



First Global Ministerial Conference on Healthy Lifestyles and Noncommunicable Disease Control (Moscow, 28-29 April 2011)

DISCUSSION PAPER

PREVENTION AND CONTROL OF NCDs: PRIORITIES FOR INVESTMENT

Summary

1. This paper is for **policy makers** that are involved in making investments to tackle the main non-communicable diseases (NCDs), namely cardiovascular disease, cancers, diabetes and chronic lung disease. The paper assesses interventions that address NCDs and also their key underlying risk factors - tobacco use, unhealthy diet, harmful use of alcohol and physical inactivity. In this assessment consideration is given to four key criteria: i) health impact; ii) cost-effectiveness; iii) cost of implementation; and iv) feasibility of scale-up, particularly in resource constrained settings. The paper concludes that there are a set of interventions that have significant public health impact, and are highly cost-effective, inexpensive and feasible to implement; these can be considered as "best buys" for investors (Box 1). A range of other interventions that constitute "good buys" are also identified.

Box 1 Recommended 'best buys'

Risk factor / disease	Interventions
Tobacco use	<ul style="list-style-type: none">- Raise taxes on tobacco- Protect people from tobacco smoke- Warn about the dangers of tobacco- Enforce bans on tobacco advertising
Harmful use of alcohol	<ul style="list-style-type: none">- Raise taxes on alcohol- Restrict access to retailed alcohol- Enforce bans on alcohol advertising
Unhealthy diet and physical inactivity	<ul style="list-style-type: none">- Reduce salt intake in food- Replace trans fat with polyunsaturated fat- Promote public awareness about diet and physical activity (via mass media)



Cardiovascular disease (CVD) and diabetes	<ul style="list-style-type: none">- Provide counselling and multi-drug therapy (including blood sugar control for diabetes mellitus) for people with medium-high risk of developing heart attacks and strokes (including those who have established CVD)- Treat heart attacks (myocardial infarction) with aspirin
Cancer	<ul style="list-style-type: none">- Hepatitis B immunization beginning at birth to prevent liver cancer- Screening* and treatment of pre-cancerous lesions to prevent cervical cancer

* see Table2 for more information

Introduction

2. All countries have to make difficult choices on how best to allocate resources for health and health care. For middle- and low-income countries this challenge is even greater, since an investment of \$1 per person per year represents a much larger outlay for a country that spends only \$20-40 on health per person per year compared to a country spending \$1,000 or more. Policy makers and investors often ask whether NCDs can be tackled and, if so, where the focus of attention should be. There is clear evidence that preventive interventions work and that improved access to health care can reduce the burden of morbidity, disability and premature mortality¹. However, in making a decision, policy makers also want to know what evidence there is to show that interventions will represent a cost-effective use of resources in the settings in which they are to be implemented and that scaling up these interventions is appropriate, affordable and feasible^{*}?

3. Cost-effectiveness summarizes the efficiency with which an intervention produces health outcomes. A "highly cost-effective" intervention is defined as one that generates an extra year of healthy life (equivalent to averting one disability-adjusted life year) for a cost that falls below the average annual income or gross domestic product [GDP] per person; the Annex provides a summary of globally applicable evidence for interventions identified as highly cost-effective. A "best buy" is a more pragmatic concept that extends beyond the economic efficiency and cost-effectiveness of an intervention. It is defined as an intervention for which there is compelling evidence that is not only highly cost-effective but is also feasible, low-cost and appropriate to implement within the constraints of the local health system. Interventions that do not meet all of these criteria - but which still offer good value for money and have other attributes that recommend their use - can be characterized as "good buys". Policy makers can consider "best buys" as a core set of interventions and "good buys" as an expanded set to be made available where resources allow.

* Feasibility as defined by: (i) reach (capacity of the health system to deliver an intervention to the targeted population); (ii) technical complexity (e.g. medical technologies or expertise needed for an intervention); (iii) capital intensity (amount of capital required for an intervention); and (iv) cultural acceptability (in terms of social norms and/or religious beliefs).



A package of cost-effective prevention interventions

4. Preventive strategies focus on the key underlying risk factors for NCDs (tobacco and harmful alcohol use, physical inactivity and unhealthy diet, and sequelae such as raised blood pressure, blood sugar and cholesterol). Interventions for these risk factors are described below. Table 1 summarizes interventions for countries of all income levels in terms of their ability to reduce disease burden and the cost, cost-effectiveness, feasibility and timeliness of their implementation.

Tobacco control

5. Implementing four key elements of the WHO Framework Convention on Tobacco Control² (tax increases, comprehensive legislation creating smoke-free indoor workplaces and public places, health information and warnings about the effects of tobacco, and bans on advertising, promotion and sponsorship) would save more than 5 million deaths in 23 large low- and middle-income countries alone during the period 2006 - 2015³. Available evidence from the same analysis indicates that the cost of implementing all four interventions would cost less than USD 0.40 per person per year in low-income and lower-middle income countries (in other upper-middle income countries the cost is USD 0.5-1.0 per person per year). All four constitute "best buys", with excise tax increases on tobacco products and smoke-free indoor environments being the most cost-effective.

Harmful alcohol use

6. Reduction in the harmful use of alcohol is important in preventing and tackling cancers and cardiovascular disease. Harmful use of alcohol is also a preventable cause of other burdensome noncommunicable and injury conditions, including liver cirrhosis, depression and road traffic injury. Enhanced taxation of alcoholic beverages and comprehensive bans on their advertising/marketing are recommended "best buys", based on their favourable cost-effectiveness, low cost and feasibility⁴.

Unhealthy diet

7. Excessive salt intake is linked with raised blood pressure, which accounts for more than 7 million deaths worldwide each year (mainly from heart attacks and strokes). Reducing salt content in processed foods and through mass media campaigns has the potential to prevent millions of deaths⁵ (including as many as 8.5 million over 10 years in the 23 low- and middle-income countries alluded to above¹), and is a recommended "best buy". Partial or complete substitution of partially hydrogenated trans-fat with polyunsaturated fats is another low-cost and highly cost effective measure that has been successfully introduced at the point of manufacture and estimated to be highly cost-effective; it is also a best buy⁶. A number of other low-cost and feasible interventions that tackle unhealthy diet, for example by promoting public awareness, have also been found to be highly cost-effective⁷ in combination with public awareness programmes for physical activity.

Physical inactivity

8. Physical activity reduces the risk of NCDs. It also promotes wellbeing, physical and mental health, and can sustain independent living in older adults as well as social connectedness. Promoting physical activity through the media (in combination with a healthy diet) has been estimated to be a



cost-effective, low-cost and highly feasible option⁷. The cost-effectiveness of other potential strategies is being assessed.

Indoor air pollution

9. The reliance by nearly half the world population on solid fuels (coal, wood, animal dung, crop wastes) and traditional stoves for cooking and heating needs, leads to high levels of indoor air pollution that increase risk of childhood pneumonia, chronic lung disease and lung cancer. In addition to tobacco control, reducing indoor air pollution represents the single most important strategy for preventing chronic lung disease, particularly in non-smoking women. There is accumulated evidence on the health impacts and cost-effectiveness of new stove and fuel technologies.

10. The combined cost of implementing a set of "best buy" population-based strategies - the aforementioned demand reduction measures for tobacco and harmful alcohol use, plus salt reduction - is low (for example, US\$ 0.30 per capita in India and China, and US\$1.20 in Russia). The cost of drug therapy for individuals at an elevated risk of experiencing a CVD event ranges from US\$1-2 (see paragraph 12). All package components meet the criterion for being considered "highly cost-effective" (see Table 1, Table 2 and Annex).



Table 1. Interventions to tackle noncommunicable disease risk factors: identifying 'best buys'

Risk factor (DALYs, in millions; % global burden) ^a	Interventions / actions (* core set of 'best buys')	Avoidable burden (DALYs averted, millions)	Cost-effectiveness^b (US\$ per DALY prevented) [Very = < GDP per person; Quite = < 3* GDP per person Less = > 3* GDP per person]	Implementation cost (US\$ per capita) [Very low = < US\$0.50 Quite low = < US\$ 1 Higher = > US\$ 1]	Feasibility (health system constraints)
Tobacco use (> 50m DALYs; 3.7% global burden)	Protect people from tobacco smoke * Warn about the dangers of tobacco * Enforce bans on tobacco advertising * Raise taxes on tobacco *	Combined effect: 25-30 m DALYs averted (> 50% tobacco burden)	Very cost-effective	Very low cost	Highly feasible; strong framework (FCTC)
	Offer counselling to smokers		Quite cost-effective	Quite low cost	Feasible (primary care)
Harmful use of alcohol (> 50m DALYs; 4.5% global burden)	Restrict access to retailed alcohol * Enforce bans on alcohol advertising * Raise taxes on alcohol *	Combined effect: 5-10 m DALYs averted (10-20% alcohol burden)	Very cost-effective	Very low cost	Highly feasible
	Enforce drink driving laws (breath-testing) Offer brief advice for hazardous drinking		Quite cost-effective	Quite low cost	Intersectoral action Feasible (primary care)
Unhealthy diet (15-30m DALYs; 1-2% global burden) ^c	Reduce salt intake * Replace trans fat with polyunsaturated fat * Promote public awareness about diet *	Effect of salt reduction: 5 m DALYs averted	Very cost-effective	Very low cost	Highly feasible
	Restrict marketing of food and beverages to children Replace saturated fat with unsaturated fat Manage food taxes and subsidies Offer counselling in primary care Provide health education in worksites Promote healthy eating in schools	Other interventions: Not yet assessed globally	Very cost-effective? (more studies needed)	Very low cost	Highly feasible
			Quite cost-effective	Higher cost	Feasible (primary care)
			Less cost-effective		Highly feasible



Physical inactivity (> 30m DALYs; 2.1% global burden)	Promote physical activity (mass media) * Promote physical activity (communities) Support active transport strategies Offer counselling in primary care Promote physical activity in worksites Promote physical activity in schools	Not yet assessed globally	Very cost-effective Not assessed globally	Very low cost Not assessed globally	Highly feasible Intersectoral action
			Quite cost-effective	Higher cost	Feasible (primary care)
			Less cost-effective		Highly feasible
	Infection		Prevent liver cancer via hepatitis B vaccination *	Not yet assessed	Very cost-effective

^a DALYs (or disability-adjusted life years) are widely used as a measure of premature mortality and ill-health - one DALY can be thought of as one lost year of healthy life. ^b See Annex for sources of evidence.

^c This estimate is based on the combined burden of low fruit and vegetable intake, high cholesterol, overweight and obesity, high blood glucose, high blood pressure - all diet related - and low physical activity



Table 2. Interventions to tackle major noncommunicable diseases: identifying 'best buys'

Disease (% global burden; DALYs ^a)	Interventions / actions (* core set of 'best buys')	Avoidable burden (DALYs averted, millions)	Cost-effectiveness ^b (US\$ per DALY prevented) [Very = < GDP per person; Quite = < 3* GDP per person Less = > 3* GDP per person]	Implementation cost (US\$ per capita) [Very low = < US\$0.50 Quite low = < US\$ 1 Higher = > US\$ 1]	Feasibility (health system constraints)
Cardiovascular disease (CVD) & diabetes (170m DALYs; 11.3% global burden)	Counselling & multi-drug therapy (including glycemetic control for diabetes mellitus) for people (≥30 years), with 10-year risk of fatal or nonfatal cardiovascular events ≥ 30%^c *	60 m DALYs averted (35% CVD burden)	Very cost-effective	Quite low cost	Feasible (primary care)
	Aspirin therapy for acute myocardial infarction*	4 m DALYs averted (2% CVD burden)	Very cost-effective	Quite low cost	
	Counselling & multi-drug therapy (including glycemetic control for diabetes mellitus) for people (≥ 30 years), with a 10-year risk of fatal and nonfatal cardiovascular events ≥ 20%	70 m DALYs averted (40% CVD burden)	Quite cost-effective	Higher cost	
Cancer (78m DALYs; 5.1% global burden)	Cervical cancer - screening (VIA), and treatment of pre- cancerous lesions to prevent cervical cancer *	5 m DALYs averted (6% cancer burden)	Very cost- effective	Very low cost	Feasible (primary care)
	Breast cancer - treatment of stage I	3 m DALYs averted (4% cancer burden)	Quite cost-effective	Higher cost	Not feasible in primary care (diagnosis and treatment requires secondary or tertiary care)
	Breast cancer - early case finding through mammographic screening (50 - 70 years) and treatment of all stages	15m DALYs averted (19% cancer burden)	Quite cost -effective	Higher cost	
	Colorectal cancer - screening at age 50 and treatment	7 m DALYs averted (9% cancer burden)	Quite cost-effective	Quite low cost	
Oral cancer - early detection and treatment	Not assessed globally	Not assessed globally	Not assessed	Not assessed	



Respiratory disease (60m DALYs; 3.9% global burden)	Treatment of persistent asthma with inhaled corticosteroids & beta-2 agonists	Not assessed globally <i>(expected to be small)</i>	Quite cost-effective	Very low cost	Feasible (primary care)
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^a DALYs (or disability-adjusted life years) are widely used as a measure of premature mortality and ill health - one DALY can be thought of as one lost year of healthy life. ^b See Annex for sources of evidence.
^c Includes prevention of recurrent vascular events in people with established coronary heart disease and cerebrovascular disease.

Cost-effective individual health care interventions

11. Cardiovascular disease, diabetes, cancer and respiratory disease accounts for around 20% of the world's disease burden (over 300 million disability-adjusted life years lost annually)⁸. To address these major NCDs there are 'best buy' interventions that can be implemented in primary care even in resource-constrained settings⁹ and a significant proportion of the burden caused by major NCDs can be reduced scaling-up these interventions (Table 2).

Integrated care for prevention and control of cardiovascular disease and diabetes

12. People at risk of heart attacks and stroke usually have modest elevation of multiple risk factors, such as smoking, raised blood pressure, raised cholesterol and/or diabetes. Such people who have medium-high cardiovascular risk should be treated with a multi-drug regimen and counseling to reduce the risk of developing heart attacks, strokes, cardiac failure and kidney failure. This intervention, which is based on the total cardiovascular risk, is more cost-effective and less expensive than conventional single risk factor interventions countries^{10,11}. Other very cost effective for CVD and diabetes are: (i) providing aspirin to people with an acute heart attack, which can save the lives of 1 in 5 of those with a heart attack; (ii) providing multidrug treatment and counseling to people *following* a heart attack or stroke to prevent recurrent attacks, which buys a reduction of recurrent events up to 75% - and of course a decrease in mortality¹²; and (iii) controlling glucose levels in people with diabetes by insulin, oral glucose-lowering medication, diet and exercise, which reduces levels of blindness and kidney failure.

Cancer

13. Effective methods of prevention, early detection, diagnosis, treatment and palliative care are available for many types of cancer including cervical cancer, breast cancer, colorectal cancer and oral cancer. Screening (by VIA and HPV testing) and treatment of cervical of cervical pre cancer has been found to be low cost, feasible and highly cost-effective in studies conducted in a number of resource settings (see Annex)¹³. Comprehensive cervical cancer programmes based on screening can also be cost-effective but the total costs of their implementation are high and therefore may not be affordable. At current prices, vaccination against the human papilloma virus (HPV being the cause of cervical cancer) is a relatively expensive option; vaccination against hepatitis B (HBV being an important cause of liver cancer and cirrhosis), on the other hand, is very cost-effective. Pain relief and palliative care is a low cost, essential intervention when judged against societal norms and standards, as well as human rights.

Chronic respiratory disease

14. The main contributors to the global burden of chronic respiratory disease are asthma and chronic obstructive pulmonary disease. Standard treatment of asthma consists of inhaled salbutamol for intermittent asthma and inhaled salbutamol and inhaled corticosteroids for persistent asthma; these are very low cost and feasible to deliver in primary care, but their cost-effectiveness is limited by their modest impact on disease burden. For persons with chronic obstructive pulmonary disease, similar conclusions can

be made concerning these drug treatments. As highlighted above, tobacco cessation and mitigation indoor air pollution are the key strategies for preventing chronic respiratory disease.

Next steps

15. More work is needed in assessing best buys for reducing physical inactivity, promoting healthy diets and treating major NCDs. Estimating the costs of implementing the package of best buys described in this paper is a crucial next step. Such calculations need to take into account national and regional population estimates, numbers at risk, demographic and socio-economic factors, infrastructure and the structure and capacity of health systems. Work is needed to build on existing activities in this area to develop national, regional and ultimately a global price tag. Piloting the implementation of the "best-buy" interventions in countries and monitoring the impact will then be required.

Interventions		Data source(s)	Is intervention highly cost-effective?					
			<i>High-income</i>	<i>Middle-income</i>	<i>Middle-income</i>	<i>Middle-income</i>	<i>Low-income</i>	<i>Low-income</i>
			Europe (West) (EurA) <i>(e.g. Spain, Sweden)</i> [< 1\$ 30,439 per healthy life year]	Europe (East) (EurC) <i>(e.g. Ukraine, Russia)</i> [1\$ 9,972 per healthy life year]	Latin America (AmrB) <i>(e.g. Brazil, Mexico)</i> [< 1\$ 9,790 per healthy life year]	Western Pacific (WprB) <i>(e.g. China, Vietnam)</i> [< 1\$ 6,948 per healthy life year]	South-East Asia (SearD) <i>(e.g. India, Nepal)</i> [< 1\$ 1,985 per healthy life year]	Africa (AfrE) <i>(e.g. Kenya, Zambia)</i> [< 1\$ 2,154 per healthy life year]
RISK FACTORS	Tobacco use: Excise tax increase, information & labeling, smoking restrictions & ad bans <i>Shibuya et al, 2003¹⁴</i> <i>Jha et al, 2006¹⁵</i>	Yes	Yes	Yes	Yes	Yes	Yes	
	Harmful alcohol use: Excise tax increase, ad bans, restricted access <i>Anderson et al, 2009⁴</i> <i>Rehm et al, 2006¹⁶</i>	Yes	Yes	Yes	Yes	Yes (except tax)	Yes	
	Unhealthy diet: Reduced salt and trans fat content in food (regulated food industry, mass media) <i>Murray et al, 2003⁵</i> <i>Willett et al, 2006⁶</i>	Yes	Yes	Yes	Yes	Yes	Yes	
	Unhealthy diet: Mass media, food taxes & subsidies, information / labeling, and marketing restrictions <i>Cecchini et al, 2010⁷</i>	Yes (UK)	Yes (Russia)	Yes (Brazil, Mexico)	Yes (China)	Yes (India)	Not established	
DISEASES	CVD (prevention): Antihypertensive drugs (BP >160/100); poly-drug therapy (for those > 30% risk) <i>Murray et al, 2003⁵</i> <i>Gaziano et al, 2006¹⁷</i>	Yes	Yes	Yes	Yes	Yes	Yes	
	CVD (treatment): Drug therapy for IHD/stroke (aspirin, B-blocker, ACEI) <i>Gaziano et al, 2006¹⁷</i>	Yes	Yes	Yes	Yes	Yes	Yes	
	Diabetes: Glycaemic control (HbA1c > 9%); blood pressure control (>165/95 mmHg); foot care; Retinopathy screening & treatment <i>Narayan et al, 2006¹⁸</i>	Yes	Yes	Yes	Yes	Yes	Yes	
	Cancer: Vaccination, screening and treatment of cervical cancer <i>Ginsberg et al, 2009¹³</i>	Yes	Yes	Yes	Yes	Yes	Yes	

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