



Policy Brief

Is prevention better than cure? A review of the evidence By Divya Srivastava¹

Summary:

This policy brief provides an overview of the literature on disease prevention and health promotion. Disease prevention policies refer to interventions that aim to lower the risk of disease and delay the onset of poor health. Preventable illness accounts for a higher burden of morbidity and mortality worldwide. The level of allocation of resources to such programmes is a key challenge for policy makers.

A current debate in the literature is whether such policies contribute to lower costs for the health care system in the long run. Evidence suggests that even though some health promotion activities may be cost saving (effective) in the short run, there is no conclusive evidence on whether such activities reduce costs in the long run. Some activities increase costs in the long run because patients live longer and become susceptible to other ailments and conditions. Even though in the long run, costs may increase relative to other treatments, such interventions may extend and improve quality of life.

The recommendations in this brief could provide policy makers a possible framework to address population health intervention (PHI) strategies and their evaluation: health promotion measures should be considered in the context of improved resource allocation, therefore focusing on cost *effectiveness* not cost *savings*; overall incentive structures should be improved; accountability and legal frameworks should underpin institutional arrangements; greater consensus on methodologies used in PHI is necessary; and measures should consider employment policies that account for longer life expectancy.

The European Commission could support countries in developing and implementing policies outlined above and facilitate policy discussions. Such steps should be based on sound methodologies to evaluate PHI, improve resource allocation and support institutions to take the health promotion agenda forward

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1. Introduction

Disease prevention is an active area of public health policy. It promotes healthy lifestyle choices, safe and healthy environmental and social conditions that aim to contribute to risk reduction and delay early onset of poor health and disease. The level of allocation of resources to such programmes is a key challenge for policy makers. They need to balance the demands for such policies against resources for curative services. A current debate in the literature is whether there should be greater policy focus on disease prevention policies and whether such policies indeed contribute to lower costs for the health care system in the long run.

This policy brief discusses evidence on disease prevention policies, methodological issues related to the evaluation of such policies, developments underway and implications for policy makers. The brief is structured as follows: Section 1 presents background on the issue; section 2 discusses evidence in the literature, section 3 provides developments underway at the international level and national level among selected countries; section 4 discusses policy implications and finally section 5 provides a summary and conclusion.

1.1. Background

Defining prevention

Disease prevention policies refer to interventions that aim to lower the risk of disease and delay the onset of poor health. Prevention policies can apply to primary, secondary and tertiary settings: primary is designed to avert disease or injury; secondary prevention is designed to reverse or retard progression of an existing condition while tertiary is designed to ameliorate the effects of a disease or condition (Cohen, Neumann P.J. et al. 2008)

The World Health Organization (WHO) considers the important role of public health strategies to minimise environmental risk. Prevention is considered in the context of health promotion strategies to a variety of population groups, risk factors, and diseases. Policies, legislation, and regulation should be developed for prevention of communicable and non communicable disease, injury and violence (WHO 2008).²

In the Organisation for Economic Co-operation and Development (OECD) report on investment in population health, prevention is considered within the context of public health, population health and health promotion. The OECD report considers the role of public health as system of organised responses of society to protect the health of its population, while population health looks at the broad range of factors and conditions that

² The WHO defines health as a state of complete physical, psychological and social well-being and not simply the absence of disease or infirmity (WHO, 1946).

determine health, and health promotion is the broad range of interventions and programs designed to promote health and well being (Bennett 2003).

The public health literature has a broad approach in defining prevention but slight differences in definitions exist. One review on the definitions of prevention concluded that the main challenge was developing a definition that would be comprehensive and at the same time practical for the measurement of prevention spend (Health England Expert Advisory Panel on Preventive Health Spending 2006).

In this brief, disease prevention is defined broadly as population health interventions (PHIs) that aim to promote health and prevent disease and premature mortality. The focus of PHIs is on collective approaches as opposed to individualized interventions, though they may be delivered by a physician in a clinical setting, the scope is beyond the health care system.

Expenditure on prevention

A significant amount of premature mortality is the result of lifestyle practices such as smoking, poor diet and lack of physical activity. According to the WHO, deaths from chronic diseases, which are significantly associated with lifestyle risk factors, accounted for 60% of all deaths worldwide: 20% in high income countries and 80% in low and middle income countries in 2005 (WHO 2005). To take another example, in the United States (US), deaths from smoking, inactive lifestyle, poor diet and misuse of alcohol have been estimated to be responsible for 900,000 deaths annually, nearly 40% of total yearly mortality (Mokdad, Marks et al. 2005).

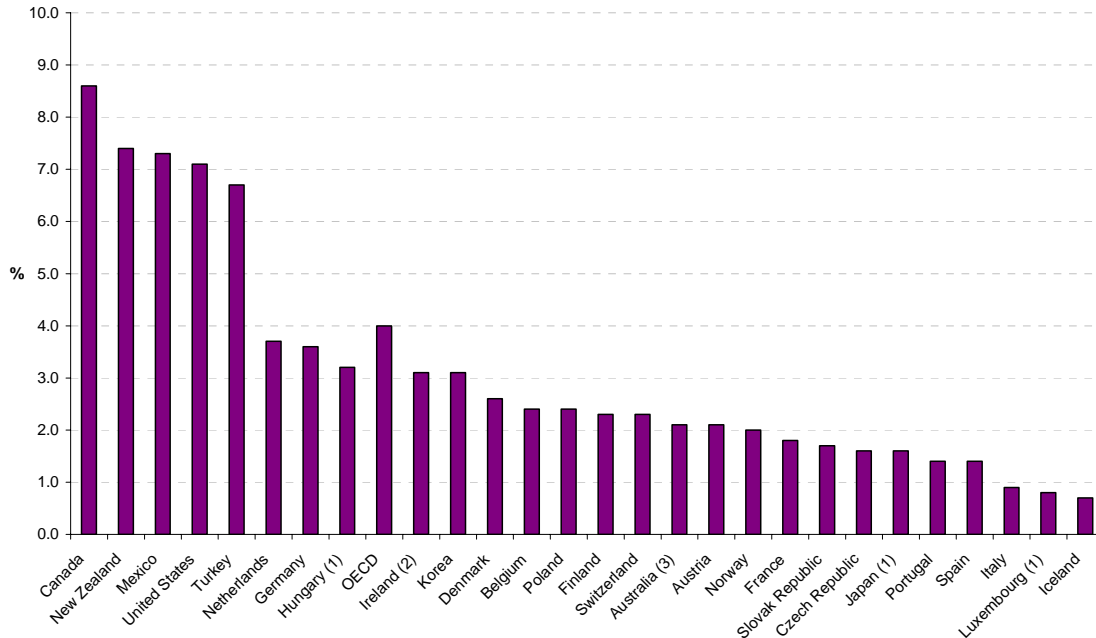
Despite the reported high burden, and the strong public health argument for increased prevention programmes, expenditure on public health and prevention accounts for a small proportion of public health budgets as shown in the figure below. According to OECD's most recent figures, average expenditure on public health and prevention in 2005 was just over 3% of public spending, whereas the average spent on curative care was 57% (OECD 2007).³ Spending on prevention included a wide range of programmes such as vaccination programmes and public health campaigns on alcohol abuse and smoking. The wide variation across countries partly reflects differences in health system organisation of prevention campaigns. In some countries, public health initiatives are not captured in these figures because they are generally included under curative care (e.g. Spain).⁴ Countries that adopt a more centralised approach to public health and prevention campaigns (e.g. Canada) can better identify spending on these programmes (OECD 2007). In some countries, these figures may be underestimated because they only include public health initiatives funded through the public health budget, therefore leaving out privately run programmes such as occupational health by private enterprise, and also

³ The other areas of expenditure were medical goods including pharmaceuticals (20%), long-term care (11%), ancillary services (e.g. diagnostic tests) (4%), and centralised expenses of health administration and insurance was 4%. Curative care covers curative and rehabilitative services provided in inpatient and outpatient settings (e.g. ambulatory sector or in the patient's home) (OECD, 2007).

⁴ Initiatives are carried out at the primary care level (OECD, 2007).

spending on public health related programmes in other sectors such as education and transport.

Figure 1.0: Percentage of public expenditure on public health and prevention as share of total public expenditure on health, 2005



Source: Health Indicators (OECD, 2007)

Note: 1 refers to data from 2003 and 2 refers to data from 2004. No data from the UK available.

The debate in the literature is whether failing to invest in prevention programmes today means that more will be spent in the future (Fries, Koop et al. 1993). The public health argument is convincing. For example, mass vaccination programmes of infants saves money in areas such as, measles, mumps and small pox (CHSRF 2003). Programmes designed to help woman stop smoking save money because they give birth to healthier babies (Tengs, Adams et al. 1995; Partnership for Prevention 2001). The evidence that national screening programmes such as cervical smears and mammography prevent deaths due to cervical and breast cancer is also strong (Holland and Stewart 2005). The question remains whether evidence supports the broader argument that in the long run, total health costs are reduced. The following section explores evidence in this area.

2. Literature Review

This section discusses literature findings on population health interventions (PHIs) and evaluation of its cost effectiveness. Findings suggest that PHI programmes tend to focus on certain types of interventions that are easier to evaluate. Furthermore, there are attempts to introduce economic incentives to encourage the adoption of prevention strategies at the individual level. Overall, some prevention measures may be effective while the majority are not. A review of the current approach suggests that methodologies need to be strengthened. These issues are explored below.

2.1. Applying economic evaluation to prevention

It has been argued that the lack of information on the cost effectiveness of PHIs is one reason for the modest investment in PHIs to date (Wanless 2004). Using economic evaluation, therefore, may be one way to strengthen the case for governments to invest in PHIs.

Economic evaluation can in theory help policy makers identify the balance between investing in preventive and curative care. One challenge is the long run nature of possible effects of a PHI. Economic evaluation can make use of modelling techniques to assess the long term costs and the level of effectiveness for a strategy to be cost effective.

The challenge for policy is when an intervention is more effective and more costly than an alternative intervention. An important issue that researchers and experts raise is that economic evaluation should not be used in isolation when determining resource allocation. The decision will be based on a variety of factors such as the intervention may be in conflict with other policy goals, value judgements, political and resource constraints. For example, an intervention may be effective in one country context but not in another.

Applying economic evaluation to PHI does carry practical and methodological challenges and these are discussed in more detail in section 2.5 (Kelly, McDaid et al. 2005; Drummond, Weatherly et al. 2007). Health technology assessment (HTA) bodies recommend the use of an approach called cost utility analysis. In this analysis, outcomes are measured in utilities that aim to reflect an individual's preference for a specific level of health status or a specific health outcome, e.g. the Quality Adjusted Life Year (QALY). It is noted that this approach does not capture the substantial non-health impacts of PHI.⁵ Most of the literature findings presented below draw on the cost utility approach.

There are alternative approaches but each has its limitations. Cost benefit analysis (CBA) is commonly used in the transport and environmental sectors and measures costs and benefits in monetary terms. There are concerns that this approach can generate a negative public perception because it places a value on health (and health benefits) in monetary terms.

2.2. Reviews of the literature

Evidence of cost-effectiveness of PHIs is much smaller than the evidence base of health care interventions, but it has experienced growth in recent years. A useful approach for understanding the size of the evidence base is to draw on information from existing high quality reviews. Three recent reviews have been undertaken (Rush, Shiell et al. 2004; Lister, Fordham et al. 2006; McDaid and Needle 2006).

⁵ For instance, an improvement in health status could have social and economic effects (e.g. healthy workers generate productive output for society.)

Rush et al. (2004) reviewed over 400 economic evaluations of health-promoting interventions in the literature between 1990 and 2001. The overwhelming majority (90%) focused on biological or behavioural determinants of health. There is a lack of economic evaluations that consider social and economic determinants of health but initiatives are underway to examine these issues. The authors noted that research is needed on how to support decision maker's use of imperfect, incomplete and uncertain information.

McDaid and Needle (2006) carried out a review of economic evaluation in public health between mid 1960s until the first half of 2005. They identified more than 1700 evaluations with the majority undertaken in the past 10 years. The authors found that the United States (US) accounts for the majority (49%) of studies, followed by the United Kingdom (UK) at 13%, Canada (5%) and the both Australia and the Netherlands at 4%.

A review of the cost effectiveness (CE) of primary health promotion interventions was carried out in the areas of alcohol, smoking, obesity, illicit drug taking, sexual risk taking, mental illness and behaviours related to heart disease (Lister, Fordham et al. 2006). The study identified societal costs of preventable illness to be £200 billion. The study found that when the societal perspective is included in the analysis, societal returns on investment ranged from £34 for every £1 spent to returns of over £200 for each £1 spent. International studies showed returns on investment to health expenditures of \$0-20 for \$1 spent, while when measured at the societal level, the returns were much higher at \$20-50 for each \$1 invested.

2.2.1. Areas targeted

Economic evaluation of PHIs mainly has a clinical focus, such as physician-administered interventions in a clinical setting. McDaid and Needle (2006) found that more than 60% of evaluations were carried out on straightforward PHIs such as vaccinations and screening programmes. Overall, these interventions are easily measured to identify short term outcomes, resource cost, detection of cases (e.g. true positives, false positives).

Complex PHIs has been evaluated to a lesser extent. Examples of interventions include targeted disease programmes for older people, tobacco and alcohol control measures, financial incentives and educational measures to promote nutritional change (McDaid 2008).

A significant proportion of PHIs involves the use of studying the cost effectiveness of medicines to prevent disease such as hypertensive and cholesterol-lowering medicines (see section below on cardiovascular disease). This has been promoted and largely funded by the pharmaceutical industry (Schwappach 2007).

Targeted measures show evidence of effectiveness relative to non-targeted interventions. For instance, the usefulness of routine examinations in the middle aged have shown no effect on mortality or morbidity but are still propagated by many (Holland and Stewart 2005). Evidence from the US suggests that counselling programmes to quit smoking, screening for colorectal cancers and providing influenza vaccination reduce mortality

either at low cost or at a cost savings (Maciosek, Coffield et al. 2006). Evidence on prevention measures where robust evidence exists is presented below.

Smoking

School-based programmes have found savings in health care costs. Every \$1 spent in certain types of school-based tobacco prevention programmes saves about \$20 in associated medical costs (US Department of Health and Human Services 2003). A study by the Public Health Agency of Canada estimated that \$1 spent in produced discounted lifetime societal benefits of \$15 (Stephens, Kaiserman et al. 2000).

Evidence from the US Department of Health and Human Services estimated that in the state of California, every \$1 spent on anti-smoking measures resulted in about \$4 saving in direct medical costs (US Department of Health and Human Services 2003).

Cardiovascular disease

A review of economic evaluations for the prevention of cardiovascular disease between 1995 and 2005 was carried out (Schwappach, Boluarte et al. 2007). A total 195 studies were included and were mainly carried out in the US or the UK. The authors confirmed that there is a large body of evidence on clinical preventive measures, primarily lipid lowering drugs, but much less of health promotion interventions (Schwappach, 2007). The authors noted that there is a need for government intervention to evaluate broader economic evaluations. The current focus of these studies is on cost effectiveness of medicines which is mainly funded by the pharmaceutical industry.

Mental health

A review of economic evaluations on mental health focused on promotion of mental wellbeing and prevention of mental health problems, while economic evaluations of drug therapies were excluded (Zechmeister, Kilian et al. 2008). The authors noted that most compelling evidence to reduce the onset of these problems required early year interventions targeted at children and their parents. A total of 14 studies were included. The authors found robust evidence on such interventions is limited and can not be easily generalised. There is need to strengthen the methodology of economic evaluations in this area.

Workplace

Workplace assessment programmes have been shown to be cost effective. Evidence from the US suggests several programmes are cost effective: physical exercise programmes, the provision of lifestyle advice, workplace health screening programmes, and care management programmes for those identified as having depression and or stress problems (Wang, 2007).

Multisectoral approach

A common criticism of current PHIs is that they are clinically focused and that there is a need for greater multisectoral collaboration. One area this applies to is to reduce accidents and injuries, many which are particularly cost effective. In New Zealand, a country that has high number of road traffic accidents, a range of measures were introduced including enforcement measures delivered by police, the transport sector funded advertising campaigns against drunk-driving, and mandatory use of seatbelts appeared to be highly cost effective in reducing number and severity of crashes (Guria, 1999).

2.3. Using economic incentives

The use of financial incentives on preventive care has been a recent approach to address the high and growing costs of preventable disease and deaths. Reviews of the available evidence on the impact of economic and financial incentives on preventive care largely come from the US and have shown some effectiveness of incentives for patients only in the short-term and little effect on providers.

One review found that studies of simple and complex PHIs tend to draw from different patient populations (Kane, Johnson et al. 2004). Patients of low socioeconomic status (e.g. drug users, teen mothers) were most frequently studied for simple preventive care. In contrast, generally healthy, middle-class populations were most frequently used for complex health promotion lifestyle changes such as smoking cessation and weight loss. Therefore the generalisability of the findings to the whole population is limited.

Rewards to patients for simple behaviours appear to be effective for well defined and distinct behavioural interventions (Kane, Johnson et al. 2004). In some studies, effectiveness of very modest incentives appears to work. Incentives as rewards for participating and adhering to goals whether for complex or simple interventions resulted in a positive behaviour change in the short term (Nexoe, Kragstrup et al. 1997; Jakicic, Winters et al. 1999; Kaper J 2005). In contrast, long term follow up studies found that the outcome measures had turned to their original levels in the case of obesity (Jeffery and French 1999) and smoking cessation (Volpp KG 2006). That is, there is insufficient evidence that economic incentives are effective for long-term lifestyle changes required for health promotion.

There is little evidence that explicit provider incentives are effective in increasing the provision of PHIs (Fairbrother, Siegel et al. 2001). Some evidence shows that incentive effects were larger for group practices than solo practices but there more information is needed to sort out the causes. Appropriateness and efficacy of financial incentives have only recently begun to be subjected to examination through either experimentation or well-designed studies.

2.4. Evidence of PHI costs

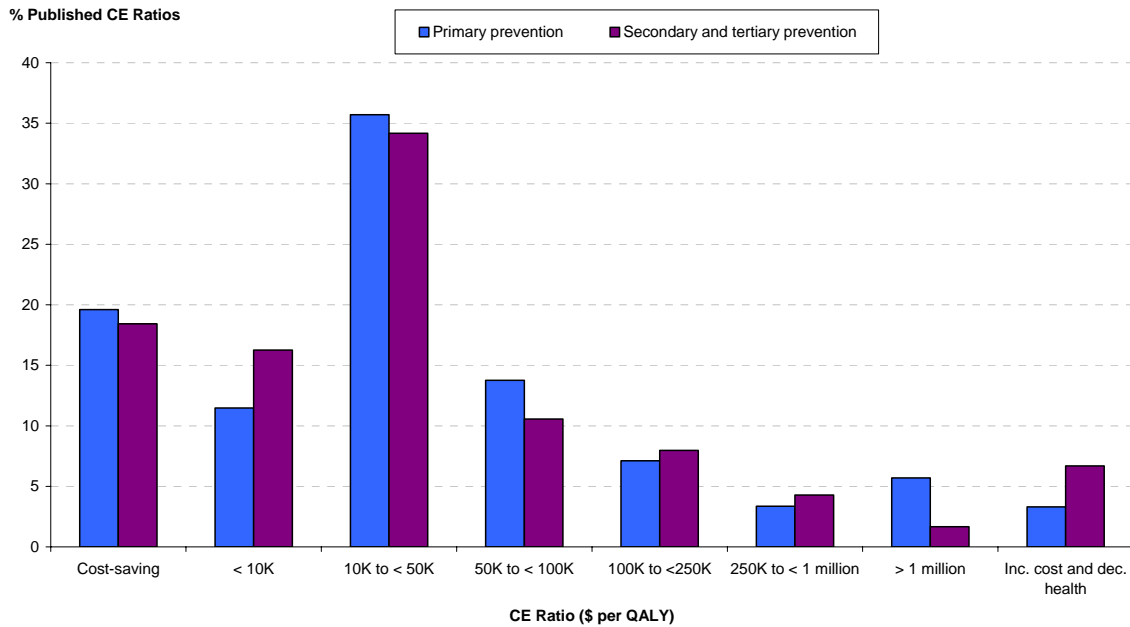
Even though studies show some effectiveness in prevention programmes, the broader implication of these interventions is their impact on overall health care costs. The focus on the cost saving of prevention programmes sidesteps the question of whether such measures are more cost effective than the treatment of existing conditions (Cohen, Neumann P.J. et al. 2008). For some conditions, expensive high-technology treatments may be cost effective such as cervical cancer screening for women with HIV (Goldie, Weinstein et al. 1999), diagnostic scans of the heart (transesophageal echocardiography), or the use of medications (low-weight-molecular heparin) to treat of blood clots for patients suffering from deep vein thrombosis (Weinstein 1999). Preventing illness can save money, especially when targeted at those who benefit most from them, but in other cases it can add to health care costs—such as interventions used for more broadly defined groups of people (Russell 2007).

Preventive measures may create savings from developing diseases such as cancer in the short run. This analysis, however, is limited because one implication of living longer is that these individuals may become vulnerable to other conditions later on in life and will require health services. Mental illness, respiratory disease and joint and bone problems account for about the same proportion of health care budgets as cancer and heart disease (Kirby M et al. 2002). These diseases are less fatal but data suggest that in countries with low mortality, elimination of fatal diseases by successful prevention increases healthcare spending because of the medical expenses during added life years (Bonneux, Barendregt et al. 1998).

A recent study analysed costs and benefits of prevention measures versus the costs and benefits of treating existing conditions (Cohen, Neumann P.J. et al. 2008) and confirms previous reviews. The authors carried out a systematic review of cost effectiveness studies and identified 599 published between 2000 and 2005. Of these, 279 CE ratios were classified as preventive designed to avert disease or injury (primary prevention in the table). Secondary and tertiary prevention were grouped together (a total of 1221 CE ratios).⁶ Incremental costs (in US\$ 2006) were divided by the incremental health benefits quantified as QALYs. Low cost effectiveness ratios were favourable because they indicated that the intervention was inexpensive for the incremental gains in QALYs. The diagram is presented below.

⁶ Primary, secondary and tertiary prevention were defined as follows: primary is designed to avert disease or injury; secondary prevention is designed to reverse or retard progression of an existing condition while tertiary is designed to ameliorate the effects of a disease or condition (Cohen et al., 2008).

Figure 2.0: Distribution of Cost- Effectiveness Ratios for preventive measures



Source: (Cohen, Neumann P.J. et al. 2008)

Note: Data are from the Tufts–New England Medical Center Cost-Effectiveness Registry. QALY denotes quality-adjusted life-year.

The authors found that the distribution of CE ratios for preventive measures and treatments were similar. This implies that the benefits outweigh the costs for some prevention programmes but not for the majority reviewed in the study (Cohen, Neumann P.J. et al. 2008). The summary of evidence presented indicates that some prevention measures may be cost effective but evidence on whether they lead to reduced total health care costs in the long is not there. A list of selected CE ratios from this study is presented in Annexe A.

2.5. Methodological issues – current practices in the literature

While there is growing evidence on the evaluation of PHI, a common criticism is that the current methodological practices need to be strengthened. These issues are discussed below.

Quality: A repeated concern is that the quality of evidence presented varies in the articles. Even though research in this area has grown, many studies lack quality. For example, studies fail to provide information on the study perspective (see footnote 7) or the year costs were considered (Schwappach 2007).

Causality: The challenge with disease prevention studies is that there may be many factors that affect the intervention. Different behaviours can lead to the same health

outcomes and the impact of behaviour change on outcomes may be non linear.⁷ One way of addressing this problem is to use attribution fractions related to disease outcomes to behaviours. The WHO publishes an attribution model for low mortality countries in the European Region (Ezzati, Lopez et al. 2006).

Varied approaches: Reviews found that the minority of studies are consistent in the analytical approach which makes it difficult to interpret results and their generalisability/transferability (Chisholm and Evans 2007).

In the UK, the National Institute of Health and Clinical Excellence (NICE) is a HTA body that reviewed the effectiveness of PHI in achieving behaviour change. NICE found that while there are many studies in this field, few use consistent methods of analysis (NICE Behaviour Change Group 2006). A third of the studies in this review claimed to adopt a societal perspective but a consistent definition was not applied.⁸ Furthermore, a review of studies on willingness to pay found that different methods of assessing the cost and benefits produced different answers (Hirth, Chernew et al. 2000), underscoring the importance of sensitivity analyses to show how sensitive the results are to changes in the parameters of the study.

Study focus: The current evidence focuses on clinical approaches and interventions in clinical settings. Broader prevention measures should be assessed to evaluate optimisation of population health rather than individual care (Holland 2004). These interventions, however, are more complex than the assessment of individual procedures of the cost effectiveness of drugs. Multisectoral approaches (an exception is probably road traffic and injury) are less common which implies that evaluation in this area needs to be strengthened.

2.5.1. Methodological issues to address

The growing level of research in this area has sparked discussion and debate on the methods of economic evaluation. Researchers have identified key areas that need to be addressed in the economic evaluation of PHI.

Consistency in approach: The studies note that valuation of health outcomes and the types of costs included vary. The problem does not appear to lie in insufficient research but in the lack of consensus in the approach to economic evaluation in this area (Lister, Fordham et al. 2006). A stricter adherence to health economic guidelines is necessary.

Long term implications: It is important to assess the effect of an intervention in the long run because of the delay in possible health benefits of an intervention. Long time periods

⁷ The relationship between behaviour change and outcomes is not proportional and relates to effects that are not proportional to their causes. In mathematics, the relationship between outputs is not proportional to its inputs (e.g. quadratic functional form, i.e. variables that have exponents greater than one).

⁸ A societal perspective aims to capture costs and benefits that have an impact on society (e.g. spillover costs or savings to other public or private sector agencies). It is recommended to adopt a societal viewpoint which is broadest and most relevant (Drummond, O'Brien et al., 1997). A more narrow perspective in economic evaluation is to consider costs and benefits from the patient's perspective.

make it difficult to identify causal relationships create higher levels of uncertainty that need to be modeled properly (Schwappach 2007; Wasem 2007). Using Discrete Event Simulation or Markov Models is necessary to generate incremental cost effectiveness ratios. It is important for researchers to be transparent about the assumptions so that policy makers understand the interpretation of such results (CADTH 2006).

Discounting: A related issue to long term implications of prevention policies is the rate of discounting. This is a concept that aims to capture how society and individuals value future health against present health. Discounting allows calculating benefits and costs that will occur in the future relative to their present value. Please see Annexe B for an example.

There are theoretical arguments to support uniform rates over time (Keller and Cretin 1983; Lazaro 2002) but there is empirical evidence that indicate discount rates decline with time rather than staying uniform (Cairns and van der Pol 1997; Cairns and van der Pol 2000). A declining rate puts greater value on future health benefits. This implies that prevention using declining rates would be more favourable than it presently seems in economic evaluation.

There is some evidence that people place more value on cure when asked to compare directly the benefits of prevention and treatment under resource constraints, but more research is needed (Ubel, Spranca et al. 1998; Corso, Hammitt et al. 2002; Schwappach 2002a; Schwappach 2002b).

Presently an optimal solution does not exist. Some experts note that policy makers need to discuss the discounting level that is necessary to meet their national policies (Severns and Milne 2004). For instance, in the UK, NICE took a view to discount both costs and QALYs at 3.5% (Wasem 2007). Health economic guidelines recommend that sensitivity analysis should be carried out on the discounting rate.

Measuring costs of PHIs: Economic evaluations of PHIs should capture all the costs of implementation. Current economic evaluations may miss information on the cost of making necessary changes in lifestyle (Mooney 2007). For instance, at the patient level, preventive activities such as exercise could bring costs from injury, and have an adverse effect on utility and leisure time devoted to exercise (CHSRF 2003; Mooney 2007).

Costs may arise from detection because it may be inaccurate, requiring re-testing of patients to ensure that they are not false positives. These additional tests cost the health system: it is estimated that in screening for mammography, 80 to 93% of suspicious or positive results were false positives (Wright and Mueller 1995).

The problem of accurate detection is also affected by stress patients may experience. For instance, it is reported that hypertension tests make patients nervous and as a result their pressure goes up only to drop back to normal once they return home (CHSRF 2003). Costs associated with anxiety of taking tests, e.g. screening, are also difficult to measure but important to consider (Holland and Stewart 2005), or the value of reduced anxiety

from a lower risk of contracting a disease (Drummond, Chevat et al. 2007). Depending on how invasive preventive treatments are, patients may also experience pain, discomfort or anxiety from undergoing such treatments. Costs from other conditions that may develop later in life also need to be appropriately modeled.

These examples of costs should also be considered relative to benefits from PHI. For instance, modeling techniques already incorporate benefits that when individuals live longer, they make positive contributions (e.g. increase labour productivity) to society. Factors such as the benefits of herd immunity (a positive externality), however should also be incorporated into analyses.⁹ This is particularly important given the increase in the cost of the new generation of vaccines compared to traditional low cost vaccines (McDaid 2008).

3. Policy developments at the national and international level

The national and international policy environment has been active in developing policies on prevention. Evaluation tools of PHI have been slower in development but recent work is underway to evaluate the evidence of PHI programmes. Selected developments are presented below.

3.1. International Level

Cost effectiveness data

There are efforts underway to develop data resources on economics of prevention. The WHO has set up the Choosing Interventions that are Cost Effective (CHOICE) database. This project assembles regional databases on the costs, impact on population health and cost-effectiveness of key health interventions for the purposes of assisting policy makers in priority setting and health policy planning (WHO 2008). A set of standardised analytical tools, guidelines and quality control have produced a high degree of comparability across specific disease analysis (Chisholm and Evans 2007). Results are adapted to the country contexts. An example that illustrates interventions to tackle alcohol and tobacco related problems in Estonia is presented in Annexe C (Lai, Habicht et al. 2007).

Assessing models

The OECD has launched a project on the Economics of Prevention. The project aims to develop a conceptual framework on the economics of non-communicable disease prevention. The potential of government intervention will be explored in this area of health policy. The strengths and weaknesses of conventional methods (e.g. cost effectiveness) in the area of prevention will be assessed. The project was launched in 2007. A concept paper that outlines the issues to be explored was recently published

⁹ Economics defines an externality a direct effect (positive or negative) of the behaviour of one entity on the welfare of another (Varian, 1987).

(Sassi and Hurst 2008). A second report comparing countries using selected risk factors and determinants of chronic conditions will be published later in 2008.

European Union

Activity at the European Commission (EC) on public health is encompassed in the programme in community action, which falls under the European Union's obligation under Treaty Article 152 that all community actions will contribute to a high level of health protection (European Parliament and Council of the European Union 2007). The EC first developed a strategy document on public health in 1993. On this basis eight action programmes on health promotion, cancer, drug dependence, AIDS and other communicable diseases, health monitoring, rare diseases, accidents and injuries, and pollution-related diseases were agreed. These programmes were replaced with the Public Health Programme 2003-2008 and the Health Programme 2008-2013 (European Parliament and Council of the European Union 2007). There appears to be a policy shift towards focusing on collective efforts rather than on the individual (Sykes, Willig et al. 2004). The current programme aims to improve health security, promote health, reduce inequalities (including comparative measures on prevention), increase knowledge exchange of health information, and place emphasis on consultation and participation of stakeholders.

The EC recognises that community policies have an impact on health and health systems and it has taken a broader approach (referred to as health in all policies) to facilitate coordinated actions in other policy areas such as environmental, social and economic policies. Preventive care is part of these larger efforts and is included as one of the objective areas in the Open Method of Coordination (OMC) concerning social protection and social inclusion (Employment Social Policy Health and Consumer Affairs Council 2008) and in the new health strategy (Commission of the European Communities 2007).

There is scope at the EU level to engage with researchers on measures of prevention and discuss methodologies for assessing the effectiveness of PHI.

3.2. National efforts

Developing public health guidance

The evaluation of PHIs has received attention in the UK. Since 2005, NICE has had its remit expanded to issue public health guidance apart from interventions within the health care system. NICE's analytical approach will allow for the use of cost-consequences analyses in addition to conventional cost-utility analysis. This approach presents a range of outcomes e.g. heart attacks avoided or a reduction in crime rates rather than one outcome measure.

NICE issues two types of public guidance. One is led by public health professionals and focuses on a local action such as advice on exercise in primary care settings. The second is related to programmes that will involve other agencies and policies that may involve

changes to institutional arrangements. Topics covered include smoking cessation in the workplace and community engagement in health promotion. The impact of this guidance remains to be seen. Even though NICE has links to the policy making process, uptake of recommendations relating to health care guidance are not always implemented: one study found that about half of all National Health Service (NHS) Primary Care Trusts (PCTs) were found to be following this guidance (Sheldon, Cullum et al. 2004).

In England, a reference group for health and well being, Health England, was established in 2007. The main work of the group is to focus upon the development of a 10-year plan for preventative spending (Health England 2008). The plan will be published in March 2009. As part of its work, this group will develop and propose a set of conventions to be applied to cost effectiveness analysis of PHI. The body will propose how to incentivise not only individuals but providers, institutions, and local governments to engage in health promotion efforts: for instance, joint-budgeting arrangements between commissioners and PCTs (Le Grand and Srivastava 2008).

In the UK, the freely available NHS Economic Evaluation Database funded by the government assists decision-makers by systematically identifying and describing economic evaluations, appraising their quality and highlighting their relative strengths and weaknesses (NHS EED 2008).

Establishing a public health agency

The German government has prepared a draft law to establish a new foundation on disease prevention and promotion of healthy lifestyle that will set national targets and carry out public campaigns on health promotion. The foundation will be financed from various bodies (e.g. sickness funds, pension funds) and will receive €350 million on an annual basis. The law has not been passed yet because of disagreement between the political parties (Eckpunkte für ein Präventionsgesetz 2007). Countries such as Sweden, Finland, Denmark and the Netherlands have set up similar supporting public health agencies. Please refer to Allin and Mossialos (2004) for a review.

Recent preventive measures target primary and secondary prevention by the health ministry and statutory health insurers such as public awareness campaigns, smoking bans, screening programmes for specific target groups (e.g. screening for prostate cancer in men 45 years and above) (German Ministry of Health 2008). A more detailed description is provided in the Annexe D.

Lack of evaluation of national PHI programmes

A review of public health interventions was carried out in 8 countries: Denmark, Finland, France, Germany, the Netherlands, Sweden, Australia and Canada (Allin, Mossialos et al. 2004). The review provided useful documentation of national policies in public health to tackle health problems such as smoking, inactive lifestyles and poor diet. Intersectoral approaches are becoming more common between ministries, local governments, non-governmental organizations, providers and academic institutions. In the Netherlands,

local governments, providers and universities target reducing health inequalities. Efforts between ministries and local governments also occur in Sweden (with health impact assessments), Denmark and Finland.

The authors note that the development of public health policies and approaches reflect national priorities but very little economic evidence exists to support these national policies (Allin, Mossialos et al. 2004). Some evidence from Australia shows cost effectiveness of programmes relating to tobacco control (\$2 benefit for every \$1 on public expenditure), road injury prevention (benefit to cost of 3:1 ratio), and cervical screening (cost effective for high risk groups). The Netherlands has evaluated its policies on health inequalities, which could be a useful starting point to evaluate public health programmes. The authors note that there is a need for more international comparisons, including the role of informal networks and mechanisms to better understand the policy making process in public health. Recent efforts are underway. Please see Annexe E for a description.

Economic incentives

Evidence from the academic literature suggests that economic incentives for patients were successful in the short term. A recent development underway within the US is that some states are experimenting with financial incentives to control Medicaid costs. The results have been less successful. Financial incentives (e.g. free cinema passes) for child immunisation did not lead to significant numbers who redeemed the rewards: in the state of California only 2,000 of the 56,000 eligible parents (3.5%) redeemed the reward in 2004 (Redmond P 2007). Florida has experimented with offering coupons worth \$15 to \$25 to be redeemed for preventive services such as flu shots or smoking cessation but the cost of implementation has far exceeded uptake among recipients in 2006 (Redmond P 2007). An analysis of the low uptake in these programmes is necessary but some evidence suggests that information problems led to the low uptake: recipients did not know or understand the incentives. West Virginia has begun to pilot a programme where recipients will be rewarded with a more comprehensive health care package for adopting healthy lifestyle practices. Such programmes may carry risk for vulnerable patient groups because those who will be in most need of services will likely have problems with plan compliance (e.g. mental health patients) (Solomon 2006).

Economic incentives are also being experimented at the local level. For instance, the mayor of Varallo in Italy has offered financial incentives to city's residents to lose weight: €50 for losing 9 pounds and 7 pounds for woman in one month. The effect of this policy remains to be seen. If residents kept the weight off for 5 months, they will be receive €200 (Halpern 2007).

4. Policy implications

There are a number of policy implications arising from this discussion, which involve resource allocation, a broader approach to public health policy, institutional

arrangements, improving methodologies and measures to account for longer life expectancy. These are discussed below.

i. Health promotion measures should be considered in the context of improved resource allocation not cost savings

Data suggest that not all health promotion measures lead to cost savings. CE should inform the policy process but not in isolation. CE and societal value should be the underlying arguments for health promotion (i.e. living longer and healthier lives). Hence, the debate between disease prevention and health promotion should be about improving resource allocation, that is **cost effectiveness** and not about cost reduction. For instance, a PHI may be both more costly, but also more effective than an existing programme or clinical intervention.

ii. Policies should improve overall incentive structures

There are repeated concerns for a broader approach to PHI. Such moves should shift the policy focus from individual behaviour (e.g. raising taxes on cigarettes) towards overall incentive structures of not only patients but providers, institutions, local governments, etc. Furthermore, any attempt to address health promotion will also require more regulatory attention to industries that produce unhealthy foods, labeling standards in supermarkets, and standards on caloric content of foods served in restaurants.¹⁰

iii. Accountability and legal frameworks should underpin institutional arrangements

A broader approach to PHI implies a different approach to existing institutional arrangements in most country settings. There is a need for greater coordination between government bodies through joint budgeting arrangements so they have a greater incentive in implementation. Another option would be to have a stand alone ministry on population health to identify PHI and facilitate coordination between other departments. Any measures for intersectoral work should be supported by law with a clear accountability framework. Recent efforts are underway in the Netherlands (please see Annexe E).

iv. Policies should improve the quality base of PHI and facilitate cross-sectoral cooperation in implementation

A key issue raised in this brief is about the quality of CE data and economic evaluations. Improving the quality of evidence is necessary. There needs to be greater consensus between researchers on methodologies used. One option would be to expand the remit of HTA bodies to consider PHI. This is already underway in the UK but may not be feasible in other European settings. Where such capacity is limited, alternative institutional models will be required so that countries can draw from international practices elsewhere.

¹⁰ Banning trans fat and correct labeling of foods in trans fat, and listing caloric content in restaurants are examples of recent measures introduced in selected US cities (Lombardi, 2008).

v. Measures should consider employment policies that account for longer life expectancy

Longer life expectancy has many implications for public policies. An important question is whether such policies should be adjusted to reflect longer life expectancies. Already changes are being made to pension reform to account for longer life expectancy in many countries. An extension to retirement age would have implications for health policy planning, delivery of and demand for health services. Within Ministry of Finance circles, this issue is under consideration but the public health community has yet to address this issue.

There is scope for the European Union to support countries in developing and implementing policies outlined above, particularly by facilitating sharing of information between countries and promoting best practice. Another key area of facilitation could be to strengthen the link of knowledge transfer between researchers and policy makers to improve interpretation of results arising from economic evaluations. The Commission could facilitate discussions through the new European Health Technology Assessment network to assist countries where capacity is limited, or draw on expertise for instance, from the WHO and other relevant institutions (e.g. the European Observatory on Health Systems and Policies). The OMC could also be a useful platform for best practices and could organize a peer review on prevention policies to inform member states on prevention policy efforts.

5. Conclusion

This policy brief provided an overview of the literature on health promotion and disease prevention policies. The evidence indicates that even though some health promotion activities may be cost saving (effective) in the short run, there is no conclusive evidence on whether such activities reduce costs in the long run. Indeed, some activities increase costs in the long run because patients live longer and become susceptible to other ailments and conditions. . Even though in the long run, costs may increase relative to other treatments, such interventions may extend and improve quality of life.

The discussion in the literature emphasises a choice between disease prevention and curative treatment. The discussion, however, should be about identifying interventions to improve resource allocation. That is, the terms of the debate should be about **cost effectiveness** and not cost reduction.

Improvements to the quality of evidence will require developing some consensus on the most effective analytical techniques and stronger adherence to health economic guidelines. Such steps could improve economic evaluation of PHI rather than focusing on approaches that do not work.

A broader approach is necessary but there are challenges with institutional inertia. A financial incentive structure that encourages joint work between bodies, along with clear legal and accountability could encourage such changes. Furthermore, a broader approach

should tackle factors relating to the social and economic context of unhealthy behaviours, particularly those in poverty. Low income individuals are at greater risk of having poor health. Activities that target socioeconomic determinants of health could have a positive effect on overall population health. For instance, low-income neighbourhoods lack proper recreational facilities, and grocery stores lack fresh produce.

Policy makers should be aware that targeting simple preventive areas could be effective but there are equity concerns because different approaches will be required for non-adherent and high risk patients. Policy mechanisms should try to minimise perverse behaviour that may create dependency on the part of providers and patients if, for instance, financial incentive structures change.

Ultimately, health promotion efforts and activities reflect societal choices on how to live and what is valued; and these choices have long run implications. There is scope for the European Union to support Member States by identifying choices for health promotion policy and facilitating exchanges of experience and knowledge on the issues raised. Such steps should be based on sound methodologies to evaluate PHI, improve resource allocation and support institutions to take the health promotion agenda forward.

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Annexe A – CE of Selected Ratios from Cohen et al. (2008)

Cost-Effectiveness of selective primary, secondary and tertiary preventive measures (2006 Dollars)*

	Cost-Effectiveness Ratio
Primary prevention measures	
<i>Haemophilus influenzae</i> type b vaccination of toddlers	Cost-saving
One-time colonoscopy screening for colorectal cancer in men 60-64 years old	Cost-saving
Newborn screening for medium-chain acyl-coenzyme A dehydrogenase deficiency	\$160/QALY
High-intensity smoking-relapse prevention program, as compared with low-intensity program	\$190/QALY
Intensive tobacco-use prevention program for seventh- and eighth-graders	\$23,000/QALY
Screening all 65-year-olds for diabetes as compared with screening 65-year-olds with hypertension for diabetes	\$590,000/QALY
Antibiotic prophylaxis (amoxicillin) for children with moderate cardiac lesions who are undergoing urinary catheterization	Increases cost and worsens health
Secondary and tertiary prevention	
Cognitive-behavioral family intervention for patients with Alzheimer's disease	Cost-saving
Cochlear implants in profoundly deaf children	Cost-saving
Combination antiretroviral therapy for HIV-infected patients	\$29,000/QALY
Liver transplantation in patients with primary sclerosing cholangitis	\$41,000/QALY
Implantation of cardioverter-defibrillators in appropriate populations, as compared with medical management alone	\$52,000/QALY
Left ventricular assist device, as compared with optimal medical management, in patients with heart failure who are not candidates for transplantation	\$900,000/QALY
Surgery in 70-year-old men with a new diagnosis of prostate cancer, as compared with watchful waiting	Increases cost and worsens health

*The cost-effectiveness ratio is the incremental costs divided by the incremental benefits, relative to a comparator. The comparator is omitted from the intervention's description if it was no treatment or current treatment or if the intervention was added to, rather than substituted for, another treatment. Source: (Cohen, Neumann P.J. et al. 2008).

Annexe B – Example of discounting in economic evaluation

Formula

PV = present value

i = discount rate (assumed to be positive)

t= number of years in the future

$$\text{Present Value (PV)} = C_0 + C_1/(1+i)^1 + C_2/(1+i)^2 + \dots + C_T/(1+i)^T$$

Example

Costs of an intervention:

Present year = €1,000; year 2 = €2,000; year 3 = €5,000

Annual discount rate = 5%

Calculation

Undiscounted is the sum of the costs over the entire period: 1,000+2,000+5,000= €8,000

Discounting costs is calculated as follows:

$$\begin{aligned} \text{PV} &= 1,000 + 2,000/(1 + 0.05) + 5,000/(1 + 0.05)^2 \\ &= €7,440 \end{aligned}$$

Annexe C – Example of using the WHO CHOICE Model

Objective: To assess the population level costs, effects and cost effectiveness of different alcohol and tobacco control strategies in Estonia

Data sources: health behaviour and prevalence of health risks taken from a major postal survey in Estonia; mortality data obtained from Estonian Statistical Office; morbidity data from review of scientific literature.

Calculations: Local data on the costs of delivering interventions were calculated

Interventions:

Alcohol: excise taxes; reduced access to retail outlets; comprehensive advertising ban; roadside breath-testing; brief interventions involving counselling by a primary care doctor.

Tobacco: excise taxes; comprehensive advertising ban; controls on smoking in public indoor locations; nicotine replacement therapy (NRT).

Policy analysis and direction:

Local group of experts discussed and contextualised interventions to Estonian situation. Annual costs of implementing legislative and fiscal measures were much lower than brief therapy and NRT.

Increased excise taxes were most cost effective:

- €9 per DALY averted for alcohol and €14 tobacco consumption.
- Incremental cost per DALY averted by advertising bans €5 for alcohol and €19 for tobacco.
- Incremental cost per DALY averted of comprehensive combination of interventions for alcohol EEK 7,152 and tobacco EEK 3,728.
- These interventions were below the recommended level of cost per DALY averted of EEK 90,454, suggested by WHO Commission on Macroeconomics data for Estonia.

Source: (Lai, Habicht et al. 2007)

Annexe D - Interventions underway in Germany

Primary prevention:

- Campaigns informing about healthy nutrition habits, campaigns instructing people how to prevent back pain, etc.
- The sickness funds introduced elective tariffs for their insurees that grant a discount on the health insurance premium, when giving proof for regular physical activities. They also offer programmes free of charge, such as cooking courses, smoking cessation, etc.
- Nationwide ban on smoking (as of September 2007) in public buildings and transport; ban on smoking in some states in restaurants and pubs; minimum age for purchasing tobacco products was raised from 16 to 18 years of age.
- Human papillomavirus (HPV) vaccination for the female population in the age group of 12-17 year old.

Secondary prevention:

- General check-up, every two years for people 35 years and above.
- Yearly screening for prostate cancer and haemorrhoids for male persons 45 years and above.
- Mammographic screening, every two years, all female in the age group 50 – 70 years.
- Screening for cancer of the colon, every ten years for people 55 years and above.
- From July 2008 onwards: skin cancer screening, every two years for people 35 years and above.

Source: (German Ministry of Health 2008)

Annexe E – Monitoring and evaluating public health policies

Sweden	Finland	Denmark	The Netherlands
<ul style="list-style-type: none"> • National programme started in 2003. • The National Institute of Public Health (NIPH) is responsible to report on progress every four year. • The NIPH presented its first report in 2005. • Some of the areas the report identified include: <ul style="list-style-type: none"> • inequitable living conditions contribute to mental health; • improve safety of elders who fall experience falls; • improve quality of youth clinics; • limit access to alcohol among youth. 	<ul style="list-style-type: none"> • Monitoring across sectors takes place at the national level. • Annual surveys are conducted; research institutions contribute to public health research (STAKES and KTL). • Progress reports are planned every four years on the health of the population and factors associated with certain health problems. The most recent report was published in 2006. • The report identified that some of the main public health problems include: <ul style="list-style-type: none"> • diabetes • alcohol related harm • and functional limitations among the older people. 	<ul style="list-style-type: none"> • Previously, monitoring towards achieving national targets will be coordinated by the Ministry of Health. • To date, no evaluation of public health interventions have taken place. • A new Ministry of Health and Prevention was established in late 2007 so it is too early to know how monitoring and evaluation of health interventions will be implemented. 	<ul style="list-style-type: none"> • Previously there has been evaluation of interventions targeting health inequalities. • Public health policy is found in the public plan 2007-2010. The plan introduces a legal framework for responsibility at the local and central level of government, which will include reports every 4 years on how achievements are being made. • The report identified the following areas for action: <ul style="list-style-type: none"> • smoking • alcohol • overweight • diabetes • depression

Source: (Swedish National Institute of Public Health 2005)

Source: (Allin, Mossialos et al. 2004)

Source: (KTL 2006)

Source: (Ministry of Health and Prevention 2008)

Source: (Ministry of Health Welfare and Sport 2006)