, return on investment analysis, compares the costs of delivering an intervention with the costs to health and other sectors that can be avoided as a result of intervention. While this does not directly consider health outcomes, a positive return on investment is usually attributable to better health outcomes being achieved. This approach is increasingly used as a complement to economic evaluation in making the case for public health interventions [18, 19]. A variant of this, social return on investment, also places a value on broader benefits achieved through better outcomes, for example putting a value on additional friendships gained through health promoting actions to tackle social isolation [20].

What types of action can be taken?

Public and primary health services should be at the heart of actions within the health system, as well as advising and working with other sectors

Before providing some illustrative examples on the economic case for action, let us first look at some of the types of actions that can be taken. Figure 3 provides an illustrative framework of the determinants of health and potential avenues for action to promote better health and prevent disease or injury. It highlights underlying determinants of health, as well as behavioural and biomedical risk factors that affect risks to our health. It recognizes that individual characteristics such as age, gender and genetics also influence health.

Figure 3 also indicates that actions can be delivered within or outside the health system. Health systems should be at the heart of these strategies directly delivering health promotion and disease prevention activities, for instance to mitigate biomedical risk factors, as well as by working with other actors to influence implementation of effective actions to address some of the wider determinants of health in other sectors.

Figure 3: A framework for determinants of health and potential avenues for action

Source: Adapted and augmented from [21]

For example, within the health system, public and primary health care services, including dental and optical services, can play a vital role in primary prevention and early intervention, through actions linked to annual health check-ups, as well as vaccinations. Public health services can also help ensure the provision of nutritional and dietary supplements to high-risk segments of the population, or advise other sectors on these issues, such as schools and workplaces, or increase access to counselling services and support to reduce risk of psychological and physical health problems. They might also work more closely and be better integrated with primary care.

Secondary prevention is more likely to be delivered by specialist health care services, and concentrates on actions to improve health outcomes for individuals already at high risk of disease. These, for example, could include screening and treatment services for cancers, while midwives and health visitors may be on the lookout for maternal and infant health problems. Counselling services may be employed to address poor mental health seen in individuals

with chronic physical health problems such as arthritis or diabetes. More generally, good management of chronic diseases such as diabetes also reduces the risks of complications and development of related diseases.

The links between health and social care services vary between countries. Sometimes they are part of the formal health system and sometimes not, but they also have a very important role to play in disease prevention. One example is in assessing homes for environmental hazards, where cost-effective actions can be taken to reduce the immediate risk of injuries such as fall-related fractures in older people that are a major cost to health care systems [22, 23].

Many actions are also delivered by or in partnership with other sectors

Many actions need to be delivered outside health systems. Health systems can help generate knowledge on the need for and impacts of these different actions. They can, for example, work in partnership with ministries of finance to evaluate the effectiveness of different potential tools

available that could influence risky behaviour. One prominent example is the use of fiscal and tax-related measures to influence an individual's willingness to engage in harmful or protective activities (e.g. taxes on tobacco and alcohol or subsidies to reduce the cost of fruit and vegetables or increase cycling). The health system can also provide evidence, as well as help design evaluations in areas where evidence may be more limited, such as taxes on sugary drinks and gambling, or subsidies for electric cars to reduce pollution. The health system and other sectors can work in partnership to help design effective legislation; examples include rules on food and drink labelling, advertising restrictions (including on social media), controls on the display of products such as alcohol and cigarettes in shops and regulation of the levels of salt and sugar in food. There may be outright prohibition of some harmful risks –for example banning smoking in workplaces or the emission of other toxic substances into the environment. Information and health literacy campaigns within and outside the health system may also be employed.

Recently, attention has also turned to the use of behavioural psychology to influence or reframe individual choices over health promoting actions [24]. Popularized as a 'nudging' individual choices, these interventions can be a complement to other measures to reduce harmful lifestyle actions. Many of these methods are likely to be implemented outside health systems. They have already been used to address choices over tobacco and alcohol, and increasingly, examples of nudges related to physical activity and diet can be found [25, 26]. Examples of the latter include TV campaigns showing smoke coming out of a baby's mouth to emphasize the dangers of passive smoking, as seen in Portugal. Another example is the placement of healthy food rather than sugary snacks near the checkouts of supermarkets in order to influence last-minute impulse purchases [24]. Potentially, the health system can also work with the private sector to aid in implementation; the private sector has made use of behavioural psychology in the proliferation in the availability of pedometers, apps and other devices that measure physical activity to encourage individuals to exercise and live more healthily.

What do we know about the economic case?

Having looked at the different types of economic evaluation methods that can be used and a broad spectrum of potential interventions, we now provide a short overview of some actions where there is a degree of consensus that they are likely to either be cost saving or highly cost-effective in different country contexts (See Box 1).

Box 1: Defining cost saving and cost-effective interventions

In this brief, **cost saving** interventions are those that have both better outcomes and lower costs than the usual intervention, while **highly cost-effective** actions have an additional cost per quality adjusted life year (QALY) gained or DALY averted at less than country specific GDP per capita level. Some studies instead report cost-benefit analyses or return on investment analyses; studies that have a **positive return on investment**, where the monetary value of benefits outweighs the costs of action are also included. These are also considered to be **cost saving**.

There are many examples of interventions that are highly cost-effective or even save costs

The summary takes as its starting point evidence collated in reviews of the economic case for action. This includes reviews of work undertaken in the WHO European Region, as well as evidence from other high-, middle- and low-income country contexts around the world, including the WHO's 'Best Buys' document which identifies interventions that would be considered cost-effective in low- and middle-income country contexts [27-33]. This review also draws on detailed economic evidence and reviews commissioned by the National Institute for Health and Care Excellence in England over the last 13 years to inform their public health guidance [15], and recent return on investment work commissioned by Public Health England [34]. It should be stressed that these examples (summarized in Table 1) are not an exhaustive list of all cost savings and cost-effective actions. Where possible, examples from the WHO European Region context are provided, but it should again be stressed that these findings are context specific and cannot simply be generalized to different country settings. It does not focus on actions where benefits in individual countries cannot be identified; for instance readers may also be interested in recent modelling work looking at the return on investment in public health interventions solely for low- and middle-income countries as a whole rather than individually, most of whom are outside of the WHO European Region [35].

(1) Actions delivered within health care systems

Many preventive actions can be delivered within health care systems and some examples are set out here. In addition, we note strategies that involve a combination of actions taken within and beyond the health care system to promote health, for example to reduce harmful drinking. Some strategies have immediate benefits to the health care system, while some take a number of years to realize their full benefits.

Brief advice on physical activity given in primary care settings to at-risk groups in high-income settings can be highly cost-effective [36]. This is particularly the case when mental as well as physical health benefits (coronary heart disease, stroke and type 2 diabetes) are considered [37]. One example of this concerns investment in collaborative care in primary care to deal with psychological distress and the risk of depression and anxiety disorders that has been associated with diabetes and cardiovascular diseases [18]. From a societal perspective after just two years there was a positive return on investment of \$1.52 for every \$1 invested in the United Kingdom's context, although most of these benefits were gained outside the health and social care sector. **Lifestyle interventions** and/or **drug therapy** (secondary prevention) for at-risk individuals with impaired glucose intolerance have also been shown to be highly cost-effective or cost saving in some country contexts [38-40], but the magnitude of these costs and benefits is difficult to determine because of differences in study design [41]. Indeed in some contexts, for example in Kyrgyzstan, modelling suggests drug therapy is not cost-effective [42].

Another illustrative example concerns **screening programmes**. Screening for hazardous drinking followed by brief intervention within the health care system has been found to be cost saving in 14 EU countries, and highly cost-effective in another 10; however, these interventions were not cost-effective in four countries [43]. Another example is

Table 1: Illustrative examples of cost saving and highly cost-effective actions to promote health and prevent disease

HIGHLY COST-EFFECTIVE:	COST SAVING:
(1) Actions mainly delivered within health system	
<ul style="list-style-type: none"> Brief physician advice for regular physical activity (UK) Screening programme for older women at high risk of hip fractures (UK) 	<ul style="list-style-type: none"> Collaborative care for mental health delivered in primary care to people with diabetes and/or cardiovascular disease (UK) Screening and brief intervention for hazardous drinking (EU28)* Universal hepatitis B vaccination (Italy)
(2) Actions often delivered in partnership with other sectors / actors	
<p>Behavioural risk factors:</p> <p><i>Tobacco smoking</i></p> <ul style="list-style-type: none"> Taxation to increase price of cigarettes (Netherlands) Implementing a price increase for cigarettes (World Bank Europe and Central Asia Region) Mass media campaigns to encourage quitting (UK) Peer school tobacco prevention programmes (UK) 	<ul style="list-style-type: none"> School-based tobacco prevention programmes (Germany)
<p><i>Hazardous drinking</i></p> <ul style="list-style-type: none"> Drink driving legislation and enforcement (WHO Euro C Region)** Reduced access to alcohol in shops (WHO Euro C Region) Increase in excise taxation or improved tax enforcement (WHO Euro C Region) Combination (brief advice, random breath-testing, reduced access, advertising ban, plus increased tax and enforcement) (WHO Euro C Region) 	<ul style="list-style-type: none"> Increase in taxation or advertising bans or reduced retail opening hours (Denmark) Minimum unit price (Ireland)
<p><i>Physical inactivity</i></p> <ul style="list-style-type: none"> Dedicated cycle lanes (New York, USA) Mass media campaign to promote physical activity (Australia) Mass media health promotion campaign (UK-England, Russian Federation) 	<ul style="list-style-type: none"> Pedometers as a motivational tool for activity (Australia)
<p><i>Unhealthy diets</i></p> <ul style="list-style-type: none"> Mass media health promotion campaign (UK-England, Russia) 	<ul style="list-style-type: none"> Subsidies on fruit and vegetables and tax increases on high fat foods (UK-England, Russian Federation) Tax on sugary drinks (USA) Food reformulation to reduce salt content (UK-England) Mandatory labelling of salt content (UK-England) Food reformulation to ban trans-fatty acids (UK England & Wales) Nationwide salt policy package*** (Kyrgyzstan) Public awareness campaigning on physical activity (Belarus)
<p>Other determinants and risk factors:</p>	<ul style="list-style-type: none"> Increased enforcement of speeding, drink-driving and seat belt laws (Norway) Home hazard assessment for fall prevention (UK) Programme to promote social, emotional and behavioural development in areas of high risk for poor childhood development (Canada) Parenting programmes to prevent long-term behavioural problems in at-risk children (UK) Provision of universal workplace physical and mental health promotion programmes (UK) Provision of universal workplace mental well-being programmes (EU countries)

Sources: Based on Tables in the Appendix.

Notes:*Cost saving in 14 countries, cost effective in 10, not cost effective in 4 (Bulgaria, Croatia, Estonia, Romania). **WHO Euro C Region = Belarus, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Ukraine. ***Surveillance of salt consumption patterns, education and awareness programme and salt-reduction strategies in community eating spaces (including schools, workplaces, hospitals).

bone mineral density measurement. For instance, recent trial data in England were used to look at the cost-effectiveness of screening high-risk older women on bone mineral density measurement and 10-year risk of hip fracture in order to help prevent fractures [44]. Over five years, the cost per QALY gained was \$4111, a value considered highly cost-effective in a United Kingdom's context. The analysis is also conservative as it does not take into account the social care and long-term care costs averted.

Many **immunization programmes** also provide positive returns on investment, for example a retrospective analysis looking at the first 20 years of a hepatitis B immunization programme for infants in Italy found that it more than covered its costs from a health sector perspective within this time-period; the authors then modelled the long-term impacts over a further 49 years. This showed that costs averted by the health care system would be almost three times greater than the costs of the programme [45].

(2) Actions delivered in partnership with other sectors/actors

There is also an economic case for actions outside health systems and in this brief we now provide some illustrative examples covering tobacco and alcohol consumption, physical activity and diet, early years interventions for children, workplace health promotion and road traffic injuries.

Tobacco control

Evidence-based tobacco control policies, consistent with the WHO Framework Convention on Tobacco Control (FCTC) which includes multisectoral demand and supply side measures [46, 47], can be highly cost-effective, both in the WHO European Region and globally [10, 48, 49]. Articles 6 to 14 of the FCTC cover measures relating to the reduction of demand for tobacco. Examples of actions include **taxation** and/or **price increases**; economic analyses demonstrate that the costs of implementing such measures are more than outweighed by the long-term benefits from the reduction in smoking-related disease and premature death that arise from a reduction in tobacco consumption [49, 50]. Another example of this multi-pronged approach, **mass media advertising campaigns**, can also be cost-effective [51, 52]. Another example is action to ensure **protection from exposure to tobacco smoke, such as in indoor workplaces**. Smoke-free workplaces have been shown to have a positive return on investment even from the narrow perspective of businesses; this is further strengthened when considering benefits to the health sector and society [52]. The FCTC also notes that measures to reduce tobacco use include effective and appropriate training on tobacco control addressed at specific key individuals, which can include educators, while the WHO Health Promoting Schools: a Framework for Action notes the importance of policies in schools to prevent tobacco use [53]. Potentially effective actions that could be part of a multisectoral approach to tobacco control include **school-based programmes** delivered by teachers and peers to raise awareness of the dangers of smoking and thus help to reduce long-term smoking uptake [54-56] and generate positive long-term economic benefits [57, 58].

Hazardous drinking

When looking at the benefits of reducing hazardous drinking levels, many economic models place a monetary value on immediate benefits beyond health systems such as

reduced violence and other crime, workplace accidents, absenteeism and road traffic delays. There is also an immediate reduction in hospitalizations and other health care service use associated with these events. Preventive actions outside the health system are therefore usually cited as being highly cost-effective or cost saving. They include the **enforcement of price rises**, as well as **limiting retail access** to alcohol and **limiting advertising** [59, 60]. The introduction of a **minimum price per unit** of alcohol may also be cost-effective in some country contexts. In Ireland, if a \$1.15 minimum price was set, then modelling suggests that within a year costs to the health care system of \$6.6 million could be avoided. There would also be averted crime-related costs of \$6.3 million and \$13.9 million in work absenteeism. Over 20 years, total costs avoided would be in excess of \$524 million, increasing to \$1.51 billion if a monetary value is also placed on quality of life gains [61]. Other measures that are likely to be highly cost-effective include **drink-driving legislation** and measures such as **random breath-testing** campaigns [59]. A package **combining measures** within the health care system such as brief advice, alongside some measures delivered in other sectors, suggests that this will generate sufficient additional health benefits and remain highly cost-effective in the WHO European Region, despite higher costs [62].

Physical activity and diet

Another area where partnerships with a range of actors in different sectors are helpful concerns the promotion of physical activity and healthy diets. Again most of the economic analyses are modelling studies, many from outside the WHO European Region; promising interventions include **mass media campaigns** to encourage physical activity; they can be cost-effective and sometimes cost saving in some contexts, such as shown in economic modelling work in Belarus [28, 63, 64]. **Behaviour change interventions** that motivate individuals to take part in physical activity can also be cost-effective. Over a lifetime measures such as the use of **pedometers** [28] and **changes to the built environment** that encourage more 'active travel', for example walking or cycling, have been modelled to be cost-effective in some settings [65]; but this can be very context/location specific [66], thus limiting generalizability.

Actions to influence diet include **taxation on unhealthy food and drinks**. These taxes tend to be cost saving over very long time periods in modelling studies because of favourable reductions in conditions such as cardiovascular diseases, diabetes and stroke, as well as improvements in oral health [67-69]. However, there may be potential adverse effects of taxes on those with low incomes who face additional barriers to behaviour change and thus are left with less money for other uses; subsidies targeting healthy food or disadvantaged consumers may help address this concern [70]. Even if individuals do change their dietary habits, the level of health benefits gained will also partly depend on what they eat or drink instead.

Another limitation here is that practical experience implementing these taxes remains limited, although some appear to have changed consumer behaviours. For instance, in Mexico a sustained 7.6% reduction in the consumption of taxed sugary drinks has been seen in the two years after the tax was introduced [71]. The recent levy on sugary drinks in the United Kingdom appears, initially at least, to have sufficiently incentivized many in the drinks industry to reduce the sugar content of their products to fall below the limit at which the levy would apply [72]. In any event, a

combination of actions, for example involving product reformulation and information campaigns, may be preferable [73].

Increasingly sophisticated epidemiological models are available that can specifically look at the association between a change in health behaviours and impacts on future health problems, such as cardiovascular diseases and diabetes. These include a number of economic analyses informed by epidemiological analyses that potentially suggest product reformulation to reduce the level of salt and trans-fats in processed food can be highly cost-effective or cost saving [74, 75] and lead to significant improvements in health and averted mortality. Strategies that mandate or strongly encourage **product reformulation**, sometimes in combination with other strategies such as **labelling, media campaigns** and **restrictions on fat levels in restaurant food**, can also be cost saving [68, 75-77]. Combined diet and physical activity **promotion programmes**, involving at least two contacts with service providers, have mainly been shown to be highly cost-effective, but not cost saving [78]. A economic model with a **combined strategy** involving better salt surveillance, an education campaign and measures to encourage reduced consumption of salt in communal eating areas was estimated to generate a twelvefold return on investment after 15 years in Kyrgyzstan [42].

Other areas for action

There are many different risks to health where an economic case for investment in disease prevention and health promotion can be made for which there is insufficient space in this brief. For instance, **collaboration between health and other sectors to promote physical and mental well-being in childhood** is economically very sound. This includes taking action during the perinatal period to support mothers and their infants, as well as investing in emotional resilience and health literacy, parenting programmes (particularly targeted at high-risk groups) and anti-bullying measures [79]. There is, for example, long-term evidence from a number of studies indicating that actions to **promote better mental resilience** and **enhance educational support** are cost saving when impacts on sectors other than health are considered, as for instance illustrated by social, emotional and educational development programmes in Canada and the United Kingdom [80, 81].

Health systems can also benefit by **collaborating with occupational health services and workplaces**, particularly small- and medium-sized workplaces that may have limited occupational health services to promote physical and mental well-being in the workplace. Evaluations generally show a positive return on investment both to employers and health care systems [82, 83]. There is also a strong economic case for the health sector to continue to work with **transport and justice sectors**, as well as with the **automobile industry**, for enhanced enforcement of safety measures such as traffic calming and speed reduction measures, increased use of seat belts and more safety features installed into vehicles, all of which can be cost saving [84].

Interpreting results

This brief has illustrative examples of many different health promotion and disease prevention actions found to be cost-effective or cost saving. Recent reviews generally conclude that many investments in health promotion and disease prevention represent good value for money, helping to reduce

some avoidable immediate and downstream demands for health care treatments [27, 29]. Return on investment methodologies are increasingly used, with one recent example being ongoing work at global level to identify the economic case for addressing some risk factors for poor health in terms of the impacts on the future costs of specific health problems such as cardiovascular diseases [19].

Policy-makers should be careful when interpreting results of evaluations and carefully examine the assumptions made

Nonetheless, the multiplicity of methods used means that policy-makers should be careful in the way that they interpret the results of these and other economic evaluations. Economic evaluations of the same intervention in the same country context could lead to very different conclusions depending on the method used. This is not just because of the difference in outcome measurement; many other factors also play a role.

One of the most important is the perspective adopted in evaluation. A narrow focus on costs and impacts on the health system alone, particularly when successful implementation requires funding and other support outside the health sector, for example in workplaces, may be unhelpful. It also ignores broader economic benefits of better health, such as greater levels of participation in employment or education. While many disease prevention and health promotion interventions represent good value from a health system perspective alone, it is important to recognize that interventions may generate more benefits outside the health system. For instance, a key driver of actions delivered within or around school settings, such as many social and emotional literacy and resilience programmes for children and young people, impacts on educational outcomes and the school environment, including teacher health [41].

A second key issue when looking at the economic case for investment in health promotion and disease prevention is the time horizon over which benefits and costs are incurred and how this is dealt with in economic evaluation. Unlike many interventions to treat health problems that usually have fairly immediate impacts, the benefits of many health promotion and disease prevention interventions may take a number of years to be generated. For instance, investing in measures early in life to reduce the risk of childhood obesity may lead to health benefits many decades later, including a reduced risk of dementia in old age [3]. The same can be said of many actions to reduce the uptake and continued use of tobacco, although there are exceptions such as the immediate benefits to the unborn child of women who stop smoking during pregnancy. This long-term time horizon before impact is achieved may be a barrier to investment for some policy-makers more concerned with shorter electoral cycles.

A further related issue concerns the use of discounting in economic evaluation. Traditionally, benefits (and costs) incurred more than one year in the future are discounted; in the United Kingdom, for example, they are currently discounted at a rate of 3.5% per annum. This means that benefits many years in the future will appear to have only a small fraction of their value had they occurred in the current year. This means that the cost-effectiveness of disease prevention/health promotion interventions can appear to be less favourable than investment in immediate health care treatments. Yet many individuals would consider good health in the future to be of great value.

Given that the long time horizon for many interventions is beyond that seen in most randomized-control trials, there is a reliance on economic models to estimate the long-term costs and benefits of health promotion interventions, in some cases looking at impacts over many decades. There may be considerable uncertainty over the sustainability of health benefits over time, and therefore it is important that detailed sensitivity analyses are undertaken which look at potential costs and benefits under very conservative and not just optimistic scenarios on the sustainability, for example, of behaviour change.

Models also need to take account of the consequences of behaviour change; for instance much of the work on the case for investing in taxes on unhealthy food and drinks partly depend on modelling assumptions not only on whether individuals will reduce their consumption of sugary drinks but also what they will switch to. Some alternative options such as natural fruit juices or full fat milk potentially are less beneficial in terms of risks of obesity or poor oral health compared to switching to water. If consumers simply spend more of their disposable incomes on unhealthy food and drinks, then they will have even fewer resources left for other goods and activities, potentially further harming their health. Models therefore need to be transparent on the key assumptions that they make.

Potential 'best buys' in one country may not always be cost-effective in another: health system and broader country institutional and cultural contexts are very important

Health system and broader country institutional and cultural contexts always have an impact on effectiveness, cost-effectiveness and likely implementation. Interventions that have been proven to be potential 'best buys' in one country may not always be cost-effective in another. For instance, in 28 separate analyses screening and brief interventions in health care systems to reduce hazardous drinking in Europe were found to be cost saving in 14 countries, cost-effective in 10 more, but not cost-effective in four countries [43].

This needs to be considered by decision-makers when assessing whether or not to implement a programme or policy that has been shown to be cost-effective in one or more different contexts. Take for example a hypothetical legislative measure to reduce access to harmful products. The effectiveness of legislation depends, in part, on cultural attitudes towards laws, as well as how well these laws are likely to be enforced and the severity of penalties for any infringement. Countries can also learn from failure, as well as success. This could include learning from experiences where resources might have been allocated to interventions with a weak evidence base on effectiveness, as well as identifying poor implementation of potentially cost-effective interventions.

A country specific modelling analysis, as well as pilot study, can help assess the likelihood that this action can be delivered adequately and represent a good use of resources. Such a detailed economic modelling study in Kyrgyzstan, for example, found no evidence to support investment in provision of drug therapy, including glycaemic control for diabetes, and counselling as a way of reducing cardiovascular risk in at-risk population groups; the costs of the programme to the health care system far outweighed societal benefits achieved [42]. In contrast, the model estimated positive returns on investment on measures delivered outside the health care system to reduce salt and

tobacco intake and promote physical activity. Another example of this type comes from modelling work undertaken in Belarus [64]. As in Kyrgyzstan this modelling analysis predicted substantive returns within 15 years on salt reduction, physical activity, tobacco and alcohol control. In contrast, cardiovascular diseases and diabetes clinical interventions did not generate positive long-term returns on investment.

The results of economic analysis should also not be considered in isolation; the costs of future implementation, including the costs of any workforce expansion and scaling up of services also need to be considered. Many economic evaluations also do not consider equity implications; health promoting actions might inadvertently widen health inequalities if those that benefit most are those least in need of support in maintaining their health. Again it is important to consider equity concerns when looking at the results of economic evaluations – studies may be able to separately report impacts on different population subgroups or consider the economic case for investing more in actions to better engage with those who could benefit most from health promotion and disease prevention actions [85]. Much of the burden of YLDs, such as for poor mental and musculoskeletal health, has been skewed towards low-income population groups – disease prevention and health promotion actions might therefore explicitly wish to focus more resources and efforts on these groups in line with the concept of proportionate universalism [86].

Making it happen: using economic evidence to help overcome barriers to implementation

In this brief we show there is a sound economic case for investing in measures to promote health and prevent disease and injury, although an imbalance in the existing evidence base remains, with most of the evidence coming from a few countries in North America, Australasia and western Europe with a long tradition in health economic evaluation. Yet, despite this ever growing body of evidence we have seen that identifiable spending on health promotion and disease prevention within health systems remains very low. Those controlling the purse strings within health systems appear reluctant to allocate more of their limited resources to these activities. Even in relatively well-resourced systems, for instance in England, funds intended for public health have been diverted to other activities [87].

Tables 2a and 2b summarize some of the different barriers to investment and implementation that have been identified and how they can be overcome [88, 89]. These issues are further discussed in this section of the brief.

There is a need to challenge misconceptions about the value of investing in health promotion and disease prevention

This is not just about more effective communication of the strength of the effectiveness and economic evidence, but also about challenging the view that these interventions, unlike health care treatments, are only worth implementing if they are shown to save money. In other words, that interventions always have to be cost saving from a health system perspective rather than simply being cost-effective, with better outcomes but at a cost that is considered worth paying. The view that the benefits of disease prevention are overstated because the long-term additional costs of living longer are not included also needs to be challenged [89]. Not only is this unfair, as this is rarely considered when

looking at the value of treatment in the health care system, but interventions that promote health and potentially extend life may actually result in a compression of morbidity, reducing demands for resources, leading to longer, healthier lives, with a shorter period of poor health near the end of life [90]. It is far from certain that extending life leads to greater use of health services. Better continuing training in the health care workforce may also help assure some professionals that they could have a role to play as part of health promotion and public health services as well as in health care services; an example of this are nurses who undertake additional training to work as public health professionals.

Identifying short- as well as long-term impacts

Many of the illustrative interventions in this brief may take many years to realize their full economic and health benefits. Clearly when the outcomes of investment may not be seen for such a long time elected politicians may understandably not place health promotion and disease prevention at the top of their political priorities. Equally, some health care providers may be reluctant to invest and not see benefits for a very long time when they have so many pressing issues to deal with. In an ideal world building a political consensus around health policy might be a way for countries to ensure sufficient investment in long-term measures, but this may be difficult to establish and sustain.

A more practical measure may be to identify cost-effective short-term investments, for instance home hazard assessment for falls, avoidance of harm to the unborn child through smoking and alcohol cessation programmes during pregnancy, psychological interventions to protect the mental health of people living with chronic diseases, and adherence to safer sex practices. Short-term wins may help create the space and greater acceptance of other investments that may take many years to reach fruition. The benefits to future generations of children and grandchildren of health gains may also help promote public support.

Stimulating and facilitating intersectoral activity

Some actions to promote and protect health are delivered outside the health system. Other sectors may have little interest in better health as a policy objective. Fragmented funding and accountability structures, mutual mistrust and a lack of legal and regulatory frameworks to stimulate intersectoral partnerships between health system actors are among some of the obstacles to intersectoral activity. Another practical challenge concerns what has been described as 'diagonal accounting', where one sector may shoulder the financial responsibility for delivering a service, while another sector is perceived to make most of the gains (and avert costs) at some future point in time [88].

It is important therefore to highlight 'win-win' situations where health and other sectors benefit from investment in disease prevention. However, health systems need to be much more effective in speaking the language of other sectors when trying to leverage funds and/or create conditions for partnership working. For instance, emphasizing improvements in educational attainment, classroom atmosphere and teacher sickness absence rates from school-based mental health intervention can act as a catalyst for their implementation by the education sector [91]. Changes to taxation may also be attractive if, as can be the case, they are easy to implement. Where tax infrastructures already exist, the marginal costs of

implementing changes to taxation levels may be low. Taxation measures can be made even more attractive if any revenues raised (even though revenue generation is not their primary purpose) are earmarked for reinvestment into the health system or external health promoting infrastructures, such as sports facilities and green spaces.

In England many health promotion and public health actions fall under the responsibility of local councils. Public Health England (a national agency that provides government, local government, the National Health Service (NHS), Parliament, industry and the public with evidence-based professional, scientific expertise and support) commissioned a number of different return on investment tools to aid decision-making, including by local councils and other non-NHS organizations (Box 2) [34].

Box 2: Use of return on investment tools to aid local decision making in England

Public Health England has commissioned health economists to develop a number of return on investment tools. These are intended to bring together in a single place the best available evidence on costs, savings and health benefits, for a range of interventions for different health concerns, in order to aid in decision-making on disease prevention and health promotion by local government and health services.

So far 10 models have been published looking at:

- Colorectal cancer
- NHS Diabetes Prevention Programme
- End of life care
- Weight management
- Oral health in preschool children
- Mental health promotion
- Musculoskeletal conditions
- Movement into employment
- Falls prevention
- Best Start in Life

Each model calculates the return on investment for different interventions to selected different sectors over different time frames. For example, the falls prevention model reports a return on investment to health and social care services of £3.17 for every £1 invested in home assessment and modification services, while in the mental health promotion tool, investment in debt advice and management services has a return on investment of £2.60 to health, legal services and employers for every £1 invested.

Sources: [18, 23, 34]

Other approaches to support intersectoral activity include mechanisms and regulatory structures to allow different organizations across sectors to share resources and responsibilities around health promotion and disease prevention goals, as well as the creation of dedicated health promotion and public health bodies that have a remit for working across sectors [92, 93]. Simply co-locating relevant health and other sector services can also help build trust and increase the likelihood of shared goals being set [94].

Effective communication helps

Better communication is another element for facilitating implementation. This means investing in specialist communication capacity where individuals have skills in communicating research needs and outputs and who also are comfortable in decision-making environments.

Decision-makers have to contend with many different voices arguing for different ways in which resources can be used; specialist communication, research and public health skills are needed to help separate robust sources of evidence from other materials and distil this into succinct messages to aid decision-making. These specialist professionals can also help liaise with researchers, including economists, in order to commission research that is most practical and useful to

health systems, but also realistic to achieve. It has also been argued that population health actions are at a disadvantage compared to health care treatments as they often do not have 'identifiable victims' and thus have suggested that social marketing and other strategies should be used to give a 'human face' to the potential beneficiaries of public health interventions [89].

Table 2a: Examples of barriers to investing in health promotion and disease prevention and how they can be overcome

BARRIERS TO INVESTING	POTENTIAL SOLUTIONS
<p>Perceptions and expectations of some policy makers and health care service providers, for example:</p> <ul style="list-style-type: none"> • Perception that the evidence base on the effectiveness of health promotion and disease prevention interventions is weaker than that for health care treatments • Perception that investment in disease prevention means there will be fewer resources available for health care treatment • Fears that greater investment in health promotion and disease prevention means divesting from health care services leading to job losses • Belief that, in the long run, disease prevention costs more than other health spending because individuals live longer and cost the health system more in the long run • Expectation that public health interventions only represent good investments if they save money 	<p>Continued efforts to change perceptions and beliefs about health promotion / disease prevention interventions, for example:</p> <ul style="list-style-type: none"> • Communicate in clear everyday language that evaluations show disease prevention and health promotion are effective • Demonstrate that better health potentially can help to free up resources for health care services by reducing avoidable health problems • Short-term positive returns on investment are achievable and can help free up resources for health care systems by reducing some avoidable service use; workforce can also be retrained to work more in public health, e.g. more nurses moving into public health • Treatment interventions also have the potential to extend life; extra life years have value; interventions that extend life can also result in compression of morbidity, with people living longer, healthier lives, with a shorter period of poor health near the end of life • While some health promotion / disease prevention interventions are cost saving, in general, health promotion / disease prevention should not be required to meet higher standards of economic effectiveness than health care services
<p>Timeframe</p> <ul style="list-style-type: none"> • Longer timeframes to impact compared to clinical interventions that often go beyond the electoral cycles of politicians • Conventional use of discounting in economic analysis means that benefits appear less appealing the further into the future they occur; in contrast many health care treatments have more immediate benefits that are not affected as much by discounting 	<ul style="list-style-type: none"> • Establish cross-party dialogue and seek to establish cross-party consensus on very long-term public health strategies and goals • Identify interventions with short-term benefits (e.g. avoiding smoking in pregnancy, fall prevention, infant immunization, contraception), as well as interventions with mid- to long-term benefits • Identify intermediate shorter-term health benefits, e.g. reduced levels of smoking • Show annual levels of benefit where feasible from delays as well as avoidance of morbidity and mortality • Report undiscounted as well as discounted costs and benefits • Highlight value of intergenerational benefits linked to better health; this may encourage the public to recognize potential benefits for their own future health and that of their children and grandchildren, thus personalizing the benefits

Table 2b: Examples of barriers to investing in health promotion and disease prevention and how they can be overcome

BARRIERS TO INVESTING	POTENTIAL SOLUTIONS
<p>Intersectoral activities</p> <ul style="list-style-type: none"> • Actions to promote and protect health should be delivered outside the health system; these other sectors have little interest in better health as a policy objective • Fragmented funding structures for intersectoral activities • Lack of past collaboration / mistrust create barriers to intersectoral action • Financial risks and incentives are not shared equally across sectors; a situation of 'diagonal accounting' can arise where one sector may shoulder the financial responsibility for delivering a service at one time point, while another sector is perceived to make most of the gains (and avert costs) at some future point in time 	<ul style="list-style-type: none"> • Be prepared to identify and emphasize non-health sector specific benefits associated with health promotion and disease prevention when making a case for investment outside the health system rather than health benefits • Identify potential shared objectives and goals and highlight 'win-win' situations where health and many other sectors (not just ministries of finance) benefit from investment in disease prevention • Co-locate relevant health and other sectors to help establish working relationships and trust • Introduce mechanisms and regulatory structures to mandate or encourage different organizations across sectors to share resources and responsibilities around health promotion and disease prevention goals • Create dedicated health promotion and public health bodies and funds explicitly focused on implementing working across sectors
<p>Population interventions are impersonal and less attractive</p> <ul style="list-style-type: none"> • Lack of 'identifiable victims': whereas clinical medicine typically deals with identifiable people (patients), beneficiaries of public health measures are generally unknown and not yet ill 	<ul style="list-style-type: none"> • Combine public health with social marketing approaches to give a human face to the potential beneficiaries of public health interventions • Instead of focusing on the large number of unidentified people who could benefit from public health interventions, create an image of a single individual who could benefit, and with whom decision-makers can identify
<p>Communication and complexity</p> <ul style="list-style-type: none"> • Policy makers have to contend with a wide range of influences including special interest groups, industry and the general public each with their own perspectives; many of these influences may not prioritize health promotion and disease prevention over treatments • Complexity of policy and funding decisions: evidence is not the only driver of policy and funding decisions; competing influences, including organizational, political and strategic factors; financial and resource constraints; personal experience; common sense; expert opinion; stakeholder and public pressure; community views and local competition, can restrict the use of research evidence in health-related decision-making 	<ul style="list-style-type: none"> • Strategies are required to facilitate iterative dialogue between researchers and decision makers • The environment within which decision makers work, in terms of structure and rewards, should be adapted to encourage the use of research evidence • Invest in specialist communication capacity where individuals have skills in communicating research needs and outputs and also are comfortable in policy-making environments

Conclusions

Spending on disease prevention and health promotion appears to be low, despite evidence on the effectiveness of many different interventions. The challenge is to focus on how best to help translate evidence-based knowledge into routine everyday practice across the WHO European Region. Economic evidence can be used as part of the policy-making process to help increase investment within and outside health systems. There is a strong economic case for investment in the promotion of better health and prevention of disease and injury; illustrative examples of cost-effective and sometimes cost saving actions in different country contexts have been highlighted.

However, there are still many gaps in the evidence base, including much less information on the economic case for action in the eastern part of the WHO European Region and a need for more information on interventions with short-term as well as long-term impacts. There is a lack of evidence on the value of investing in behavioural psychology influenced interventions that have had raised profiles in recent years. It is also the case that much of the existing literature does not directly look at the equity implications of interventions; this is needed to help reduce the risk of inadvertently widening health inequalities by failing to reach those segments of the population in most need.

However, simply increasing the volume of economic evidence is unlikely to be sufficient to make a dramatic impact on overall levels of investment. This requires much more attention to be placed on the way in which evidence can be translated into practice. Ministries of health as well as ministries of finance can play pivotal roles in incentivizing different actors within and outside the health system to invest in disease prevention. Some of this is about implementation and political science, but there are important contributions that economics can also make. These include devoting more efforts to the generation of return on investment analyses that place as much (if not more) emphasis on the value of non-health benefits to sectors that the health system wishes to influence or partner with. This needs to go beyond a focus solely on ministries of finance but should consider many more sectors, such as housing, education, social welfare, justice and transport. Financial and other economic incentives, contracts and other regulatory arrangements can also be used to stimulate new partnerships between the health system and other sectors. The same approach might also be used to stimulate even more partnership working between public health professionals and other actors within health systems.

Appendix

Illustrative examples of cost saving and cost effective actions to promote health and prevent disease

All values in the tables below are in purchasing power parity (PPP) adjusted 2016 international dollars.

Table A1: Examples of actions delivered within the health sector				
Intervention	Country	Context specific examples of return on investment	Perspective / Time period	Conclusion
Brief physician advice for regular physical activity	UK [37]	Cost per QALY gained of \$2715	Health/Lifetime	Highly cost effective
Collaborative care for mental health delivered in primary care to people with diabetes and/or cardiovascular disease	UK [18]	Positive Return on Investment \$1.52 for every \$1 invested in programme	Health, productivity/ 2 years	Cost saving
Screening and brief intervention for hazardous drinking	EU 28 Countries [43]	Cost per QALY gained ranging from cost saving in 14 countries to \$42 569	Health care/10 years	Cost saving 14 countries, Cost effective in 10, not cost effective in four – Bulgaria, Croatia, Estonia, Romania
Universal hepatitis B vaccination	Italy [45]	Return on Investment Analysis. \$2.78 for every \$1 invested from health system perspective. Programme also breaks even within 20 years	Health care and societal/ 68 years	Cost saving
Screening programme for older women at high risk of hip fractures	UK [44]	Cost per QALY gained of \$4111	Health system/5 years	Highly cost effective

Table A2: Examples of actions to address smoking				
Intervention	Country	Context specific examples of return on investment	Perspective / Time period	Conclusion
Taxation to increase price by €0.22 per pack of 19 cigarettes	Netherlands [50]	\$6539 per QALY gained	Health care/75 years	Highly cost effective
Implementing a 33% price increase	World Bank Europe & Central Asia Region [10]	Between \$5 and \$55 per DALY saved gained	Health care/50 years	Highly cost effective
Mass media campaigns to encourage quitting	UK (England) [51]	\$844 per life year gained	Health care/Lifetime	Highly cost effective
School-based tobacco prevention programmes	Germany [57]	Benefit : Cost Ratio 3.6:1	Health care & productivity costs/Lifetime	Positive return on investment
School-based tobacco prevention programmes	England [58]	\$2 477 per additional student not smoking	Health care & local government/2 years	Cost-effective in short term and highly cost-effective if long-term benefits also considered

Table A3: Examples of actions to address hazardous drinking

Intervention	Country	Context specific examples of return on investment	Perspective / Time period	Conclusion
Drink driving legislation and enforcement	WHO Euro C Region [59]*	Cost per DALY saved \$941	Health care/Lifetime	Highly cost effective**
Reduced access to alcohol in shops	WHO Euro C Region [59]*	Cost per DALY saved \$683	Health care/Lifetime	Highly cost effective
Excise taxation increased by 20% or improved tax enforcement by 20%	WHO Euro C Region [59]*	Cost per DALY saved \$458 and \$600	Health care/Lifetime	Highly cost effective
30% increase in taxation or advertising bans or reduced retail opening hours	Denmark [60]	All cost saving: nationwide at least \$14.05 million lower costs and 1911 DALYs saved	Health care/Lifetime	Cost saving
Minimum unit price between of €0.4 and €1.20	Ireland [61]	Nationwide between 8 and 2561 QALYs gained and costs avoided between \$11.9 and \$3533million	Health, crime, work, societal/20 years	Cost saving
Combination (brief advice, random breath-testing, reduced access, advertising ban, plus increased tax (by 50%) and its enforcement (50% less unrecorded consumption)	WHO Euro C Region [59]*	Cost per DALY saved \$909	Health care/Lifetime	Highly cost effective

Notes: * Covers Belarus, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Ukraine. ** When broader perspective is taken, including impacts on road management and value of life lost, intervention is shown to be cost saving.

Table A4: Examples of actions to address physical inactivity and unhealthy diets				
Intervention	Country	Context specific examples of return on investment	Perspective / Time period	Conclusion
Dedicated cycle lanes in New York city	USA [65]	Cost per QALY gained of \$1310	Health, transport/ Lifetime	Highly cost effective
Pedometers as a motivational tool for activity	Australia [95]	20 000 DALYs averted; \$415 million saved	Health/Lifetime	Cost saving
Mass media health promotion campaign	UK (England), Russian Federation [67]	Cost per DALY averted \$31 208 & \$15 559	Health/20 years	Highly cost effective
Mass media campaign to promote physical activity	Australia [95]	23 000 DALYs averted; \$ 425 million saved	Health/Lifetime	Cost saving
Subsidies on fruit & vegetables & tax increases on high fat foods	UK (England), Russian Federation [67]	1496 and 1696 DALYs averted per million population and net savings to health system	Health system/20 years	Cost saving
16% tax on sugary drinks	USA [69]	101 000 DALYS averted. Admin- istration costs were 0.95% of tax revenue. Reduction in health care costs of \$24 billion. Return on investment of \$55 : \$1	Health system/10 years	Cost saving
Food reformulation to reduce salt content	UK (England) [74]	9758 life years gained in population through reduced coronary heart disease risk; up to \$1017 million saved	Health system/10 years	Cost saving
Mandatory labelling of salt content	UK (England) [74]	984 life years gained in popula- tion through reduced coronary heart disease risk; up to \$666 million saved	Health system/10 years	Cost saving
Food reformulation to ban trans-fatty acids	UK (England and Wales) [75]	7900 QALYs gained, and 7200 deaths from coronary heart disease averted, with net costs averted between \$93 and \$383 million (2015)	Health system, productivity, informal care/5 years	Cost saving
Mandatory labelling of trans-fatty acids	UK (England and Wales) [75]	4000 QALYs gained, and 3500 deaths from coronary heart disease averted, with net costs averted between \$32 and \$167 million (2015)	Consumer standards, health system, productivity, informal care /5 years	Cost saving
Nationwide salt policy package: surveillance of salt consumption patterns, education and awareness programme and salt-reduction strategies in community eating spaces (including schools, workplaces, hospitals)	Kyrgyzstan [42]	Positive return on investment: 12.3 to 1 due to productivity gains. Also 1161 deaths averted and 15 493 life years gained	Health system, productivity/15 years	Cost saving
Public awareness campaigning on physical activity	Belarus [64]	Positive return on investment: 5 to 1 due to productivity gains	Health system & productivity/15 years	Cost saving

Table A5: Other examples of cost saving and cost effective health promoting actions

Risk factor	Intervention	Country	Context specific examples of return on investment	Perspective / Time period	Conclusion
Road safety	50% increased enforcement of speeding, drink-driving and seat belt laws	Norway [84]	4.4, 3.3 and 2.6% reduction in fatalities. Benefit to cost ratio of 8, 9.3 and 13 to 1 respectively	Lost productivity, police & traffic system/ 1 year	Cost saving
Early childhood development	Programme to promote social, emotional and behavioural development in areas of high risk for poor childhood development	Canada [80]	Improved education and mental health outcomes for children; reduced use of special educational needs services, reduced parental depression, reduced crime. Benefit to cost ratio 2.5:1	Health, education and social services/7 years	Cost saving
Early childhood development	Parenting programmes to prevent long-term behavioural problems in at-risk children	UK [81]	Significant reduction in long-term behavioural and mental health problems in adulthood. Benefit to cost ratio of at least 8:1	Health, education, social services, criminal justice/ 25 year	Cost saving
Fall prevention	Home assessments for fall hazards for older people	UK [23]	Positive return on investment from health and social care perspective of 3.17: 1. With societal benefits this is 7.34:1.	Health, social care, society/2 years	Cost saving
Workplace health promotion	Provision of universal workplace physical and mental health promotion programmes	UK [83]	Significant reduction in absenteeism and presenteeism; reduced contact with health care systems. Benefit to cost ratio 9:1	Business, health/1 year	Cost saving
Workplace health promotion	Provision of universal workplace mental well-being programmes	EU countries [82]	Significant reduction in absenteeism and presenteeism; reduced contact with health care systems. Benefit to cost ratio 28:1	Business, health, social welfare, wider economy/5 years	Cost saving

References

1. WHO Regional Office for Europe. The Tallinn Charter: Health Systems for Health and Wealth. Copenhagen: WHO Regional Office for Europe; 2008.
2. OECD. Society at a glance 2016: OECD social indicators. Paris: OECD Publishing; 2016.
3. Livingston G, Sommerlad A, Orgeta V, Costafreda SG, Huntley J, Ames D et al. Dementia prevention, intervention, and care. *Lancet*. 2017;390(10113):2673-734.
4. World Health Organization. DALY estimates 2000–2015. WHO Regions. Geneva: World Health Organization; 2018 (Available from: http://www.who.int/healthinfo/global_burden_disease/GHE2015_DALY_WHOReg_2000_2015.xls?ua=1)
5. World Health Organization. YLD estimates 2000–2015. WHO Regions. Geneva: World Health Organization; 2018 (Available from: http://www.who.int/healthinfo/global_burden_disease/GHE2015_YLD_WHOReg_2000_2015.xls?ua=1).
6. Bloom DE, Cafiero ET, Jané-Llopis E, Abrahams-Gessel S, Bloom LR, Fathima S et al. The global economic burden of non-communicable diseases. Geneva: World Economic Forum; 2011.
7. Olesen J, Gustavsson A, Svensson M, Wittchen HU, Jonsson B. The economic cost of brain disorders in Europe. *European Journal of Neurology*. 2012;19(1):155-62.
8. Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet*. 2009;373(9682):2223-33.
9. Laslett A-M, Catalano P, Chikritzhs T, Dale C, Doran C, Ferris J et al. The range and magnitude of alcohol's harm to others. Fitzroy, Victoria: AER Centre for Alcohol Policy Research, Turning Point Alcohol and Drug Centre, Eastern Health; 2010.
10. Jha P, MacLennan M, Chaloupka F, Yurekli A, Ramasuundarahettige C, Palipudi K et al. Global hazards of tobacco and the benefits of smoking cessation and tobacco taxes. In: Gelband H, Jha P, Sankaranarayanan R, Horton S, editors. *Cancer*. Washington (DC): International Bank for Reconstruction and Development/The World Bank; 2015.
11. Ding D, Lawson KD, Kolbe-Alexander TL, Finkelstein EA, Katzmarzyk PT, van Mechelen W et al. The economic burden of physical inactivity: a global analysis of major non-communicable diseases. *Lancet*. 2016;388(10051):1311-24.
12. Gmeinder M, Morgan D, Mueller M. How much do OECD countries spend on prevention? OECD Health Working Papers, No. 101. Paris: OECD Publishing; 2017 (Available from: <http://dx.doi.org/10.1787/f19e803c-en>).
13. McDaid D. Socioeconomic disadvantage and suicidal behaviour during times of economic recession and recovery. In: Samaritans. Socioeconomic disadvantage and suicidal behaviour. Ewell: Samaritans; 2017:32-68.
14. Heins E. Social and labour market policies and suicidal behaviour. In: Samaritans. Socioeconomic disadvantage and suicidal behaviour. Ewell: Samaritans; 2017:69-93.
15. National Institute for Health and Care Excellence. Guidance and advice list. London: NICE; 2018 (Available from: <https://www.nice.org.uk/guidance/published?type=ph>).
16. McDaid D, Sassi F, Merkur S. Supporting effective and efficient policies: the role of economic analysis. In: McDaid D, Sassi F, Merkur S, editors. *Promoting health, preventing disease: the economic case*. Maidenhead: Open University Press; 2015:19-31.
17. Bertram MY, Lauer JA, De Joncheere K, Edejer T, Hutubessy R, Kieny MP et al. Cost-effectiveness thresholds: pros and cons. *Bulletin of the World Health Organization*. 2016;94(12):925-30.
18. McDaid D, Park A, Knapp M. Commissioning cost-effective services for promotion of mental health and wellbeing and prevention of mental ill-health. London: Public Health England; 2017.
19. Bertram MY, Sweeny K, Lauer JA, Chisholm D, Sheehan P, Rasmussen B et al. Investing in non-communicable diseases: an estimation of the return on investment for prevention and treatment services. *Lancet*. 2018;391(10134):2071-8.
20. McDaid D, Bauer A, Park A-L. Briefing paper: making the economic case for investing in actions to prevent and/or tackle loneliness. London: Campaign to End Loneliness; 2017.
21. Australian Institute of Health and Welfare. Evidence for chronic disease risk factors. Canberra: AIHW; 2016.
22. Keall MD, Piersie N, Howden-Chapman P, Guria J, Cunningham CW, Baker MG. Cost-benefit analysis of fall injuries prevented by a programme of home modifications: a cluster randomised controlled trial. *Injury Prevention*. 2017;23(1):22-6.
23. York Health Economics Consortium. A return on investment tool for the assessment of falls prevention programmes for older people living in the community. London: Public Health England; 2018.
24. McDaid D, Oliver A, Merkur S. What do we know about the strengths and weakness of different policy mechanisms to influence health behaviour in the population? Copenhagen: WHO Regional Office for Europe, on behalf of the European Observatory on Health Systems and Policies; 2014.
25. Sousa Lorenco J, Ciriolo E, Rafael Almeida S, Troussard X. Behavioural insights applied to policy: European report 2016. Luxembourg: Publications Office of the European Union; 2016.

26. OECD. Behavioural insights and public policy: lessons from around the world. Paris: OECD Publishing; 2017.
27. McDaid D, Sassi F, Merkur S, editors. Promoting health, preventing disease: the economic case. Maidenhead: Open University Press; 2015.
28. Vos T, Carter R, Barendregt J, Mihalopoulos M, Veerman L, Magnus A et al. Assessing cost-effectiveness in prevention (ACE–Prevention). Brisbane: University of Queensland; 2010.
29. Masters R, Anwar E, Collins B, Cookson R, Capewell S. Return on investment of public health interventions: a systematic review. *Journal of Epidemiology and Community Health*. 2017;71(8):827-34.
30. Hill SR, Vale L, Hunter D, Henderson E, Oluboyede Y. Economic evaluations of alcohol prevention interventions: is the evidence sufficient? A review of methodological challenges. *Health Policy*. 2017;121(12):1249-62.
31. World Health Organization. Updated Appendix 3 of the WHO Global NCD Action Plan 2013–2020. Geneva: World Health Organization; 2017.
32. Dyakova M, Hamelmann C, Bellis M, Besnier E, Grey C, Ashton K et al. Investment for health and well-being: a review of the social return on investment from public health policies to support implementing the Sustainable Development Goals by building on Health 2020. Health Evidence Network synthesis report 51. Copenhagen: WHO Regional Office for Europe; 2017.
33. World Health Organization. 'Best buys' and other recommended interventions for the prevention and control of noncommunicable diseases. Geneva: World Health Organization; 2017.
34. Public Health England. Health economics: a guide for public health teams. London: Public Health England; 2018 (Available from: <https://www.gov.uk/guidance/health-economics-a-guide-for-public-health-teams>).
35. Arnold V, Bertram M, Härmälä S, Land M-A, Robinson S, Toroyan T et al. Saving lives, spending less. A strategic response to noncommunicable disease. Geneva: World Health Organization; 2018.
36. Vijay GC, Wilson EC, Suhrcke M, Hardeman W, Sutton S. Are brief interventions to increase physical activity cost-effective? A systematic review. *British Journal of Sports Medicine*. 2016;50(7):408-17.
37. Anokye NK, Lord J, Fox-Rushby J. Is brief advice in primary care a cost-effective way to promote physical activity? *British Journal of Sports Medicine*. 2014;48(3):202-6.
38. Herman WH. The cost-effectiveness of diabetes prevention: results from the Diabetes Prevention Program and the Diabetes Prevention Program Outcomes Study. *Clinical Diabetes and Endocrinology*. 2015;1:9.
39. Aroda VR, Knowler WC, Crandall JP, Perreault L, Edelstein SL, Jeffries SL et al. Metformin for diabetes prevention: insights gained from the Diabetes Prevention Program/Diabetes Prevention Program Outcomes Study. *Diabetologia*. 2017;60(9):1601-11.
40. Png ME, Yoong JS. Evaluating the cost-effectiveness of lifestyle modification versus metformin therapy for the prevention of diabetes in Singapore. *PloS one*. 2014;9(9):e107225.
41. Roberts S, Barry E, Craig D, Airoidi M, Bevan G, Greenhalgh T. Preventing type 2 diabetes: systematic review of studies of cost-effectiveness of lifestyle programmes and metformin, with and without screening, for pre-diabetes. *BMJ open*. 2017;7(11):e017184.
42. Kontsevaya A, Farrington J, Kulikov A, Rotar O, Webb D. Prevention and control of noncommunicable diseases in Kyrgyzstan : the case for investment. Copenhagen: WHO Regional Office for Europe; 2017.
43. Angus C, Thomas C, Anderson P, Meier PS, Brennan A. Estimating the cost-effectiveness of brief interventions for heavy drinking in primary health care across Europe. *European Journal of Public Health*. 2017;27(2):345-51.
44. Turner DA, Khioe RFS, Shepstone L, Lenaghan E, Cooper C, Gittoes N et al. The cost-effectiveness of screening in the community to reduce osteoporotic fractures in older women in the UK: economic evaluation of the SCOOP Study. *Journal of Bone and Mineral Research*. 2018;33(5):845-51.
45. Boccalini S, Taddei C, Ceccherini V, Bechini A, Levi M, Bartolozzi D et al. Economic analysis of the first 20 years of universal hepatitis B vaccination program in Italy: an a posteriori evaluation and forecast of future benefits. *Hum Vaccin Immunother*. 2013;9(5):1119-28.
46. World Health Organization. The WHO Framework Convention on Tobacco Control: an overview. Geneva: World Health Organization; 2018.
47. World Health Organization. WHO Framework Convention on Tobacco Control. Geneva: World Health Organization; 2003.
48. Levy DT, Huang AT, Currie LM, Clancy L. The benefits from complying with the framework convention on tobacco control: a SimSmoke analysis of 15 European nations. *Health Policy and Planning*. 2014;29(8):1031-42.
49. Irwin A, Marquez PV, Jha PK, Peto R, Moreno-Dodson B, Goodchild M et al. Tobacco tax reform at the crossroads of health and development: technical report of the World Bank Group global tobacco control program (Vol. 2): main report. Washington (DC): World Bank Group; 2017.
50. Over EA, Feenstra TL, Hoogenveen RT, Droomers M, Uiters E, van Gelder BM. Tobacco control policies specified according to socioeconomic status: health disparities and cost-effectiveness. *Nicotine & Tobacco Research*. 2014;16(6):725-32.

51. Brown J, Kotz D, Michie S, Stapleton J, Walmsley M, West R. How effective and cost-effective was the national mass media smoking cessation campaign 'Stoptober'? *Drug and Alcohol Dependence*. 2014;135:52-8.
52. Ekpu VU, Brown AK. The economic impact of smoking and of reducing smoking prevalence: review of evidence. *Tobacco Use Insights*. 2015;8:1-35.
53. World Health Organization. Health promoting schools: a framework for action. Geneva: World Health Organization; 2009.
54. Langford R, Bonell C, Jones H, Poulou T, Murphy S, Waters E et al. The World Health Organization's Health Promoting Schools framework: a Cochrane systematic review and meta-analysis. *BMC Public Health*. 2015;15:130.
55. Thomas RE, McLellan J, Perera R. School-based programmes for preventing smoking. *Cochrane Database of Systematic Reviews*. 2013(4):Cd001293.
56. MacArthur GJ, Harrison S, Caldwell DM, Hickman M, Campbell R. Peer-led interventions to prevent tobacco, alcohol and/or drug use among young people aged 11–21 years: a systematic review and meta-analysis. *Addiction*. 2016;111(3):391-407.
57. Hoeflmayr D, Hanewinkel R. Do school-based tobacco prevention programmes pay off? The cost-effectiveness of the 'Smoke-free Class Competition'. *Public Health*. 2008;122(1):34-41.
58. Hollingworth W, Cohen D, Hawkins J, Hughes RA, Moore LA, Holliday JC et al. Reducing smoking in adolescents: cost-effectiveness results from the cluster randomized ASSIST (A Stop Smoking In Schools Trial). *Nicotine & Tobacco Research*. 2012;14(2):161-8.
59. Anderson P, Chisholm D, Fuhr DC. Effectiveness and cost-effectiveness of policies and programmes to reduce the harm caused by alcohol. *Lancet*. 2009;373(9682):2234-46.
60. Holm AL, Veerman L, Cobiac L, Ekholm O, Diderichsen F. Cost-effectiveness of preventive interventions to reduce alcohol consumption in Denmark. *PloS one*. 2014;9(2):e88041.
61. Angus C, Meng Y, Ally A, Holmes J, Brennan A. Model-based appraisal of minimum unit pricing for alcohol in the Republic of Ireland. An adaptation of the Sheffield Alcohol Policy Model version 3. Sheffield: University of Sheffield; 2014.
62. Anderson P. Tackling alcohol-related harms?. In: McDaid D, Sassi F, Merkur S, editors. *Promoting health, preventing disease: the economic case*. Maidenhead: Open University Press; 2015:81-99.
63. Sassi F, Cecchini M, Lauer J, Chisholm D. Improving lifestyles, tackling obesity: the health and economic impact of prevention strategies. *OECD Health Working Papers*, No. 48. Paris: OECD Publishing; 2009.
64. Kontsevaya A, Farrington J, Rotar O, Tarlton D, Gamgebell L, Rusovich V. Prevention and control of noncommunicable diseases in Belarus. The case for investment. Copenhagen: WHO Regional Office for Europe; 2018.
65. Gu J, Mohit B, Muennig PA. The cost-effectiveness of bike lanes in New York City. *Injury Prevention*. 2016.
66. Veerman JL, Zapata-Diomed B, Gunn L, McCormack GR, Cobiac LJ, Mantilla Herrera AM et al. Cost-effectiveness of investing in sidewalks as a means of increasing physical activity: a RESIDE modelling study. *BMJ open*. 2016;6(9):e011617.
67. Cecchini M, Sassi F, Lauer JA, Lee YY, Guajardo-Barron V, Chisholm D. Tackling of unhealthy diets, physical inactivity, and obesity: health effects and cost-effectiveness. *Lancet*. 2010;376(9754):1775-84.
68. Smith-Spangler CM, Juusola JL, Enns EA, Owens DK, Garber AM. Population strategies to decrease sodium intake and the burden of cardiovascular disease: a cost-effectiveness analysis. *Annals of Internal Medicine*. 2010;152(8):481-7, W170-3.
69. Long MW, Gortmaker SL, Ward ZJ, Resch SC, Moodie ML, Sacks G et al. Cost effectiveness of a sugar-sweetened beverage excise tax in the U.S. *American Journal of Preventive Medicine*. 2015;49(1):112-23.
70. Sassi F, Belloni A. Fiscal incentives, behavior change and health promotion: what place in the health-in-all-policies toolkit? *Health Promotion International*. 2014;29 Suppl 1:i103-12.
71. Colchero MA, Rivera-Dommarco J, Popkin BM, Ng SW. In Mexico, evidence of sustained consumer response two years after implementing a sugar-sweetened beverage tax. *Health Aff (Millwood)*. 2017;36(3):564-71.
72. Pym H. Sugar tax is already producing results. London: BBC News; 2018 (Available from: <http://www.bbc.co.uk/news/health-43372295>).
73. Sassi F. Taxing sugar. *BMJ (Clinical research ed)*. 2016;352:h6904.
74. Collins M, Mason H, O'Flaherty M, Guzman-Castillo M, Critchley J, Capewell S. An economic evaluation of salt reduction policies to reduce coronary heart disease in England: a policy modeling study. *Value in Health*. 2014;17(5):517-24.
75. Allen K, Pearson-Stuttard J, Hooton W, Diggle P, Capewell S, O'Flaherty M. Potential of trans fats policies to reduce socioeconomic inequalities in mortality from coronary heart disease in England: cost effectiveness modelling study. *BMJ (Clinical research ed)*. 2015;351:h4583.
76. Eatwell. D2.3 Evaluation of cost utility of policy interventions. Reading: University of Reading; 2012.
77. Pearson-Stuttard J, Hooton W, Critchley J, Capewell S, Collins M, Mason H et al. Cost-effectiveness analysis of eliminating industrial and all trans fats in England and Wales: modelling study. *Journal of Public Health*. 2016.

78. Li R, Qu S, Zhang P, Chattopadhyay S, Gregg EW, Albright A et al. Economic evaluation of combined diet and physical activity promotion programs to prevent type 2 diabetes among persons at increased risk: a systematic review for the Community Preventive Services Task Force. *Annals of Internal Medicine*. 2015;163(6):452-60.
79. McDaid D, Hewlett E, Park A. Understanding effective approaches to promoting mental health and preventing mental illness. OECD Health Working Papers, No. 97. Paris: OECD Publishing; 2017.
80. Peters RD, Bradshaw AJ, Petrunka K, Nelson G, Herry Y, Craig WM et al. The Better Beginnings, Better Futures project: findings from grade 3 to grade 9. Monographs of the Society for Research in Child Development. 2010;75(3):1-176.
81. Bonin EM, Stevens M, Beecham J, Byford S, Parsonage M. Costs and longer-term savings of parenting programmes for the prevention of persistent conduct disorder: a modelling study. *BMC Public Health*. 2011;11:803.
82. Matrix Insight. Economic analysis of workplace mental health promotion and mental disorder prevention programmes and of their potential contribution to EU health, social and economic policy objectives. Brussels: Executive Agency for Health and Consumers; 2013.
83. Knapp M, McDaid D, Parsonage M, editors. Mental health promotion and mental illness prevention: the economic case. London: Department of Health; 2011.
84. Elvik R, Sogge CV, Lager L, Amundsen FH, Pasnin LT, Karlsen R et al. Assessing the efficiency of priorities for traffic law enforcement in Norway. *Accident Analysis and Prevention*. 2012;47:146-52.
85. McDaid D, Sassi F. Equity, efficiency and research synthesis. In: Shemilt I, Mugford M, Vale L, Marsh K, Donaldson C, editors. Evidence-based decisions and economics: health care, social welfare, education and criminal justice. Oxford: Wiley-Blackwell; 2010:67-78.
86. Marmot M. Fair society, healthy lives: The Marmot Review. London: Strategic Review of Health Inequalities in England post-2010; 2010.
87. Willmott M, Womack J, Hollingworth W, Campbell R. Making the case for investment in public health: experiences of Directors of Public Health in English local government. *Journal of Public Health*. 2016;38(2):237-42.
88. McDaid D, Wilson E, Knapp M. Barriers and facilitators to commissioning cost-effective services for promotion of mental health and wellbeing and prevention of mental ill-health. London: Public Health England; 2017.
89. Richardson AK. Investing in public health: barriers and possible solutions. *Journal of Public Health*. 2012;34(3):322-7.
90. Wouterse B, Huisman M, Meijboom BR, Deeg DJ, Polder JJ. The effect of trends in health and longevity on health services use by older adults. *BMC Health Services Research*. 2015;15:574.
91. McDaid D. Investing in health literacy: what do we know about the co-benefits to the education sector of actions targeted at children and young people? Copenhagen: WHO Regional Office for Europe, on behalf of the European Observatory on Health Systems and Policies; 2016.
92. McDaid D, Park AL. Evidence on financing and budgeting mechanisms to support intersectoral actions between health, education, social welfare and labour sectors. Health Evidence Network synthesis report 48. Copenhagen: WHO Regional Office for Europe; 2016.
93. McDaid D, Wismar M. Making an economic case for intersectoral action. In: McDaid D, Sassi F, Merkur S, editors. Promoting health, preventing disease: the economic case. Maidenhead: Open University Press; 2015:293-312.
94. McDaid D. Joint budgeting: can it facilitate intersectoral action? In: McQueen D, Wismar M, Lin V, Jones C, Davies M, editors. Intersectoral governance for Health in All Policies: structure, actions and experiences. Copenhagen: WHO Regional Office for Europe, on behalf of the European Observatory on Health Systems and Policies; 2012:111-127.
95. Cobiac LJ, Vos T, Barendregt JJ. Cost-effectiveness of interventions to promote physical activity: a modelling study. *PLoS Medicine*. 2009;6(7):e1000110.

Health Systems for Prosperity and Solidarity Series

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1. How can European health systems support investment in and the implementation of population health strategies?
David McDaid, Michael Drummond, Marc Suhrcke
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Corinna Sorenson, Michael Drummond, Finn Børlum Kristensen, Reinhard Busse
3. Where are the patients in decision-making about their own care?
Angela Coulter, Suzanne Parsons, Janet Askham
4. How can the settings used to provide care to older people be balanced?
Peter C. Coyte, Nick Goodwin, Audrey Laporte
5. When do vertical (stand-alone) programmes have a place in health systems?
Rifat A. Atun, Sara Bennett, Antonio Duran
6. How can chronic disease management programmes operate across care settings and providers?
Debbie Singh
7. How can the migration of health service professionals be managed so as to reduce any negative effects on supply?
James Buchan
8. How can optimal skill mix be effectively implemented and why?
Ivy Lynn Bourgeault, Ellen Kuhlmann, Elena Neiterman, Sirpa Wrede
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Sherry Merkur, Philipa Mladovsky, Elias Mossialos, Martin McKee
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Tanya Horsley, Jeremy Grimshaw, Craig Campbell
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Christiane Wiskow, Tit Albrecht, Carlo de Pietro
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John N. Lavis, Govin Permanand, Cristina Catalo, BRIDGE Study Team
17. How can knowledge brokering be advanced in a country's health system?
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18. How can countries address the efficiency and equity implications of health professional mobility in Europe? Adapting policies in the context of the WHO Code and EU freedom of movement
Irene A. Glinos, Matthias Wismar, James Buchan, Ivo Rakovac
19. Investing in health literacy: What do we know about the co-benefits to the education sector of actions targeted at children and young people?
David McDaid
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Marieke Kroezen, James Buchan, Gilles Dussault, Irene Glinos, Matthias Wismar
21. How can voluntary cross-border collaboration in public procurement improve access to health technologies in Europe?
Jaime Espin, Joan Rovira, Antoinette Calleja, Natasha Azzopardi-Muscat, Erica Richardson, Willy Palm, Dimitra Panteli
22. How to strengthen patient-centredness in caring for people with multimorbidity in Europe?
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