

# The Economics of Priority Setting for Health Care: A Literature Review

Katharina Hauck, Peter C. Smith and Maria Goddard

September 2004



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HEALTH CARE: A LITERATURE REVIEW**

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## Health, Nutrition and Population (HNP) Discussion Paper

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# Health, Nutrition and Population (HNP) Discussion Paper

## The Economics of Priority Setting for Health Care: A Literature Review

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Paper prepared for the World Bank's Resource Allocation and Purchasing Project

**Abstract:** This report provides a review of the literature on priority setting in healthcare. It adopts an economic perspective on the problem of choosing the optimal portfolio of programmes that can be afforded from a limited national healthcare budget. The traditional economic approach, proposes maximizing health gain (however measured) subject to a budget constraint, which implies ranking programs according to their cost-effectiveness ratio. However, our critical review suggests that this traditional approach is subject to three important difficulties: limitations in economic evaluation methodology, incorporating equity principles, and practical constraints. These suggest a need for a fundamental rethink of the role of cost-effectiveness analysis in priority setting.

Methodological concerns include identifying whose perspective to adopt, the generalizability of results to multiple settings, the treatment of uncertainty and timing, and the treatment of interactions between programs. Most equity considerations can be captured in two broad headings: equity related to some concept of need and equity related to access to services. In principle equity concerns can be incorporated into an economic approach to priority setting with relative ease. However we find that many contributions to the debate on equity concepts are theoretical and remote from practical implementation issues. The traditional cost-effectiveness approach generally ignores the numerous practical constraints arising from the political, institutional, and environmental context in which priority setting takes place. These include the influence of interest groups, the transaction costs associated with policy changes, and the interactions between the provision and financing of health services. We find that treatment of such political economy perspectives is the least well-developed aspect of the priority setting literature and suggest some rudimentary models that could serve as a starting point for analysis.

**Keywords:** resource allocation and purchasing, health care financing, priority setting, basic packages, cost-effectiveness analysis, equity, political economy

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## FOREWORD

Great progress has been made in recent years in securing better access and financial protection against the cost of illness through collective financing of health care. This publication – *The Economics of Priority Setting for Health Care: A Literature Review* by Katharina Hauck, Peter C. Smith and Maria Goddard – is part of a series of Discussions Papers that review ways to make public spending on health care more efficient and equitable in developing countries through strategic purchasing and contracting services from nongovernmental providers.

Promoting health and confronting disease challenges requires action across a range of activities in the health system. This includes improvements in the policymaking and stewardship role of governments, better access to human resources, drugs, medical equipment, and consumables, and a greater engagement of both public and private providers of services.

Managing scarce resources and health care effectively and efficiently is an important part of this story. Experience has shown that, without strategic policies and focused spending mechanisms, the poor and other ordinary people are likely to get left out. The use of purchasing as a tool to enhance public sector performance is well documented in other sectors of the economy. Extension of this experience to the health sector is more recent and lessons learned are now being successfully applied to developing countries.

The shift from hiring staff in the public sector and producing services “in house” from non governmental providers has been at the center of a lively debate on collective financing of health care during recent years. Its underlying premise is that it is necessary to separate the functions of financing health services from the production process of service delivery to improve public sector accountability and performance.

In this Discussion Paper, Hauck, Smith and Goddard review current approaches to priority setting in the health sector. They demonstrate the weakness of current approaches to priority setting using cost effectiveness techniques and argue a strong case for a broader approach to resource allocation and purchasing using cost benefit and stakeholder analysis.

*Alexander S. Preker*

Lead Economist  
Editor of HNP Publications





# EXECUTIVE SUMMARY

## INTRODUCTION

This is a review of the literature on priority setting in health care. It adopts an economic perspective on the choice of the optimal portfolio of programs that a limited national health care budget can afford. The traditional economic approach proposes maximizing health gain (however measured) subject to a budget constraint, which implies ranking programs according to their cost-effectiveness ratio. However, our critical review suggests that this traditional approach is subject to three broad difficulties: economic evaluation methodology, incorporation of equity principles, and practical constraints. These are considered below in turn.

## ECONOMIC EVALUATION

1. First, we review the literature relating to the use of economic evaluation as a tool for priority setting, covering cost-benefit and cost-effectiveness analysis. We conclude that economic evaluation is a powerful tool for priority setting, but that many methodological and practical barriers limit the extent to which the results of economic evaluations can be used in practical priority-setting decisions.
2. Methodological barriers affect the applicability and reliability of studies such that cost-effective programs in one situation or setting are not in another. First, studies can be taken out from a variety of *perspectives* (e.g., from the perspective of society, a health care institution, or third-party payers), and the applicability of results to another perspective might be limited. Second, studies might not be *generalizable* to other settings (e.g., other countries), because health care systems, disease incidence, or relative prices and costs are different. Third, the *target population* is the population for whom a program is intended, and different target populations can affect the cost-effectiveness of interventions. Fourth, a great deal of *uncertainty* surrounds the parameters used in evaluations. Fifth, *timing* is an issue, as economic evaluation studies have to be conducted before medical technologies are in widespread use, because established behaviors are difficult to change. Sixth, costs and effectiveness of different programs may exhibit important interactions, and the incremental costs of establishing a new program depend on the existing infrastructure. Therefore, economic evaluation studies should consider *portfolios of programs*.
3. We also outline the practical barriers to the use of economic evaluation studies that may arise from the different perspectives of decisionmakers operating in the political and clinical environment and researchers generating cost-effectiveness data.
4. We conclude that CEA is indeed a powerful tool for priority setting, and the existence of the shortcomings we identify does not imply it should be abandoned. Instead, we suggest that improvements in methodology and coverage of CEA may enhance its practical usefulness. We also debate whether alternative strategies such as the simplification of cost-effectiveness data could increase acceptability of this method among decisionmakers.

## EQUITY ISSUES

5. The second issue examined in this discussion paper concerns priority setting to address equity concerns in health in order to produce a “fair” allocation of resources.

6. The review discusses seven concepts of equity: *egalitarianism*, which implies that everybody should have identical health status; *allocation according to need*, which relies on an adequate definition of “need,” the concept of *rule of rescue* which demands that it is an ethical duty to do everything possible to help individuals in immediate life-threatening situations; *equality of access*, which is often used to operationalize the concept of equity but itself requires a definition of “access” as well as need; the notion of providing a *decent minimum*, which involves definition of an essential package of health services; Rawls’ *maximin principle*, which demands that social policy should seek to maximize the position of the worst-off; and *libertarianism*, which favors a distribution of resources according to entitlement.
7. We conclude that many contributions on equity concepts are theoretical and remote from practical implementation issues. However, most equity considerations can be captured in two broad headings: equity related to a concept of need and equity related to access to services and—in principle—equity concerns can be incorporated into an economic approach to priority setting with relative ease.
8. Health gains arising from different programs can be weighted differently according to who receives them, and the policymaker is free to decide how to skew resources to meet the needs of different population groups. However, the practical application of equity weighting requires us to operationalize concepts such as “need,” which proves to be more difficult.

### PRACTICAL CONSTRAINTS

9. The third area explored in this discussion paper relates to the practical constraints that may force decisionmakers to deviate from the decisions they would make if confronted by the simple efficiency-equity maximization problem proposed by the traditional economic approach.
10. First, we review several models of political economy, which highlight a range of additional constraints faced by decisionmakers operating in a political context such as the need to gain political support in order to assure reelection and the tendency to operate out of self-interest or to respond to the interests of powerful groups. In this context we consider models of *majority voting*, *interest groups*, *donor constraints*, *bureaucratic decisionmaking* and *rent-seeking* behavior.
11. We then consider other practical constraints on decisionmakers such as: the existence of *transaction costs* associated with making policy shifts (e.g., transition and abandonment costs); externalities associated with some expenditures on health care (such as the productivity impact of the population’s improved health status); and models that address the way policy changes occur in practice (i.e., *satisficing and incremental budgeting*).
12. Finally, we consider the important interactions that occur between methods of financing health care and priority-setting processes, even though in principle, these two processes should be independent of each other. We illustrate the impact that particular forms of financing may have on provider and patient behavior, which can influence who gains access to health care. They may also influence the size of the revenue base available for funding health care.
13. We present a model for analyzing the implications for priority setting of four methods of funding: collective insurance, private insurance, complementary insurance, and direct user charges. In particular, we consider the implications of citizens “opting out” of the

collective system and taking out private insurance which, if applicable to a large proportion of the population, may undermine support for the collective system, reducing the capacity to raise revenue and possibly leading to a downward spiral of an increasingly restricted collective package and more extensive private coverage. We also consider user charges operating alongside the collective system. They fulfill a dual role of moderating demand and partially financing the health system and, if a system of exemptions is not operating, many patients will be confronted with catastrophic user charges they cannot afford. This is likely to offend many concepts of fairness, leading to a need to consider abatement or removal of user charges for individuals with inadequate means. This arrangement will increase the expenditure of the collective system, reduce its income, and alter political support for the collective system.

14. Models of priority setting under practical constraints attempt to reflect the reality of the decisionmaking process more accurately than traditional economic approaches. Some of these are useful only in terms of their ability to enhance our ability to explain what we observe in the real world. However, we also outline some decision aids designed to cope with decisionmaking in complex environments, including *program budgeting and marginal analysis* (PBMA), *robustness analysis*, *real options analysis*, and *multiattribute problem analysis*.

## CONCLUSIONS

15. Priority setting in health care is a complex task. Our review illustrates the many theoretical, political, and practical obstacles facing decisionmakers. As a consequence, it would perhaps be easy to conclude that the task is insurmountable, rather than merely difficult. However, we believe this conclusion would be unduly pessimistic.
16. Instead, we believe that adopting an economic approach to priority setting has many advantages, not least that it forces the decisionmaker to define explicitly the objectives of the priority-setting process, even if these cannot be easily measured. An economic perspective recognizes that the priority-setting process will often involve a series of conflicts, but instead of obscuring such conflicts, it provides a framework for their exploration, and trade-offs can be made explicit.
17. The economic approach is just one element of the priority-setting process and cannot be used in isolation from the many other factors that influence decisionmakers and which will no doubt remain difficult to incorporate into economists' models. Optimal solutions to the priority-setting process will be very dependent on local circumstances and constraints.
18. This discussion paper nevertheless argues that, in principle at least, the traditional economic approach can be expanded to incorporate both equity concerns and a wealth of practical constraints that will influence decisions. Making these principles operational offers a rich and challenging agenda for researchers and policymakers.



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## INTRODUCTION

Most countries face high demands on their health care systems and a limited budget to meet these demands. Politicians want to get the highest value from a limited budget. Priority setting is a more or less systematic approach to distributing the available resources among demands to fashion the best health care system possible, given the constraints. In practice, priority setting in health care often takes place implicitly but recognition is growing that this is unacceptable and that open and clear debate is needed (House of Commons Health Committee 2002).

There is no universal best method of priority setting that works in all circumstances and all countries. The application of simple “rules” is not sufficient as it fails to take into account the wide range of factors and constraints that may influence the priority-setting process. In addition, different societies will have different ideas about what is “optimal.” Optimization requires setting of objectives, which may vary between countries and regions. However, two key objectives have received worldwide attention: maximization of health and reduction of inequalities in health. The first objective seeks to achieve the highest health status for the overall population health with a given level of resources. The second objective demands that differences in health status between individuals or distinct groups of the society should be minimized.

The traditional economic approach to priority setting can incorporate each of these major objectives by assuming that a benevolent decisionmaker wants to maximize efficiency or equity (or both) subject to budget constraints. The basic priority-setting problem can be formulated as a linear programming problem. The principal goal is to maximize benefits from health care interventions subject to the available budget for health care:

$$\begin{aligned} \text{Maximize : } & \sum_i \lambda_i B_i \\ \text{subject to : } & \sum_i \lambda_i X_i \leq \bar{X} \end{aligned}$$

where  $B_i$  are the annual benefits arising from program,  $i$ ,  $X_i$  are the associated costs,  $\lambda_i$  indicates the proportion of program  $i$  adopted, and  $\bar{X}$  the total budget available. Equity considerations can be incorporated by attaching weights to the benefits realized by different individuals or groups of individuals. The familiar approach of ranking programs according to their (equity-weighted) cost-effectiveness ratios is a logical consequence of this approach to priority setting.

However, the apparent simplicity of this approach masks some serious problems that arise when attempts are made to operationalize it. Some of these problems relate to weaknesses within the cost-effectiveness approach itself, in particular, the serious methodological issues that are yet to be resolved sufficiently to allow the simple application of rankings and league tables. The incorporation of equity considerations into this approach is also far from straightforward once an attempt is made to move from academic and theoretical debate to practical application of the concepts of equity. A third set of problems arises after consideration of the political, institutional, and environmental context in which the implementation of priority setting takes



place. In reality, decisionmakers pay attention to a wide variety of objectives and are faced with an array of practical constraints, all of which make the application of unadulterated cost-effectiveness rules less straightforward.

In this discussion paper we review the literature on priority-setting concepts from an economic perspective. However, by adopting a critical approach, we are able to highlight the problems raised above and discuss how useful a tool the economic approach is for priority setting, both theory and in practice. We discuss the basis of economic evaluation and its value in priority setting in section 2. In section 3 we consider concepts of equity and their incorporation into the priority-setting process. Finally, in section 4, we consider in more detail the context in which decisionmaking takes place and the influence this will have on the priority-setting process in practice.

Throughout we focus on priority setting from the point of view of a national policymaker. Decisionmakers at higher levels (such as donor agencies) and lower levels (local governments, even individual clinicians) may profoundly influence resource allocation, and these issues are alluded to in relevant sections of this paper. However, our central concern is with the national policy problem.

Our conclusions (section 5) are as follows. First, we note that despite the apparent simplicity of the cost-effectiveness approach to priority setting, a plethora of methodological and practical problems arise, limiting its usefulness to the policymaker hoping to choose efficiency-maximizing health care programs. We document the current technical issues arising in the literature and steps that have been taken to resolve them. Two of the main limitations to the use of cost-effectiveness ratios in the priority-setting process are the lack of standardization of study methodology and the difficulties associated with generalizing results to settings other than those used in specific economic evaluations. We also outline the obstacles to the practical application of cost-effectiveness results and conclude that policymakers often cannot use such results due to their lack of transparency, their inability to take into account other important contextual factors, and their irrelevance to their own situation. Indeed, Gafni and Birch (1993) argue that cost-effectiveness ratios provide information relevant to allocation decisions only in very special circumstances that do not usually apply in practice. Although we note that the recent development of guidelines for conducting economic evaluation studies is likely to enhance the usefulness of cost-effectiveness approaches, we also debate whether a simplified and more transparent approach to economic evaluation might do more than further refinements in the methodology to help the decisionmaker make use of these potentially valuable and powerful tools.

Second, our review of the different notions of equity addressed in the literature concludes that most contributions are theoretical and remote from the practical issues involved in ensuring a “fair” allocation of resources and that a great deal of ambiguity remains about what is meant by “fair” in this context. However, most equity considerations fall into two broad headings: equity related to a concept of need and equity related to access to services and, in principle, equity concerns can be incorporated into an economic approach to priority setting with relative ease. Health gains arising from different programs can be weighted differently according to who receives them, and the policymaker is free to decide how to skew resources to meet the needs of

different population groups. However, the practical application of equity weighting requires us to operationalize concepts such as “need,” which proves more difficult. Finally, a number of issues are rarely addressed by the literature, for example, eliciting public preferences regarding equity and the issue of diverging equity concepts at different decision levels (e.g., what perspective of equity arises at a doctor-patient level).

Third, we conclude that some of the most important factors to influence the priority-setting process arise from the decisionmaker’s specific operating context and practical constraints. We consider the political environment in which decisions are made and note that issues such as the need to retain political support in order to be reelected, the requirement to respond to the concerns of powerful interest groups, and the existence of supranational constraints such as donor conditions of funding will influence decisions. We also conclude that judgments will be influenced by the existence of costs associated with implementing decisions such as transition costs arising from policy changes and externalities not captured by traditional cost-effectiveness approaches. Finally, we argue that financing regimes and priority-setting decisions cannot be considered in isolation and their interaction has important implications for the revenues available for health care and access to services by different groups. These conclusions suggest that decisionmakers are unlikely to be concerned merely with the economic imperative of maximizing equity-weighted health gain subject to a budget constraint but will also have to address these additional factors when deciding how resources should be allocated.

Priority setting in health care is undoubtedly a complex task. Our review illustrates the many theoretical, political and practical obstacles facing the decisionmaker. As a consequence, concluding that the task is insurmountable, rather than merely difficult, would perhaps be easy. However, we believe this would be unduly pessimistic. On the contrary, we show that adopting an economic approach to priority setting has many advantages, not least that it forces the decisionmaker to define explicitly the objectives of the priority-setting process, even if these cannot be easily measured. It also allows us to model explicitly the many conflicts that arise when priority setting is undertaken, allowing the nature of trade-offs to be made explicit. We also show that, in principle at least, the traditional economic approach can be expanded to incorporate both equity concerns and a wealth of practical constraints that influence decisions. Operationalizing these factors is a much harder task, and economic analysis is unlikely to capture all of them neatly. This suggests that an economic approach should be just one element of the priority-setting process and cannot be used in isolation from the many other factors that influence decisionmakers.

## ECONOMIC EVALUATION—A CRITICAL REVIEW

Economic evaluation of health care programs has become an important area of applied economics over the last 30 years. The objective of economic evaluation is to compare vaccinations, surgical procedures, technical equipment, but also complete treatment regimes for certain illnesses such as tuberculosis or malaria. Economic evaluation can assess whether one particular intervention is worth undertaking compared to another intervention (or compared to doing nothing). Economic evaluation analyzes whether the additional benefits of an intervention are greater than the additional costs. In principle, economic evaluation can compare the relative worthiness of interventions even if they are quite different. By providing estimates of outcomes and costs that are comparable across programs, economic evaluation can show the trade-offs involved in choosing among interventions. If health maximization is the sole objective of a priority-setting approach, the interventions that generate the highest outcomes for a given cost should be chosen. Used in this way, economic evaluation can become a powerful tool to inform complex priority-setting decisions. The basic priority-setting problem can be formulated as a linear program in which the principal goal is to maximize benefits from health care interventions subject to the available budget for health care:

$$\begin{aligned} \text{Maximize : } & \sum_i \lambda_i B_i \\ \text{subject to : } & \sum_i \lambda_i X_i \leq \bar{X} \end{aligned}$$

where  $B_i$  represents the annual benefits arising from program  $i$ ,  $X_i$  represents the associated costs,  $\lambda_i$  indicates the proportion of program  $i$  adopted, and  $X$  is the total budget available.

Most analysts agree, however, that economic evaluation can inform priority-setting decisions only if a set of stringent criteria is met.

This section provides a review of the literature on economic evaluation, focusing on the issues relevant to its use in priority setting. We focus on the use of economic evaluation for priority setting between policy options in the field of health care such as medical interventions, drug treatments, public health programs, and the like. We review the normative foundations of economic evaluation and also discuss efforts to incorporate the objective of reducing inequalities in health. The basic methods of the two types of economic evaluation are introduced, cost-benefit analysis and cost-effectiveness analysis. Then, we discuss the methodological and practical problems that may limit the scope for using economic evaluation to set priorities and consider additional limitations that arise when attempts are made to implement priority setting in practice. These areas overlap to some degree, but we attempt to distinguish between disparities that are technical in nature, and those that relate to the practical use of economic evaluation in the context of priority setting. We conclude with a discussion of whether economic evaluation can be used as a guide to priority setting.

### NORMATIVE FOUNDATIONS OF ECONOMIC EVALUATION

Economic evaluation approaches can have either the classical welfare economic or the extra-welfarist economic framework as a normative basis. Though related, the two frameworks have

important distinguishing characteristics that result in different approaches to economic evaluation (for a recent discussion see Tsuchiya and Williams 2001).

### **Classical Welfare Economics**

Classical welfare economics is a framework of assumptions and normative propositions underlying economic policy analysis since 19<sup>th</sup> century (Marshall 1961(1890); Mill 1994 (1848)). Classical welfarism states that the “goodness” of any situation (e.g., of a priority-setting decision) should be judged solely on the basis of the welfare level attained by the group of individuals affected by the situation. Group welfare is defined in terms of the sum total of utility levels attained by all individuals within the group. The situation that maximizes the sum total of utilities is judged to be the optimal one. The optimality criterion requires that utility is cardinally measurable so that the absolute utility levels attained by individuals can be compared. Historically, these properties were regarded as untenable, and the criterion of maximizing the sum of utilities was replaced by the criterion of Pareto optimality. A resource allocation is Pareto optimal if one person’s utility cannot be increased without simultaneously decreasing another’s. Welfare economists state that a Pareto optimal allocation is technically and allocatively efficient. Technical efficiency is achieved when allocation is organized to minimize the inputs required to produce a given output; and allocative efficiency is achieved when allocation is organized in a way that the prices of each good produced are proportional to the utilities consumers derive from them.

The Pareto criterion does not lead to a single best allocation, however, and can therefore provide little guidance on the optimality of priority-setting decisions. To overcome this limitation, Kaldor (1939) and Hicks (1939, 1941) developed the criterion of a potential Pareto improvement. A policy generates a potential Pareto improvement if its benefits are large enough that gainers can—hypothetically—compensate losers. The losers are—again hypothetically—no worse off than before, and the gainers are better off if they retain a net benefit after the compensation.

### **Extra-welfarism**

Extra-welfarism was developed to adapt the classical welfare economic framework to the particular characteristics of priority setting for health. There are different interpretations of extra-welfarism, but all center on the importance of health, and not utility, as the crucial outcome of health policy. Therefore, health outcome should be the most relevant characteristic in evaluating alternative policies in the health sector (Culyer 1989, 1990; Sen 1985). Most extrawelfarists argue that not individual demand, but “need for health care” should be the prevailing allocation mechanism in the health sector. Therefore, priority setting based on the extrawelfarist concept requires clear definitions of the outcome “health” and the allocation mechanism “need.” Various definitions of these concepts have been suggested, and we will discuss some of them in other sections. However, as the market process of classical economic theory does not operate according to the principle of “need,” extra-welfarism often requires a decisionmaker approach to priority setting (Sugden and Williams 1978; Williams 1993). The decisionmaker specifies the objective (health), and the researchers’ role is to identify the most efficient way of achieving the decisionmaker’s objective (Hurley 2000). For the extra-welfarists, the leading priority-setting criterion is to maximize health. It implies that health care resources should be directed toward the programs and individuals for which health gains are highest.

The principle of health maximization has been widely criticized for focusing solely on efficiency considerations, and most extra-welfarists agree that priority setting should also incorporate equity objectives. Also, classical welfarists criticize the choice of health as an outcome measure, because extra-welfarism does not take account of the value of goods in terms of happiness or utility. Different people might derive different utility from the same unit of health, and therefore, a policy that maximizes health might not maximize utility and social welfare.

Extra-welfarism and health maximization—with some adaptations—remain the basic normative foundations for economic evaluation of health care programs.

### Equity Considerations

Classical welfare economics and extra-welfarism have been taken as justifications for separating concerns about efficiency from concerns about the distribution of wealth and health (Reinhardt 1998). Classical welfare economists have stated that (1) the allocation of resources generated by a functioning market process is Pareto optimal, meaning technically and allocatively efficient, and that (2) many different Pareto optimal allocations can be achieved through a market process. Which of the optimal allocations is achieved depends on the initial distribution of wealth among individuals. Therefore, it has been argued, economists could feel free to analyze only questions of efficiency, leaving the question of the just distribution of resources to the political process (Arrow 1963).

However, Arrow himself remarks that in practice any redistributive policy will have adverse effects on the achievement of a Pareto optimal state. The process of redistribution generates costs of various kinds that cannot be ignored if society has an interest in alleviating negative distributional effects of optimal allocations. This implies that there is a trade-off between equity and efficiency, and concerns about efficiency cannot be separated from redistributive concerns. Broome (1988) argues that there is a trade-off between maximizing the sum of individual health states and fairness in the distribution, and that this trade-off should be clearly highlighted. Olsen (1997a) remarks that health maximization is concerned only with incremental improvements in health. Initial differences in health status or other characteristics of people are not considered. With simple health maximization, one unit of health is treated as of equal value no matter who gets it.

Distributional concerns can be addressed by assigning different weights to health outcomes received by different individuals or groups, so that the results of economic evaluation studies favor the groups with higher weights. In terms of the simple model outlined above, the benefits,  $B_i$ , would be weighted to reflect which groups received the benefits of the program in question (explored below in detail). Ideally, equity weights should be derived from a justifiable normative foundation. Incorporating equity weights into economic evaluation implies that health maximization is traded off against equity explicitly, and an equity-weighted outcome measure is maximized. Overall health is *not* maximized if the groups preferred on equity grounds are not also those who experience the highest benefits from an intervention.

## COST-BENEFIT ANALYSIS

Cost-benefit analysis (CBA) derives from the classical welfare economics framework. The objective is to determine an efficient allocation of resources for the production of goods that are not traded on a market. Central to CBA is the importance of individual utility in valuing resource allocations. The benefit of a policy intervention is the sum of individual utilities, and the costs of a policy intervention are its opportunity costs. CBA measures both benefits and costs in monetary units. Priority-setting decisions can be based on a ranking of alternative policy interventions according to their net benefits (benefits minus costs). The intervention with the highest net benefit is first choice, but interventions with lower rankings can be carried out until resources are exhausted.

However, the practical relevance of CBA is limited by the difficulties of correctly valuing all relevant benefits in monetary terms. Most discussion centers on the questions of which benefits to include and how to measure them (Hurley 2000). Different inclusion or exclusion criteria for certain benefit and cost elements in economic evaluation studies can dramatically affect the net benefit and the ranking of interventions. Sound priority-setting decisions can be made only if economic evaluation studies document which benefits and costs are included. The main methodological issues related to benefits and costs are summarized below.

### Benefits

#### *Identifying Benefits*

The most obvious benefit of a medical intervention is the improved health of individuals. However, an intervention may also generate wider societal benefits such as benefits to third parties such as relatives (e.g., reduction in time spent caring for the patient), the wider community (e.g., reduction in infection risk), or the economy in general (e.g., effects on the labor market). Some studies also include indirect morbidity benefits<sup>1</sup>. Patients whose treatments result in their ability to work productively generate an economic benefit to society. From a broader societal perspective, these economic gains may be included, but this practice is controversial for economic and ethical reasons.<sup>2</sup>

#### *Measuring Benefits*

Once the relevant benefits are identified, they have to be measured in monetary terms. In the 1950s and 1960s benefits were assessed using the human capital approach (see, e.g., Weisbrod 1961). The benefit of an intervention was assumed to be the present value of an individual's future earnings. The human capital approach discriminates against those who receive lower wages and those not in the workforce, such as the elderly, persons occupied with family care, housework, and children. Critics have argued that linking the value of additional life years to economic productivity only is not legitimate. Moreover, the approach was criticized for disregarding the fundamental underpinnings of welfare economics: the importance of individual utility in the assessment of benefits.

<sup>1</sup> For a framework of which indirect benefits to include in CBA, see Olsen and Richardson (1999).

<sup>2</sup> See the discussion in Gold et al. (1996b); Brouwer, Koopmanschap, and Rutten (1997); and Weinstein et al. (1997).

Schelling (1968) proposed measuring the amount an individual is willing to pay (WTP) for a reduction in the probability of death.<sup>3</sup> This approach acknowledges the probabilistic nature of health outcomes and the importance of individual utility (measured in willingness to pay). However, it creates the problem of measuring WTP for health. There are attempts to use estimates of individuals' willingness to avoid risks (e.g., wage differentials between occupations with different risks of injury) or to increase personal safety (e.g., demand for car air bags or antilock brakes) for the valuation of health (Jones-Lee 1989). However, estimates of the implied values of human life vary greatly between studies, which might reflect underlying conceptual flaws in this approach.

Nowadays, the dominant approach to measure WTP is the contingent valuation method (Arrow et al. 1993; O'Brien and Gafni 1996). The method tries to extract directly people's valuation of nonmarketed goods by eliciting the maximum willingness to pay for a given increase in the provision of a good. The contingent valuation method also suffers from various methodological problems; for instance, WTP values are strongly influenced by the questionnaire design, and measurement biases can lead to exaggerated WTP values (Olsen 1997b).

## **Costs**

The cost side of CBA is less fiercely debated than the benefits side, although some practical measurement issues exist. Costs include the direct medical costs of carrying out the interventions (e.g., costs for staff, technical equipment, drugs), but also costs for resources that are not traded on the market and thus are not included in the direct costs.<sup>4</sup> Examples for such nonmedical costs are travel and time costs for patients in the form of transportation costs to the health care provider and lost income or costs for child care due to the time it takes to wait for and receive treatment. Some studies include the costs—both medical and nonmedical—that patients would be expected to incur in the years their lives are extended by an intervention (Meltzer 1997). The inclusion of costs in added years of life adds a "surcharge" to the costs of an intervention. It decreases the relative worthiness of interventions that extend life over interventions that mainly improve quality of life rather than extend life.

## **Discounting Costs and Benefits**

Most economists agree that future costs should be discounted so that an amount paid in future is assigned a lower value than the same amount paid in the present. The question of whether benefits should be discounted at the same rate as costs in economic evaluation studies has been widely debated by health economists. Some argue that benefits and costs should be discounted at the same rate, because costs can be interpreted as forgone benefits and should therefore be treated in the same way as expected benefits. Others argue that a year of life is a year of life, whether it occurs today or in future, and therefore benefits should not be discounted, or should be discounted at a lower rate than costs (Gravelle and Smith 2001; Van Hout 1998).

<sup>3</sup> For an overview, see for example Johannesson (1996).

<sup>4</sup> Sculpher M.J. (2001) gives an overview of the role and estimation of indirect costs.



Drummond et al. (1993) found that discount rates are quite consistent across different economic evaluation studies, but they stress that the effect of discounting on net benefit can be considerable, in particular for interventions with benefits and costs occurring far in the future. In theory, the discount rate should reflect societies' rate of time preference. In practice, however, there does not seem to be a consensus about the "correct" rate to use for discounting either costs or benefits, and the choice of discount rate may often be a political rather than an economic decision.

### **COST-EFFECTIVENESS ANALYSIS**

In light of the practical difficulties encountered in CBA, especially the monetary valuation of benefits, cost-effectiveness analysis (CEA) promises a more pragmatic approach to program evaluation. CEA does not use monetary measures of benefits, and therefore avoids many of the problems related to the measurement of willingness to pay. The central measure used in CEA is the incremental cost-effectiveness ratio (C/E ratio) (Gold et al. 1996b). It provides a comparison between alternative interventions. The intervention under study can be compared, for example, to the option of "doing nothing," to "minimum care," to "usual care," or the highest valued alternative intervention. The C/E ratio is the difference in costs between the two interventions divided by the difference in their effects, and can be interpreted as the incremental price of a unit health effect from the intervention under study, compared to the other. Interventions that have a relatively low C/E ratio are "good buys" and would have a high chance of being chosen over the alternative intervention. Which value is low enough for the intervention to be chosen is a subjective decision, depending ultimately on the value society places on a unit of health effect.

The choice of the comparison program in calculating an incremental C/E ratio can be crucial. As Weinstein (1996) points out, any option can be made to look cost-effective if it is compared to a sufficiently cost-ineffective alternative. The problem in comparing different studies is that the comparison program may not be the same in each case. If comparisons are nonstandardized and researchers fail to justify or even explain the choice of comparator(s), interpretations across programs are fraught with difficulty (Drummond, Torrance, and Mason 1993).

In contrast to CBA, CEA does not consider societal benefits because the effects of interventions are valued in terms of health only. Therefore, some authors argue that societal costs should be excluded in CEA as well (Gerard and Mooney 1993). Others argue that some of the benefits can be included on the cost side (as forgone benefits), but care should be taken to ascertain their inclusion (Weinstein 1996). As in CBA, inconsistency in the inclusion or exclusion criteria of both costs and benefits is a further source of problems when comparing the effectiveness of different programs in order to set priorities. However, the main area of debate in CEA concerns the way in which health outcomes are measured and valued.

### **Measuring Health Outcomes**

There are two broad types of CEA depending on how health effects are measured: one assesses health effects in natural units ("cataracts removed", "life years gained"), and the other assesses health effects with a summary measure encompassing mortality and morbidity aspects (e.g., quality- or disability-adjusted life-years, healthy-years equivalents). Summary health measures were developed to compare interventions whose effects on health are qualitatively different. quality-adjusted life-years (QALYs) is the most prominent summary measure (Rosser and Kind



1978; Weinstein and Stason 1977). CEA that uses summary health measures is sometimes referred to as “cost-utility analysis,” because some analysts argue that the measures can be interpreted as measures of utility (Drummond et al. 1997). For simplicity, we use only the term “cost-effectiveness analysis’ in this discussion paper.

Different approaches to the estimation of health outcomes are known to generate different values for the effects of programs. This has the potential to reduce greatly the comparability of studies, which in turn reduces the value of using relative CE ratios to make priority-setting decisions. We discuss below the impact of the choice of measures for health outcomes on the priority-setting process.

### *Natural Units*

The use of natural units usually limits the focus of CEA to questions of technical efficiency—how to achieve a specified objective (e.g., cataracts removed) with least resource use. Thus, CEA in natural units can compare programs only if they have the same objective, or if the programs achieve several objectives to the same extent (Drummond et al. 1997). CEA in natural units cannot address questions of allocative efficiency, because it offers no information on the desirability of one objective over another. Despite this limitation, CEA in natural units may have an important role for certain decisions. Society may value some objectives so highly on ethical grounds that no policymaker would trade them off against another objective. For example, a society might wish to guarantee a politically determined minimum level of care for dependent elderly or children. CEA in natural units can help decisionmakers choose the most efficient policy to achieve this objective.

### *Quality-Adjusted Life Years*

In contrast to measurement in natural units, summary health measures such as QALYs are sufficiently general to provide decisionmakers with information on how to set priorities between different programs. The QALY measure assigns to each period of time a weight, ranging from 0 to 1, corresponding to the health-related quality of life during that period. A weight of 1 corresponds to perfect health and a weight of 0 corresponds to a health state judged equivalent to death. The number of QALYs represents the number of healthy years of life that are valued equivalently to the actual health outcome. Because a QALY is a general health measure that captures changes in both the quality of life (morbidity), as well as length of life (mortality), it can serve as the outcome measure for a wide range of health interventions. This allows direct comparison across a variety of interventions.

To operationalize the QALY concept, quality weights are needed to represent the health-related quality of life of the health states under consideration. QALYs take many different forms, depending on the methods used to estimate the weights.<sup>5</sup> Health economists seem to agree that the weights should be based on individual preferences for the health states (Drummond et al. 1997). There is more debate on whose preferences (e.g., patients, policymakers, general public) should be considered, although the majority opinion seems to consider the general public’s preferences as the most valid. Preference-based weights are derived under uncertainty from

<sup>5</sup> For an overview, see Gold et al. (1996a) or Dolan (2000).

hypothetical trade-offs between health states and are measured on an interval scale. Summary measures with preference-based weights are utility-based QALYs, and there is some discussion between welfarists and extra-welfarists about whether they can be interpreted as utility scores (welfarist position) or measures of subjective health (extra-welfarist position).<sup>6</sup>

QALYs are widely used and generally highly regarded, but they are nevertheless not without controversy. The critics range from those who argue that the QALY approach is needlessly complex and should be replaced by simpler disaggregated measures; to those who claim the QALY approach is overly simplistic and should be replaced by more complex methods.<sup>7</sup>

### *Disability-Adjusted Life Years*

Disability-adjusted life years (DALYs) are the sum of the present value of future years of lifetime lost through premature mortality and the present value of years of future lifetime, adjusted for the average severity of any mental or physical disability caused by disease or injury. They are therefore a measure of health lost and not of health gained. They were first introduced in the World Development Report (World Bank 1993) and subsequently advanced by Murray and Lopez (1996). The practical application of DALYs and the underlying methodological concepts have often been criticized.<sup>8</sup> First, cost-effectiveness studies that used DALYs have calculated them in markedly different ways. For example, not only have analysts presented DALYs with different assumptions and different sources of disability weights, but also at times DALYs have been miscalculated by using the wrong life expectancies. Moreover, how researchers have calculated DALYs is often not clear from papers or evaluation reports. Also, few evaluators subject their cost/DALY estimates to any form of sensitivity analysis. This makes it difficult to assess the robustness of DALY estimates and to transfer results between settings with any reliability. The DALY measure is often used in burden of disease studies which—as some claim—can be used in the priority-setting process.

### *Healthy-Years Equivalents*

Healthy-years equivalents (HYES) have been proposed as a theoretically superior alternative to QALYs, but one that is more challenging to execute (Mehrez and Gafni 1989). The main innovation of the HYE approach is to value lifetime health paths instead of individual health states. At least in theory, it can capture more accurately the true preferences of individuals. There is extensive discussion on the HYE approach. Drummond et al. (1997) provide an overview of the key points in the literature.

### *Summary Health Measures under Critique*

Some authors argue that restricting the outcome of interventions to health gains is too narrow and criticize the use of summary health measures such as QALYs and DALYs (Gerard and Mooney 1993). Some evidence suggests that QALYs fail to take account of important benefits such as the value of information for its own sake in the case of screening (e.g., Berwick and

<sup>6</sup> For a discussion, see Hurley (2000).

<sup>7</sup> For an overview, see Drummond et al. (1997).

<sup>8</sup> For an overview, see Fox-Rushby and Hanson (2001).

Weinstein 1985), or the benefit or disbenefit from receiving care per se. Also, CEA rarely picks up externalities such as the benefits of vaccination for the whole population, whereas CBA usually does. At the heart of this criticism is discomfort with the extra-welfarist notion that health care interventions should be assessed on basis of the health outcomes and not the utility they generate. Summary health measures have also been criticized for embodying the underlying principle of health maximization, which means that one QALY is treated as of equal value no matter who gets it. This problem can be overcome by assigning equity concept-based weights to individual QALY outcomes. Despite these concerns, QALYs are the prevailing outcome measure in economic evaluation, and the following discussion assumes that health effects are measured in QALYs.

### **Does CEA Get Around Placing a Price on Life?**

In contrast to cost-benefit analysis, cost-effectiveness analysis does not require the analyst to place a monetary value on health outcomes. But can policymakers who use the results of CEA avoid this decision? Phelps and Mushlin (1991) argue that CBA and CEA are nearly equivalent because each requires monetary valuation of health outcomes. The former does it as part of the analysis while the latter does it at the end of the analysis when it must be decided if a particular cost-per-unit-of-health-gained is acceptable. However, as Hurley (2000) points out, this superficial similarity masks deeply different philosophical bases. The individualistic foundation of CBA calls for eliciting the amount each individual is willing to pay for a health gain. In contrast, to decide on whether a program should be adopted CEA relies on a social judgment about the community's willingness to pay for a given health outcome. Extra-welfarists argue that such judgments should be made at the societal rather than the individual level.

Stinnett and Mullahy (1998) propose placing an explicit monetary value on a QALY by evaluating programs on the basis of their net health benefits. A program's net health benefit is the difference between the health benefit achieved by a program and the amount of health gain that would be considered necessary to justify the program's costs. If resources are invested in one program instead of another program with a higher net health benefit (NHB), an opportunity for greater net gains in health is lost. The difference between the two programs' NHBs is the cost of choosing the "wrong" program. Stinnett and Mullahy argue that in comparison to cost-effectiveness ratios, NHBs present the opportunity costs of poor health investments more explicitly.

### **BARRIERS TO IMPLEMENTING THE FINDINGS OF ECONOMIC EVALUATION STUDIES IN THE PRIORITY-SETTING PROCESS**

The textbook exposition of economic evaluation explains that once cost-effectiveness ratios of different programs are computed and placed in rank order—a league-table—a decisionmaker can select the intervention with the lowest cost per QALY and continue down the list selecting interventions until the available funds are exhausted. The resulting set of health care programs is optimal in the sense that it produces the largest possible number of QALYs for a given expenditure. CEA shows the trade-offs involved in choosing among programs, and therefore helps illuminate the opportunity cost of each choice: the health benefits lost because the next-best alternative was not selected. However, this textbook scenario has little to do with real life.

CEAs are conducted and funded by government agencies, industry, insurers, consulting firms, and universities. Considerable amounts of resources are poured into economic evaluation studies, and the number of CEAs of health and medical interventions has grown steadily in recent years. The Health Economic Evaluations Database, a joint initiative between the Office of Health Economics (OHE) and the International Federation of Pharmaceutical Manufacturers' Associations, contains some 23,500 references as of March 2002 (<http://www.ohe-heed.com/>). The National Health Service (NHS) Economic Evaluation Database, funded by the Department of Health in the United Kingdom and managed by the Centre for Review and Dissemination at the University of York, loads around 70 studies a month (<http://www.york.ac.uk/inst/crd/nhsdhp.htm>).

However, it has been found that decisionmakers do not widely use the results of economic evaluation research.<sup>9</sup> Efforts to take the results of economic evaluation into consideration have been made, but the experiences are not encouraging. Next we discuss barriers to implementing the findings of economic evaluation studies. These barriers may be due to methodological problems in the study design, or more practical problems in the application, or both. Then, we will introduce some examples where economic evaluation has been used to inform priority-setting decisions and discuss the problems encountered.

### **Methodological Barriers**

Methodological barriers that affect the applicability and reliability of studies as perceived by decisionmakers is an important obstacle to the use of economic evaluation in priority setting.<sup>10</sup> In the following sections, we discuss the main barriers and draw out their importance in relation to the priority-setting process.

#### *Perspective of the Analysis*

The study sponsor (e.g., the government agency of a certain country, a pharmaceutical company) is wants a study applicable to his context and setting, and this influences the perspective of the study. Economic evaluations can be carried out from a number of different perspectives. The broadest is the societal perspective, which incorporates all costs and all health effects regardless of who incurs the costs and who obtains the effects. National borders often delimit the societal perspective. It should not be confused with the governmental perspective, which may exclude some societal costs (Torrance, Siegel, and Luce 1996). Other perspectives that can be used in CBA and CEA include those of the health care institution (hospital or clinic), the third-party payer, and the patient and family. The perspective of the analysis can greatly affect the total benefits and costs and the net benefit or cost-effectiveness ratio of a program.

Torrance et al. (1996) emphasize that the appropriate perspective depends upon the objective of the study. For studies addressing the broad allocation of resources, they recommend using the societal perspective. The societal perspective includes all health care costs, social services costs,

<sup>9</sup> See for example Drummond, Cooke, and Walley (1997); Hoffmann and Graf von der Schulenburg (2000).

<sup>10</sup> See, for example, Sloan, Whetten-Goldstein, and Wilson (1997; Drummond, Cooke, and Walley (1997; Hoffmann and Graf von der Schulenburg (2000); Anell and Svarvar (2000); Grizzle et al. (2000); Hoffmann et al. (2002).

and spillover costs on other social sectors such as education, and costs that fall on the patient and family. This perspective assures the inclusion of all resource costs in the analysis, even when shifted among hospitals, insurers, patients, and other parties—as often happens in health care. The results of economic evaluations that take a narrow perspective are likely to be far less useful in the priority-setting process, even if the narrow view is more relevant to the study’s funders.

### *Generalizability*

Health care decisionmakers, especially in low-income countries with limited resources for carrying out economic evaluation, may wish to reinterpret in their own setting the results of economic evaluations done elsewhere to guide priority setting (Drummond et al. 1992). However, the results of studies and the economic data on which they are based may not be transferable from one setting to another.<sup>11</sup> Interventions that are cost-effective in one setting may not be in another, and vice versa. For example, the cost-effectiveness ratios for routine mammography screening to detect breast cancer for United States and the Netherlands have been estimated as \$34,600/life year gained versus \$7,250/life year gained (Brown and Fintor 1993). Drummond et al. (1997), Phelps (1997) and Phillips (1993) discuss factors likely to affect cost-effectiveness estimates of programs in different countries. These are considered further below.

### *Epidemiology of Disease and Basic Demography*

Incidence of disease is likely to differ between countries, especially between high- and low-income countries. In some cases this will affect the cost-effectiveness of health care programs, particularly those delivered on a population basis. For example, immunization programs are likely to be more cost-effective in populations where the incidence of the disease in question is high. As the immunization will prevent outbreak of the disease in more patients, benefits of the program are likely to be higher. The incidence of diseases is affected by living conditions such as access to clean water, working conditions, socioeconomic factors, and demographic factors such as age.

### *Health Care Infrastructure*

Countries differ in respect of the range of *available* treatments and health care facilities. This may be due to differences in the overall level of health care funding or to differences *in the way* these funds are allocated among competing uses, *or both*. For example, there may be differences in the availability of certain technologies. If a clinician does not have access to a certain diagnostic procedure, he or she might use a less drastic treatment such as a drug therapy to see if symptoms improve. If a definite diagnosis is possible, the clinician might *use* a more effective and more risky treatment such as an operation. *Differences in* health care infrastructure between countries *are* likely to affect the relative cost-effectiveness of therapies.

<sup>11</sup> We only deal with generalisability from place to place. Generalising studies from clinical trials to regular practice or over time are also important issues which we do not address here.

### *Incentives to Health Care Professionals and Institutions*

In some health care systems the level of remuneration of health care professionals and institutions is largely independent of the level of services delivered; while in other systems professionals are paid a set fee per item of service, and hospitals are reimbursed according to the number of cases treated. It has often been suggested that the remuneration system influences the number and range of services provided by physicians and hospitals. This leads to variations in clinical practice between countries with different remuneration systems, and influences the cost-effectiveness of therapies.

### *Relative Prices or Costs*

Differences in relative prices of health care resources are likely to affect the relative cost-effectiveness of treatments. If relative prices of the main drugs for treating a given condition differ between countries, so, too, will their relative cost-effectiveness. However, the relative cost-effectiveness will also be affected by relative prices of other health care resources. For example, a drug with greater efficacy, fewer side effects, or more convenient route of administration will appear better value for money in a country where the costs of investigations, hospitalizations, surgery, and physician visits are higher, since consumption of these items is likely to be reduced. In low-income countries, costs for these health services are usually lower, because labor costs and technology intensity are lower. Therefore, the drug with greater efficacy could appear worse value for money in a low-income country than in a country where health service costs are higher.

Wilke et al. (1998), Schulman et al. (1998) and Drummond & Pang (2000) discuss ways of adapting results of economic evaluation studies from one setting to another.

### *Target Populations*

The *target population* is the population for whom an intervention is intended. Depending on the intervention and the study sponsor's interests, the target population may be individuals of a given age and gender, residents of a particular region, the sick with a specific disease or risk profile, or groups defined by a combination of these characteristics. The target population can have a dramatic effect on the cost-effectiveness of an intervention (Torrance, Siegel, and Luce 1996). Target populations can be divided into effectiveness, cost, and preference subgroups. A program is more or less effective for different subgroups. For example, screening elderly women discloses more breast cancer cases than does screening younger women. The incidence of breast cancer increases with age, and test performance improves due to age-related changes in breast tissue. Therefore, the cost-effectiveness ratio could be lower for the elderly. For analysis, dividing the target population into age subgroups is recommended (Brown 1992b; Brown 1992a). Cost subgroups within a target population may also display different resource consumption or savings as a result of a program. Due to economies of scale, a vaccination program for urban children in a low-income country might cost less per person than the same program in a rural area with fewer inhabitants per square mile and fewer children in the program. The target population may also contain preference subgroups—groups that have significantly different preferences for the relevant health outcomes. Preference-based weights of alternative health outcomes in the QALY measure will differ between subgroups, resulting in differences in



the cost-effectiveness of programs. Reflecting preference variations in cost-effectiveness analysis would increase the overall benefit achieved from health care resources (Sculpher and Gafni 2001). Torrance et al. (1996) recommend identifying subgroups and undertaking subgroup analysis. If there are marked differences between subgroups, use of average values would invalidate the analysis. Where data limitations preclude subgroup analysis, simulation methods should be employed to infer the value of interventions in subgroups (Mandelblatt et al. 1996).

Unless care is taken to consider the nature of the target population used in economic evaluations, incorrect inferences can be drawn when the results are used to set priorities between programs which may have very different target populations.

### *Uncertainty about Costs and Outcomes*

An important area of CEA concerns the problem of how to incorporate the inherent uncertainties regarding parameters, relationships, and model structure into the estimated cost-effectiveness ratio, and then how to communicate the consequences of these uncertainties to the users of studies. Analysts since Mishan (1976) have recommended providing some assessment of how much confidence can be placed in the results to improve the reliability of the study as perceived by decisionmakers. Manning et al. (1996) distinguish among three sources of uncertainty, which may apply to aspects of the cost parameters or the effects parameters, or to both.

First, there is uncertainty about the true numerical values of the parameters used in the cost-effectiveness ratio. Parameter uncertainty may arise because the analyst has an estimate of key parameters, but there are differences in sampling variability (e.g., response to treatment), uncertainty or disagreement about key elements underlying the study (e.g., epidemiology of the disease, social discount rate), or uncertainties about the possible values of costs and outcomes in other populations than the one the study applies to. Traditionally, sensitivity analysis has been used to examine such uncertainties, but a variety of more sophisticated statistical techniques have been suggested in recent years (Briggs 2001).

A second source of uncertainty in CBA and CEA is model structure uncertainty, which refers to uncertainty about the correct method and mathematical form for combining the parameters of the model. For example, is the response to treatment linear in dose levels or do its effects decrease as dosage increases? No way of dealing with model structure uncertainty is completely satisfactory except conducting sensitivity analyses and acknowledging potential problems (Manning, Fryback, and Weinstein 1996).

Third, modeling process uncertainty is introduced by the combination of decisions made by an individual analyst. The results of an analysis are influenced by the analyst or team conducting it. Many subjective judgments and choices have to be made during an analysis, and different analysts can come up with exactly opposite assessments on the cost-effectiveness of certain treatments (Fleming et al. 1993 and Beck et al. 1994). One way of dealing with modeling process uncertainty is to conduct a meta-analysis that combines information from good-quality studies to provide probability values for estimating effectiveness.

Problems related to uncertainty suggest that economic evaluations can never provide the decisionmaker with a definitive answer to the priority-setting problem. However, even results surrounded by uncertainty can provide decisionmakers with valuable information if researchers communicate results in an accessible form (Hutubessy et al. 2001).

### *Timeliness and Accessibility of Findings*

Economic evaluations should be conducted early in the life cycle of medical technologies and repeated as new data become available. Such an approach avoids the difficulties encountered in changing behavior once interventions are in widespread use. Ross's (1995) findings on implementation barriers in Australia highlight the importance of timing. Decisions frequently had to be taken at short notice, when information was not available and when time was too short to commission a new study. Ross also found that studies might be misunderstood because the language used by academics is difficult to understand. This finding was confirmed by other studies (Burns et al. 2000; Duthie et al. 1999; Hoffmann and Graf von der Schulenburg 2000). The results suggest that researchers influence the use of their work by the way they communicate their ideas.

### *Portfolio of Programs*

Conventional cost-effectiveness studies consider each technology independently. Yet the costs and effectiveness of different programs may exhibit important interactions (O'Brien and Sculpher 2000). For example, the incremental cost of a program may be heavily dependent on whether an adequate network of health centers is already in place for other purposes. For any single intervention, the incremental costs associated with establishing a new network may be high, but there exist considerable economies of scope if a suitable portfolio of technologies is adopted.

This suggests that the setting of priorities may in some circumstances be a much more complex process than the case-by-case scrutiny of competing programs assumed in conventional cost-effectiveness analysis. It may require development of alternative configurations of fixed assets and scarce personnel, followed by an economic comparison of the optimal portfolio of programs secured under each configuration.

### **Practical Barriers**

The methodological issues reported above can severely hamper the use of economic evaluations in the priority-setting process. In addition, there are serious practical barriers. Several studies suggest that perhaps the most fundamental barrier to the use of economic evaluation studies are generated by misunderstanding between decisionmakers in the political and clinical environment and researchers (Anell and Svarvar 2000; Burns et al. 2000; Cox, Motheral, and Griffis 2000; Duthie et al. 1999; Ginsberg, Kravitz, and Sandberg 2000; Grizzle et al. 2000; Hoffmann and Graf von der Schulenburg 2000; Drummond and Weatherly 2000). Politicians, clinicians, and researchers work in very different environments with different incentive structures, organizational cultures and beliefs, and objectives and approaches to work. The groups' incentives are neither complementary nor constructed to promote cooperation.



In academia, the reward structure implies that researchers' careers depend upon publishing their findings in reputable journals. Much research is conducted over a long time horizon, and it often does not produce definitive answers to policy questions. In contrast, public policymakers advance in their careers by providing solutions to policy questions. Decisions must be made over a short period of time, and unequivocal answers to policy questions are preferred. Also, decisions have to be action-oriented and concerned with what is practicable. Clinicians' behavior is influenced by the reimbursement scheme that dictates the way in which they generate their income. Clinical decisions are influenced by a system of knowledge and beliefs, an aversion to risk, and a strong sense of clinical autonomy, which often rejects compliance with externally imposed guidelines.

### **How to Overcome Practical Barriers**

There is a range of strategies to enhance understanding between politicians, clinicians and researchers and improve implementation of the results of economic evaluation studies (Cox, Motheral, and Griffis 2000; Drummond, Cooke, and Walley 1997; Ginsberg, Kravitz, and Sandberg 2000; Hoffmann and Graf von der Schulenburg 2000; Hoffmann et al. 2002; Haan and Rutten 1987; Drummond and Weatherly 2000):

*Defining a clear policy question:* Buxton (1987) points out that over the 3 years of an economic evaluation study, the precise question being posed by the commissioner of the study, the Department of Health, changed several times. Whereas the issues surrounding a new intervention may change during the course of a study, clarity in the initial policy question is important.

*Defining a clear research question:* Some policy questions may be rather broad such as "Should this intervention be adopted?" By contrast, research questions often have to be more specific such as "From a societal perspective, what are the costs and benefits of adopting the intervention for a particular group of patients, compared with existing practice?" The answer to the research question does not necessarily answer the policy question. Making the research question specific without losing sight of policy relevance is the main skill required of the researcher.

*Making recommendations match the evidence:* In two interventions, study findings can favor one over the other but also rank them at a similar level. If there is a marked difference in the interventions, analysts should recommend the better intervention more strongly. If no strong case favors one intervention, the researcher might recommend adopting both interventions, conduct further research, or implement one of the interventions on basis of noneconomic considerations.

*Identifying the implementation mechanism:* The chances of implementation are likely to be enhanced if, at the outset, the implementation mechanism is identified. For example, countrywide programs such as immunization programs require a central government decision. The intervention itself is carried out by clinicians at the local community level. Implementation of the new immunization program might be facilitated by the introduction of a new clinical practice guideline or a change in the fee schedule.

*Paying attention to incentives and disincentives:* Achieving change is not usually a cost-free process, and the economic evaluation should identify all costs for all actors involved in adopting a new technology or abandoning an old one. A key actor is the doctor who is unlikely to change his or her practice if income is lost. Therefore, these problems must be foreseen and incentives adjusted accordingly by, for example, changing the fee schedule. Economic evaluation can help by identifying the costs and benefits falling on the different actors, including doctors, patients and their interest groups, hospitals, the government, and society at large.

*Clarifying the roles and responsibilities of the various parties:* The actions to be taken by each party involved in implementation should be specified. Failure to clarify roles and responsibilities may result in a decisionmaking vacuum and, occasionally, recrimination on all sides.

*Practical implications of adopting a new therapy:* Decisionmakers could be presented with information on the expected budgetary impact of adopting a new technology and the implications for the health of the relevant patient population.

The strategies outlined above may go some way toward helping the decisionmaker use the results of economic evaluations more effectively in the priority-setting process.

## **Practical Examples**

Several policy initiatives have tried to use the results of economic evaluations in practical priority-setting decisions. The initiatives established packages of health care interventions based on cost-effectiveness and clinical efficacy—alongside some refining criteria. We discuss briefly three well-known examples; the Oregon initiative in the United States and the public priority-setting exercises in New Zealand and the Netherlands (Blumstein 1997; Elsinga and Rutten 1997; Hadorn and Holmes 1997).

### *Oregon*

The state of Oregon has developed a unique approach to determining the benefits package for Medicaid eligibles (Blumstein 1997, Eddy 1991; Sloan and Conover 1996). Oregon's initially tried a formal and objective approach to set priorities by a league table of interventions. However, commission members and outside reviewers widely criticized this approach because the rankings were considered clinically counterintuitive (Hadorn 1991). The commission identified several problems in the initial approach, most of them highlighted in our review of the methodological problems:

- Social values relating to life-saving treatments might have been calculated incorrectly.
- Some conditions and treatments were defined too broadly.
- The duration of benefits was inaccurately estimated.
- Some cost data were incomplete or inaccurate.

The initial approach was replaced by a more subjective approach in which cost-effectiveness ratios were considered much less formally, if at all. The commission created 17 major categories of services (e.g., “preventive care for children,” “treatment of acute, life-threatening conditions

where treatment prevents death with a full recovery and return to previous health state”) and ranked these categories according to the value to society, value to an individual, and whether they are essential to health care. Then, all services were sorted into the 17 categories, and ranked by their C/E ratios. In a final step, the commission identified any remaining counterintuitive rankings and rearranged services “by hand” until the list seemed reasonable according to the commissioners’ own values.

### *The Netherlands*

In the Netherlands, growing political attention has been directed to the question of which medical services should be covered under the Dutch social health insurance companies, the sickness funds (Elsinga and Rutten 1997). A special advisory committee suggested four criteria for defining a basic benefit package:

- Is the care necessary to assure normal life for an individual in society?
- Is the care proven to be effective?
- Is the care efficient or cost-effective?
- Can the care be left to individual financing and responsibility?

The third criterion gave an incentive to use economic evaluation further, both for new and existing technologies in the benefit package. Decisions about the inclusion of new technologies are based on medical technology assessments, including economic evaluations. This procedure was followed for health transplantation, liver transplantation, breast cancer screening, and in vitro fertilization. However, as daily practice showed, once a technology was available, it was difficult to stop further use. Therefore, the sickness funds focused on elaborating criteria for using new technologies by defining indications and other guidelines for appropriate use. By the mid-1990s, 15 such studies had been undertaken, mainly in the fields of oncology, hematology, surgery, and gynecology.

### *New Zealand*

New Zealand conducted a priority-setting exercise to tackle the problem of long waiting lists for elective surgery—an example of priority setting at the individual patient level. Standardized priority assessment criteria were developed for a range of elective surgical procedures. The government wanted to move from a system of waiting lists toward one of specific booking times and make the priority-setting process more transparent and consistent across hospitals. Priority for surgery would generally be given to the patients most likely to benefit. Thus, the ethical framework for the project was largely influenced by efficiency considerations, with the principal goal of achieving the best health gain with the available funds (Hadorn and Holmes 1997). Besides clinical criteria, several social factors were discussed during the project and, to some extent, incorporated in the priority criteria. The most important were age, work status, whether patients were caring for dependants or threatened with the loss of their own independence, and time already spent on the waiting list.

The three examples show that setting priorities based on cost-effectiveness and clinical efficacy as sole criteria is fraught with practical and technical difficulties. None of the three initiatives managed to exclude interventions that were not deemed to be cost-effective (New 1997) and, in

the end, intervention costs were taken into account only “to a minor extent” (Hadorn and Holmes 1997). In practice, the many methodological difficulties involved in producing and interpreting information on cost-effectiveness limits the emphasis that can be placed on such information in the priority-setting process. In practice, other factors not captured fully by the economic evaluation process will always play a major role in decisionmaking.

### **CONCLUSIONS: ECONOMIC EVALUATION AS A GUIDE TO PRIORITY SETTING?**

Economic evaluation can assist decisionmakers in setting priorities among health care interventions, but it may also provide misleading information. Walkers and Fox-Rushby’s (2000) review of the economic evaluation studies of communicable disease interventions in developing countries shows that appropriate analytic techniques have been inconsistently applied. If QALY league tables are handled irresponsibly they may do “more harm than good” (Drummond, Torrance, and Mason 1993). One of the main dangers associated with use of league tables is in that the studies are not homogenous in terms of study methodology, and that the rankings do not hold for different settings.

We highlighted these difficulties in previous sections. Gafni and Birch (1993) argue that cost-effectiveness ratios provide information relevant to allocation decisions only in very special circumstances that do not usually apply in practice. When two interventions are compared, a positive cost-effectiveness ratio (the common case) can tell us, at best, what additional costs will be incurred to generate the additional outcomes. From an economic perspective the information required to determine the attractiveness of a new technology is different. The source of the additional resource requirements must be identified and the opportunity cost of their redeployment estimated. Because the cost-effectiveness ratio is sensitive to the method chosen to calculate QALYs, guidelines that do not specify (or justify) the appropriate method for calculating outcomes are unlikely to produce comparable results. In modern health care systems, there is always pressure to introduce more effective technology, even if it is more costly. However, there is a risk of using such noncomparable data to justify adoption of particular technologies.

Both researchers and users of economic evaluation studies developed guidelines to standardize economic evaluations and improve implementation.<sup>12</sup> These guidelines are directed toward increasing the usefulness of league tables and minimizing their potential dangers. They give guidance on how the methodology of the source studies included in the league tables should be standardized so that any comparisons of cost-effectiveness relate to the health care interventions themselves and not to study methods (Drummond et al. 1993). Methodological features unique to a setting will be most difficult to standardize. Therefore, users of league tables should consider the following three questions:

- In my setting could the interventions be applied with the same likely success as in the setting reflected in the league table?

<sup>12</sup> See, for example, the guidelines of the World Health Organization (Murray et al. 2000), of the National Institute of Clinical Excellence in the United Kingdom (Birch and Gafni 2002), and the recommendations of Drummond et al. (1993).

- Which comparison embodied in the various cost-effectiveness estimates is the most relevant comparison in my local situation?
- Are the resources similar to those available in my setting?

If the user cannot find satisfactory answers to one or more of these questions, the usefulness of the league table to inform priority-setting decisions will be limited. Economic evaluations can be standardized only for measurable factors known to the analyst. It seems unlikely that standardization will work when interventions and populations receiving them are diverse. Russell et al. (1996) suggest that the usefulness of league tables depends inversely on the diversity of programs and populations compared. A league table of alternative interventions for a single condition and the same group of people—preferably a group with similar characteristics—is less prone to difficulties. It is often easier to define health outcomes in terms that everyone can agree on and, if some benefit or cost elements must be omitted, they may affect all patients in the same manner, so omitting them does not bias the decision. For decisions involving greater diversity in interventions and the people to whom they apply, league tables must be evaluated in the light of circumstances and values that cannot be included in the analysis. In practice, therefore, it may be easier to use economic evaluations to set priorities in some circumstances than in others. For instance, if it is agreed that provision of some sort of treatment for people with HIV/AIDS is required as a priority, economic evaluations may provide guidance on the specific treatments that are most cost-effective and should be adopted. However, when the decision is a broader one and concerns the relative priority of programs to treat HIV/AIDS versus programs to treat childhood diseases, then methodological differences inherent in economic evaluation will mean it is a far less useful tool for decisionmaking.

No doubt economists will continue to refine the methodology of economic evaluation, addressing the areas of difficulty reviewed above. However, substantial technical issues are likely to persist and will therefore limit the degree to which priorities in health care can in practice be set with reference to league tables. On a more fundamental level, it is also questionable whether standardization of the methodology can wholly address the sort of concerns decisionmakers have about using the economic evaluation approach to set priorities.

Studies on the attitudes of politicians toward economic evaluation find a similar set of concerns (Burns et al. 2000; Drummond, Cooke, and Walley 1997; Duthie et al. 1999; Ginsberg, Kravitz, and Sandberg 2000; Hoffmann and Graf von der Schulenburg 2000; Luce, Lyles, and Rentz 1996; Ross 1995; Nyborg 1998). Many decisionmakers are skeptical about the monetary valuation of nonmarket goods. Some think that the values are incorrect. Others find that monetary valuation of welfare and environmental effects generates results that are not transparent to them, and they feel that these effects would be better evaluated politically. Decisionmakers tend to have *less* confidence in a more inclusive cost-effectiveness ratio. Many find that provision of natural unit information (e.g., the numbers of lives saved) gives better intuitive understanding of a program's effects. Decisionmakers find information about local conflicts of interest and business sector interests essential for making decisions. However, such effects are often not included among benefits or costs, and sometimes they are not even provided in the general project description. Decisionmakers have to use informal means to get access to this kind of information. Many decisionmakers say that they find cost-benefit or cost-effectiveness ratios useful but do not use them for ranking projects. Rather, they are used as

indicators for projects requiring further political attention. Some decisionmakers say that they do not use economic evaluation because they do not understand the methodology, but not all report this as a major obstacle. Nyborg, for example, did not find evidence that the degree of skepticism was correlated with a lack of understanding of the economic evaluation methodology (Nyborg 1998).

If these findings reflect a common attitude among decisionmakers, the consequences for the way economic evaluations are conducted might be worth considering. Instead of including as many factors as possible in the analysis, analysts could choose to report a simple and narrow C/E ratio, based only on direct health effects in natural units and monetary costs. This would move the indicator away from its normative foundation in welfare economics. On the other hand, such a measure would have a clear, descriptive interpretation, and thus make it more understandable, and possibly useful, for those who disagree with the normative premises of economic evaluations or who doubt the robustness of a study. The simple C/E ratio could be supplemented by information on other health effects for the patient, for example a descriptive account of expected improvements in quality of life; wider societal effects of the intervention, for example on the number of jobs created; and nonmonetary costs for the patient reported in natural units such as waiting time in days. Reporting health effects and nonmonetary costs in natural units implies that their valuation is left to the decisionmaker. This would also allow the less tangible considerations to be added into the equation. Also, it would be left to the decisionmaker to compare programs with a variety of diverse benefits and costs. This contradicts the principles of both welfarist and extra-welfarists positions, which state that valuations should be undertaken by individuals and society, respectively. However, a democratic election process might provide sufficient justification for politicians to undertake value judgments on behalf of the people.

Health economists in general would probably disagree with presenting a simple C/E ratio supplemented by qualitative information for fear that comparing programs on the basis of many diverse characteristics is so complex that a rational decision cannot be made. The present behavior of politicians to ignore the ranking of league tables altogether is not more rational, however, and should be a signal to researchers to provide research results that are more useful for policymakers. Maybe research efforts in economic evaluation should be directed in the opposite direction: instead of constantly refining the methodology, efforts should be made to make economic evaluations as simple and transparent as possible.

However the information derived from economic evaluations is presented and used—whether in a simple format or in much more complex approaches that address some of the methodological issues outlined earlier—it is clear that decisionmakers will always have to take into account many other factors arising from the realities of the complex environment in which decisions are made. We return to this issue in section 4.

## **EQUITY CONCEPTS—A CRITICAL REVIEW**

Equity concepts help to operationalize the second objective policymakers might have when setting priorities in health care: the reduction of inequalities between individuals or groups of individuals. Equity concepts try to define fairness in the distribution of health and health care and to translate notions of fairness into policy guidelines.



Policies directed at the reduction of inequalities in health have to acknowledge that health cannot be redistributed among persons like income or goods. To make equity concepts operational, they have to focus on factors that are instrumental in improving health. Many equity concepts focus on the fair distribution of health, but leave open how a redistribution can be achieved in practice. Some analysts assume that once the fair distribution of *health* is defined, a health production function can inform on the exact distribution of *health care* that would accomplish the equity objective. A health production function establishes a causal relation between the amount of health care received and the health status attained. It can be formulated with respect to one individual only, or it can be aggregated to apply to groups of individuals. Other equity concepts focus on the fair distribution of *health care* under the—often unspoken—assumption that it is instrumental in achieving a fair distribution of *health*. However, many analysts concede that other social policies might be as effective or more effective in improving health such as redistributing income or providing proper sanitation and housing. Despite this possibility, most equity concepts do not focus on these alternative policies.

In the following sections, we discuss seven concepts of equity most commonly found in the literature. The concepts rely on rival notions of fairness, and proponents of one concept often fiercely argue against others. We will try to provide a balanced picture of the debates and while asking whether these concepts can inform practical policy guidelines for priority setting.

## EGALITARIANISM AND HEALTH

According to egalitarianism, the preferred solution is the one with the most equal distribution of the goods to be distributed. Strong egalitarianism involves everybody getting an identical share. Applied to the distribution of health, egalitarianism implies that everybody should have identical health status. Culyer and Wagstaff (1993) argue that the relevant equity principle is equality of health. Good health is necessary for individuals to “flourish,” and any position but one in which everyone has the same opportunity to flourish is hard to defend. Therefore, a just distribution of health is an equal one, and an equitable allocation of health care is one that gives rise to equality in health. However, Culyer and Wagstaff (1993) point out that health care is not the only determinant of health, health care alone is not expected to lead to an equal distribution of health.

### Equality and Choice

Strong egalitarianism demands that differences in health status be equalized regardless of whether individuals are responsible for the differences. Some authors argue for adjusting egalitarianism for individual responsibility. Le Grand (1982) and Roemer (1998) support an egalitarian notion of “equality of opportunity.” They assume that deviations in health are partly due to factors beyond the control of individuals and partly due to individuals’ free choices. Society should compensate individuals for disadvantages that are beyond their control, but not for self-inflicted deprivations in health. In reality, however, it is difficult to determine how far individual responsibility extends. Therefore, Le Grand proposes in a later contribution that the concept of equality of opportunity be restricted to health care financing (Le Grand 1987). Health care finance, and not health care delivery, should be used to discriminate against individuals who do not fully exercise their opportunity for health. He suggests that smokers, for example, should be charged an annual premium to cover the expected costs of treatment and then should continue to receive the same treatment as nonsmokers, even if their smoking behavior causes their illness.

## Equality of Health and Priority Setting

Olsen (1997a) considers strong egalitarianism “absurd” when applied to health, because it is concerned solely with the level of inequality between individuals and not with their absolute health status. For example, situation A where two persons live in equally bad health would be preferred over situation B where one person lives in average health (which is better than bad) and the other person lives in good health (which is much better than bad). Although both persons are better off in situation B, it would not be the socially desirable distribution of health. Thus, perfect equality in health requires a leveling-down in health of healthy individuals toward the health of the least healthy individual. All that matters is inequality—efficiency defined as health maximization is of no concern.

In the light of this argument, Culyer and Wagstaff (1993) qualify that equalizing the distribution of health is not to be achieved by deliberately (as an act of policy) reducing the health of some members of society. This implies that equality in health can be achieved only by an increase in expenditure. The money spent on the health of healthy individuals should stay at the present level, and spending on the health of unhealthy individuals should be increased. Thus, the concept of equality in health implies an unspecified increase in budget and offers little guidance on priority setting within a set budget.

## Trading Equity and Efficiency: Social Welfare Functions

A way out of this deadlock is offered by a social welfare function that accounts for both inequalities in health and the absolute health status of individuals. Social welfare decreases with inequalities in health and increases with the health of individuals (Atkinson 1970; Dolan 1998; Olsen 1997a; Wagstaff 1991). Social welfare also depends on the depth of society’s aversion to inequality in health and on relative weights put on the health of an individual or groups of individuals. For example, society might value improvements in the health of low-income groups more than improvements in the health of high-income groups. The health of low-income individuals would receive a higher weight in the social welfare function. The social welfare function allows for a trade-off between inequality and efficiency defined as *health maximization*. Once the parameters of the social welfare function are known, the social optimal distribution of health can be determined by maximizing the function subject to resource and other constraints. In a second step, the optimal allocation of health care can be found with the help of a health production function linking health status to the intensity of health care. The social welfare function provides the normative base for attaching equity weights to health outcomes.

### *Which Weights Are Appropriate?*

The social welfare function approach will encounter many conceptual and practical problems. In the literature, the question of how the weights should be derived has received most conceptual and empirical attention<sup>13</sup> The standard approach is to ignore any distributional issues and attach equal weights to each individual. Harberger (1971) argues in favor of this approach, because any set of weights would be arbitrary. However, unitary weights are as arbitrary as any other set of

<sup>13</sup> For methods of calculating equity weights, see Andersson and Lyttkens 1999; Johannesson and Johansson 2002; Lindholm and Rosen 1998.



weights, as Hurley (2000) points out. He discusses three justifications for a system of weights: social preferences, economic productivity, and derivation from an ethical principle.

The first justification proposes that the weights should be based on the societal preferences. As the definition of equity weights is subject to value judgments, the public should decide on them. Williams (1988) argues that the public would discriminate, for example, in favor of young over old and people with children over people without children in the allocation of resources. Other findings supported this (Charney 1989; Nord et al. 1995; Williams 1988). Dolan et al. (2000) and Shaw et al. (2001) find that people are much keener to reduce life expectancy inequalities defined by social class than they are to reduce identical inequalities defined by smoking status and gender. This might be due to the belief that the low life expectancy of smokers is a matter of choice, but that gender inequalities are unavoidable.

Murray and Lopez (1996) use expected social productivity of an individual as justification for weighting their measure of health. Individuals between 20 and 50 years of age receive the highest weights; the elderly and very young children, the lowest weights. Many people object to such weights because they link value to society to a person's economic productivity and do not reflect concern for disadvantaged members of society.

Williams (1997) proposes basing the weights on an ethical principle he terms the "fair-innings" approach. He argues that some amount of quality-adjusted life span can be regarded as an ethical entitlement for everybody. Individuals receiving less than this amount "have in some sense been cheated," while anyone getting more than this is "living on borrowed time." Higher weights are given to individuals who have not yet received their fair innings.

### **ALLOCATION ACCORDING TO NEED**

Instead of the precise specifications described above, a vaguer principle that health care resources should be allocated "according to need" is often encountered in both the academic literature and policy documents (Lockwood 1988; Williams 1962). The principle can be formulated in two versions: *horizontal equity* (persons in equal need should be treated the same) and *vertical equity* (persons with greater need should be treated more favorably than those with less need). If the individuals most in need are the same ones who can benefit most from health care, under the efficiency objective of maximizing health gain, equity and efficiency are not in conflict. The same allocation of resources advances both efficiency and equity (Culyer 1989; Culyer 1990). However, any other concept of need leads to a conflict between efficiency and equity.

Allocation according to need—with a vague definition of need—is routinely invoked in the methods used to distribute national funds to regions and other geographical areas (Rice and Smith 2001). In practice, they entail distributing funds on the basis of existing national average expenditure, given certain sociodemographic characteristics of individuals (e.g., age, gender, and disability status). Such methods therefore merely reflect average clinical practice and are intrinsically conservative. In particular, there is no guarantee that existing clinical practice reflects either efficiency or equity criteria that are in place. Such methods are therefore better characterized as systematic rather than fair.

## Definitions of Need

Explicit definition of need is crucial to make the equity principles of “allocation according to need” operational for priority setting and geographical resource allocation. Three definitions are most common (Hurley 2000). The first equates need for health care with ill-health and the degree of need with the severity of illness—the sickest have the greatest need (this concept of need underlies the equity principle of “rule of rescue,” explored below). Some authors argue that this definition of need is problematic, however, because it ignores the limits of what is medically possible (Culyer and Wagstaff 1993). If there is no effective treatment, no matter how ill a person is, it is questionable whether health care is needed. There may be a need for other services such as medical research, care, or comfort.

The second definition of need acknowledges that need can be defined only with respect to a specific objective: “X is needed to achieve Y.” Need exists only if two conditions are met. First, X must be effective in achieving Y, and second, Y must be an objective that society endorses as being worthwhile. Otherwise, “needs” are mere “wants” (Culyer and Wagstaff 1993; Williams 1978). Some would add that X must not only be effective, but must also be the cost-effective way to achieve Y (Hurley 2000). This definition of need gives no clear information on *how much* of X is needed to achieve Y. Therefore, the definition does not establish how much health care should be allocated and can provide only limited guidance on priority setting.

Culyer and Wagstaff (1993) propose an alternative definition of need: the expenditure required to exhaust capacity to benefit. It assumes that treatments will eventually meet their medical limits, and beyond this limit there is no need for health care. The definition of need as “capacity to benefit” allows quantification of the amount of expenditure a person needs. The definition can provide no guidance on priority setting, however, if resources are too limited to completely exhaust each person’s capacity to benefit. In that case, some needs would have to remain unmet. Proponents of the definition might argue that the degree of need could be measured by the amount of resources required to reduce them, if it is not possible to exhaust them completely. However, this could lead to counterintuitive priority-setting regimes, as Hurley (2000) points out. Person A needs a comparably inexpensive treatment to avert sure death and live her life in good health until old age, and person B needs a comparably expensive continuous treatment to improve quality of life until she reaches old age. Intuitively, person A has greater need for health care, although she requires less expenditure.

## Cost-Value Analysis

Nord and Nord et al. (1996; 1999) developed an approach to incorporate the equity concept of allocation according to need (defined as severity of illness) into economic evaluation. If health outcomes, for example, QALYs, are not equity-weighted, economic evaluation follows pure efficiency objectives and is not concerned with how the health outcomes of a program are distributed across individuals. Priority is given to programs according to their cost per QALY. However, the sum of QALYs generated by a program has implications for the resource allocation decisions in terms of equivalence of numbers of people treated. For example, saving the life of one healthy person will be equivalent to curing two people who both gain 0.5 QALYs. Such equivalence judgments are referred to as “person trade-offs.”

Many societies have a strong concern for giving priority to the worst-off: an intervention that prevents death and instead leaves a person with a considerable problem is valued on the order of ninety times more than an intervention that eliminates a moderate problem—assuming the same duration of the benefit (Nord 1996). The former intervention thus justifies costs on the order of ninety times higher per person helped than the latter. Adjusting for severity of condition could therefore profoundly affect the relative value of interventions. It has been suggested that analysts could improve their performance by conducting two analyses: a conventional cost-effectiveness analysis, in which the QALYs are used as they stand, and the other being a study in which health effects are transformed into numbers that also encapsulate concerns for severity of illness. The term “cost-value analysis” has been suggested for the latter approach (Nord et al. 1999).

### **RULE OF RESCUE**

Most equity concepts are proposed in the context of decisions about population groups rather than individuals (Williams and Cookson 2000). At the individual level, one principle for decisionmaking is the “rule of rescue” (Hadorn 1991). Society and each individual have an ethical duty to do everything possible to help those in immediate life-threatening distress. This implies that the patient with the most serious condition is treated first irrespective of the costs of treatment. The rule of rescue is identical to the concept of “allocation according to need,” where need is defined as severity of illness. Thus, severity of illness of a patient or patient group establishes priority for health care expenditure—irrespective of capacity to benefit from treatment.

In certain situations the rule of rescue is not necessarily incompatible with the principle of health maximization. For example, treating a patient with a life-threatening but curable condition may not cost much more than treating patients in less serious conditions. However, treatment of the urgent condition averts deaths and might generate high benefits. Thus, if benefits are comparably high and costs comparably low, treating those in life-threatening distress maximizes overall health gain. It is likely, however, that the reverse scenario is more realistic: the benefits of treating a patient in life-threatening distress are comparably low, and the costs are comparably high. For example, expenditures for patients close to death are often very high, but benefits are very low because deaths cannot be averted despite all efforts. In this situation, rule of rescue and health maximization are incompatible.

In clinical practice and in terms of public preferences, the rule of rescue is often a dominant allocation principle. Clinicians go to great lengths to help patients in greatest distress, even when expected health gains are low. For example, a great proportion of lifetime health care expenditures of individuals is spent during the last months before death (O’Neill et al. 2000; Zweifel, Felder, and Meiers 1999). In many cases, these expenditures are made although it is unlikely that the patients’ prospects can be improved. Also, Arnesen et al. (2001) showed that general practitioners give priority to patients with suspected or verified malignant disease and risk of serious deterioration when assessing urgency for inpatient surgery. The expected result of treatment seems to have little influence on the decisions to treat.

## EQUALITY OF ACCESS

The concept of equality of access to health care is a central objective of many health care systems (Goddard and Smith 2001; Olsen and Rogers 1991). It implies that individuals should be given equal opportunity to use health services without regard to other characteristics such as their income, ability to pay, ethnicity, or area of residence. Equality of access is derived from a notion of equal opportunity and implies a willingness to devote resources to improving access to health care for some population groups. The justification for equal access does not derive from its effect on the distribution of health care or health, although the assumption on the part of policymakers and researchers alike is implicit that equal access may alleviate inequalities in health. This assumption may not hold if health care is ineffective in improving health of the unhealthy. The concept of equality of access is often coupled with some notion of need, so that access to services should be equal for individuals in equal need, and unequal for those in unequal need. Disagreement is rife on the interpretation of need, which makes the meaning of “equal access for equal need” unclear as well.

### **Alternative Definitions of Access**

The usefulness of equality of access as practical guidance for priority setting is most severely hampered by confusion about the meaning of “access.” We discuss briefly some of the alternative definitions that have been proposed.<sup>14</sup>

#### *Access as Utilization of Health Care*

Access in terms of utilization of health care is the most frequently used the definition of equal access in empirical studies. It is difficult to measure the abstract concept of “opportunity to use services,” and “actual use of services” or “treatment received” are the only measures obtainable. However, as Hurley (2000) points out, “equality of access” pertains to the ability to do something, not to whether it is actually done. Therefore, it is not the same as utilization of health services, and the attainment of equality of access cannot be assessed simply by examining consumption patterns (Mooney et al. 1991; Olsen and Rogers 1991). Goddard and Smith (2001) nevertheless develop a model for investigating inequities in access based on a measure of utilization. They point out that equity of access is purely a supply-side criterion, whereas utilization is determined by the interaction between supply and demand for health care services. By separating influences on utilization into supply and demand factors, variations in access between subgroups can be assessed.

#### *Access as Money and Time Costs Incurred in Receiving Health Care*

Le Grand (1982) suggests that the concept of equal access reflects the notion of equal opportunity of access, if each individual pays the same price (both monetary and nonmonetary) for using the same quality and volume of health care. Monetary costs include payments for treatments and drugs; nonmonetary costs include travel time and opportunity costs of waiting time. This definition has been criticized, however, for disregarding the fact that two individuals with different incomes would have different abilities to pay for health care if charged identical prices. This leads to inequities in access.

<sup>14</sup> For a comprehensive overview see, Culyer and Wagstaff (1993) or Hurley (2000).

### *Access as Maximum Attainable Consumption of Health Care*

To take account of differences in utilization due to income, Olsen and Rogers (1991) suggest interpreting “equal access” as a situation in which the upper limit of possible consumption is equal for each individual. They argue that in such a situation all differences in observed utilization are due to differences in preferences and are therefore not the result of inequity. To equalize the upper limit of consumption for individuals in different economic circumstances, health care costs have to be individually adapted to reflect these differences. This would require extensive information on all characteristics that might influence the costs of health care for individuals such as the direct financial costs of health care or time costs.

### *Access as Forgone Utility Cost of Obtaining Health Care*

Le Grand (1982) suggests measuring the costs of health care consumption in utility instead of monetary terms. For low-income individuals, marginal utility of income is higher. To guarantee equal access, health care costs have to be reduced for low-income individuals until the product of price of health care and marginal utility is the same as it is for high-income individuals. This definition of equal access means that not just monetary costs but every cost of consuming health care has to be translated into utility terms, including time costs for traveling to the health care provider and waiting for treatment. However, this could lead to the opposite result that for low-income individuals health care costs have to be increased—and not decreased as concluded before. Low-income individuals are likely to receive a low salary, and therefore, their opportunity costs of traveling and waiting are lower than for individuals with high salary. To equalize access, individuals with low income and opportunity costs of time have to face higher—instead of lower—health care costs.

### **Equality of Access and Priority Setting**

The way policymakers interpret “equal access” often differs markedly from these theoretical definitions and depends on the characteristics of the health care system. In a system with voluntary health insurance, access is often considered to refer merely to whether or not the individual is insured. In tax-financed health care systems, access is considered to refer to the presence of user charges (Birch and Abelson 1993). However, even if all citizens are insured or do not face any charges, there might be considerable variations in the personal costs of using services (e.g., travel and opportunity costs of time), in information and communication skills, and in awareness of availability and efficacy of services (Goddard and Smith 2001). Therefore, equality of access is difficult to define and operationalize in health care systems where individuals make no monetary payments for service at the point of delivery.

Although seeking to obtain equity of access to health care may be seen as a more practical way of setting priorities for use of resources than seeking to equalize health status, difficulties in operationalizing the concepts of “need” and “access” present considerable barriers to decisionmakers.

### **DECENT MINIMUM AND ESSENTIAL PACKAGES**

The equity concept of “decent minimum” of health care requires the definition of an essential package of health services provided for everybody, irrespective of ability to pay. It is therefore

an access concept that establishes a portfolio of interventions for conditions, patient groups, or both that society deems important. Definition of a decent minimum of health care requires some form of decision criteria to determine what the package should include and—more important—what it should not include. Decent minimum only becomes operational after these decision criteria are clearly specified. One approach is to rank interventions according to their cost-effectiveness and draw a line based on affordability. The line moves up and down, depending on the availability of resources. The initial (failed) approach of the Oregon initiative is a practical example of such a policy.

New and Le Grand (1996) argue that many practical initiatives in operationalizing the concept of decent minimum did not work because the definition of an essential package relied on the clinical effectiveness or the comparative cost-effectiveness of interventions. They argue that the definition of an essential package is a value judgment based on what a country's citizens deem essential. A medical intervention might not be judged essential, although it is highly cost-effective (e.g., in-vitro fertilization), or it might not be cost-effective, but judged essential (e.g., pain relief for final stage cancer patients). Defining a package means defining the boundary of a public institution's responsibilities for health care services. This requires a political decisionmaking process, including considerations of equity, and cannot be solved by a QALY league table of interventions (New 1997; New and Le Grand 1996).

### **Decent Minimum and Priority Setting**

A decent minimum could supplement other equity concepts and offset the extreme outcomes of theories such as health maximization (Williams and Cookson 2000). The World Bank (1993) proposed defining essential packages of public health and clinical services on the basis of information on four criteria: cost-effectiveness, epidemiological conditions, local preferences, and income of countries. The packages could vary from country to country but should include at least five groups of interventions:

- Services to ensure pregnancy-related care
- Family planning services
- Tuberculosis control
- Control of sexually transmitted diseases
- Care for common serious illnesses of young children.

A minimal package of essential clinical services would also include some treatment for minor infection and trauma and—for health problems that cannot be fully resolved with existing resources—advice and alleviation of pain.

Depending on resource availability and social values, some countries may define their essential clinical package to include a much broader range of interventions than this minimum. With modest increases in spending, relatively cost-effective measures for the treatment of some common noncommunicable conditions could be included. Examples are low-cost protocols for treatment of heart disease using aspirin and antihypertensive drugs; treatment of cervical cancer; drug treatment of some psychoses; and removal of cataracts. The World Bank recommended that health services with low cost-effectiveness should be excluded from the essential clinical



package in low-income countries. Examples of such services include heart surgery; treatment (other than pain relief) of highly fatal cancers; expensive drug therapies for HIV infection; and intensive care for severely premature babies. The World Bank argued that using public funds for these interventions would be hard to justify if much more cost-effective services that benefit mainly the poor are not adequately financed.

Defining minimum packages with the aid of cost-effectiveness information will run up against all the methodological and practical obstacles outlined in section 2.

### **RAWLS'S MAXIMIN PRINCIPLE**

Rawls argues that social policy should seek to maximize the position of the least well-off when distributing social and economic goods (Rawls 1971). Rawls considers a set of “primary social goods,” including basic liberties, income and wealth, positions of responsibility, and the social bases of self-respect. Rawls then assumes an initial position where all individuals operate under a “veil of ignorance.” Rational, risk-averse individuals would choose a situation where the position of the worst-off is maximized. This choice is not driven by altruism and concern for disadvantaged members of society, but by the fear of belonging to this group once the veil of ignorance is lifted. These principles could offer some guidance on designing a set of priorities.

There is some discussion on whether Rawls's maximin principle can be applied to the distribution of health or health care (Williams and Cookson 2000). Rawls himself did not include health in the set of primary social goods, because as a “natural good” it is not distributed by society. With respect to health care, Daniels (1985) argues that the maximin principle does not apply because needs for health care are distributed very unevenly in comparison to other primary social goods.

The Rawls maximin principle has been criticized for not anticipating the behavior of a utility-maximizing individual in a correct way (Harsanyi 1975). Individuals take into consideration the probabilities of ending up in different situations and maximize the sum of expected utilities. Therefore, individuals would choose the Rawlsian distribution only if the probability of ending up in the worst situation was equal to one. Le Grand (1991) pointed out that the group of “worst-off” is difficult to delineate in practice.

Despite these criticisms, the Rawls maximin principle has received much attention from health economists (e.g., Bommier and Stecklov 2002; Olsen 1997a), medical ethicists (e.g., Shevory 1986; Swenson 1992), and policymakers. Olsen (1997a) discusses the policy objectives of the Norwegian health service as an example of the Rawlsian maximin principle. In 1987, the Norwegian government emphasized that “degree of severity” was the most important criterion for priority setting in health services. They presented a system with five priority levels, depending on the severity of consequences if they were not implemented. Later, in 1994, a second criterion was introduced: “the expected effectiveness of treatment” (Olsen 1997a). Olsen points out that the first criterion has an equity connotation (with equity interpreted in the Rawlsian sense) while the second has an efficiency one, and in his paper he discusses the potential implications of this combined policy objective.

## **LIBERTARIANISM**

Libertarians eschew traditional equity concepts and instead favor a distribution of resources according to entitlement (e.g., Locke 1967 (1690); Nozick 1974). An individual is entitled to his or her possessions if acquired justly, for example, through earnings or inheritance. Thus, equity is conceived as procedural rather than redistributive, and whether a distribution is considered equitable depends entirely on whether or not legitimate private property rights are respected. Enforcing property rights is seen as the role of the state. The state has no right to intervene in the distribution of goods, wealth, or health care. Therefore, a libertarian would reject equity concepts that require state redistribution of resources and hence, violation of property rights. For example, “equal access to health care” would be considered unjust in libertarian terms, because no citizen has the right to health care unless it is acquired through the market. A libertarian equity concept formulated with respect to equity in health requires that every individual attain health in a just manner. Assuming that a variety of factors influence the health of individuals, all these factors must have been acquired by respecting property rights. Therefore, differences in health status due to differences in genetic endowments, income, or housing conditions are not regarded as unjust as long as the distribution of these factors is just in libertarian terms.

It is hard to imagine that libertarianism would be a country’s sole guiding principle for priority setting for health care. However, the principle of libertarianism might apply to selected groups of the population or selected services. For example, public health care services in many low-income countries are severely underfunded, and wealthy individuals usually finance their own health care privately. Also, certain interventions regarded as not essential or not cost-effective can be excluded from government-financed services. For example, the exclusion of certain services from an essential package of health care services could be interpreted as application of a “selective libertarianism.” Libertarianism is sometimes combined with another equity principle. For example, libertarianism combined with decent minimum principle could characterize a health system with a tax-financed state provision of essential health care services for the poor, complemented by private delivery and financing of health services for the rest of the population. The idea of a publicly funded essential package in combination with privately financed services for the rich seems quite appealing to policymakers, especially in low-income countries (World Bank 1993).

## **CONCLUSIONS: UNRESOLVED ISSUES AND PRACTICAL IMPLICATIONS**

Most contributions on equity concepts are theoretical and remote from practical implementation issues. Instead of addressing implementation issues, much of the literature addresses the ideological debates on the correct definition of concepts that are all equally remote from practice. As we have indicated, most of the concepts offer little practical guidance, considering the political realities of the priority-setting process. In the following sections, we discuss equity issues that the literature rarely addresses. In addition, we discuss how equity concepts can be used to inform priority-setting decisions.

### **Consistency with Cost-Effectiveness Analysis**

The discussion in this section highlights a wide variety of concepts of equity. It is important to recognize that any notion of fairness is ultimately a personal construct and that no concept is in



any sense more legitimate than another. Instead, it is the job of the politician to formulate a societal notion of the preferred concept of equity in light of these individual viewpoints.

We have identified two broad categories of equity concept that may be relevant to priority setting. The first reflects the desire to depart from pure efficiency criteria and instead to skew resources toward certain classes of individuals because they are in some sense more "deserving" than others. The second reflects a desire to secure some notion of equal access to health care. Both concepts can be integrated into the conventional cost-effectiveness framework but require an adjustment in, respectively, the benefits and the costs of each intervention under consideration.

As regards the first equity category of "deservingness," possible criteria for allocation of resources include:

- Capacity to benefit from health care (the only equity criterion consistent with the health maximization criterion)
- Expected future health (skewing resources toward those with lower potential for health)
- Previous health experience (skewing resources toward those with lower previous quality of health)
- Rule of rescue (skewing resources toward those with immediate needs)
- Some other concept of need.

With the exception of the first, each of these implies that the existence of some dimension of social condition, or "need," along which otherwise identical health gains should be weighted differently. That is, suppose  $\theta$  indicates an individual's need status (say life expectancy) and  $f(\theta)$  indicates the population's probability-density function. Consider an intervention  $i$  with expected benefit for any individual in need of  $b_i$ . Then, if the relative incidence of intervention  $i$  is given by  $g_i(\theta)$ , the total benefits  $B_i$  are given by

$$B_i = \int b_i g_i(\theta) f(\theta) d\theta$$

A concern with equity implies a need to weight the benefits differently, depending on the population group under consideration. That is, assuming a higher level of  $\theta$  indicates a higher priority, there exists a function  $w_B(\theta)$  such that

$$\int w_B(\theta) f(\theta) d\theta = 1$$

where  $w_B(\theta_1) \geq w_B(\theta_2)$  if and only if  $\theta_1 \geq \theta_2$ . Weighted benefits are now written as

$$B_i^w = \int b_i g_i(\theta) w_B(\theta) f(\theta) d\theta .$$

This modification will tend to increase measured benefits for interventions used disproportionately by disadvantaged populations and to reduce benefits for interventions used more by less needy populations. In other words, the health gains arising from an intervention will be valued differentially, depending on the population group to which they accrue. Williams' notion of an equity adjusted QALY is an example of such a construct (Williams 1988, see above). In a priority-setting context therefore, equity weighting should in general effect a shift toward programs that favor disadvantaged populations.

The second equity category, equity of access, implies an interest in the supply side. It suggests that additional resources may be needed to secure an adequate level of health care provision for certain groups. In short, the expected costs of securing benefits  $b_i$  of intervention  $i$  may be greater for some groups than others. If the expected unit costs of the intervention are  $x_i$ , then the unadjusted total costs of the intervention are

$$X_i = \int x_i g_i(\theta) f(\theta) d\theta.$$

The need to consider equity of access suggests that—along a chosen dimension of social circumstance, such as income—it costs more to assure satisfactory utilization among the disadvantaged. That is, the expected costs of the intervention must be weighted differentially. The weighting will in general depend on the nature of the intervention, because certain types of intervention (such as hospital services) may require stronger skewing of resources than others. So we must now define the function  $x_i(\theta)$  to reflect the differential unit costs of securing benefits  $b_i$  depending on social condition  $\theta$ . Then total costs are recalculated as

$$X_i^w = \int x_i(\theta) \hat{g}_i(\theta) f(\theta) d\theta$$

where it will usually be the case that  $x_i(\theta_1) \geq x_i(\theta_2)$  if and only if  $\theta_1 \geq \theta_2$ . We assume a new relative incidence of the intervention  $\hat{g}_i(\cdot)$  brought about by the increased expenditure directed at disadvantaged groups. This reflects the previously “unmet need,” and therefore  $\hat{g}_i(\theta) \geq g_i(\theta)$  for all levels of need. So we also expect benefits to increase to

$$\hat{B}_i^w = \int b_i \hat{g}_i(\theta) w_B(\theta) f(\theta) d\theta$$

In a priority-setting context, this second category of equity consideration may perversely discriminate against conditions with a high incidence among disadvantaged groups, or against programs with high relative costs of securing equity of access among disadvantaged groups. The desire to effect equity of access increases costs disproportionately in such interventions.

Thus the introduction of both outcome and access equity concepts is not inconsistent with the cost-effectiveness criterion. However, their implementation is very demanding in terms of information, requiring value judgments to provide equity weights, epidemiological data to estimate unmet need, and accounting data to estimate the costs of securing utilization. The introduction of equity considerations will in general result in a change in the cost-effectiveness rankings of individual interventions, and therefore in their priority ranking. Also, within a fixed budget, the incorporation of equity criteria will in general result in a reduction of the health gains secured by the chosen package, as some efficiency is sacrificed.

### Public Preferences Regarding Equity

The nature and importance of the equity concept employed is ultimately a political judgment. Many authors therefore assume implicitly that society’s concept of fairness is translated into equity concepts by a benevolent decisionmaker. But the decisionmaker may wish to seek public views of what constitutes a “fair” distribution of health and health care. Attempts to elicit equity concepts from the general public have been made, applying concepts of fairness into operational priority-setting principles. For example, Dolan et al. (2000) and Shaw et al. (2001) found that many people in the United Kingdom are keen to redirect considerable resources toward people of low social class or with adverse health prospects, at the expense of other NHS activity, in line

with the government's public health policy. For life expectancy, the median response indicated that an intervention offering 6 months' improvement in life expectancy to the lowest social class is regarded as equivalent to an intervention offering 2 years' improvement to the highest social class. This is similar to the response obtained when the subgroups are defined in terms of the "healthiest" and "unhealthiest" 20 percent of the population. When the questions were framed in terms of long-term illness, the median response suggested that an 8.5 percent reduction in the rate of long-term illness for the lowest social class was equivalent to a 2 percent reduction for the highest social class; again, a similar response was obtained when the subgroups used are the healthiest and unhealthiest 20 percent of the population.

### **Diverging Equity Concepts at Different Decision Levels**

Decisionmakers at different levels of the health care system may follow different equity concepts. Depending on the features of the health care system, different decisionmakers are involved in setting health care priorities. In most public health care systems, there are political decisionmakers at the national level and at regional administrative levels. In addition, decisions are made by clinicians at the level of the individual patient. As political administration is generally hierarchical, decisions made using specific equity concepts can cascade down the decisionmaking chain, and this may facilitate the alignment of national and local decisions. However, bringing political decisions at national and regional levels into accordance with clinical decisions could prove much more difficult. Clinicians and politicians work in different environments and are subject to different incentives. Decisions at the clinical level are crucial, however, for the implementation of equity concepts. It is at this level where interventions actually reach people, and policy strategies can make a difference. Faced with the clinical reality, health care providers are likely to follow their individual ethical principles, not centrally defined policies. Therefore, incentive structures may have to be changed, guidelines set up, or audit procedures introduced to implement successfully a chosen equity concept.

### **Implementation of Equity Concepts in the Priority-Setting Process**

We have outlined the main equity concepts and some of the gaps remaining in the literature. However, even if the theoretical issues set out above were addressed in a satisfactory way, the problem of how to use equity concepts in a practical way in the priority-setting process would persist. The main obstacles to doing so are summarized below.

*Equality of health* may require a leveling-down in the health of healthy individuals toward the health of the most unhealthy individual, if a priority-setting process made on this basis has to be budget neutral. If this outcome is unacceptable, equality in health can be achieved only by increasing expenditure devoted to the health of the unhealthy. Therefore, the concept of equality in health offers little guidance on priority setting with a given budget.

A vaguer *allocation of resources according to need* underlies many commentaries and policy documents. In practice (e.g., in geographical allocation of resources), this often means simply allocating resources consistently on the basis of relative levels of expenditure on different types of people. That is, it is a conservative reflection of practice. However, a "fair" regional distribution of the health care budget on this basis might perpetuate inefficiencies and inequities and may not reflect desired priorities. Instead, the concept of need requires more careful specification to be made operational.

In clinical practice, the *rule of rescue* might be the prevailing equity principle. Clinicians usually do nearly everything possible to help patients in greatest distress, even if the expected result of the treatment is poor. This patient-level equity concept can have consequences for the implementation of priority-setting decisions at a higher level, especially if they diverge.

The practical interpretations of *equality of access* usually differ markedly from theoretical definitions and depend on the characteristics of the health care system. Often, equality of access is defined as universal health insurance coverage or the absence of user charges. In general, equality of access is difficult to define and operationalize in health care systems where individuals pay nothing for care at the point of delivery.

A *decent minimum* is often translated into the idea of providing an essential package of health care services. To make the concept work, it is crucial to select the included (and excluded) services with a widely supported selection mechanism. This mechanism will be driven by social judgment and cannot rely completely on ranking programs by cost-effectiveness ratios.

*Rawls's maximin principle* is sometimes cited by policymakers as a guiding principle for allocating resources. It is frequently taken as a justification for basing the resource allocation on the “degree of severity” of illnesses. However, the criterion is usually supplemented by a second criterion saying that the treatment should improve health. This takes us back to the difficulties inherent in using cost-effectiveness information.

It is hard to see that *libertarianism* would be a country's sole guiding principle for priority setting for health care in a country. However, the principle of libertarianism might apply to selected population groups or services. For example, exclusion of certain services from an essential package of health care interventions could be interpreted as application of a “selective libertarianism.” A private market might develop for the excluded services.

In conclusion, the theoretical debates about diverging principles of equity can be made consistent with cost-effectiveness notions, but to date they have not contributed much to the practical problems of setting priorities. The most promising areas—which are still fraught with difficulties—include the development of equity-weighted measures of health benefits, estimates of the additional costs of ensuring equity of access to health care services; attempts to define a decent minimum; and progress in eliciting the public's views about what constitutes a “fair” distribution of health and health care.

## **PRIORITY SETTING UNDER PRACTICAL CONSTRAINTS**

So far, we have examined the priority-setting process under the conventional assumptions of economic theory: a benevolent decisionmaker maximizes efficiency, equity, or both subject to budget constraints. The principal goal is to maximize benefits from health care interventions subject to the available budget. The previous section shows how equity considerations can be incorporated by assigning weights to the benefits realized by different individuals or groups of individuals.

In practice, the priority-setting process does not take place in a vacuum but in a context where many political, institutional, and environmental constraints apply. These influence decisionmakers in their priority-setting decisions. In this section we examine, from an economic perspective, some of the constraints that apply when seeking to implement a priority-setting process. We discuss the realities of the political decisionmaking process that arise from the influence of interest groups or weaknesses in democratic voting mechanisms. We introduce several models of political economy that describe how decisionmakers react to political realities and how priority-setting decisions may be influenced by them.

Even if the decisionmaking process functions without such political constraints, putting decisions into practice may not be straightforward. Transition costs or abandonment costs may occur when priorities are switched from one program to another; externalities that must be taken into account may arise, together with various other constraints. First, we describe these constraints and outline some tools that may be used to address them within the decisionmaking process. Then, we discuss the relationship between the way the health care system is financed and the way health care priorities are set. Different financing arrangements impose different budget constraints and influence the priority-setting process.

### **INFLUENCES ON THE POLITICAL DECISIONMAKING PROCESS**

In this section, we discuss selected models of political economy. These models try to explain why the political decisionmaking process fails to generate Pareto-improving policy changes. This phenomenon is often referred to as government failure. Models of political economy investigate the reasons for government failure from different angles by predicting how decisionmakers react to the political context in which their decisions are made. There is hardly any literature on the consequences of government failure on priority setting for health. Where appropriate, we try to adapt more general results to the particular characteristics of the resource allocation process in health care systems of low-income countries.

Models of political economy rest on two basic premises (Shugart 1999). First, the same behavioral model used to explain decisionmaking in ordinary markets can also be applied to decisionmaking in the public sector. Public policymakers are not benevolent maximizers of social welfare, as conventionally assumed in economic theory; they are instead motivated by their own self-interests. Companies seek to maximize profits, consumers seek to maximize utility, and policymakers seek to maximize political support. The second basic premise is that while policy errors are certainly possible, citing “error” or “ignorance” to explain policy outcomes is not very informative. Instead, and especially when a policy has persisted for a long time, it seems reasonable to assume that the intended effects of a policy can be deduced from the actual effects. Thus, models of political economy are not normative theories about how government should work, but theories about how government does work. The only important difference between the market for wealth transfers in this approach to the study of government processes and conventional markets for private goods arises from differences in the constraints facing self-interested market participants in the two settings. Outcomes differ in the two settings not because the goals of individual behavior differ, but because the institutions within which individuals pursue their own gains are different.

In the following paragraphs, we discuss relevant models of political economy, relating them to the priority-setting context in health care. They offer slightly different explanations of why the allocation of public goods might differ from that predicted by the naïve economic model. However, they all acknowledge that priority setting takes place in a political environment. Choices will be to the advantage of some groups and to the disadvantage of others. It is therefore important to examine the utility function of the priority setters, whom we shall refer to as “the government,” although sometimes the importance of individual ministers or officials within government should be kept in mind.

A spectrum of government utility functions can be envisaged with respect to health care. At one extreme, the government might be concerned solely with the long-run efficiency and equity concerns explored above. Its main concern may then be to determine which concepts of efficiency and equity to apply and then to apply them consistently and universally. At the other end of the spectrum, a government may be entirely self-serving, wishing only to set priorities in a way that offers the best prospect of its own survival. Indeed, in the extreme, individual ministers or officials may base their decisions on the implications for their personal advancement and wealth. The most realistic scenario is likely to lie somewhere between these two extremes, hence the usefulness of exploring political economy models as an additional explanation for how real decisions about priorities in health care are made.

### **Majority Voting**

A government depends for its survival on the support of key interest groups. In principle, in democratic societies, the ultimate arbiter will be the electorate, and a rich theory of voting behavior has developed (Anderson 1999; Mueller 1989). Barr and Davis (1966) and Inman (1978) demonstrate that the characteristics of voters, as demanders of public sector output, are correlated with the volume of public sector expenditures. Evidence of this theory’s application directly to the health domain is scarce, but there can be little doubt that health often plays a prominent role in local and national elections.

Prominent among the theories of majority rule voting is the notion of the median voter. Hotelling first presented the median voter theorem as an outcome of two-party representative democracy (Hotelling 1929). It focuses on the politician as a maximizer of votes. Political opinion is depicted as lying along a single liberal-conservative (Left-Right) dimension. Each voter is assumed to have a most preferred position along the spectrum for her party to take. The farther the party is from this position, the less desirable its election is to the voter. If every voter votes for the party closest to her most preferred position, the liberal party receives all the votes lying to the left of its position plus half of the votes lying between the liberal and the conservative parties’ positions. The conservative party receives all the votes to the right of its position plus the other half of the votes located between the liberal and the conservative parties’ positions. Both parties can increase their votes by moving toward the position of the opposite party and are thus driven toward the position favored by the median voter.

The original median voter model is simplistic, but many subsequent contributions investigated the model under more realistic assumptions, for example, the existence of three or more parties, the possibility of abstentions, or asymmetric distributions of voter preferences such as a majority

of voters having political positions to the extreme of the left or rightwing spectrum.<sup>15</sup> Under some of these assumptions the results of the median voter model can be overturned. Empirical results suggest that the median voter model is often better—or at least as good—in explaining government spending decisions than competing models (Ahmed and Greene 2000; Congleton and Shugart 1990; Congleton and Bennett 1995). These studies were done in the United States, however, and not all of them focus on social expenditures. The median voter model may be less powerful when applied to different settings, for example to parliamentary democracies like those in many European countries.

But even in different settings the median voter hypothesis is helpful in that it draws attention to the importance of government's need to secure the support of crucial electoral constituencies. It is particularly important in health care because it may explain why governments find it difficult to direct resources toward certain patient groups, despite their apparently reasonable claims on resources from an efficiency or equity perspective.

For example, all citizens perceive that they or their family may at some time need emergency health care or maternity services, and so the provision of such services is likely to receive widespread support from the population. However, services directed at certain chronic conditions (e.g., some mental illnesses, HIV/AIDS) may receive less popular support because the median voter cannot perceive any personal need for such services. Even if the cost-effectiveness of the latter services is greater, the government may find it difficult to attach high priority to them.

The median voter model can be adapted to analyze the distribution of health care expenditures in low-income countries. We assume that the low-income country has a democratic political system and that a wealthy minority pays relatively high taxes. Some wealthy citizens are members of the government and own much property, or they bankroll political parties. Therefore, wealthy citizens have greater influence on the political decisionmaking process. In high-income countries, the incidence of certain diseases is distributed fairly equally across all social groups. In a low-income country, however, a small minority of wealthy citizens suffers mainly from noncommunicable and chronic conditions, while a large majority of poor citizens suffers from mainly communicable diseases and diseases that originate from their poor living conditions. As the proportion of poor in the electorate is relatively large, the median voter is likely to belong to the poor group. The median voter model would predict that most health care expenditure would be devoted to illnesses of the poor to win the support of the median voter.

In many low-income countries, however, this is not the case. The proportion of health care expenditures devoted to illnesses of the wealthy is often much higher than would be justified on basis of the prevalence of these illnesses in the overall population (World Bank 1993). The median voter model can be adapted to explain this phenomenon by incorporating information about the financing of health care expenditures. In a high-income country, inequalities in income are usually less acute than in low-income countries. This implies that differences in tax yield between income groups are smaller in low-income countries and that each citizen's

<sup>15</sup> For a more detailed exposition, see Mueller (1989).



contribution to the financing of the health care budget does not vary substantially. However, in a low-income country, a small group of wealthy citizens contributes a large proportion of taxes. The government may therefore feel it needs to please the tax-paying wealthy minority by providing health care services for illnesses of the wealthy to retain the viability of the country's tax base. If this consideration is incorporated into the median voter model, the distribution of political positions of citizens could be tax-weighted, and the tax-weighted median voter would then be located in the wealthy rather than the poor group. This issue is considered further in the sections on interest groups and health care financing below.

## **Interest Groups**

The political process may not necessarily produce what voters want. Voters may generally be ill-informed about most of the legislature's activities and have little incentive to seek out information, while special interest groups are well informed about the issues that affect them most directly. The political process may then produce outcomes that benefit the special interests rather than the general public interest (Holcombe 2001). This seems a realistic scenario for many low-income countries where a great proportion of the population may be ill-informed about government policies due to low levels of education and literacy and underdeveloped infrastructure that greatly limits the distribution of information. In this situation, key interest groups may be highly influential in sustaining or endangering a government. If, for example, a government relies for its survival on the support of urban areas, it is likely to look more favorably on programs benefiting such areas (despite their lower cost-effectiveness) than on competing programs that benefit rural areas. A substantial body of literature analyzes the interest-group model of government and sheds light on why political institutions may fail to allocate resources efficiently (Holcombe 1985; McCormick and Tollison 1981; Weingast, Shepsle, and Johnsen 1981).

The interest-group model attempts to explain why some population groups are more successful than others in maximizing their wealth and what impact this might have on resource allocation. The model applies to any situation in which the state's monopoly power can be mobilized selectively to benefit one group at the expense of others. The model is frequently used in the analysis of regulation. Coalitions of producers often find it profitable to use the apparatus of public regulation to secure for themselves such regulatory favors as direct cash subsidies, control of the entry of new rivals, restrictions on the outputs and prices of complementary and substitute goods, and the legitimization of price-fixing schemes (Stigler 1971). The interest-group model predicts a redistribution of wealth between groups of the population in the form of transfers. The transfers can take the form of cash but might be denominated in terms of favors. Redistribution is organized by the government. The model assumes that coalitions of individuals that have the lowest costs of organizing themselves (costs include becoming informed, lobbying effectively, and securing cohesion of the group) have a comparative advantage in demanding transfers. Groups that have high costs of organizing themselves are not successful in demanding transfers. On the contrary, they cannot avoid having a portion of their wealth taken away for transfer to the well-organized groups. Small, cohesive interest groups are often successful in obtaining transfers at the expense of the general population, whose interests are more diffuse and whose costs of organizing are relatively high (Olson 1971). Redistribution of wealth generates transfer



costs and makes society poorer on balance: the private gains realized by the recipients of transfers are more than offset by the costs to society of transfer activity .<sup>16</sup>

Interest groups can take a number of forms. For example, because important “opinion formers” such as the media might play an important role in securing widespread support for government actions, policies may be designed to ensure that such groups look favorably on the chosen priorities. Providers, usually in the form of the medical profession, are a crucial interest group in the health care systems of many countries. Governments are often wary of alienating doctors as they are in a strong position to mobilize opposition to chosen priorities. Doctors also have many credible threats that can jeopardize implementation of government plans, which may range from overt threats such as striking, quitting the workforce, or emigration, to more subtle undermining of policy shifts through noncooperation and adherence to traditional patterns of care.

We have been unable to find any coherent body of literature documenting the constraints on government action imposed by the medical profession, but any priority-setting process may benefit certain professional groups at the expense of others, and the power of the disadvantaged group may be sufficient to affect government choices. For example, doctors often resist transfer to rural areas. A policy of moving toward more community health care, based in rural health centers, at the expense of high-technology medicine in urban centers, may alienate a powerful group of specialist doctors capable of undermining support for, and implementation of, the chosen priorities.

Pharmaceutical companies are another crucial interest group in low-income countries. The issue of whether governments should regulate the drug market by introducing patent protections for new drugs is highly debated. It is feared that such regulatory policy could result in higher prices for drugs. On the other hand, there are potential benefits (Nogues 1993). Protection of intellectual property rights may encourage research on drugs to address developing-country needs. However, there is only limited evidence of an increase in research and development activities after the introduction of patent protections in some countries of the developing world in the 1970s and 1980s (Lanjouw and Cockburn 2001). Thus, it is possible that such powerful interest groups can manipulate government decisionmaking to serve their own interests. At a higher level, national government choices may be constrained by requirements imposed by supranational organizations or donors that act as a particular sort of “interest group” in this context. Thus, for example, a donor might make a grant conditional on implementation of certain health programs or a certain geographical allocation of resources. Acceptance of this condition implies that the constraint has to be accommodated within the national priority-setting process.

The impact of interest groups imposes a constraint on government action that is not recognized in the earlier discussion of efficiency and equity. That discussion treated the government’s problem as one of maximizing equity-adjusted health outcomes, subject merely to a budget constraint. The existence of interest group considerations introduces additional constraints, such as requiring that a certain proportion of the available funds are spent in urban areas or on

<sup>16</sup> For a more detailed exposition of interest group models, see McCormick and Tollison (1981), and for an overview of interest-group models in the context of low-income countries, see Shugart (1999).

particular programs; or that changes in policy do not alienate powerful groups such as doctors. In general, such constraints will result in departures from conventional cost-effectiveness rules.

### **Donor Constraints**

Donor agencies often make finance and support conditional on national actions, and their preoccupations may therefore be an important influence on national priority setting.

The formulation of the Millennium Development Goals (MDGs) is an example of the influence of donor organizations on national policies (A Better World for All: Progress toward the International Development Goals 2000). The MDGs were established as a joint initiative by the United Nations, the World Bank, the International Monetary Fund, and the Organization for Economic Cooperation and Development. The MDGs aim at establishing yardsticks for measuring results, not only for low-income countries but also for rich countries that help to fund development programs and for the multilateral institutions that help countries implement them. The seven MDGs are: halving the proportion of people living on less than \$1 a day; enrolling all children in primary school; empowering women by eliminating gender disparities in education; reducing infant and child mortality; reducing maternal mortality; promoting access to reproductive health services; and promoting environmentally sustainable development. The major obstacles to achieving these goals are—according to the four organizations—inadequate policies, human rights abuses, conflicts, natural disasters, HIV/AIDS, inequities in income, education, and access to health care, as well as unequal opportunities between men and women. Moreover, development is hampered by a lack of access to global markets for low-income countries, the debt burden, a decline in development assistance, and inconsistencies in donor policies (A Better World for All: Progress toward the International Development Goals 2000).

The sick comprise a set of competing interest groups that is particularly relevant to this discussion paper. As noted in the preceding section, different types of sickness may influence the political process in different ways, depending on the magnitude, distribution, and nature of the condition. The Global Burden of Disease (GBD) Study, initiated by the World Bank and the World Health Organization, can be seen as an attempt to inform the political process in this domain. It seeks to provide information on the extent of ill-health from premature mortality and from nonfatal health outcomes, and the contribution of different diseases, injuries, and risk factors to ill-health in countries of the developed and the developing world (World Bank 1993; World Health Organization 1999).

Proponents of GBD studies argue that the estimates offer direct guidance on priority setting, but most concede that they should be used alongside information on the cost-effectiveness of interventions (Murray and Lopez 2000; Murray, Lopez, and Jamison 1994). Resources should be devoted not just to the most cost-effective interventions but also to the cost-effective interventions that have the potential to substantially improve population health status. GBD calculations base priorities on the size of the problem. This is the main reason the value of GBD studies has been questioned. Williams (1999) and Mooney and Wiseman (2000) argue that priority setting should be based on information about the value of interventions. Otherwise, vast amounts of resources may be wasted trying to combat disease for which there is no cure. Thus the GBD approach might be best seen as a means of supporting the political process by offering

some (if incomplete) objective evidence on the claims of competing interest groups among the sick.

### **Bureaucratic Decisionmaking**

Another locus of potential self-interest is represented by the bureaucratic models developed by commentators such as Tullock (1965) and Niskanen (1971). These focus on the “bureaucrats” interest in maximizing their influence (and ultimately their utility) and the effect of the bureaucrats’ behavior in determining the volume and nature of government output. The model examines the incentive structure for bureaucrats in the same way as microeconomic theory has examined the incentive structure for individuals working in firms. It has found that, unlike in markets, bureaucrats do not have the incentive to produce the output demanded by consumers of their services. At the center of bureaucratic models is the implication that bureaucrats receive power and remuneration in proportion to the size of the enterprise they control. The models assert that the inadequacy of controls on growth of government agencies leads to a bloated and inefficient public sector. This effect is even more pronounced in the political and economic circumstances experienced by many low-income countries. Kimenyi (1987) showed that the amount of rent seeking through bureaucratic maximization is more extensive in countries with less democratic governments. In a dictatorship, for example, the authority has a distinct interest in maintaining the bureaucrats’ wellbeing in order to guarantee their continued support (Nate 1999).

The implication of such models for priority setting in health is that government agencies will seek to implement policies that maximize the size of their own enterprises and to undermine proposals for activities outside their own direct control. The key issue is that the bureaucrats have informational advantages over their political counterparts. Ministers are therefore at a comparative disadvantage in seeking to set policies in line with their own objectives (Niskanen 1975). If this model holds, bureaucrats may influence the pattern of health care expenditures in ways that do not accord with efficiency and equity considerations but instead reflect their own interests.

### **Rent-Seeking Behavior**

In most nations, the health system is the result of a complex mixture of institutions, regulations, conventions, and historical accidents. These arrangements give great scope for what Tullock (1967) and Krueger (1974) refer to as “rent-seeking,” the process whereby providers compete to appropriate the producer surpluses created by imperfectly competitive market structures. When individuals can gain from government policies, they have an incentive to expend resources up to the expected value of that gain to get the benefits, generating substantial losses to society in the process. In a way, the political decisionmakers represent interest groups themselves, exploiting the government apparatus to their own advantage. When the government undertakes projects, the possibility of transfers is created. This triggers rent-seeking activity that dissipates some or all of the potential gains of the project. Therefore, rent-seeking is another reason priority setting may fail to reach Pareto optimal solutions.

Kimenyi and Tollison (1999) and Pedersen (1997) discuss the implications of rent seeking for economic development of low-income countries. Pedersen (1997) uses a rent-seeking approach to explain why in low-income countries urban social groups have gained much more income

than the majority of the population, who live in rural areas or urban shantytowns. Pedersen explains the distribution of foreign aid and of the revenue generated by exploiting agricultural producers between different private groups and those employed in the private sector. The basic explanation for the bias in income distribution is found in the distribution of political influence, and perhaps more fundamentally, in the political processes determining the distribution of political influence. Certain urban groups in the private and public sectors end up “exploiting” agricultural producers, confiscating benefits of foreign aid, and marginalizing the urban poor.

Pedersen’s results might explain why health care resources are concentrated in urban areas at the expense of rural areas in many low-income countries: political influence is distributed unequally between urban and rural groups such as health care providers, who profit from investments in health care. Groups in urban areas are more successful in attracting foreign aid and public investments in health care services than rural groups. In addition, the particular features of primary health care provide greater scope for rent seeking. Many primary care services are relatively easy to transfer. For example, resources meant for the cure of a communicable disease (e.g., antibiotics) can just as easily be used for treating other conditions. Incentives, in particular unofficial payments, may mean the diversion of resources from benefit packages.

### **Concluding Comments**

Stiglitz discusses four reasons for government failure, that is, why the political decisionmaking process fails to generate Pareto improvements (Stiglitz 1998). First, governments are not able to make long-term commitments. Most policies are implemented in stages and are not one-shot changes and, although a reform may be favorable to all groups early in that process, it may undermine the interests of one or a few groups in later stages. These disadvantaged groups are often far-sighted enough to anticipate that, in the long run, they will be worse off and thus act to oppose an apparent Pareto improvement. Second, coalition forming and bargaining among participants in the political game is likely to lead to suboptimal outcomes if they are imperfectly informed and if each coalition is seen as part of an ongoing dynamic bargaining process. Actions that in the short run might look like a Pareto improvement can look far riskier from a long-term, dynamic perspective. Third, destructive competition might prevent Pareto improvements. In imperfectly competitive markets, companies can get ahead not just by producing a better product at lower costs, but also by raising their rivals’ costs. Fourth, uncertainty about the consequences of change might prevent decisionmakers from implementing welfare-enhancing policies. Skepticism about an adversary’s proposals is often generalized, leading politicians to think that anytime an adversary makes a proposal, it must involve the adversary’s benefiting at their own expense.

We have discussed ways government failure can influence the priority-setting process. Economic models of public choice represent the “dismal science” at its most dismal. Many of the models discussed are relevant to only a minority of countries, and the effects described may be counterbalanced by other mechanisms. We nevertheless believe it is imperative to have a clear understanding of the potential for self-serving behavior in any political process, and to develop a priority-setting policy that can either challenge or accommodate political realities and imperatives.

## TRANSITION COSTS AND EXTERNALITIES

Having examined the political context for priority setting, we now move on to consider factors that influence implementation: capacity for change, externalities, and multilevel decisionmaking.

### Satisficing and Incremental Budgeting

An important consideration for any priority-setting endeavor is the managerial burden it imposes on the government. The informational requirements for comprehensive priority setting are enormous, and many judgments must be made in the absence of relevant information. Even if assuming goodwill on all sides, the existence of limited managerial capacity and information resources may give rise to disagreement and instability in the priority-setting process. In its purest form, the rational cost-effectiveness model assumes that information capture is costless and that the required analytic capacity exists. However Simon (1957; 1959) characterizes the policymaking process as one of “satisficing” rather than optimizing. Instead of maximizing the benefit from a portfolio of health care programs, the politician’s goal is to attain a certain satisfactory level of benefit. The explanation for this behavior stems from psychological theories about a person’s motivation to act. Motives to act stem from drives, and action terminates when the drive is satisfied. The conditions for satisfying a drive are not necessarily fixed, but may be specified by an aspiration level that itself adjusts upward or downward, based on experience about what is practically attainable.

The model of satisficing is linked to the long tradition of viewing government activity as an incremental process, in which problems are tackled on the basis of perceived urgency and importance. Any changes in policy can involve high transition costs such as retraining programs, redundancy payments, relocation expenses and (possibly) political costs. A more gradual reform may reduce such costs substantially. Therefore, policymakers may seek to address priorities piecemeal instead of comprehensively, turning to issues as they assume political importance or new information arises. Lindblom (1959) characterizes the process as a “muddling through.” This incremental view conflicts with the “rational comprehensive” model assumed by cost-effectiveness models. It may simply be unfeasible or inefficient for a government to reappraise continually the entire health system, as required in principle by the conventional priority-setting model. In practice, provider capacity can be slow to adjust to the delivery of a whole new package. A more realistic aspiration is that a government should progressively remove ineffective programs and replace them with effective actions.

The incremental model implies that governments will set priorities for action according to criteria not considered in conventional cost-effectiveness models. These might include:

- The magnitude of the program involved: greatest potential gains may be secured by first reconsidering programs consuming a large part of health care expenditure
- The existence of large differences in aspects of competing technologies such as in outcomes, externalities, or equity considerations;
- Practical considerations: programs may have priority according to how feasible changing delivery patterns is and how high the transition costs are.

The incremental budgeting model can be modeled in the linear programming framework. With transition costs for inaugurating and abandoning programs, the priority-setting problem becomes one of selecting from a set of currently accepted programs P and a set of potential new programs Q, where the annualized transition costs of abandoning a program i in P (or of inaugurating a program in Q) are  $T_i$ .

$$\begin{aligned} \text{Maximize : } & \sum_{i \in P} (1 - \delta_i) B_i + \sum_{i \in Q} \delta_i B_i \\ \text{subject to : } & \sum_{i \in P} \{(1 - \delta_i) X_i + \delta_i T_i\} + \sum_{i \in Q} \delta_i (X_i + T_i) \leq \bar{X} \end{aligned}$$

where  $\delta_i$  is set to zero if the program's status remains unchanged, or one if the program's status changes (from within the package to exclusion, or vice versa). Bounded capacity to implement change could take the form of (say) a constraint of the form:

$$\sum_{i \in P, Q} \delta_i \leq \Delta_{\max}$$

indicating the maximum number of changes that can be processed.

## Externalities

A powerful criticism of conventional cost-effectiveness analysis is that it fails to model the more general economic environment in which health care takes place. Governments may make priority-setting decisions for economic reasons other than the apparent relative cost-effectiveness of programs. Jack (2000) uses positive externalities as an example. Goods have positive externalities if their consumption not only provides benefits to the direct consumer but also to other individuals. Examples of goods with positive externalities are immunization against disease and completion of curative therapy, both of which reduce the likelihood that others will contract the illness. If the consumer of such a good does not take into account the benefit to others, she will consume too little. In this situation, a government can improve overall welfare by inducing the individual to consume more, typically by subsidizing the price of the good (e.g., offering free tuberculosis treatment). The size of the subsidy should be equal to the size of the benefits the individual confers on others through her actions. This argument shows that externalities can be an important rationale for government action, but the effects of externalities are not reflected in cost-effectiveness estimates.

Moreover, health system activities may generate important outputs that are in addition to impact on the level and distribution of health. The World Health Report 2000 (World Health Organization 2000; Darby et al. 2000) recognized some of these by examining the health system's "responsiveness" to users. This is defined as "how the system performs relative to nonhealth aspects" and embraces respect for the person (dignity, confidentiality, autonomy) and client orientation (prompt attention, quality of amenities, access to social support, and freedom of provider choice). There is much debate about the exact nature and importance of responsiveness, but there is little doubt that the health system can have an important influence on individual welfare, independent of its impact on health. Politicians are likely to be especially



sensitive to responsiveness issues such as patient satisfaction and waiting times. They may therefore wish to take such considerations into account in priority setting if, for example, prompt attention has become an important political issue.

Moreover, the ramifications of health system performance may extend well beyond individual welfare to affect national productivity and other macroeconomic factors. The WHO report on macroeconomics and health (World Health Organization 2001) argued that, as well as saving lives, investment in health can “reduce poverty, spur economic development, and promote global security.” The lower life expectancy in poor countries lead to much lower lifetime earnings: for example, undiscounted lifetime incomes in Botswana are on average one tenth of those in the United States. However, poor health influences more than absolute income levels. WHO estimates suggest that each 10 percent improvement in life expectancy at birth is associated with a rise in economic growth of at least 0.3 to 0.4 percent per year, holding other growth factors constant. High prevalence of diseases such as malaria and HIV/AIDS are associated with persistent and large reductions of economic growth rates. Also, global security is affected by political and social instability in disease-ridden countries. Disease breeds instability in poor countries, which rebounds on the rich countries as well.

The effect of better health on macroeconomic factors can work through numerous mechanisms such as promoting labor productivity, improving educational status, and reducing personal uncertainty associated with health. Certain health system interventions are likely to have wider implications for the economy than others, although outputs may appear identical when measured purely in terms of health outcomes. In practice, the existence of various types of externalities may explain, in economic terms, priority-setting decisions that appear to run contrary to an approach based on simple cost-effectiveness ratios alone.

### **Multilevel Government**

Many countries devolve the stewardship of the health system to local governments, which may have considerable autonomy over the choice of priorities and volume of funding applied to health. Devolution can therefore lead to substantial divergences between local and national priorities. Such variations may be both efficient and legitimate. For example, it is unlikely that it would be either efficient or (in most people’s view) equitable for remote rural areas to follow the same pattern of health care services as their urban counterparts. Furthermore, local communities may hold different values from the national norm and might therefore legitimately pursue different priorities.

However, variations between local governments may also reflect inefficiencies or rigidities that inhibit pursuit of national priorities. Under these circumstances, the national government may wish to encourage local governments to change policies. The mechanisms for doing this are examined in the fiscal federalism literature (King 1984) and are based predominantly on the grants-in-aid paid by the national government to localities. These might, for example, take the form of matching grants (that match a specified proportion of local spending with a national grant) or conditional grants (which tie a grant to implementation of specific programs). Most such grants have been used to encourage general or specific activity that would otherwise have not taken place. However, the grant regime could also become a deterrent (for example, by withdrawal of a general grant after a certain spending threshold was exceeded).

This principle might be extended to more local decisionmaking units, in the extreme to individual physicians or households. Physicians may be reluctant to offer treatment in line with national priorities, and patients may be unwilling or unable to respond in the fashion assumed when setting priorities. For example, a national vaccination program may in principle be highly cost-effective, but is in practice compromised by poor compliance on the part of the population, perhaps because of poor information, poor access, or cultural barriers. In short, there is no guarantee that national policies will be reflected in local actions, and a government may have to put in place incentives and dissemination and training programs in order to secure local compliance. The costs of these mechanisms should be included in any cost-effectiveness analysis, implying that the cost-effectiveness of an intervention may be highly contingent on local circumstances.

In a similar vein, implementation of health strategies may require concerted coordination among different agencies. If the implementation of strategies relies on such collaboration, then priority setting in health may have to recognize the constraints and incentives operating on the collaborating agencies. For example, a health priority that requires the collaboration of (say) education services to implement immunization programs may have to recognize or overcome the institutional constraints operating in the education services, which may affect both the benefits and costs of implementation.

### **How to Deal with Transition Costs and Constraints?**

Now we will look at some approaches that have been developed to deal with transition costs and constraints: program budgeting and marginal analysis, robustness analysis, real options analysis, and multiattribute problem analysis.

#### *Program Budgeting and Marginal Analysis*

Program budgeting and marginal analysis (PBMA) has been developed as a practical approach to priority setting. It can be interpreted as an attempt to rationalize the incremental budgeting approach. PBMA was first applied in the health setting in the 1970s in the United Kingdom and since then some other countries have used it (Pole 1974; Mitton et al. 2000; Viney, Haas, and Mooney 1995). However, the approach has not been very widely applied, and some observers question whether it is a useful framework at all (Posnett and Street 1996). Although researchers have reported on individual PBMA studies, there has been little work describing the overall use and impact of PBMA internationally (Mitton and Donaldson 2001).

A study by Mitton and Donaldson (2002) confirmed the importance of incremental budgeting in reality and investigated the usefulness of PBMA as a priority-setting aid. (Mitton and Donaldson 2002). They analyzed how key Canadian decisionmakers in regional health authorities set priorities. The decisionmakers reported that no clear process of setting priorities exists and that allocation of resources is generally based on historical trends. Respondents were critical of the lack of transparency in the priority-setting process. Mitton and Donaldson (2002) found that PBMA would be useful in such a context. It is a pragmatic, economic framework that identifies how resources are being spent before looking into potential changes in service provision, at the



margin, to maximize benefit and minimize cost.<sup>17</sup> PBMA can address questions of efficiency and equity, and it can be utilized either within or across programs of care (micro and macro PBMA). The framework can be operationalized by answering five questions about the use of resources:

- What resources are available in total?
- In what ways are these resources currently spent?
- What are the main candidates for more resources and what would be their effectiveness?
- Could any areas of care be provided to the same level of effectiveness but with fewer resources, thereby releasing resources to fund candidates for more resources?
- Should some areas of care, despite being effective, have fewer resources because another program is more cost-effective?

An application of PBMA would first require definition of the specific program area and objectives (Mitton and Donaldson 2001). Then, a program budget can be developed to map the relevant activity and cost data. An expert panel, representing key stakeholders including management, clinicians, and possibly the public should then be used to identify areas for service expansion and resource release. Based on detailed information of the marginal costs and benefits of potential changes, the panel might then make recommendations for redesigning the services in question. In this way, resource shifts can be made so as to optimize benefits (or health outcome) for the total resources available. The introduction of PBMA could be an important step forward for many low-income countries that rely on line-item budgeting systems. These systems make priority setting difficult because, although they can inform about general reallocations such as from urban to rural or from secondary care to primary health care, they are insufficient to monitor reallocations between specific programs (e.g., the reallocation from first aid to malaria treatment within the primary health care package). A practical focus on the evaluation of relatively modest and manageable changes, as opposed to adherence to historical patterns, is the key contribution made by the PBMA approach.

### *Robustness Analysis*

Robustness analysis, which originates from operational research, can be used as a means of incorporating transition costs into decisionmaking. The conventional cost-effectiveness analysis treats the decisionmaker as risk neutral. Yet decisionmakers may in practice exhibit high aversion to risk. Reversing a decision that turns out to have been wrong is often extremely costly, either politically or in terms of real resources. As a result, it may be optimal for decisionmakers to adopt “robust” rather than optimal decisions (Gupta and Rosenhead 1968).<sup>18</sup> Robustness analysis provides an approach to structuring problem situations where uncertainty is high and decisions can or must be staged sequentially. Robustness analysis is concerned with situations where an individual, group or organization needs to make commitments now under conditions of uncertainty, and where these decisions will be followed at intervals by other commitments. A robustness perspective puts the focus on the alternative immediate commitments that could be made. They are compared in terms of the range of possible future

<sup>17</sup> For a review of the literature on PBMA, see Mitton and Donaldson (2001).

<sup>18</sup> For an overview, see Rosenhead (1980; 1989).

commitments with which they appear to be compatible. Thus, robustness analysis assesses the flexibility achieved or denied by particular acts of commitment.

The classical approach to planning that, for example, underlies economic evaluations of health care interventions, identifies the optimal target configuration for an assumed future state of the environment. Economic evaluation identifies the portfolio of health care interventions that will generate the highest health outcomes. The classical planning method also consists of a path of sequential decisions necessary to transform the current system into the optimal target configuration. Applied to economic evaluation, these are the steps required to change current resource allocation to the future optimal allocation. Robustness analysis, in contrast, declines to identify an optimal target and a decision path. It calls only for a decision concerning the nearest future, an initial commitment. Possible future commitments are of interest principally for their capability to respond to unexpected developments in the environment. The robustness of any initial commitment is the number of acceptable options at the planning horizon with which it is compatible, expressed as a ratio of the total number of acceptable options at the planning horizon. Robustness can take two forms: the decision is “good” (if not optimal) under a wide range of future scenarios; or the decision is readily reversed or altered if improved information subsequently indicates a change of strategy is required. In other words, it is flexible.

### *Real Options Analysis*

The basic notion of robustness analysis is to give flexibility an economic value in decisionmaking. This idea has been applied to economic evaluation by Palmer and Smith (2000) who model the adoption of a health care technology using “option-pricing” techniques. The options approach is useful whenever there is uncertainty about the future costs and benefits of a program, when subsequent abandonment would be costly, and when there is an opportunity to defer a decision. Under these circumstances, the decision about whether or not to introduce a new program is analogous to a financial call option. In general, an option approach implies that the hurdle cost-effectiveness ratio for a new program is higher than that used in conventional cost-effectiveness analysis. Conversely, abandoning an existing program may require the estimated cost-effectiveness ratio to fall well below the conventional CEA hurdle.

The reason for these results is that implementing a new program (or abandoning an existing program) entails a sunk cost in real resources or political credibility that cannot be completely recovered if the decision is reversed. Therefore, waiting to see whether the new information or technology clarify decision may be optimal. Palmer and Smith show how the required CEA hurdle, based on option pricing principles, can be readily calculated, and that it rises sharply as uncertainty surrounding a technology’s cost-effectiveness ratio increases.

The option pricing approach offers an explanation of politicians’ reluctance to make radical changes in existing priority-setting schemes. In the presence of uncertainty, high sunk costs, and the option to defer, they have a powerful incentive to appear conservative in retaining existing technologies and requiring a high rate of return from new technologies.

### *Multiattribute Problem Analysis*

Economic evaluation combines all benefits or outcomes of an intervention into one single benefit measure. As discussed in section 2, policymakers might feel uncomfortable with this procedure because it results in a loss of transparency. A single outcome measure does not convey any information on the nature and importance of the different attributes of the outcome of an intervention. Multiattribute problem analysis<sup>19</sup> (MPA) is sometimes considered an alternative decisionmaking aid to cost-effectiveness or cost-benefit analysis which overcomes these problems (Carrin 1984). MPA avoids weighting the outcome attributes and combining them into a single measure.<sup>20</sup> MPA has been used for a diverse collection of decisions such as budget allocations, analysis of responses to environmental risks, selection of nuclear waste cleanup strategies, inventory of blood in blood banks, and other problems.

MPA is best demonstrated with an example.<sup>21</sup> Let's assume a decisionmaker has to decide between five possible health interventions with four attributes: reduction of child mortality rate, reduction of adult mortality rate, number of work days gained per year per adult, and costs of the intervention. The attributes are valued in natural units or in percentage values. Each of the five interventions scores differently on the four attributes. If one intervention dominates all other interventions, scoring higher on all four attributes, choice is easy: the respective intervention is more attractive than all others on the basis of all attributes. However, if no intervention that dominates all others, policymakers' choice depends ultimately upon how they value the different attributes. The way to proceed further is to look for equivalent alternatives whereby all attributes but one are equalized. At the end only one attribute will differ, so the final choice becomes easy. Attributes are equalized by encouraging the decisionmaker to explicitly trade off attributes against one another and establishing a rate of substitution between the two attributes. For example, the first and third attribute are traded off with the question "How much reduction in the number of work days gained are you willing to accept in exchange for a further reduction in the infant mortality rate of 15 percent?." The answer is, say, two work days. This procedure is repeated for all but one attribute. Based on the rates of substitutions, the equivalent of each intervention can be calculated, and one dominant intervention will remain. An important prerequisite for MPA is that attributes' values can be manipulated in negative and positive directions.

Another essential requirement for MPA is the willingness of decisionmakers to make explicit trade-offs between different attributes (Winterfelt and Edwards 1986). This underlines a fundamental philosophical difference between MPA and economic evaluation. In cost-benefit analysis, each individual determines the value of health gains by stating her willingness to pay. Cost-effectiveness analysis relies on a social judgment about willingness-to-pay for a given health outcome. In MPA, decisionmakers take over the roles of individuals and society, respectively, and determine the worthiness of interventions on basis of their own value judgments, their own willingness-to-pay for the programs' attributes. To some, this might seem

<sup>19</sup> MPA is also called multiattribute decision analysis or multiattribute utility measurement.

<sup>20</sup> For an introduction into MPA, see Winterfelt and Edwards (1986), Edward (1977), or Keeney and Raiffa (1976).

<sup>21</sup> For a more detailed exposition of this example, see Carrin (1984).

unacceptable. However, it could improve politicians' acceptance of systematic decision aids and increase transparency of the political decisionmaking process.

### **PRIORITY SETTING AND HEALTH CARE FINANCE**

The nature of the financing system is an important issue with practical implications for the way priorities are set. Priority setting entails determining a societal social welfare function that reflects collective preferences regarding health system performance, expressed in terms of outcomes and equity. In principle, determining rules for setting priorities within a fixed budget should be independent of the system used to fund the consequent health care requirements. However, in practice, important interactions between the health system and the financing system may have to be taken into account when setting priorities. In particular, certain forms of financing may have important implications for provider behavior or patient behavior (in the form of stimulating or suppressing demand or changing insurance arrangements). These responses may influence who gains access to health care and how they do so, which in turn may affect health outcomes and equity. They may also affect the size of the revenue base available for funding collective health care.

The priority-setting literature generally presumes that a form of collective insurance is in place, with funding contributions being independent of utilization (and often instead being related to ability to pay). That is, it is assumed that users are not charged directly for health care. Yet in practice all systems of health care rely on a mixture of funding mechanisms, and lower income countries often rely heavily on direct user charges. In this section we examine the implications for priority setting of mixed funding systems.

For the purposes of this discussion, we consider the methods of funding health care under four headings:

- Collective insurance (through mediums such as general taxation, social insurance, or employer schemes) under which payments are independent of health care
- Private health insurance, under which for-profit insurers offer individuals comprehensive or partial cover for health care, with payments usually based on the insurer's perception of an individual's risk rating
- Complementary insurance, under which individuals choose to extend the coverage beyond some basic package, with payments based on the insurer's perception of an individual's risk rating
- Direct user charges and informal payments, under which providers charge users according to a fixed schedule of charges or other criteria such as local market conditions.

In examining these systems, it is important to keep in mind the accounting identity that (in the long run) the revenues of the health system must equal its expenditure. That is, the sum of tax revenues, private insurance, user charges, and other sources of income (such as donor revenues) must equal expenditure.

## Private Insurance

Consider first the implications of a market in private health care insurance alongside the collective insurance. In this case, citizens can choose to replace the collective health care coverage with private insurance, paying premiums according to the insurer's perception of the individual's risk rating. In some systems citizens may even be allowed to "opt out" of the collective system. They then receive a rebate in respect of the collective payment, which effectively acts as a subsidy for private insurance premiums.

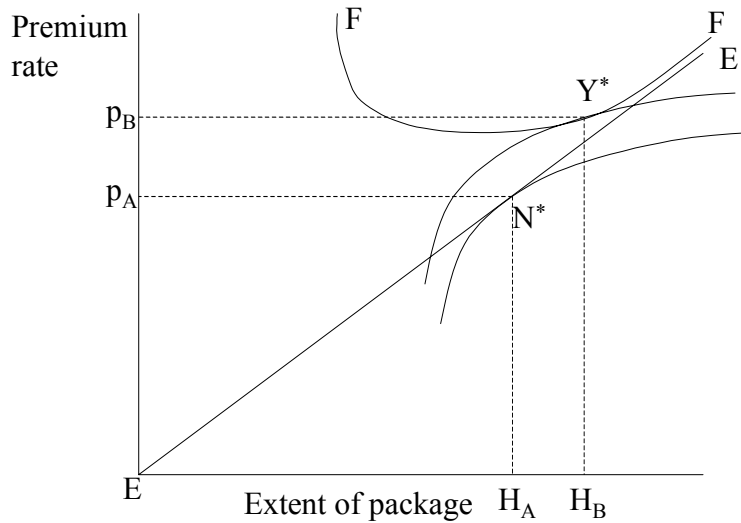
This arrangement has profound implications for the collective priority-setting process. Citizens with adequate income will scrutinize the proposed collective priorities to determine whether they are willing to pay for private insurance. They will choose to take out private coverage if the expected utility secured from the private package is greater than the expected utility from the collective package, after taking account of the (possibly subsidized) private premium. Private insurance will be attractive to citizens (a) with relatively high incomes (b) who are relatively healthy and (c) whose expected health care needs fall outside the collective package of care.

The volume of private insurance will have implications for the volume of activity and costs of the collective system. Furthermore, where the private premium is subsidized, the subsidy effectively results in a loss of revenue for the collective system. Widespread private insurance coverage also has important implications for the political support for the collective system. Reliance on private coverage on private coverage by a large segment of the population may undermine support for the collective system, reducing the capacity to raise revenue, and possibly leading to a downward spiral of an increasingly restricted collective package and higher levels of private coverage.

In short, the budget available for the collective package may be endogenous to the choice of package. In designing a set of priorities under these arrangements, therefore, policymakers have to take account of the attractiveness of the proposed collective package for the individuals who can afford to buy private insurance.

To illustrate this issue, Figure 1 shows the impact on the collective health care premium (or tax rate) of expanding the package of care. When the revenue base remains constant, this is represented by the line EE. That is, if there is no private insurance, increased expenditure on health care requires a proportionate increase in the premium rate. Social welfare will be maximized toward the bottom right of the diagram, so policymakers will choose an optimum such as  $N^*$ .

**Figure 1. The Collective Health Care Package and the Insurance Rate**



Now let's consider the special case when those with adequate means can opt out. With a generous collective package of care, citizens have little incentive to opt out, so the revenue base remains undiluted and the required premium rate will remain similar to the case with no private insurance. However, as the package becomes more limited, wealthier and healthier citizens may opt out. This will reduce the expenditure requirements of the collective sector, but it will also reduce the tax base for raising premiums. The latter effect will usually outweigh the former, so the collective premium rate will have to be higher than it would be without private insurance, as shown by the line FF. In the extreme, as the package becomes very restricted, the revenue base for collective health care may become so weak that collective premiums start to increase as more and more people opt out. The collective system breaks down.

Therefore, if too many people opt out, policymakers may be forced to select an inferior optimum ( $Y^*$ ). This sort of phenomenon may occur even if—as is more common—there is no formal subsidy for opting out. Wealthier citizens may nevertheless take out private insurance while continuing to pay collective premiums. Although they then pay for both private and collective cover, political support for the collective premiums will be thereby diminished. This may not directly reduce the size of the revenue base available for collective premiums, but it may seriously constrain the level of premium that can be chosen. In the extreme, public facilities may disappear if support from wealthy citizens is inadequate.

Under these circumstances, governments may seek to make the collective package more attractive to wealthier citizens by skewing its contents toward their preferences. This may entail departing from strict cost-effectiveness criteria and may impair equity, but it may increase support for the collective system among higher income taxpayers and thereby sustain its revenue base. In the context of Figure 1, skewing the package toward the people who can afford to opt

out may result in a premium curve somewhere between EE and FF. Policymakers have to judge whether the improved revenue-raising capability this offers is worth the equity and efficiency costs of skewing the package.

### **Complementary Insurance**

Complementary insurance offers the opportunity for those with adequate means to secure coverage beyond the priorities encompassed in the basic package. Assuming that no citizens can opt out of the basic package, this arrangement can offer policymakers the opportunity to diverge somewhat from pure cost-effectiveness criteria in setting priorities. It may then become possible to skew the collective package at:

- Interventions that are predominantly needed by those unable to afford complementary insurance
- Interventions that would result in widespread catastrophic payments if not covered
- Conditions that cannot be covered by complementary insurance.

### **User Charges**

We now consider a system of formal or informal user charges operating alongside the collective health system. In the extreme case, user charges might be set at market clearing prices. This situation would appear to leave little role for priority setting or collective provision. We must therefore assume that user charges are lower than market prices, at least for some interventions. They will then fulfill a dual role of moderating demand and partially financing the health system.

Offered an intervention within the chosen package of care, citizens must decide whether the expected utility associated with receiving the intervention exceeds the expected utility associated with forgoing the intervention, after taking into account the associated user charge. In aggregate, such choices will have important implications for the expenditure and revenue of the health system.

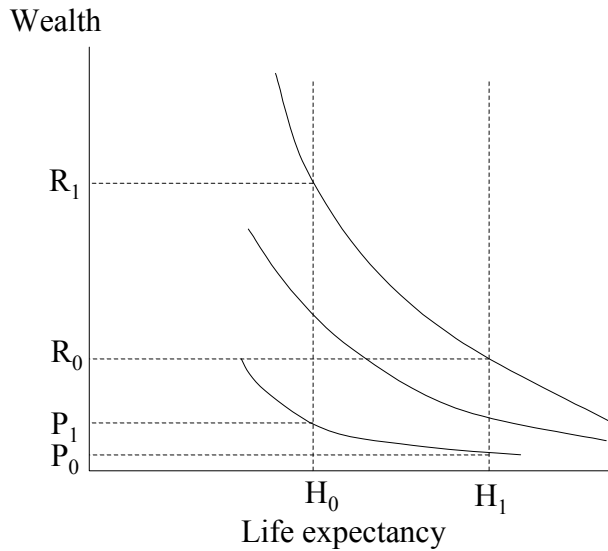
If no system of exemptions is in place, many patients are likely to be confronted with catastrophic user charges that they cannot afford. The consequent impoverishment or inability to access care is likely to offend many concepts of fairness, leading to a need to consider abatement or removal of user charges for people who cannot pay them. This arrangement will increase the expenditure of the collective system (through increased demand) and reduce its income (through the subsidy). It may also alter political support for the collective system among those who qualify for subsidy, and among those who do not.

The impact of user charges on utilization can be illustrated by means of a diagram (Figure 2) that examines an individual's wealth (present value of future income) and health (health-adjusted life expectancy). Consider three individuals having identical preferences and health but differing in wealth. They would each like to be located in the top right hand of the diagram (healthy and wealthy). However, each enjoys a current health status of  $H_0$ , yielding the three prevailing indifference curves distinguished by the different levels of wealth. Suppose an intervention exists that would confer on each an improvement in health from  $H_0$  to  $H_1$ . The poorest individual has a much lower ability to pay for improved health. By undergoing the intervention,



the wealthy individual would enjoy an improvement in welfare providing that the user charge was less than  $R_0R_1$ , while the poor individual would enjoy an improvement in welfare only if the user charge was less than  $P_0P_1$ . Thus, in the absence of any subsidy for the poor, the inclusion of the intervention in the package with a user charge will benefit the rich more than the poor.

**Figure 2: Trade-off between Wealth and Health among Rich and Poor**



User charges will almost always have a detrimental impact on equity in this way, and are therefore justified principally on the grounds of depressing demand for an intervention and generating revenue, and thereby enabling expansion of the package. Thus, if unnecessary utilization (moral hazard) is a substantial risk or if the potential benefits of a procedure are highly variable between individuals (depending perhaps on the nature of their employment), there may be an argument for imposing a user charge. Only individuals for whom the intervention would yield some minimum level of benefit would then seek treatment.

If user charges permit expansion of the package, they effectively act as a subsidy from one class of the sick to another. If intervention 1 is already in the package, then a new user charge for intervention 1 may make it possible to expand the package to include intervention 2. If this occurs, patients requiring intervention 2 can then receive treatment at a price below the market rate. In short, a transfer has occurred from patients requiring intervention 1 to patients requiring intervention 2.

User charges are most appropriate for interventions that do not result in widespread catastrophic payments. In the extreme, such low-cost interventions (however effective they are) might be omitted from the package, leaving patients to purchase care at market rates. The priorities package would instead focus on higher cost technologies that would otherwise lead to catastrophic payments. In short, a system of priority setting alongside user charges might lead to

substantial departures from strict cost-effectiveness criteria, incorporating considerations such as the costs of the intervention, its vulnerability to excess utilization, and a variety of distributional considerations.

User charges can be modeled as a mathematical program, but the complexity of the problem increases considerably from the simple linear program discussed above. For each program  $i$  we consider a choice variable  $c_i$  that indicates the proportion of the full market price charged to users of the collective package. That is, the policymaker must choose for each program the proportion  $c_i$  of the cost (copayment) borne by the user. The function  $\theta_i(c_i)$  then indicates the proportion of all potential users that use the intervention when copayment is set at proportion  $c_i$  of the cost. Therefore  $\theta_i(0)=1$  and  $\theta_i(1)=0$  (we assume that all users will have recourse to the private sector when the collective package charges full costs). The expression:

$$\eta_i = \frac{c_i}{\theta_i} \cdot \frac{d\theta_i}{dc_i}$$

indicates the price elasticity of demand for the intervention  $i$ . It is the proportionate change in demand brought about by a one percent change in price. Note that the elasticity should in general be less than or equal to zero for all levels of copayment.

The priority-setting problem is then to select a set of  $c_i$  that optimize the following program:

$$\begin{aligned} \text{Maximize : } & \sum_i \theta_i(c_i) B_i \\ \text{subject to : } & \sum_i (1 - c_i) \theta_i(c_i) X_i \leq \bar{X} \\ & c_i \in [0,1] \quad \forall i \end{aligned}$$

The benefits  $B_i$  of the program may be equity-weighted, as in section 3, so equity considerations could be readily built into the model. Provided that the functions  $\theta_i(\cdot)$  are “well-behaved,” this problem is readily solved mathematically. The solution implies that:

- For sufficiently high values of the benefit-cost ratio  $B_i/X_i$  no zero user charge will be levied, as the benefits of free access outweigh any forgone revenue.
- For sufficiently low values of  $B_i/X_i$  the full market price copayment will be levied, as the benefits of the program are never sufficient to justify any user charge subsidy.
- For moderate levels of  $B_i/X_i$  an intermediate copayment may be levied, as the benefits of user charge revenue compensate for some reduction in utilization.
- For programs with equal elasticities, charges  $c_i$  will increase as the cost-effectiveness ratio  $B_i/X_i$  decreases, until for sufficiently low values they become 1.
- For programs with equal (moderate) cost-effectiveness ratio  $B_i/X_i$ , charges  $c_i$  will increase as elasticities decrease, until for sufficiently low values they become 1.

This analysis reinforces the view that—when resources are limited—free access should be targeted at low probability, high cost conditions that would otherwise require catastrophic payments among the poor.

One straightforward extension to this analysis would allow the values of  $c_i$  to become *negative*. That is, for some high benefit interventions it may become optimal to offer payments (or

subsidies) to citizens to encourage them to use of the intervention. A more complex extension would allow different levels of copayment according to criteria such as income.

## CONCLUSIONS

In this section we have attempted to examine the realities of the priority-setting process by going beyond the classical assumptions of economic theory, which consider a benevolent decisionmaker maximizing efficiency, equity, or both subject to a budget constraint. We have outlined several models of political economy that explain why governments might fail to secure Pareto-improving policy changes. The models suggest a range of additional constraints on decisionmakers operating in a political context, for example, the need to gain political support to be reelected and the tendency to operate out of self-interest or to respond to the interests of powerful groups. We went on to consider additional issues that may influence the practical implementation of priority-setting decisions, particularly the existence of substantial transition costs associated with making policy shifts and also the externalities associated with health care expenditures, which may not be accounted for in traditional cost-effectiveness analyses. These approaches suggest circumstances under which we might expect decisionmakers to depart from the decisions they would make if confronted with a simple efficiency and equity maximization problem. They are therefore valuable additions to our knowledge in terms of their ability to describe the realities of the priority-setting process. However, on the whole, the models do not offer solutions on how to deal with the problems of priority setting in health care, given the plethora of political and practical obstacles to making “rational” economic choices.

To address the latter issue, we described some decision aids designed to cope with decisionmaking in complex environments. Many of these models stem from management and business science but have been applied to the situations faced by public decisionmakers. PMBA has been used before in the health care setting and may merit further investigation, especially in terms of how it can help formalize the incremental approach to priority setting, which may in practice be the approach most likely to be adopted in many circumstances. However, it probably fails to capture the complexity of decisionmaking in this area, which is where robustness analysis may be more informative and worthy of further analysis in terms of its specific application to health care.

In approaching priority-setting decisions from the classical economic perspective, the potential influence of the financing system is easy to overlook. This is because it is usually assumed that priority-setting rules should be independent of the mechanisms used to raise the budget within which decisionmaking takes place. However, we have described the ways in which financing regimes, and the decisions on which packages of care to prioritize, can interact in important ways, with serious implications for the revenue base available for health care expenditure and access to services by different groups. This implies that the rules for setting priorities may vary legitimately between systems with different approaches to the financing of health care.

In conclusion, we have examined a range of approaches that attempt to reflect the reality of the decisionmaking process more accurately than the traditional economic approaches. Some of these are useful only because they enhance our ability to explain what we observe in the “real” world where decisionmakers encounter a variety of political, institutional, and financial constraints. Others have more practical relevance and may be used alongside traditional

approaches such as economic evaluation. The latter deserve further attention and application to the health care context.

## CONCLUSIONS

This discussion paper examines the challenge of setting national priorities for health from an economic perspective. The basic problem confronting national policymakers is to select an optimal portfolio of programs within the nation's means, as reflected in a fixed budget constraint. The traditional economic approach has been to assert that this implies using the fixed budget to maximize some measure of incremental health output, often expressed in the form of quality adjusted life years (QALYs) or equivalent measures. The policy advice of ranking programs according to their cost-effectiveness ratios flows from this formulation.

However, the apparent simplicity of this approach masks some serious problems that arise when attempting to operationalize this process. Three broad issues are examined in this paper. First, the cost-effectiveness approach itself has weaknesses; second, the incorporation of equity considerations raises conceptual and practical issues; and third, the political, institutional, and environmental context in which priorities are set takes means decisionmakers are unlikely to apply simple cost-effectiveness rules when setting priorities.

Our review of current economic evaluation practice (section 2) highlights many unresolved methodological and practical difficulties that compromise its use for priority setting. In particular, two of the main limitations on the use of cost-effectiveness rankings is the lack of standardization of study methodology and the difficulties associated with generalizing results to settings other than those used in specific economic evaluations. We outline the obstacles to the practical application of cost-effectiveness results and conclude that policymakers often cannot use such results due to their lack of transparency, their inability to take into account other important contextual factors, their and lack of relevance to their own situation. In addition, for many interventions, no cost-effectiveness data exists. Despite these limitations, it would be wrong to conclude that the principle of using cost-effectiveness analysis should be abandoned. Instead, efforts to improve methodologies and extend the coverage of CEA may be useful. However, we also debate whether alternative approaches such as the simplification of the cost-effectiveness approach, might make it a more attractive option for policymakers who may be seeking a more transparent way of using economic information for priority setting.

Our review of the different notions of equity addressed in the literature (section 3) concludes that most contributions are theoretical, remote from the practical issues involved in ensuring a "fair" allocation of resources, and ambiguous about what is meant by "fair" in the health care context. However, most equity considerations fall into two broad headings: equity related to a concept of need and equity related to access to services, and we conclude that, theoretically, incorporating these concepts into CEA analysis is unproblematic. Skewing resources toward the needy merely implies that health gains should be weighted differently according to who receives them. The notion of equity-weighted health gain is unproblematic, although much needs to be done in practical terms to make notions such as "need" operational.

The practical constraints discussed in section 4 offer a more challenging agenda. Three broad areas of concern are: the political environment in which priority setting takes place; the transition costs of implementing new priorities; and the interaction between priority setting and health care finance. These issues suggest that decisionmakers are unlikely to be concerned merely with the economic imperative of maximizing equity-weighted health gain subject to a budget constraint but will also have to address additional factors when deciding how resources should be allocated. However, we have tried to demonstrate that these considerations do not necessarily compromise the broad principle of using CEA as *one* criterion for priority setting—but it cannot be used in isolation. CEA becomes just one of a number of inputs in the priority-setting process. Furthermore, we have demonstrated that traditional CEA can in principle be readily modified to accommodate issues such as donor constraints, setup and abandonment costs and user charges. However, we must acknowledge that such developments would considerably complicate the CEA methodology. They imply that optimal solutions to the priority-setting problem will depend heavily on local circumstances and constraints.

Priority setting in health care is a complex task. Our review illustrates the many theoretical, political, and practical obstacles facing the decisionmaker. As a consequence, it would perhaps be easy to conclude that the task is insurmountable instead of merely difficult. We believe this would be unduly pessimistic. We have shown that adopting an economic approach to priority setting has many advantages, not least that it forces the decisionmaker to define explicitly the objectives of the priority-setting process, even if they cannot be easily measured. It also allows the many conflicts that arise in priority setting to be explored explicitly rather than merely avoided and as a consequence the nature of the trade-offs involved in setting priorities is made clear.

The economic approach is just one element of the priority-setting process and cannot be used in isolation from the many other factors that influence decisionmakers and which will no doubt remain difficult to incorporate into economists' models. Optimal solutions to the priority-setting process will depend heavily on local circumstances and constraints. Our findings nevertheless suggest that, at least theoretically, the traditional economic approach can be expanded to incorporate both equity concerns and a wealth of practical constraints that will influence decisions. Making these principles operational offers a rich and challenging agenda for researchers and policymakers.



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