

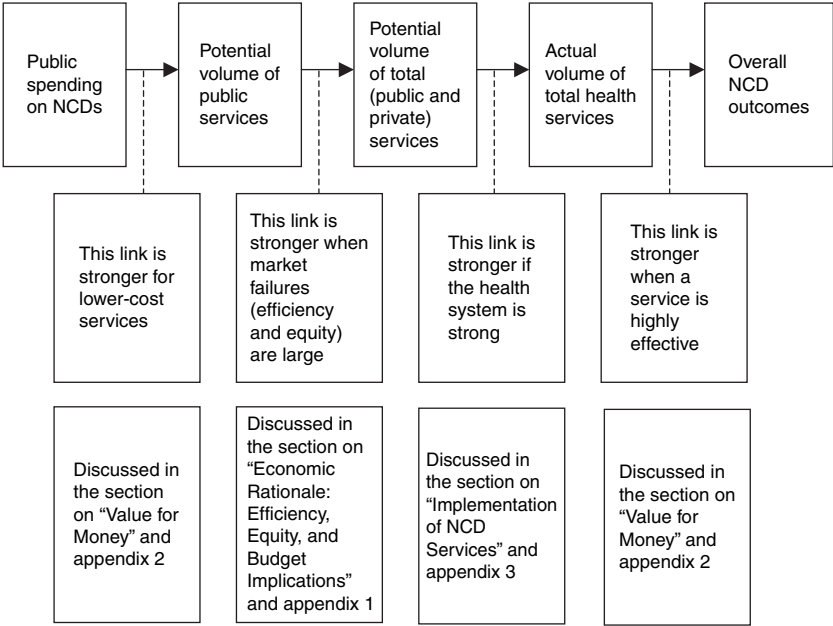
CHAPTER 2

Improving NCD Outcomes: A Public Policy Perspective

Identifying the dual challenges that policy makers confront—to avoid noncommunicable diseases (NCDs) to the greatest extent possible while preparing for a likely higher burden in the future because of demographic forces—is only a first step toward laying out an agenda for addressing NCDs. The purpose of this chapter is to provide a more detailed framework for analyzing potential pathways toward improving NCD outcomes. Although the focus is on public policy, this is not intended to deny the important role of the private health sector, which will be addressed where appropriate. It is merely a recognition that the perspective of government, including its regulatory role, is foremost in the World Bank’s dialogue with its clients. The approach set forth in this chapter is intended be useful in a wide variety of settings, as the NCD challenges World Bank clients face are highly varied and cannot all be addressed individually in this report.

The approach focuses on three broad factors to consider when formulating public policies aimed at improving NCD outcomes. Each of these will help determine the extent to which a dollar spent on NCDs is successful in achieving the objective of lowering morbidity and

Figure 2.1. How Strong Is the Chain That Links Public Spending on NCDs to Better Outcomes?



Source: Authors.

mortality. All three factors matter, as the chain from public spending to better health outcomes will only be as strong as its weakest link (this analogy and the overall framework are drawn from Filmer, Hammer, and Pritchett 2000 and Filmer and Pritchett 1999). The factors are as follows (figure 2.1):

- The net impact of public spending on health outcomes will be greater if it addresses needs that the private sector satisfies poorly or not at all. This embraces the standard approach of establishing the economic rationale for public intervention, including the goal of achieving more equitable outcomes for the poor. The private health sector represents an important player in nearly every country. If public spending merely displaces the private sector with the same allocative (efficiency) and distributive (equity) results, including the risk of impoverishment, then its net impact will be low.
- Not all interventions imply the same value for money in terms of health improvements per unit of expenditure. For example, a government

health budget of a given size translates into fewer health gains for the population if it is spent exclusively on bypass surgery instead of aspirin to reduce the probability of a heart attack. Thus, all else being equal, robust evidence on cost-effectiveness can be a useful input into budget allocation decisions.

- The impact of public spending will also be greater when the public sector's capacity to translate money into effective services on the ground is stronger. Among other things, this will tend to reflect the institutional capabilities, incentives, and accountability of the various actors within the public health system. If doctors do not show up for work, drugs are not available in clinics, and equipment is not maintained, then even the best budget plans will not result in better NCD outcomes.

The importance of all three issues bears repeating: the failure of just one factor means that the impact of public spending on NCD outcomes will be diminished. For example, a health service aimed at the poor may have a strong economic rationale, but if the health system cannot ensure its delivery on the ground, public funding will be to no avail. Or a low-cost curative intervention may be cost-effective, but if the private sector already provides it to the same clientele, public provision will not necessarily change the total volume of health services delivered (and thus outcomes achieved) in the country. Lastly, a public sector hospital may provide a surgical procedure of excellent quality, but better value for money in terms of health gain may be available through other interventions. The potential list of similar scenarios is long.

This framework also implies that an exclusive focus on inputs, for example, more money for NCDs, is not appropriate, as improved outcomes may be achievable within an existing budget by strengthening each of the three links. Indeed, doing so may be the best way to make credible claims for a larger budget in the future. In general, while governments can, and often do, serve as a force for good in addressing NCDs, their effect could be greatly enhanced if they gave these three issues careful consideration. Note also that even though the framework has a supply-side focus, the chapter will also address issues affecting the demand side, such as information, financing, and quality.

Economic Burden of NCDs

NCDs impose a significant economic burden, not just on patients, but on households, communities, employers, health care systems, and government

budgets. The direct morbidity and mortality burden of NCDs on patients and their families is reflected in diminished productive activity and lower returns to investment in human capital. When aggregated across economies, these household costs have an important impact on the size and productivity of the labor force and on national incomes in general. Of course, good health is an important objective in its own right and need not be viewed only as a contributor to better economic outcomes. Nevertheless, the economic burden resulting from NCDs is an important subject to address in policy dialogue.

Empirical work frequently draws on microeconomic approaches to measure the economic burden of a disease condition at the household level. The most common method for computing the cost of illness is the human capital method, which involves an accounting of both the direct costs (private and public spending on disease prevention and treatment) and the indirect costs (productivity losses associated with the illness and forgone income of both the patient and the caregiver). Many studies have aggregated costs assessed at the individual or household level into national cost estimates.

Even though evidence from high-income countries is much more abundant than from low- and middle-income countries, a growing body of literature from the latter reveals a significant economic burden attributable to NCDs. In general, the direct costs of illness may be lower in poorer countries and among poorer populations, as they have less access to advanced, and therefore costly, health care services and to social support provided by the government. However, lower direct costs of illness because of a lack of medical options tend to be associated with a significant increase in indirect costs. Studies have found significant effects of NCDs on a wide range of labor market outcomes, including wages, earnings, workforce participation, hours worked, retirement, and job turnover. People with chronic diseases and risk factors are more likely to face barriers to employment arising from productivity limitations, costs of disability, and, in some cases, stigma.

Appendix 1 provides more details on these findings and the costs associated with specific diseases and countries. The following illustrative examples offer an indication of the economic burden:

- A few studies have estimated the large costs of risk factors for some NCDs, including tobacco and alcohol use, obesity, and hypertension. In 1995, the costs of tobacco-related disease accounted for 1.5 percent of gross domestic product (GDP) in China, whereas obesity-related costs

were equivalent to 1.1 percent of GDP in China and 2.1 percent in India (Hu and Mao 2002; Popkin 2002). In 1996, the economic burden associated with hypertension was roughly US\$20 per capita in Mexico (Villarreal-Rios and others 2000).

- The total costs of cardiovascular disease (CVD) are between 1 and 3 percent of GDP in most developed countries. The annual per capita burden of CVD is about US\$4 to US\$8 in China and India, US\$15 to US\$30 in Brazil and South Africa, and about US\$70 to US\$90 in Russia (Leeder and others 2004).
- The direct costs of diabetes range from 2.5 to 15.0 percent of annual health care budgets, depending on local prevalence and the sophistication of the treatments available (IDF 2003).¹ Among low- and middle-income countries, total diabetes-related costs were highest in Latin America and the Caribbean, where the economic burden of diabetes has been estimated at US\$65 billion annually, or typically between 2 and 4 percent of GDP in most countries.

NCDs are not restricted to older populations who have already left the labor force. As indicated by table 2.1, a significant share of the burden of NCDs occurs in populations of working age. Although NCDs generally afflict people at older ages than communicable diseases, because a large share of communicable diseases is concentrated among children younger than five, NCDs are a more important cause of illness and death among working-age populations. Moreover, about three-quarters of the NCD disability burden in low- and middle-income countries occurs among those

Table 2.1. Share of Disease Burdens Falling on Those between the Ages of 15 and 69 in Low- and Middle-Income Countries, 2005

<i>Disease category</i>	<i>Total deaths, all ages (millions)</i>	<i>Percentage of deaths accounted for by those aged 15–69</i>	<i>Percentage of DALYs accounted for by those aged 15–69</i>
All causes	32.8	46	54
All NCDs	23.6	43	74
CVD	10.3	38	72
Cancers	5.4	62	81
All communicable diseases	5.5	35	32
Injuries	3.6	76	69

Source: Lopez and others 2006.

Note: CVD = cardiovascular disease; DALYs = disability-adjusted life years.

between the ages of 15 and 69. Achieving a goal of lower morbidity and mortality would help lower these shares, reduce indirect costs and the economic burden more generally, and contribute to healthy aging.

Furthermore, estimates of the costs of NCDs found in cost of illness studies tend to underestimate the true burden of NCDs, and are therefore conservative in their assessment of economic impact (Suhrcke and others 2006). Several issues can be identified in this connection. First, households do not react passively to chronic disease. To cope with the costs of a family member with a chronic illness, households in developing countries often mobilize and reallocate their productive resources in ways that may have long-term repercussions and risk perpetuating socioeconomic inequalities. The most frequently invoked coping strategy involves tapping savings and liquidating assets to cover the costs of care and lost productivity, which can in turn affect investment decisions. Another coping response is to engage other household members, often women and children, in caring for sick family members. Children are more likely to be removed from school during health crises to care for a sick older relative, compensate for production losses, or reallocate school expenditures to help cover medical costs. Although these effects of poor health are not unique to NCDs, the longer duration of chronic diseases makes the negative impacts larger than in the case of acute illnesses.

These various costs of NCDs can cause a household to fall below the poverty line. While little direct evidence attributes impoverishment to NCDs specifically (for some exceptions, see Bonu and others 2005; Suhrcke and others 2006), the general findings on catastrophic health expenditures, the relatively high costs and long durations of NCDs, and the evidence that the poor are less able to insure consumption against “severe” illnesses all suggest that the costs of NCDs can be impoverishing (see Gertler and Gruber 2002; Wagstaff 2005; Xu and others 2003). This would be a valuable direction for future research.

A second reason why cost of illness studies may underestimate the economic burden is that the behaviors associated with risk factors, as well as with chronic diseases themselves, play a role in poverty, as they can displace expenditures on food purchases and capital investments. For example, tobacco and alcohol use is costly (Esson and Leeder 2004), and the poor tend to spend a disproportionate share of their incomes on these products, potentially substituting for investment in human capital, such as health and education. Appendix 1 identifies several studies that have analyzed the impact of tobacco spending on other household expenditure decisions. Risk factors also have distal impacts, as the behavioral

decisions of adults are reflected in the health outcomes of their children. Secondhand smoke is the most obvious example.

Finally, many of the cost of illness estimates do not adequately capture the effects of NCD on employers and their broader impact on investment. Employers may absorb a considerable portion of the economic burden of chronic disease through absenteeism, decreased on-the-job productivity, increased employee turnover, and health care costs (Berry, Mirabito, and Berwick 2004; Bleil, Kalamas, and Mathoda 2004).

The economic burden attributable to NCDs can also be approached in terms of their macroeconomic impact. Health—measured as life expectancy or adult mortality—is a robust and strong predictor of economic growth (Barro 1991, 1996; Barro and Lee 1994; Barro and Sala-i-Martin 1995; Sachs and Warner 1995, 1997). As mortality from chronic disease accounts for a significant portion of reduced life expectancy and adult mortality, it would be expected to have a negative impact on economic growth. Quantifying this impact is a difficult task, however. Although one recent study (Urban and Suhrcke 2005) looked at the impact of CVD mortality on growth, such estimates should be viewed as indicative only, as cross-country regressions for identifying the determinants of growth have numerous drawbacks (Pritchett 2006). In general, while there is good reason to believe that NCD mortality has a negative impact on growth, substantiating this relationship empirically is extremely difficult.

In sum, a wide range of pathways exists through which NCDs may impose an economic burden on individuals and societies. However, evidence of a significant economic burden does not alone imply an economic rationale for government intervention to address NCDs.

Economic Rationale: Efficiency, Equity, and Budget Implications

The introduction to this chapter identified the issue of an economic rationale for public intervention as one of three key considerations for improving the impact of spending on NCD outcomes. It noted that the net impact of the public sector will be greatest when market failures are largest. If these are absent, government interventions may only serve to displace the private health sector without improving outcomes in either allocative (efficiency) or distributive (equity) terms, including the risk of impoverishment. This section focuses on the economic rationale for a public role to address NCDs.

To improve efficiency and equity in health care, and following the framework set out in Musgrove (1996), we can identify three broad

reasons for governments to intervene in health care instead of leaving it to the private sector. One is to achieve the optimal level of production and consumption of public goods and those goods that are partly public in character because of the presence of externalities. This can include the provision of health care services, of information that helps people improve their own health, or of other interventions. A second reason is to make insurance markets work more efficiently and equitably for services that are private goods, but for which risk sharing is required because of high costs or uncertainty about need (or both). The third reason is to help those who are too poor either to buy insurance or to buy services that the nonpoor can afford out-of-pocket (Musgrove 1996). These three reasons correspond, respectively, to public goods, high-cost private goods, and low-cost private goods. All three are relevant to the rationale for a public role in relation to NCDs.

A key difference between communicable and noncommunicable diseases is that because the former can be transmitted, one person's illness increases the probability that others will also be infected. To the extent that individuals do not factor the prospect of infecting others into their own behavior, the optimal level of health care consumption will not be achieved, and thus government intervention makes sense. While some exceptions exist, such as secondhand smoke, in general the same logic does not apply to NCDs; that is, the health impact of NCDs is largely internalized. Nevertheless, goods of a public nature do exist for NCDs as well, albeit less commonly than for communicable diseases. Public goods and externalities will be the focus of the discussion on prevention, whereas low- and high-cost private goods will be addressed under the section on treatment.

Prevention

The economic rationale for a public role in NCD prevention rests primarily on information and some externality issues arising from the public character of many health care goods. Information has many features of a public good that private markets will tend to undersupply, and the resulting lack of knowledge on the part of consumers can result in suboptimal outcomes. In the case of NCDs, incomplete information will typically take the form of a lack of awareness about the health risks associated with tobacco and alcohol use, dietary choices, and physical inactivity. For tobacco and alcohol, there is an added dimension of ignorance about the addictive nature of these commodities.

Whether consumers in a given country have been sufficiently informed about the health consequences of certain choices is an empirical question,

and at least some will continue making unhealthy choices despite awareness of the attendant health risks. In general, a lack of information is more likely to prevail in cases where the health effects of a behavior are insufficiently understood, for example, because of the long time lag between behavior and outcome; in developing countries, for instance, strong evidence points to this effect in relation to smoking in China (Chinese Academy of Preventive Medicine 1997); among children and teenagers; and where industry marketing efforts have distorted information (Suhrcke and others 2006).

Externalities with regard to NCD risk factors arise for secondhand smoke and drunk driving. Evidence about the harmful effects of secondhand smoke is growing (Department of Health and Human Services 2006; WHO 2004), although the effects are smaller than the direct health impacts for smokers. While most health risks are internal, the financial repercussions (or monetary externalities) can be much larger. Some household impacts were noted earlier. In industrial countries, the rest of society bears part of the additional medical bill for smokers, although a full accounting would also include factors working in the opposite direction, for example, old-age security, because smokers, on average, tend to die at a younger age than nonsmokers (Manning and others 1989; Viscusi 1995). In developing countries, by contrast, publicly funded treatment options are fewer and old-age security is less comprehensive. To be clear, these narrow financial calculations do not imply that the premature death of smokers is socially desirable.

Similarly, there is an economic rationale for alcohol taxes on the basis of health and monetary externalities. These are especially associated with drunk drivers who may cause injury and death on the roads and impose burdens on the government or on group medical services as a result of alcohol-induced illness. The greater risks of personal violence and public disorder associated with alcohol are also relevant here (Kenkel and Manning 1996; Manning and others 1989; Pogue and Sgontz 1989; Saffer and Chaloupka 1994).

A final potential externality relates to environmental health. Increased air pollution as countries develop is an important factor in the rise of asthma and chronic obstructive pulmonary disease. Pollution of water, land, and the food chain can also result in NCDs, including cancer; the case of arsenic poisoning in Bangladesh is an important example.² The multisectoral nature of this problem lends itself to World Bank engagement.

Specific interventions to address both information and externality issues may take a variety of different forms, with the intent of the main

government instruments being to inform, mandate, or regulate.³ Examples include populationwide or targeted public information campaigns; product labeling; or restrictions on the marketing of unhealthy commodities, such as bans on tobacco and alcohol advertising. In some cases, direct government action works better than the provision of information. For example, measures could include lowering the fat composition of manufactured foods through regulation; limiting sodium intake by mandating lowered salt content in manufactured foods; or encouraging physical activity by designing appropriate fuel tax, transportation, and urban policies. In general, behavior change can be difficult to achieve. Appendix 2 addresses the evidence on the effectiveness of interventions.

Perhaps the most effective way to address market failures and discourage risky behavior is through taxation, especially for tobacco and alcohol. Taxation is possibly the most effective intervention for discouraging smoking initiation and encouraging smokers to quit. Another reason for tobacco and alcohol taxation is to raise revenues to pay for public spending, as both theoretical and empirical work suggest that optimal commodity taxes exceed levels warranted on externality grounds alone for commodities that are relative leisure complements (Nugent and Knaul 2006; Parry, Laxminarayan, and West 2006a, 2006b; Sandmo 1975).

Finally, with respect to tobacco (and on a more institutional level), as of May 2007, 147 countries are parties to an international health treaty, the Framework Convention for Tobacco Control (appendix 2). However, translation of the treaty into action at the country level is fraught with difficulties because of the political economy of implementing those provisions that run contrary to the interests of the tobacco industry, including farmers. This area should receive more attention from countries and the World Bank in order to implement the convention at the country level.

Treatment

If preventive interventions are successful, the need for treatment to address an NCD could be delayed until old age, after a healthy and productive life has been lived. At this stage of life the productivity-related costs of illness are also likely to be minimized. However, as the earlier discussion of demographic trends highlighted, rising demand for NCD treatment is highly probable in most countries. This has implications for deciding what combination of interventions may best achieve healthy aging.

The economic rationale for a public role in NCD treatment rests mainly on the second and third arguments in favor of government intervention presented earlier, namely, to address the insurance problem for high-cost

private goods that require risk sharing and to subsidize access by the poor to low-cost private goods that they cannot readily afford out of pocket. Although the distinction is not absolute, the former stems largely from an efficiency argument, while the latter reflects equity concerns.

The relative expense of health care services is thus an important distinguishing factor between the two justifications. Of course, whether a particular service is expensive depends on the income of the patient in question. Empirical work can help determine households' ability to finance care out of pocket (Das and Hammer 2006). In general terms, the long list of possible medical interventions available to address NCDs covers the entire range from the cheap, for instance, aspirin to reduce the risk of heart attack or a so-called polypill to address multiple risk factors, to the expensive, such as coronary bypass surgery, with many others in between, for example, mammograms to detect breast cancer. In addition, the relative expense of different interventions is not immune to government action, for example, NCD drug prices vary widely around the world, and in their role as purchasers and market regulators, governments can help achieve lower drug prices (Gelders and others 2006).

The challenge of ensuring financial access to high-cost health services is particularly acute for NCDs, because in general, and despite important exceptions, interventions for NCD clinical care tend to be more expensive per unit of health gained than either nonclinical NCD or communicable disease interventions (Laxminarayan, Chow, and Shahid-Salles 2006). The resulting prospect of high and unpredictable out-of-pocket expenditures for NCD-related medical care underpins the case for providing financial protection against the cost of illness. If private insurance markets do not work, the result will be a welfare loss. Of course, these markets do tend to fail for reasons that are many and complex, arising largely from the familiar problems of moral hazard and adverse selection. Indeed, adverse selection is likely to be greater in the case of NCDs because of their chronic nature: many of those who will be sick tomorrow are already sick today, heightening the danger of risk selection leading to market inefficiencies. However, risk selection is only a problem for private insurers, who can refuse customers or charge them more.

Thus, a strong rationale exists for government intervention to address the failure of private insurance markets to help finance high-cost NCD care, but additional challenges may arise depending on the form that this intervention takes. A government's capabilities and resources are often as important as the economic rationale in determining policy prescriptions.

Correcting private insurance markets through regulation or, to a lesser extent, providing public insurance both require administrative capacities that are frequently inadequate in many low-income and some middle-income countries. In addition, relatively small formal sectors and limited tax handles often constrain revenue mobilization. This poses challenges to both social insurance mechanisms financed by payroll taxes and public provision of benefits packages financed by general tax revenues (noncontributory). Again, these issues are particularly acute in low-income countries and they are not specific to NCDs. Fiscal sustainability also becomes a key concern if, as is common, the response to insurance market failure is greater public financing of health care. For a more extensive treatment of health financing issues see World Bank (2006a).

In the case of low-cost NCD treatment services that the nonpoor are able to finance out of pocket, the justification for a public role reflects equity concerns to improve access for the poor. These interventions may be subsidized or, in countries where governments are deeply involved in the provision of health care, they may be included directly in packages of essential services. In either case, the health financing challenges will also apply.

NCDs and the Poor

Poverty reduction is the central mission of the World Bank, and looking at NCDs through that lens is essential. Poverty and ill health can be reinforcing, and this is likely to be at least as true for NCDs as for other health problems. Indeed, the long duration of chronic NCDs can make this a particularly vicious circle. The earlier discussion of economic burden identified potential pathways linking NCDs and poverty. The purpose of this section is to briefly address a commonly asked question, namely, how much do NCDs matter to the poor?

The extent to which NCDs matter to the poor has been the subject of some debate (Gwatkin, Guillot, and Heuveline 1999; WHO 2005a). Some advocates of increasing the focus on NCDs disagree with what they refer to as the myth that NCDs are not important for the poor. At the same time, some skeptics of expanded efforts to address NCDs believe that they are a problem that is more relevant to the nonpoor. The policy implications revolve around the relative importance that might be attached to two alternative agendas when health priorities are established: the emerging agenda of NCDs versus the unfinished agenda of communicable disease control. Why should the relative burden of NCDs among the rich and poor matter as long as we know that there are poor people who suffer from NCDs? One reason is that it helps to identify sources of inequality, which are relevant

to the extent that we care about gaps in health outcomes across groups and not just their absolute levels. The relative burden also has important implications for the ability to target the poor.

In reality, the data on the NCD burden among the poor present a nuanced picture, and understanding these nuances can help generate a more productive debate than taking an either-or perspective (see appendix 1 and Smith 2006b for further details on the data presented). One reason for the nuanced picture is that the metric chosen to evaluate the importance of NCDs to the poor can affect interpretation. For example, when deaths are measured in absolute terms, NCDs are by far the leading cause of death worldwide, accounting for about 75 percent or more of the total in all World Bank country income groups except the poorest. Even in low-income countries, NCDs are projected to overtake communicable diseases as the leading cause of death by 2015. By this metric, NCDs are highly important to the poor.

An alternative yardstick is to analyze excess deaths, or in other words, what explains the gap between mortality in the world's richest countries and the rest of the world? The answer here is that NCDs account for a significantly smaller share of the disease burden—typically less than one-third in the world's two poorest quintiles—when we measure excess deaths rather than total deaths. The reason underlying the gap between total and excess deaths attributable to NCDs is that while the poor are twice as likely to die from NCDs as the rich (based on age-standardized mortality rates), they are 20 times more likely to die from communicable diseases.

Evidence on socioeconomic differences in NCD outcomes within countries is scant, but as average income in the country where a person lives explains about 70 percent of global income inequality between individuals, the cross-country data are strongly indicative (World Bank 2005f). If anything, this approach will overstate the importance of NCDs among the world's very poor. Nevertheless, by any metric, NCDs are more important (relative to communicable diseases) in middle-income countries than in low-income ones.

Analyzing some NCD risk factors according to country income levels is also informative. No correlation with per capita GDP is apparent for blood pressure. In the case of adult smoking prevalence, cross-sectional data reveal a slight, inverted, U-shaped relationship, with rates increasing at lower income levels before ultimately declining at higher levels (although the decline may reflect temporary lagged effects). Cholesterol levels and body mass index have a positive relationship with income: these risk factors increase as countries grow richer (Ezzati and others

2003; Mackay and Eriksen 2002). For still other risk factors, such as indoor air pollution, the risk factor diminishes as country income rises. These patterns do not apply in certain countries, and the level of a given risk factor may be more dangerous for a poor person than a rich one because of worse access to medical care, but in general, NCD risk factors tend to be better than the cross-country average in poor countries and worse in rich ones (this is shown graphically in appendix 1). Within countries, the relationship between risk factors and socioeconomic status appears to vary widely across different world regions (Blakely and others 2005). As with the NCD burden, NCD risk factors tend to be worse in middle-income countries than in low-income ones.

In sum, in all countries and by any metric, NCDs account for a share of the disease burden that is large enough to merit policy attention. The increasing importance of these illnesses over time reinforces this message: NCDs are the future. At the same time, we acknowledge that in most countries infectious diseases remain a more important cause of the rich-poor gap in health outcomes and that NCDs are of relatively greater importance in middle-income countries than in low-income ones. This is relevant to questions of inequality, targeting, and ultimately the relative emphasis that policy makers might place on combinations of interventions at the country level.

Budget Implications of NCD Interventions

As private insurance markets often work poorly (or not at all) and government regulation is a challenge even for countries with excellent administrative capacity, many countries opt for public financing or provision of high-cost NCD services that require risk sharing (or both). For equity reasons, they often do the same for low-cost services.

Important upstream and downstream linkages exist between a higher NCD burden and each of four major causes of health expenditure growth: aging, technology, insurance, and economic growth. Aging societies have more NCDs than younger ones, even where efforts to achieve healthy aging are successful. More NCDs, in turn, will tend to generate demand for both more technology for NCD diagnosis and treatment and more insurance coverage to provide financial protection against technology-driven costs. This process can be self-reinforcing. Finally, economic growth tends to be associated with behavioral changes that can increase some of the risk factors for NCDs, but it will also generate more demand for medical care to address them (see Smith 2006a for further discussion on the links between NCDs and expenditure growth).⁴

As the NCD burden rises, how are budgets likely to evolve? A useful distinction can be drawn between the spending pressures associated with aging societies (as older people, on average, require more health care) and those that result from higher age-specific expenditures (changes over time in health spending for people of a given age resulting from such factors as new technology or insurance expansion). This is relevant because the aging process is essentially beyond the reach of government action, while policy choices can affect changes in age-specific expenditures to a significant extent. A key message is that both historically and in projections undertaken for this report, the age-specific component of expenditure growth is likely to be substantially larger than the demographic (aging) component (see appendix 1 and Smith 2006a for more details). In brief, countries facing a higher burden of NCDs will also face growing demand for both complex medical technologies and financial risk protection through insurance. The former will tend to raise the cost per episode to the health system, whereas the latter will reduce the cost the patient faces at the point of service. This combination can potentially result in rapidly increasing age-specific expenditures with a magnitude much larger than can be accounted for by aging alone.

Thus, while aging is an important reason for the growing burden of NCDs, it will not necessarily be the major direct cause of higher health expenditures. The latter will instead be driven primarily by policy decisions that affect age-specific health expenditures, for example, how decisions pertain to technology adoption, more expensive pharmaceuticals, and insurance expansion. Careful health technology assessments, judicious expansion of benefits packages, and ultimately financing mechanisms that promote the sustainability of health spending over time will all play an important role in helping countries adjust to the financial implications of the epidemiological transition. In high-income countries where NCDs predominate, how to contain rapidly rising expenditures has been a recurrent theme in health policy reform, with major fiscal implications. The same challenges await many middle-income countries. Appendix 1 provides additional discussion on this topic. A case study of Indonesia in appendix 3 explores some of health system pressures of NCDs in a specific country context.

Value for Money

The second major determinant of the impact of public spending on NCD outcomes, as identified at the outset of this chapter, is the value

for money attained through alternative interventions. Health-improving interventions vary greatly both in their cost of implementation as well as in health gained. Thus, given a fixed budget, decisions about how funds are allocated (which interventions to “buy”) will play a key role in determining the volume of services that can be delivered and ultimately their impact on reducing morbidity and mortality. This section briefly discusses examples of interventions that offer value for money in addressing NCDs (the information presented here draws heavily on Laxminarayan and others 2006). Appendix 2 presents a more detailed discussion of the effectiveness of NCD interventions.

The previous sections indicated that an economic rationale exists for a range of different NCD interventions to correct market failures on either efficiency or equity grounds, and in many settings further prioritization within this range may be necessary. Having decided to intervene against NCDs, policy makers can use cost-effectiveness analysis (CEA) to redirect resources to achieve more health gains (see Jamison and others 2006a for more details). CEA is a tool for weighing the costs and health outcomes of different interventions and allows policy makers to ascertain the “price” of buying health through different interventions.

CEA has numerous drawbacks. The evidence it provides is often highly context specific (with respect to both time and place); depends on scale considerations, prevailing unit prices, and local epidemiology; and can vary according to service delivery models, for example, individual or bundled. It should also be placed in the context of this chapter’s broader framework. The earlier discussion on economic rationale implies that if a publicly provided, “cost-effective” intervention offers services for which market failures are few and therefore displaces private health sector activity, then its net impact will be much lower than suggested by an analysis of the public sector alone. Furthermore, as the next section will discuss, cost-effectiveness evidence drawn from a study in a well-functioning health system has limited relevance in an environment where public sector and service delivery capacities are low.

These caveats are important, and thus CEA should be only one of many inputs into policy making. Nevertheless, its imperfections should not obscure an important point: that political economy considerations often guide decisions on health budget allocations (echoed in the common complaint that spending is biased toward expensive tertiary hospitals catering to an urban elite), and as a result such allocations do not yield improvements in health outcomes on the scale that could be achieved, all else being equal, through a more technical approach (see Birdsall and

James 1993 on the political economy implications of the epidemiological transition). When used appropriately, CEA can be helpful in identifying highly cost-effective opportunities to improve health that policy makers are currently neglecting as well as widely prevalent investments that are not cost-effective.

Whether a specific public information campaign to promote diet and exercise works or by how much a particular drug reduces the likelihood of heart disease matters greatly for public policy to improve NCD outcomes. Medical and public health research is constantly evolving, and robust evidence of effectiveness should precede large-scale implementation of an intervention. More broadly, monitoring and evaluation to provide evidence on the health production function should be viewed as a public good worthy of government and donor support.

What does the CEA evidence reveal? Contrary to some beliefs, many NCD interventions are cost-effective. Cigarette taxes are possibly the most effective intervention to curb smoking. Tobacco control through tax increases often has dual benefits of increasing tax revenues as well as discouraging smoking initiation and encouraging smokers to quit. The cost-effectiveness of a policy to increase cigarette prices by 33 percent ranges from US\$13 to US\$195 per disability-adjusted life years (DALY) averted globally, with a better cost-effectiveness ratio (US\$3 to US\$42 per DALY averted) in low-income countries (Laxminarayan and others 2006). Nonprice interventions, such as banning advertising, providing health education information, and forbidding smoking in public places, are relatively less cost-effective (US\$54 to US\$674 per DALY averted) in low-income countries, but are still important components of any tobacco control program.⁵

Cost-effective interventions also exist for other CVD risk factors. Population-based primary prevention interventions can effectively lower the risk of coronary heart disease and stroke at a relatively low cost and without expensive health infrastructure. For example, replacing dietary trans fat with polyunsaturated fat is likely to be effective in settings where intake of trans fat is high. If this occurs during manufacture rather than through changes in the behavior of individuals, the cost would be US\$25 to US\$73 per DALY averted. Replacement of saturated fat with monounsaturated fat in manufactured foods accompanied by a public education campaign is considerably more expensive: US\$1,865 to US\$4,012 per DALY averted.

Clinic-based prevention strategies targeted at individuals at high risk for CVD—measured as a combination of nonoptimal blood pressure,

lifestyle, and genetic risk factors—can also be effective, especially when implemented in tandem with population-based measures. The cost-effectiveness of primary prevention of CVD may vary greatly depending on the underlying risk factors, the age of the patient, and the cost of medications. The cost of treating acute myocardial infarction with aspirin and beta-blockers is less than US\$25 per DALY averted in all regions. In regions with poor access to hospitals, a combination of aspirin plus the beta-blocker atenolol is highly cost-effective in preventing the recurrence of a vascular event: US\$386 to US\$545 per DALY averted. Treatment of acute ischemic stroke with aspirin costs US\$150 per DALY averted, and at US\$70 per DALY averted is also the cheapest option for secondary prevention.

Single-pill (polypill) combinations of blood pressure-lowering medications, statins, and aspirin offer the potential dual benefit of being highly effective at lowering the risk of CVD and facilitating patient compliance with a drug regimen. A hypothetical multidrug regimen that includes generic aspirin, a beta-blocker, a thiazide diuretic, an angiotensin-converting enzyme inhibitor, and a statin may be implemented at a cost-effectiveness ratio of US\$721 to US\$1,065 per DALY averted (compared with no treatment in a population with an underlying 10-year CVD risk of 35 percent). The use of the multidrug regimen for prevention in patients with a lower underlying CVD risk improves health benefits, but costs increase more than proportionately.

Little evidence is available on the cost-effectiveness of programs to encourage exercise and other behavioral changes. For example, while strong evidence of the health benefits of regular physical activity is available, population policies to promote physical activity are scarce, and if present are rarely evaluated on their own. Research attempting to understand the factors that influence physical activity, including urban environment, use of leisure time, occupation, and transportation, is only just beginning to emerge. Also, few studies have established the effectiveness of policies to encourage higher consumption of fruits and vegetables. Issues for study include how to ensure the availability of fruits and vegetables in poor neighborhoods, how to reach populations who are often misinformed on the benefits of various nutrients and diets, and what the potential benefits of taxing energy-dense snacks might be.

In sum, highly cost-effective interventions for the control of NCDs do exist, and although not the only relevant criterion, evidence on best

buys can be a valuable input into resource allocation decisions. Table 2.2 shows the cost-effectiveness ratios for selected interventions (including two that are not cost-effective) and associated DALYs averted per US\$1 million spent. (For more examples see appendix 2 and for a more exhaustive list see Jamison and others 2006b.)

Implementation of NCD Services

The third and final consideration affecting the extent to which a dollar of public spending on NCDs can lead to better outcomes is the public sector's capacity to translate its health budget into services of adequate quality. Service delivery in the health sector can be challenging, and governments' ability to achieve results has often been weaker than hoped. The challenge of service delivery is receiving increased attention and is particularly relevant for health (see, in particular, World Bank 2003). Decades of anecdotal observations—absentee health workers, empty drug cabinets, facilities without power—and a growing body of literature have revealed that the quality of medical care is often woefully inadequate (Chaudhury and others 2006; Das and Hammer forthcoming;

Table 2.2. Selected Cost-Effectiveness Ratios for Interventions against NCDs

<i>Service or intervention</i>	<i>Cost per DALY (US\$)</i>	<i>DALYs averted per US\$1 million spent</i>
1. Taxation of tobacco products	3–50	20,000–330,000
2. Treatment of acute myocardial infarction or heart attack with an inexpensive set of drugs (aspirin and beta-blocker)	10–25	40,000–100,000
3. Treatment of acute myocardial infarction with inexpensive drugs plus streptokinase (costs and DALYs for this are in addition to what would have occurred with inexpensive drugs only)	600–750	1,300–1,600
4. Lifetime treatment of heart attack and stroke survivors with a daily polypill combining four or five off-patent preventive medications	700–1,000	1,000–1,400
5. Coronary artery bypass graft or bypass surgery in specific identifiable risk cases, such as disease of the left main coronary artery (incremental to 4)	>25,000	<40
6. Bypass surgery for less severe coronary heart disease and lifetime treatment (incremental to 4)	Very high	Very small

Source: Jamison and others 2006b.

Leonard and Masatu 2005). This section briefly considers how the public sector can achieve better results in the field. Many of the issues discussed constitute what is often referred to as a health systems approach to improving outcomes (for further discussion, see World Bank 2007). Appendix 3 presents three country case studies related to service delivery issues.

A first step is to conceptualize the nature of the problem. The range of NCD services may be characterized using the framework developed by the World Bank (2003). This categorizes services as discretionary, transaction intensive, or both. Discretionary services are those that require significant judgment on the part of the provider about what service to provide and how to deliver the service to the client, who has significantly less information. Transaction-intensive services require repeated, frequent interaction between provider and client.

In general, most nonclinical NCD preventive services, such as public information campaigns about risk factors or tax policies for tobacco and alcohol, are discretionary but are not transaction intensive (although tax collection may be transaction intensive). Their design requires a certain level of judgment by the policy maker, but once this step has been accomplished, it does not need to be repeated regularly. By contrast, most clinical NCD services are both discretionary and transaction intensive: the health worker needs to make judgments about the appropriate diagnostic technique, drug therapy, or other intervention and must do so on many separate occasions. This is the case for most curative health care, but is particularly so for chronic NCDs.

The discretionary and transaction-intensive nature of many NCD services is precisely what makes service delivery so challenging. This is because of the difficulties it poses for establishing accountability in the institutional relationships—among patients, providers, and policy makers—that are critical to service delivery success. On a conceptual level, measures to improve accountability will be important for strengthening public sector capacity to deliver services.

On a practical level, considering some of the characteristics of NCDs that are particularly relevant to service delivery issues is helpful. In other words, what is different about NCDs when compared with the more “traditional” priorities of acute communicable diseases and maternal and child health? The focus here will be on clinical services, where the challenges are likely to be greatest as they are both discretionary and transaction intensive. A nonexhaustive list of some of these characteristics follows, along with some of the necessary inputs and strategic directions

that they suggest. Empirical research on this topic in low- and middle-income countries is sparse.

- NCD services are typically more complex than other health interventions. They require a greater number of interactions with the health system (that is, they are transaction intensive), at multiple levels of care (primary, specialized, laboratory, and so on), and often in the presence of comorbidities. The continuity, coordination, and comprehensiveness of care are critical in this setting. Strong information systems will be a key input for addressing all three challenges (Renders and others 2001; Wagner and Groves 2002), and can also serve to strengthen accountability. Another challenge in the face of complexity is the quality of care, underlining the need for clinical guidelines and a clear articulation of roles, responsibilities, and accountability relationships. Finally, the complexity of NCDs does not imply an emphasis only on higher levels of care; indeed, stronger primary care services have been associated with better chronic disease outcomes in industrial countries (Starfield and Shi 2002).
- NCDs' long-term nature implies greater responsibilities for self-care by the patient, highlighting the need for health systems to equip patients to take on that role. This is a recurring theme in the literature from industrial countries on chronic care service delivery (Renders and others 2001; Wagner and Groves 2002). Promoting patient education programs and engaging communities can help promote patient self-management. A more informed patient also has the potential to improve the accountability of providers and to participate more actively in decision making.
- NCDs are often characterized by long periods during which the patient may be asymptomatic, which underlines the importance of new approaches to access, especially by reaching beyond facility-based services to engage communities. Contracting with civil society organizations to, for example, disseminate information, promote awareness, and encourage screening if and when appropriate may be a promising approach in this regard.
- NCDs often entail extended use of pharmaceuticals, with important implications for drug access, quality, and affordability. This highlights the value of stewardship functions, such as a competitive generic drug policy to help reduce costs, and a consumer information agency to help inform and protect those paying for medications out of pocket.
- NCD treatment is often more technology intensive than other health services. In this context, health technology assessments will

become crucial inputs to the policy process, particularly in relation to cost containment.

- Numerous studies have stressed the role of skilled workers, midlevel cadres, and nonmedical personnel in chronic care provision (Renders and others 2001; Rothman and Wagner 2003; Singh 2005; WHO 2005a, 2006b). A shift in the mix of skills and human resources has implications for training, but does not necessarily imply an emphasis on higher-level skills.

Reflecting these characteristics, a number of models have been developed that recognize the complexity of the strategies that are required to manage chronic disease. Examples include the following:

- The chronic care model was developed in the United States and variations have been used in other high-income countries (Bodenheimer, Wagner, and Grumbach 2002a, 2002b; Wagner 1998). The model comprises four components: self-management support, delivery system design, decision support, and clinical information systems. The model implies strong linkages between the community and the health system and involves a range of multisectoral interventions (Wagner and others 1999). Some recent empirical studies have lent support to components of the chronic care model (Piat and others 2006; Tsai and others 2005).
- A systemic approach that includes risk factor surveillance, prevention, disease management, and monitoring underlies the development of conceptual models to target chronic disease developed by WHO (2002a).⁶ These models focus primarily on low- and middle-income countries.
- The St. Vincent Declaration, adopted in 1989 under the aegis of the International Diabetes Federation (Europe), established a widely accepted set of goals and principles for the prevention, diagnosis, and management of diabetes and its complications.⁷ This was followed by practical guidance on how to implement such a strategy (European Diabetes Policy Group 1999a, 1999b). The declaration emphasizes self-management of diabetes and a “therapeutic partnership” and introduces the idea of a treatment team rather than reliance on individual health professionals.

The characteristics of NCDs relevant to service delivery should also be viewed through the lens of prospects for reaching the poor with NCD services. NCDs are qualitatively different from communicable diseases

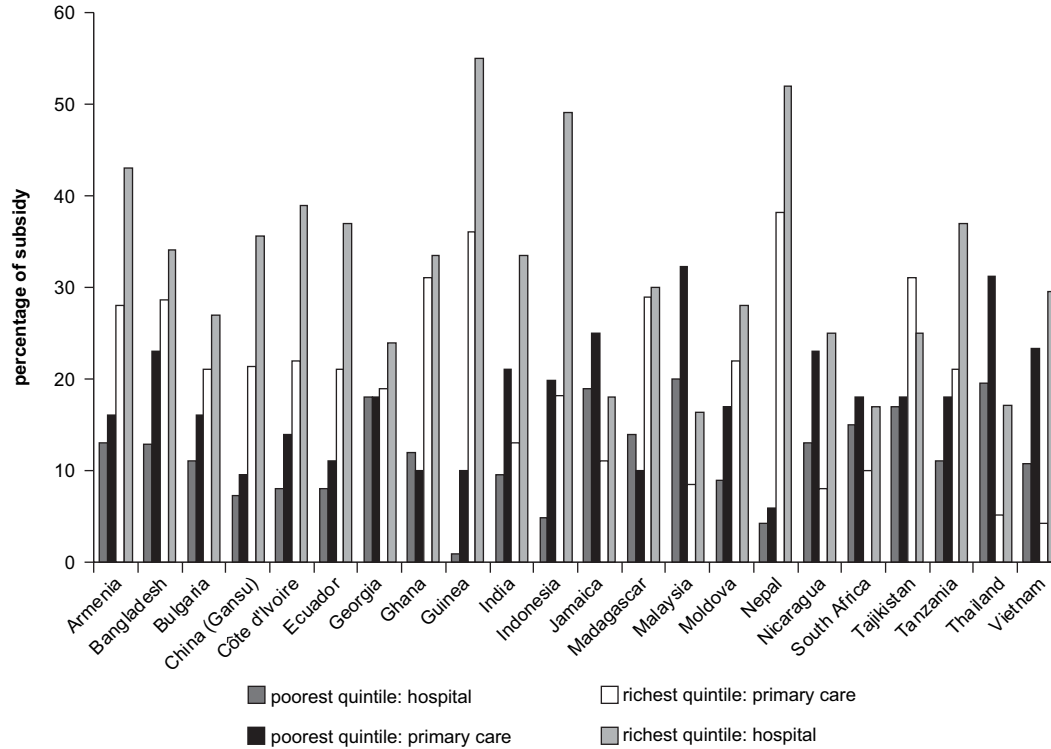
in a number of respects that suggest additional challenges in reaching the poor. For example:

- *Higher nonclinical costs.* The potentially higher frequency of contacts with trained service providers required for chronic diseases implies greater transport and opportunity costs for the patient.
- *Poorer financial access.* NCDs are characterized by higher costs per episode of illness, heightening the importance of insurance mechanisms. However, the difficulties of providing insurance coverage to the informal sector, where the poor tend to be concentrated, are well known.
- *Economies of scale.* The hospital bias of certain NCD interventions, resulting in part from economies of scale for the deployment of technology, makes reaching rural areas more difficult than reaching urban areas.⁸ Even if some follow-up services can be delivered through health centers, diagnosis may require an initial hospital contact, which can effectively exclude the poor.
- *Specialized labor.* Similarly, the complexity of some NCD interventions makes it more difficult to use less skilled human resources of the type available through health centers, outreach, and so on. Issues of access by the poor to specialized facilities and labor is particularly important for conditions requiring urgent care, such as heart attack or stroke.

Thus, reaching the poor with clinical NCD services is likely to pose some important challenges. Although studies have not looked at NCDs explicitly, general findings indicate strongly that this is indeed the case. Figure 2.2 shows the results of several expenditure incidence studies in different countries. In a wide range of settings, expenditure incidence for health services tends to be skewed in favor of the rich.⁹ The contrast is even larger for hospital services than for primary care, highlighting the potential difficulties for NCD interventions. In addition, the studies indicate that progressivity tends to be better in middle-income countries than in low-income countries. Thus, the countries in which NCDs are relatively more important are also those that have a better chance of successfully tackling the issue.

The incidence studies suggest that if a country has a poor track record with respect to reaching the poor with services for communicable diseases, it should be cautious in terms of launching massive new efforts to provide NCD services in the clinical setting, as the latter will probably be even more difficult to do in a progressive manner. This should not be a reason for inaction, but rather a motivation to do a better job. In all

Figure 2.2. Expenditure Incidence for Primary and Hospital Care, Selected Countries, Various Years



Sources: Filmer 2003; O'Donnell and others 2005.

countries, the challenge will be to find innovative solutions to reach the poor with NCD services.

A final note on targeting can help identify one other challenge for reaching the poor with NCD services. In many settings, NCDs represent a larger share of the overall disease burden than communicable diseases and more poor people have NCDs than communicable diseases. Even in this context, categorical targeting through a focus on communicable diseases can, in principle, be a more promising way to reach the poor than undertaking NCD interventions. This is because there tend to be fewer nonpoor people with communicable diseases, and thus less potential for leakage. In this scenario, even if everyone (nonpoor and poor) suffering from a condition has an equal probability of benefiting from public expenditures (and the incidence studies suggest this is often not the case), a dollar invested in NCD interventions will be less progressive than spending on communicable disease.¹⁰

NCDs and other health interventions share some commonalities. In particular, HIV/AIDS also entails chronic disease management and sustained contacts with health service providers, and the engagement of communities in detection and diagnosis plays a critical role. Tuberculosis and sexually transmitted diseases also offer potential parallels with NCDs with respect to case detection and management. The many lessons learned in recent years in relation to addressing HIV/AIDS and these other conditions may be highly applicable to NCDs and vice versa.

In sum, the ability of health systems to translate public spending on NCDs into better outcomes cannot be taken for granted. The difficulties of service delivery for interventions that are simpler than those for NCDs and the potential complexity of NCD service delivery emphasize the need to carefully consider NCDs' key characteristics and how systems can be adapted to produce results. This is particularly true for reaching the poor with NCD interventions. This note of caution should be balanced with optimism that innovative solutions exist: the challenge is to identify and incorporate them into policies. An awareness of the challenges is a critical first step toward developing those solutions.

Summary: A Matrix of the Economic Rationale for NCD Interventions

This chapter has presented a framework for analyzing public policy for improving NCD outcomes. It was built on three major considerations: economic rationale, value for money, and public sector capacity to deliver services. As emphasized throughout, all three are important determinants

of the effect of public spending on NCD outcomes: the chain is only as strong as its weakest link.

Table 2.3 summarizes the economic rationale for public intervention in NCDs in the form of a matrix. The case for primary prevention rests primarily on taxes to address externalities related to tobacco and alcohol

Table 2.3. Illustrative Matrix on the Economic Rationale for Public Intervention in NCDs

<i>Level of care</i>	<i>Low-income countries</i>	<i>Middle-income countries</i>
Primary prevention (primarily nonclinical services)	<p>Strong rationale on efficiency grounds for tobacco and alcohol taxes, advertising bans, and a ban on smoking in public places.</p> <p>The provision of information to improve knowledge about risk factors (for example, alcohol, tobacco, diet, exercise) is also justified, with a special effort to reach poor populations.</p>	<p>Strong rationale on efficiency grounds for tobacco and alcohol taxes, advertising bans, and a ban on smoking in public places.</p> <p>The provision of information to improve knowledge about risk factors (for example, alcohol, tobacco, diet, exercise) is also justified, with a special effort to reach poor populations.</p> <p>Regulation to address the content of manufactured foods.</p>
Secondary prevention and treatment (primarily clinical services)	<p>A limited set of simpler, possibly nonhospital, low-cost interventions for which there is a good probability of reaching the poor (and that will not strain the government budget) might be justified on equity grounds, for example, if included in a well-targeted basic package of services.</p> <p>There is a good efficiency rationale for high-cost interventions (for example, by addressing the insurance problem), but achieving this is difficult because of the likelihood that these will not be pro-poor if delivered via hospitals, limited administrative capacities, and resource constraints on the public purse.</p> <p>Other: Governments should commission monitoring and evaluation of interventions to determine what works. They may also be able to negotiate lower NCD drug prices.</p>	<p>Intervention in low-cost NCD services is justified on equity grounds (for example, they could be included in a well-targeted basic package), with special attention to reaching the poor.</p> <p>There is a strong efficiency rationale for high-cost interventions, intervening either via insurance markets or public financing (with or without public provision). However, special efforts should be made to make these pro-poor, and new services should be added to benefits packages only at a pace that can be sustained by the public purse.</p> <p>Other: Governments should commission monitoring and evaluation of interventions to determine what works. They may also be able to negotiate lower NCD drug prices.</p>

and the provision of information about various risk factors. The section on treatment distinguishes between low- and high-cost NCD services, with equity concerns motivating a public role for the former and efficiency issues related to insurance markets largely motivating the latter. Any expansion of clinical services should be mindful of the challenges of reaching the poor and of resource constraints resulting from limited health budgets where public financing is pursued. For these reasons, a less ambitious set of interventions than in middle-income countries is advisable in low-income countries. The rollout of new interventions should also be accompanied by direct or indirect public support for monitoring and evaluation mechanisms to help determine what works.

How do cost-effectiveness and service delivery capacity affect this matrix? For the top row on primary prevention, the message does not change significantly. The services for which an economic rationale exists generally tend to be cost-effective, although robust evidence on how best to provide the public with information is often lacking. Also service delivery of these interventions in most settings will generally not be problematic, as they are not transaction intensive (with the possible exceptions of tax collection, as opposed to design, and the suppression of smuggling if it arises in response to taxation), and do not typically rely heavily on strong health systems. Thus, primary prevention activities are a logical first priority in low-income countries.

The picture is somewhat less clear for the second row on secondary prevention and treatment. Many low-cost clinical interventions against CVD are cost-effective, but unless they reach the poor who would otherwise not have access (thereby achieving equity goals), the economic rationale is weaker. Neither consideration will matter if service delivery in a widely scattered network of primary health clinics is weak, and this is often a concern in low-income countries. With respect to higher-cost hospital interventions, the economic rationale is stronger in middle-income countries, and service delivery capacity here tends to be better, although value for money is less than for lower-cost alternatives. Ultimately, the resolution of some of these tensions will rely on country-specific factors (see Filmer, Hammer, and Pritchett 2002 for further discussion).

Key Messages

The key messages of this chapter are as follows:

- Three distinct factors are likely to play an important role in determining the effect of public spending on NCD outcomes, with the overall chain

that binds them together being only as strong as its weakest link. These factors are (a) the net impact of the public sector, which depends on the extent of market failures; (b) the budget allocation decisions, which imply either more or less value for money depending on cost-effectiveness; and (c) the public sector's capacity to translate money into effective services. This trio of factors offers a useful framework for analyzing public policy related to NCDs.

- NCDs impose a significant economic burden, not just on patients, but also on households, communities, employers, health care systems, and government budgets. Typical cost of illness studies often underestimate this burden.
- The economic rationale for NCD interventions for primary prevention rests primarily on taxes to address externalities related to tobacco and alcohol and on the provision of information about various risk factors. The economic rationale with regard to treatment distinguishes between low- and high-cost NCD services, with equity concerns motivating a public role for the former and efficiency issues related to insurance markets as the main motivation for the latter.
- In all countries and by any metric, NCDs account for a large enough share of the disease burden of the poor to merit serious policy attention. At the same time, in most countries infectious diseases remain a more important cause of the rich-poor gap in health outcomes and NCDs are of relatively greater importance in middle-income countries than in low-income ones.
- A growing burden of NCDs will have potentially large budget implications, but the fiscal consequences of aging are likely to be much less important than the growth of age-specific expenditures, particularly because of the greater demand for both high-cost technologies and public insurance coverage that NCDs may generate.
- Cost-effectiveness analysis, despite its limitations and if all else is equal, can offer useful information for input into budget allocation decisions. Highly cost-effective interventions for the control of NCDs do exist. Among the most cost-effective are tobacco taxes and clinical interventions for primary and secondary prevention of CVD.
- Service delivery issues will be central to achieving better NCD outcomes. Key characteristics of NCDs, including the need for long-term, sustained interaction with multiple levels of the health system, the importance of community engagement to improve access and patient self-care, and the intensive use of technology and drugs, can help inform policy decisions aimed at improving service delivery.

- Both conceptual and empirical reasons provide grounds for the belief that achieving equity goals through NCD interventions will be a challenge in low-income countries. Middle-income countries have a better track record of reaching the poor. In all settings, the challenge will be to find innovative approaches to make interventions pro-poor.

Notes

1. IDF (International Diabetes Federation). 2003. *Diabetes Atlas*. 2nd ed. Brussels: International Diabetes Foundation.
2. WHO. "Arsenic in Drinking Water." Fact Sheet 210. WHO. <http://www.who.int/mediacentre/factsheets/fs210/en/index.html>. Date consulted: October 31, 2006.
3. This terminology is from Musgrove (1996). Two other instruments, finance and provision, are somewhat less common for NCD prevention, but more so for treatment.
4. Note that technology can also be cost saving, but a growing body of literature points to technology as the most important driver of health expenditure growth, so the savings are outweighed.
5. The World Bank considers health interventions that cost less than US\$100 per year of life saved as highly cost-effective for poor countries.
6. See also WHO 2005a.
7. St. Vincent Declaration. "Diabetes Care and Research in Europe: The St. Vincent Declaration." International Diabetes Federation. <http://www.idf.org/webdata/docs/SVD%20and%20Istanbul%20Commitment.pdf>. Date consulted: November 15, 2006.
8. Many NCD interventions are recommended for the hospital setting (Laxminarayan and others 2006).
9. The data presented in figure 2.2 show average incidence. A more relevant indicator, but one that is more difficult to determine, is marginal incidence, which may be more pro-poor (Lanjouw and Ravallion 1999).
10. In practice, some individuals may have comorbidities that include both communicable diseases and NCDs, and both will require treatment.