Searching for Essential Health Services in Low- and Middle-Income Countries

A Review of Recent Studies on Health Priorities

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Foreword

Although José Luis Bobadilla does not require a lengthy introduction, this, his posthumous work, needs an explanation. Dr. Bobadilla was born in Mexico where he received his medical training. He quickly joined the ranks of those whose ideals led them to the broader issues of how to improve the health of entire populations rather than simply that of individual patients. Thus, he embarked on a career in public health and, in particular, devoted himself to the study of the relationship between epidemiology and economics in an attempt to improve the impact of available resources on public health. It is not surprising, then, that his last days found him working on the development of this paper, How to Set Priorities in Health Expenditures.

José Luis had the idealism of someone with a public conscience and the pragmatism of a scientist. It followed, therefore, that he would do battle with the most intricate public health issues; namely, how to determine which benefits should be included in the design of a public health service. The genesis of this report dates from the time when Dr. Bobadilla was working for the World Bank, where he participated in the publication of the 1993 World Development Report, *devoted to the topic of health. It was at that time that the need arose to evaluate the returns of expenditures on health to ensure that all members of society have access to basic health services. This report brings together the initial findings of that effort in various regions of the world.*

By mid-1996, Dr. Bobadilla was well-advanced in this research when he transferred to the Inter-American Development Bank to concentrate his efforts on the Americas. In October of that same year, an accident while traveling on business, cost him his life. His life-long work in support of the countries of the region and this report whose aim was to set forth his findings, were thus left unfinished. It is particularly significant that the section of the report dealing with the burden of disease in Latin America and the Caribbean was left undone — as if to indicate to us what we need to continue doing. This document, thus, presents a posthumous and unfinished work which was initiated and developed, for the most part, while Dr. Bobadilla worked at the World Bank, and continued during his very short stay at the IDB.

This portion of Dr. Bobadilla's written legacy existed only in draft form at the time of his death. In spite of that, highlighting the

document's value and usefulness, it was being used as a teaching tool in the joint application of economics and epidemiology to health policy formulation in universities throughout the region. The publication of an unfinished work is a delicate matter since respect for the author requires that the text be readable while, at the same, remaining faithful to his message. We have endeavored to remain true to the content and nature of Dr. Bobadilla's draft, but have found it necessary to make minor editorial changes to facilitate comprehension.

The IDB is publishing this report in honor of Dr. Bobadilla and in gratitude to the World Bank where he developed this work (this should appropriately be considered the work of that institution). An additional reason for publishing this report is to offer it as testimony of the IDB's support to the establishment of social priorities in order to ensure equity. We hope that this work will inspire politicians, researches and policymakers throughout the region to study the allocation of health care resources with a view to the needs of all social groups. The methodology analyzed in this paper offers a practical way to carry out that task and channel resources appropriately. Indeed, the projects that the IDB is now financing in Latin America and the Caribbean include the study of the relative efficiency of various types of interventions as a function of their cost-effectiveness and the prevalence of disease.

In March 1997, the World Bank, the Pan-American Health Organization and the Mexican Health Foundation joined the IDB in the establishment of the José Luis Bobadilla Prize *to be awarded to those individuals making a significant contribution to research and policy development to improve health services in Latin America and the Caribbean. The* Bobadilla Prize, *which will be awarded for the first time in June 1998, will be administered by the Mexican Health Foundation. In this way, we hope to begin a process of inspiring and supporting those who, like Dr. Bobadilla, have an interest in public health policy. It is our hope at the IDB that this publication, intended to honor Dr. José Luis Bobadilla, will serve as a source of inspiration to many people in the region to continue and improve upon his intellectual legacy.*

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Preface

It is a pleasure to be asked to write a preface to as stimulating a paper as this, especially as it represents the last major work of Dr. José Luis Bobadilla. Of course, one must avoid the temptation to make this solely a tribute to this remarkable thinker in public health who inspired many of those who came into contact with him, and reflect more profoundly about the factors that influence the public's health and our ability to modify those factors. The topic of setting priorities is inherently difficult in any area, and the voluminous literature in fields such as industry shows the varied and complex approaches adopted by systems engineers and their colleagues to devise models that address the issue.

The setting of priorities in the field of health has long been bedeviled by several myths. First, there is the myth that priorities are somehow unnecessary in an area such as health, which for some moral reason should be attended to at all costs. Then, there is the myth that the setting of priorities is a matter only for the developing countries where resources are scarce. Finally, there also is a myth that there is an inherent contradiction or incongruence between an inexorable move toward free market economies, with the acceptance of their weakness as allocative mechanisms, and a collectivist approach to the distribution of public goods, such as some aspects of health. This latter approach sees the need for distributive justice in some fields and posits that equity should be a central focus to any such discussion in an area such as health.

Dr. Bobadilla sets out clearly the nature of the problem and in a very elegant prose debunks some of those myths. He emphasizes what should by now have become standard dogma; namely, that no country, no matter how rich, can satisfy the health demands of its population, and the focus, therefore, has to be on needs. Unfortunately, there is still evidence that the thesis put forward 26 years ago by the English GP, Tudor Hart, still obtains, in that the availability of good health care tends to vary inversely with the need of the population. One of the important aspects of Dr. Bobadilla's paper is to discuss how one might objectively assess those needs on the basis of some rational development of priorities. He correctly points out that the technocratic solution is necessary but not sufficient. One must take account of the difficult ethical and political aspects involved. He is not unaware of demand pressure and explains the rationale

behind the almost universal law that as per capita income rises, the ulitization of health care services and the cost of treatment rise as well.

It is very revealing to see the progress in thinking within the World Bank on the technical aspects of priority setting. Attention to this topic will assume even greater importance as that institution and other financial organizations seek to invest more in the health sector not only for humanitarian reasons, but also because of the economic implications of health.

The paper is balanced in that there is no blind advocacy of one or other technique, and Dr. Bobadilla sets as elegant a critique of the use of Disability Adjusted Life Years as I have seen anywhere. Perhaps the most challenging part of the paper is that which deals with quantum of budget needed, how to distribute it, and how to put in place the mechanisms to make the scheme work.

The lasting value of this work, however, lies not so much in the excellent description of the the technical issues or the careful analysis of the case studies. It is to be found in the openness of the call to those of us involved in health policy to reflect on the fundamental problem of how to advise on the allocation of resources in a transparent manner, while seeking the almost holy trinity of equity, effectiveness, and efficiency. It is relatively easy to hide behind general statements of principles and desiderata, but it is very difficult to advance proposals that are founded in the kind of critical attention to the issues raised by Dr. Bobadilla. It is interesting and significant that the paper is titled as a search. I trust that others who continue this search for ways to attend to the health of the public recognize and build on the efforts of José Luis.

Sir George A. O. Alleyne
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The Importance of Dr. Bobadilla's Manuscript

This meta-analysis by Dr. José Luis Bobadilla is a major contribution to the literature on the cost-effectiveness of burden-of-disease analyzes. Dr. Bobadilla critically reviews the twenty-four country studies that were launched after the publication of the 1993 World Bank World Development Report*; carefully analyzes the serious pitfalls encountered during the conduct of these studies; provides a synthesis of useful generalizations; and thoughtfully outlines the major areas that require attention if further progress is to be made in the use of burden-of-disease tools for practical decision-making at the country level.*

Among the several very important conclusions and recommendations that Dr. Bobadilla makes, I consider the four issues discussed below to be the most important:

The overwhelming deficiency in these studies is the lack of appropriate data *for monitoring changes in death and disability rates in relation to specific interventions and underlying risk factors. Indeed, reasonable estimates of age, sex and place-specific mortality rates were rarely available, let alone cause-specific rates or information on morbidity. Reasonable estimates of the unit costs of health programs were also sparse. Two contributing factors to this deficiency are the data systems which collect large amounts of unsuitable information, and the lack of understanding on the part of those responsible, about what data is most needed to assist in the resource allocation and health planning decision-making processes. In some respects, the most important contribution of these studies is that they made evident the enormous gap in suitable data for establishing health care priorities.*

The lack of appropriately trained health managers and researchers is directly related to inadequate and inappropriate training from standard courses in both epidemiology and economics to understand and use the methods for setting and monitoring heath system priorities. Dr. Bobadilla emphasizes that "more of the same" will not improve things; adequate educational programs for decisionmakers and researchers must be developed to meet the needs in these new knowledge and skill areas.

Dr. Bobadilla points to the fact that even available information and methods for quantitative analysis to assist in the establishment of priorities are not used because little attention is given to the political context for making decisions. *He identifies a threefold set of tensions: First, the tensions between the researchers and the policymakers regarding the time required to produce results and the rigor of the studies needed to make decisions. Second, some decisionmakers find it politically "inconvenient" to have priorities set forth in an explicit, transparent fashion, and are likely to resist such approaches since they may be seen as an erosion in their discretion and power. Politicians and decisionmakers must be fully involved in order for them to appreciate that it is in their long-run interest to fully understand and make use of these methods. Third, neither researchers nor the public health communities are particularly interested in convincing decisionmakers to apply these new methods to set priorities. The researchers' focus is on scientifically rigorous results rather than on the information needed to make decisions. Public health specialists frequently have their own entrenched interests and are not interested, and indeed may feel threatened, by these approaches.*

Finally, Dr. Bobadilla was deeply concerned about issues of equity. *In this study, he points out that in some situations, resource allocation efficiency goals and equity goals could clash. This was an area that he had just begun to explore and since it had become an important concern of mine as well, we had planned to meet with a few others to do some brainstorming on the week that he was due to return to Washington following his ill-fated trip.*

There are numerous other important points raised in Dr. Bobadilla's review, and the article, even in its draft, not-yet-polished form as presented here, is a rich source of stimulating ideas and thought-provoking issues.

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Introduction

Good health sector analyzes have found serious mismatches between the disease profile of the population and the distribution of resources. There are many complex reasons to explain why health services, all too often, fail to meet the health needs of the population. However, they are all related to technical issues and/or social values.

The technical reasons for this misallocation are generally based on the use of oversimplified models to set health care priorities and a lack of appropriate quantitative information. Explanations based on social values, on the other hand, focus on imperfect fits between population preferences and real health needs, and between population preferences and the content and distribution of health services.

This paper addresses the progress made, and the problems that result from applying technical criteria to set health priorities in a more rational way. The usefulness of technically derived priorities depends largely on their political feasibility and the extent to which they reflect social values. The paper draws freely from two unpublished earlier documents prepared for the World Health Organization: *Research on Setting Health Priorities: the Case of Low- and Middle-Income Countries* and *Setting Priorities in the Newly Independent States.*

The main focus of this paper is the application of explicit criteria to set health priorties in lending projects and sector work. It draws lessons from 24 studies undertaken in low- and middle-income countries from 1993 to 1996. The paper describes the main characteristics of the studies, assesses their technical quality and policy relevance, and summarizes the first two stages which culminated with the publication of the *1993 World Development Report: Investing in Health* (World Bank 1993).

The paper is organized into six chapters: Chapter I summarizes the logic behind setting health priorities and briefly reviews their antecedents through explicit criteria. Chapter II describes the main characteristics of the studies. Chapters III and IV focus on the evaluation of information, methods and indicators to set priorities and design packages of essential health services. Chapter V reports on the main disease priorities and the results of cost effectiveness analyzes. Finally, and lastly, Chapter VI identifies research and development needs to improve future studies.

Several colleagues contributed to the analysis presented in this paper. Peter Cowley collaborated in the first inventory and assessment of health priorities studies, published in January 1995. Beatriz Zurita was responsible for the assessment of the cost-effectiveness analyzes and other issues on resource allocation. Adnan Hyder helped to evaluate the burden of disease component of the studies. Veronica Vargas summarized the inventory of studies presented in chapter II. Prabhat Jha and Kent Ranson prepared Box 3. As usual, the errors and inaccuracies remain my sole responsibility.

I am grateful to those who contributed with ideas and reviews of previous versions of this paper: Philip Musgrove, Cristian Baeza, Beatriz Zurita, and Veronica Vargas. The support from Richard Feachem, Helen Saxenian, and Xavier Coll in the Human Development Department of the World Bank was invaluable.

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I
Antecedents

Like other sectors, the health sector has finite resources. All governments, therefore, must address the mismatch between health resources and health care needs. Yet, in low-income countries the problems that governments must confront are more severe. The situation is compounded by the fact that health care needs, defined as physical and mental problems that require medical counseling, diagnosis or treatment, are considered infinite. No matter how healthy a population, their health needs and demands will always exceed the ability of health institutions to provide services.

Rationale for Setting Priorities

A number of changes are taking place in the epidemiological profiles of populations and the financing and organization of health systems that have increased the need to set health priorities.

The demand for health care is growing. Studies have shown that as per capita income grows, life expectancy at birth increases. However, as income per capita rises, the use of health care services and the unit cost of treating an individual also increase. This health utilization paradox can be explained by four sociodemographic changes which correlate strongly with income.

First, the medium-term effect of fertility decline is a sharp shift in the age structure of the population. Populations are aging and imposing a heavier burden on health services because older people tend to be sicker and consume more health services. In addition, the services that they require are more expensive than those for other age groups (Mosley et al. 1993).

Second, more education and information on health issues and risks lowers a population's threshold of physical and mental abnormality, increasing the prevalence of perceived morbidity and, in turn, the demand for health care (Berman and Ormond, 1988).

Third, the life styles of urban middle and upper classes undergo a stage of regressive behavior. Tobacco consumption, alcohol abuse, excess consumption of animal fat, and lack of exercise become more prevalent as people increase their income. However, after a few decades of indulgent behavior, certain sectors of the population (the more educated and wealthier) begin to stop smoking, consume less fat and exercise more often. Between these two stages, the incidence of many chronic diseases (most notably, cardiovascular disease and lung cancer) rise and impose a significant, and sometimes heavy, burden on health services (Bobadilla and Costello 1961).

Fourth, the technology needed to diagnose and treat diseases and injuries has developed rapidly during the past 20 years. As countries increase their wealth, their adoption of new medical technologies tends to grow at a faster rate. Generally, new drugs and techniques in clinical medicine lead to higher health care costs with marginal benefits in the health status of the population (Bronzino, Smith and Wade 1990).

Over the past 30 years, most low- and middle-income countries have begun to experience one or more of these changes. Many middle-income countries in Latin America, East Asia and Eastern Europe have experienced all of them, with a wide range of intensity.

Strong arguments can be made for setting health priorities, mainly because the health problems which affect populations are becoming more complex, and the absolute burden of disease and the demands for health care are increasing rapidly. To be sure, if financial resources for health were simultaneously increasing, prioritization would not be needed. Unfortunately, this is not the case.

Resources for health are shrinking or not growing fast enough. Due to the debt crisis in the 1980s and to other macroeconomic problems, most low- and middle-income countries have reduced per capita public spending on health (Lafond 1995).

Government spending is under greater scrutiny than before. Countries facing a severe fiscal crisis in the 1980s and 1990s increasingly had to justify the use of public funds to produce goods and services (Birdsall, 1993). As a result, governments have reduced their funding or direct involvement in the production of a vast array of goods and services. Although there are strong reasons to justify some public financing for health (World Bank 1993), there is no agreement on what the right level is. As one possible solution, the *1993 World Development Report* emphasized that services beyond the essentials could be left to private funding.

Health care priorities are inclusive of all actions, interventions and programs that are primarily justified by their positive health effects. Apart from typical medical interventions, many other programs routinely managed by other sectors should be included in the menu of health care choices. Social programs that work indirectly to produce health benefits (such as the formal education of girls, activities which generate income, or direct subsidies to the poor) are not part of the menu because their implementation is not primarily justified by their health benefits. On the other hand, environmental interventions that are justified by their health benefits, even when the real effect on morbidity and mortality is moderate, are included in the universe of health choices.

Although health priorities can be set for any type of health organization, private or public, their relevance is more obvious for public institutions. Private health insurance agencies often set priorities, mostly through the definition of intervention exclusion lists. Public health institutions are accountable for the use of the resources entrusted to them; taxpayers expect, and sometimes demand, an efficient use of health resources (Musgrove 1995).

Health care priorities are an intrinsic part of all health systems. All the systems have a built-in mechanism for setting priorities which applies implicit criteria. The current decision- making process in the public sector, which is based on implicit criteria, is unsatisfactory because of a lack of transparency and distortions in the alloction of resources. With few exceptions, establishing priorities is heavily influenced by political pressures and delegated to health managers who often have serious conflicts of interest. Such is the case of hospital managers who want to expand the degree of sophistication and size of their medical facilities, but have no incentives to use hospital resources to provide the most cost-effective services to their patients. Moreover, in many countries, public sector health institutions spend most of their money in urban areas, often at the expense of the rural populations' access to health care. A more subtle way of setting priorities is through the underfunding of recurrent and maintenance costs which leads to deterioration in the quality of care.

Recent Progress in the Development of Indicators, Methods and Data

Research efforts primarily directed at improving priority setting in the health sector of low- and middle-income countries have been incomplete, scarce and of fair quality. Most of what we know about priority setting has, in fact, been learned through research efforts that have had indirect objectives connected to the process of setting priorities. The main weakness with the available research is its narrow focus on the measurement of cost-effectiveness and cost-utility analysis, and to some extent, on the burden of disease. Issues associated with the political process of priority setting, the ethical implications of various methods, the institutional and management implications of proposed priorities, and the role of social values in the allocation of health resources have been largely neglected.

The mainstream scientific literature suggests a technocratic approach to priority setting. This approach involves three stages. The first stage is the quantita-

tive analysis of the burden of disease, preferably through a single indicator. Typically, premature mortality and disability losses would be estimated with breakdown by immediate causes (diseases), sex and age (Murray 1994). The second stage is the analysis of the cost-effectiveness of the alternative interventions to control the diseases that cause the largest health losses (Jamison et al. 1993). The third stage is the selection of a package or list of interventions that can be delivered with the available budget and through the current health system (Bobadilla et al. 1994).

Table 1 lists the main areas of development that have influenced policymakers in conceptualizing and setting health priorities. The development of a single indicator to measure health status has been a major step forward for the setting of health priorities. The disability adjusted life year (DALY) and its variations have been extensively used since the publication of the *1993 World Development Report.* To a large degree, the DALY is a "clone" of the quality adjusted life year (QALY), which was developed about 20 years ago (Feachem, 1993). The main merit of this

Table 1
Recent Progress in Health Priorities Research

Subject	Main Contribution	References
Measuring Health Status	Design of the Quality of Life Years (QALY)	Zeckhauser and Sehpard, 1976
	Desing of the Potential Years of Life Lost (PYLL)	Anonymous, 1987
	Design of the Disability Adjusted Life Year (DALY)	World Bank, 1993; Murray and Lopez, 1994
Cost-effectiveness Analysis	Applications to medicine and health	Weinstein and Statson, 1977 Many other authors
	Summarizing and standardizing cost-effectiveness studies	Jamison et al., 1993 Tengs et al., 1994
Integration of Criteria to Set Priorities	Integrating analysis of health status and cost-effectiveness	Ahumada et al., 1976 Ghana Health Assessment Project Team, 1981
	Integrating interventions into packages of health services	King, 1974; Walsh and Warren, 1981; World Bank, 1993; Bobadilla et al., 1994
Country or State Studies and Applications	In low- and middle-income countries: Ghana and Mexico	Ghana Health Assessment Project Team, 1981; Frenk et al., 1994
	In high-income settings: England and Oregon State (USA)	RAWP, 1976; Klevin et al., 1991

indicator is that all health benefits from health interventions are comparable, regardless of their outcome and the characteristics of the individual affected. In effect, theoretically, all health losses (premature mortality, acute morbidity, permanent disability, pain or discomfort) can be aggregated into a time measure.

Many critics of this indicator emphasize the age weightings and discount rate of future health gains which are built into the original formulation of the DALY (Anand and Hanson, 1995). Both dimensions of the DALY are social preferences and, therefore, cannot be justified on technical grounds. The usefulness of the DALY to measure mortality and morbidity as a single indicator are maintained regardless of the choices made on age-weighting and discount rate preferences. Box 1 summarizes the most important criticisms of the DALY.

The measurement of disease burden through years of life lost due to specific diseases and injuries provides an incomplete picture of health priorities. The proximate determinants or risk factors of disease and injuries need to be measured as well. The interventions that would be recommended through the analysis of years of life lost to specific risk factors differ substantially from those that would emerge from the analysis of disease and injuries. The former would almost entirely demand modifications of the environment and the behavior of individuals, whereas the latter would more likely suggest clinical interventions. Methods to estimate health losses due to risk factors are only partially developed.

Several problems need to be solved to study properly the burden of disease due to risk factors. The proportion of years lost by a risk factor in a specific socioeconomic setting is likely to differ from the proportion in a different setting. This makes it difficult to apply results from high-income countries, where the vast majority of the studies take place, to other countries. In addition, in order to estimate the number of years of life lost that would be averted if a specific risk factor were reduced, analysts need information on the prevalence of other risk factors. This information is typically not available, leading to inaccurate estimates of the burden of disease due to the risk factor. Take the example of the use of seat belts. Its use in the United States is associated with a 40 percent reduction in road traffic accident fatalities. Their use in a middle-income country would probably prevent fewer than 40 percent of deaths, because the contribution of other risk factors to fatal road accidents is greater. Among these factors are speed, the prevalence of driving under the influence of alcohol, more pedestrians, fewer protective signals per vehicle, and a more relaxed enforcement of traffic laws.The exaggeration of the years of life lost to a specific risk factor is also due to the limitations of the current scientific knowledge on risk factors, which cannot account for all the cases and deaths. Ischernic heart disease, for example, would not disappeared if all the known risk factors—smoking, lack of exercise, high cholesterol and hypertension were eliminated. About 30 to 40 percent of the incidence of Ischemic heart disease remains to be explained. It is common to find studies that distribute the incidence of a specific disease among the risk factors that have been identified, neglecting that burden due to unknown risk factors.

Cost-effectiveness analysis (CEA) has been increasingly used in clinical decision-making, particularly in high-income countries (U.S. Congress, Office of Technology Assessment 1994, and Sloan, 1995). Cost-effective analysis has been incorporated at a slower pace to the setting of public health priorities. In effect, the dominant application of CEA in clinical medicine has been extended only in the past few years to assess interventions at the population level in low- and middle-income countries.

Even when countries and institutions in practice have been able to link burden of disease measures and results from CEA (Bobadilla and Cowley, 1995), the technical bases for building service packages are still weak. Three technical problems often encountered in the application of CEA to improve the allocative efficiency of health systems are briefly outlined in Box 2.

Box 1
Main Criticisms of the Disability Adjusted Life Year (DALY)

Two schools of criticisms can be identified. One which questions the subjective aspects of the indicator and the other which claim it has technical deficiencies. The former criticism is not easy to resolve and addressing it should wait until more research is done on social preferences, whereas the latter, can be resolved with relatively minor modifications to the original formula.

1. The DALY imposes social preferences that have not been validated. The discount rate, the age weights and the disability scale reflect the preferences of a small groups of researchers and international professionals (Anand and Harson 1993). They are arbitrary and may not necessarily reflect the preferences of those affected by the analysis. Current practice in setting priorities through mortality information by cause impose an equivalence of values likely to be further away from the beneficiaries 'values: zero discount rate, no concern about the value of time lost due to deaths at different years, flat age weights and complete disregard for disability). Another implication of this criticism is that each country (and perhaps each population group) should be formally consulted about the preferences involved in the DALY. The feasibility of undertaking such a consultation should be evaluated.

2. The age weights do not reflect common preferences among health specialists, economists and the general population. Concerns have been expressed about the two extremes of the age span. The DALY values a year in the life of a 50-year-old at about 25% of that of a 25-year-old. According to Morrow and Bryant (1995) this relation is at odds with preferences from most societies, however, technically this problem would be easy to solve. At the other extreme of the age span, the value of one year of life at birth is equal to one year at age 25 when empirically most people seem to value one year in the life of an adult four to seven times more than that of a newborn. No matter how many changes are introduced into the DALY formula, it is impossible to reach the preferred ratios (Jamison 1996). This problem reflects the need for a new DALY formula.

3. The exclusion of late fetal deaths is unjustifiable. The World Health Organization defines a fetus as viable when it reaches a weight of 1,000 grams, or approximately 28 weeks of gestation. If a woman with severe obstructed labor is properly treated, her child could be saved from stillbirth. If the burden of disease assessment ignores late fetal deaths, the cost-effectiveness of treating obstetric complications is nil. The data is routinely collected in most countries where vital statistics are reliable, and although the reliability is lower than that for deaths of children under five years of age, the problems are not more serious than those of neonatal deaths (Bobadilla 1992).

4. The application of the DALY at the national level overestimates the years of life lost. Two main arguments support the use of life table models with high life expectancy in the Global Burden of Disease assessment. The model should have at least as many years of life expectancy at birth as the known national population with the highest life expectancy (the Japanese). Second, in order to avoid fostering health inequalities between countries, the standard model for low mortality countries should be applied to high mortality countries. These arguments do not apply at the national level. Since the planning time horizon is typically five to ten years, the use of a life table with 80 years at birth is clearly unrealistic for countries with life expectancy of 60 years or lower (Shepard 1996).

5. DALYs violate the rule of rescue. DALYs are insensitive to the density of years lost by individuals: the value of 30 years lost through death by one individual is the same as the one year lost by 30 individuals. Although this is easy to correct, it introduces problems in the statistical manipulation of aggregated DALYs for a country.

6. The disability weights ignore the handicap attached to some permanent disabilities in different societies. The same disability has different effects on the lives of individuals in different countries. Some traditional societies stigmatize and reject individuals with specific permanent impairments, such as infertility, AIDS or psychosis. The real health loss in these individuals is greater than that estimated by the DALY. Similar to aforementioned criticisms, this poses a problem for national burden of disease assessments.

7. The disability due to cognitive development is not fully captured. Children with deficient cognitive development are permanently disabled. Lack of early stimulation and some mild forms of protein-energy malnutrition could be the cause of significant cognitive deficiencies. The DALY fails to capture this disability and many of the causes of cognitive development impairments.

8. DALYs are not applicable in countries with scarce health information. The information required for a national BOD assessment with DALYs is not available. The estimates are unreliable, particularly on disability (Ugalde and Jackson 1995; Advisory Committee on Health Research, WHO 1995).

Box 2
Technical Issues in Resource Allocation Through Cost-Effectiveness Rules
Allocating Resources from Ground Zero or at the Margin

There are two ways to allocate resources in an optimal way. First, in the ground zero approach, all of the health budget can be reassigned to maximize the DALYs bought by providing health interventions (Murray, 1994). This is probably the most cost-effective means of optimizing resources. The coverage scale can be adjusted to overall health interventions whereby the combination of interventions and the level of application are all effective at the margin, thus, coverage for intervention A increases until intervention B becomes more cost effective. An additional benefit of the zero approach is its accurate estimate of sunk costs for the current health system: the losses from a significant change. However, access to care is higher for the urban population, who receive more care per capita than the rural population. This is due to the distance from health infrastructure and the dispersion of the population. Further problems include poor management and the political feasibility for carrying out this approach.

Adding new interventions at the margin is a second approach which assumes that resource allocation can only be changed at the margin (Murray, 1994). Its strengths are that it is usually politically feasible, it is technically simple, and it does not pose managerial problems. However, its main limitation is that it does not try to eliminate the inequities of the health system and stop inefficient practices. Its objective is only to reduce the gap, and if the change at the margin is very small, then the expected effects on the system will be negligible.

Incremental Cost-Effectiveness

The basic cost-effectiveness approach for simple optimization only applies to selecting independent alternative interventions to fit a given budget. However, when the budget must be spent on interventions where all the combinations are not feasible because their effects are not additive, there is a need to use an incremental cost-effectiveness approach (Weinstein, 1995). These interventions are then competing interventions for the treatment of the same disease. In this case, the incremental cost-effectiveness ratio relative to the next costly option should be compared to the cost-effectiveness ratio of the last intervention selected, which is part of the current budget.

Determination of a Critical Ratio

The determination of the acceptable cost-effectiveness ratio needs judgment and consideration of nonquantifiable factors such as the degree of resource constraints. Weinstein has described six that have theoretical merit and explained the consensus on the relative role they can play in the decision-making process. The alternatives are: shadow prices for explicit budget constraints (accounting for sunk costs), opportunity costs in the absence of an explicit budget constraint (limited budget but wanting to measure health opportunity costs), comparison with other health programs (at the societal level - to spend or not to spend), Inference of cost-effectiveness criteria from prior decisions, cost-benefit methods, and rules of thumb (Weinstein, 1995).

Morrow and Smith pioneered the application of explicit criteria to set health priorities in Ghana at the end of the 1970s (Ghana Health Assessment Team, 1981). The authors used the number of healthy days of life lost to assess the health impact of diseases. Five disease conditions were the most significant: malaria, measles, childhood pneumonia, sickle-cell disease and severe malnutrition. This analysis was used in the Ghanaian primary health care program and its methodology has served as a yardstick for subsequent developments in the assessment of the burden of disease.

National applications of quantitative methods to set priorities have proliferated in the past decade. Following the publication of the WDR 1993, Mexico was the first country to measure the burden of disease and undertake cost-effective analysis to design a package of essential services (Bobadilla et al. 1994). At least 24 countries have engaged in a review of health priorities in the past seven years. The methods used and the results obtained in high-income countries have been reviewed elsewhere (Ham and Honigsbaum 1995).

II
Overview of Studies (1993-1996)

Assessment Issues

The success of a package of essential health interventions or any priority setting exercise should, ideally, be measured by improvements in the health status of the population. All the studies analyzed in this paper were initiated in the past four years, making it almost impossible to document any significant changes in health status. Nonetheless, by working backwards in the chain of events, a reasonable assessment can be made by first measuring the distribution of resources by socioeconomic group and health interventions (or programs); second, examining the type of allocation of resources policies that lead to a more equitable or cost-effective distribution; third, determining what improvement has been made in the quality of the data, analysis and dialogue used to formulate resource allocation policies; and lastly, accurately measuring the burden of disease and the cost-effectiveness of interventions.

The studies analyzed in this paper were started in different years; many are recent and their results on the burden of disease and cost effectiveness are preliminary. Others, by comparison, are quite mature and are able to show an impact in the allocation of resources. This and the next two chapters highlight the lessons that can be learned from the selected studies, and problems and contributions in two areas: the technical quality of the data and methods used to set priorities, and the policy relevance of the results. As will be shown, a tension exists between technical merit and policy relevance in the development of health priorities which use explicit criteria. Many years are required to complete a high quality study on health priorities, but policies are formulated in shorter time spans. The detail, language and presentation of the study results may also differ between academic standards and policy requirements.

Thus, an excellent study of health priorities could be irrelevant to decision-making.[1] Conversely, a moderately good study can prove to be enormously important to improving the current allocation of resources to the health sector. The severity of the misallocation of health resources has a large effect on determining the scope and precision required for the study. Assessing the policy relevance of a study, therefore, involves a subjective judgment.

The technical quality of a study is also relative because information available in countries varies widely. For example, many low-income countries have no vital registration system on deaths, whereas many middle-income countries do. Therefore, a burden of disease study in a middle-income country could yield more reliable estimates than one in a low-income country. This is the case even if the methods used are comparable.

Analysts have developed a simplified method to complete their studies. This is an expected outcome, considering that the perfect study is not possible and policy questions do not require precise answers. But, at the other end of the spectrum a critical question still remains: What level of technical quality is acceptable for the type of policy question being asked? The an-

[1] The perfect study of health priorities is difficult to define and perhaps very unlikely to ever be undertaken. This is due to the exorbitant information needs to estimate the burden of disease resulting from all diseases (more than 2000), all the risk factors (about 100), and all the disability types (100 to 200). In addition, the cost-effectiveness of more than 6000 interventions would have to be measured and information on effective utilization of services (and the technical efficiency of their application) would need to be collected for all the geopolitical areas of interest. This information is not available in any country at present.

swer can be found by identifying studies that produce results which are unacceptable, because the reliability is below a predetermined threshold. All studies with costs greater than the marginal benefit (on policy making) could, accordingly, be considered unacceptable.

How can the marginal benefit be measured? If results from a health priorities study are equal to or less accurate than the results obtained from priorities derived with traditional methods (intuition and expert consultations) the marginal benefit is nil or negative. The assessment of reliability should satisfy decisionmakers also. If decisionmakers find the results faulty due to unreliable methods or data, and choose to disregard them, then the study is unacceptable, regardless of the marginal benefit obtained.

Inventory and Overall Description

The universe of studies analyzed here was selected according to four criteria. First, the studies had to be recent, initiated no earlier than 1993; they had to be fairly advanced in their analysis and descriptive documentation; they had to use explicit criteria to set priorities; and finally, they had to refer to a low- or middle-income country and include the active participation of that country's government in the study. Studies and information from studies undertaken in industrialized countries, or in previous years, are on occasion referred to for comparative purposes. Most of those selected have been financed, undertaken or are technically supported by the World Bank.

Up to March 1996, 24 countries had either assessed the burden of disease, measured the cost-effectiveness of interventions, or estimated the costs of a package of interventions. There are only 19 studies because two are multicountry, East Africa (Eritrea, Kenya, Ethiopia, Uganda and Tanzania) and the Maghreb (Algeria, Morocco and Tunis). One of the studies focuses on a large Indian state (Andhra Pradesh).

Table 2 (a through d) summarizes the inventory of studies by region. The regions with more country studies are Sub-Saharan Africa (SSA) and Latin America and the Caribbean (LAC) with seven and six, respectively. The reason for this concentration is probably linked to the intensity of World Bank lending and not to any other common characteristic of the two groups of countries (Bobadilla and Cowley, 1995).

Columns two and three in Table 2 present recent information on per capita income and the economic growth of the country. Per capita income is the main determinant of per capita health expenditures. In addition, the financial resources for health in the near future are closely related to the economic growth of the country. Both variables set an important part of the policy context for health priorities. SSA countries, with the exception of Mauritius, are low-income and economic growth is modest or stagnant. They also lack infrastructure, including health facilities. In contrast, LAC countries are upper middle-income (with the exception of Guatemala), but their economies are not growing.[2] They also possess a vast infrastructure, including health facilities. The former socialist economies (FSE) are a special case. Most middle-income countries are experiencing a severe economic contraction and have excess capacity in terms of health, physical and human resources (even compared with the OECD countries) (World Bank 1993). With the exception of Mauritius, India and Chile, the economies of all the countries in Table 2 are growing at a moderate pace, stagnating, or contracting (see table footnote for a definition of the terms).

A lending operation was involved in 11 of the studies, the remainder were part or complete pieces of sector work. In other countries, such as Mexico and Uganda, the results of the sector work were used to prepare a loan (see column four).

[2] The classification of countries by per capita income used in this paper is based on the World Bank; criteria as of 1995 (World Bank 1995). Per capita income in low-income countries is below $700 a year; it is between $700 and $6,999 in lower middle-income countries; and between $7,000 and $19,999 in upper middle-income countries.

The main characteristics of the study are described in column five. None of its characteristics correlate with the type of Bank activity. However, the scope of the study does correlate with per capita income. In general, low-income countries undertake simplified studies, whereas middle-income countries engage in comprehensive studies involving a wide range of diseases and health interventions. Simplified studies in low-income countries tend to avoid burden of disease or cost-effectiveness analyses; within each of these they tend to analyze only mortality health losses (often for only a few disease conditions), or they neglect an evaluation of effectiveness and only analyze costs (for less than 30 interventions). Middle-income countries typically analyze the burden of disease due to premature mortality and disability for 100 or more conditions and analyze the cost-effectiveness of about 100 health interventions or clusters of interventions.

The only comprehensive health priorities study in a low-income region is the one undertaken in Andra Pradesh. As will be shown in the following sections, this study comprises a very thorough analysis of mortality and morbidity for more than 100 causes, and vast analyzes of the cost effectiveness of health interventions. Unfortunately, the policy relevance of the study has been limited because of the length of time elapsed between the study's completion and the presentation of its results for decision-making. At the time of writing this paper, more than three years had already passed. The standards to undertake this study were extremely high, likely going beyond the requirements to reallocate resources in this Indian state. In the long run, however, it will likely have a positive impact on future studies based in similar contexts, making them easier and faster to undertake.

The most ambitious study, the Turkey study, involved the collection of data on key variables for burden-of-disease (BOD) and cost-effectivenss (CE) analyzes. The original plan had to be simplified, restricting the analysis to existing information, because the government decided that it was more important to guarantee the ownership of the study and ensure the sustainability of its results. It was not willing to take the risk that the original complex and sophisticated series of surveys and studies would eventually be under the control of foreign universities and consultants. In short, policy relevance and excellence are closely related to the ownership of the process and the results.

The objectives of the studies vary widely with no discernible relation to other variables in Table 2. The most common objective was to design a package of essential interventions that would be provided to the population of the country or a particular socioeconomic group. Within each country income group, the scope of the study is related to the objective of the study. In general, the more specific the objective, the more simplified the methods and the fewer variables studied in the BOD and CE analyzes. In Indonesia, for example, where the objective was to assess if the government was spending sufficiently in the health sector, the study was restricted to the estimation of the cost of the minimum package of health interventions (as proposed by the WDR 1993). In contrast, most of the SSA countries undertook a more extensive analysis of mortality and cost-effectiveness because the objective was to identify a package of priority interventions. Similar examples can be presented for middle-income countries. Estonia and Georgia had very limited objectives and simplified studies, whereas Mexico and Colombia, had wider objectives and more complex and extensive analyzes.

The ownership of the study is difficult to assess without the aid of some systematic information on the views of the authors and users of the studies. An approximate indicator is the authorship of the report: of the 24 reports analyzed, 17 were authored by World Bank staff or (foreign) consultants and 7 by country nationals.

The cost of the studies varied from less than $10,000 to more than $200,000; the mode was between $100,000 and $150,000. As a general rule the studies in low-income countries tend to be less expensive because of the more restricted scope of their analyzes.

Table 2a
Inventory of Studies on Health Priorities -- Sub-Saharan Africa

Country	GNP per Capita	Macroeconomic Environment	Activity	Study Costs	Study/Activity Main Objective	Scope & Technical Quality	Comments
Eritrea Kenya Ethiopia Uganda	 $310 $110 $170	Generally improved over the l980s " "	Sector analysis " "	$500,000 (for the five countries)	Capacity building, done with local teams To reallocate MOH spending from curative to community & preventive services	BOD: 15 diseases with analysis of mortality. Morbidity excluded because its small burden. C-E: More than 35 interventions**	Explicit economic criteria applied, not C-E. BOD technique used for assessment, monitoring & evaluation.
Tanzania	$110	"	"			BOD:11 diseases with analysis of mortality *	
Ghana	$450	Stagnation Undergoing structural adjustment	Sector analysis	>$30,000	Restructuring of priorities & rationing of health services	BOD: Seminal work from l981, 48 conditions*** Cost: 27 interventions *	The MOH is costing a package of health services using CE data
Guinea	$510	Low economic growth	Sector analysis	+/-$50,000	Help to prioritize interventions	BOD: 27 diseases with analysis of mortality *** Costs: 40 interventions *	This is the best BOD study in a low-income country.
Mauritius	$2,700	Significant growth	Sector analysis	$150,000	To invest in C-E interventions To ration expensive, inefficient medical technologies	BOD: 78 conditions and 4 risk factors with analysis of mortality& morbidity * * * Cost: none yet	No capacity building Weak country ownership.
Uganda	$170		Lending operation		To expand coverage to the poor in project areas	BOD: 10 diseases Cost: 8 interventions	Weak country ownership.
Zambia	$290-350	Stagnation/low growth	Lending operation	Part of project preparation	To make basic package available to everyone	BOD: 20 diseases with mortality & disability** Cost: in process	It provides direction to investment, MIS. regional allocations

Table 2b
Inventory of Studies on Health Priorities -- Asia

Country	GNP per Capita	Macroeconomic Environment	Activity	Estimated Study Cost	Study/Activity Main Objective	Scope & Technical Quality	Comments
Andhra Pradesh	$310	Significant growth	Sector analysis	> $100,000	Identify cost-effective interventions for hospital care	BOD 112 diseases *** Cost: > 70 interventions*	This study is taking more than 3 years to complete
India	$310	Significant growth	Lending operation	Unknown	Identify a package of reproductive and child health serv.	BOD: none Costs: 8 interventions*	Implicitly CE was used to select the interventions
Sri Lanka	$540	Moderate growth	Lending project	< $40,000	Assist in the appraisal of a health project	BOD: 95 diseases* Costs: None	Disability estimates are weak
Indonesia	$670	Significant growth	Public financing review	<$10,000	Assess if public spending on health is appropriate	BOD: None Cost: 12 intervention*	Indonesia spends 25% of the required to pay a minimum package
Turkey	$l,980	Moderate growth	lending operation	$3,231,000	To institutionalize selling health priorities with BOD and CE criteria	BOD: in preparation CE: in preparation	This is the most ambitious plan to design a package

Table 2c
Inventory of Studies on Health Priorities – Former Socialist Economies

Country	GNP per Capita	Macroeconomic Environment	Activity	Study Cost	Study/Activity Main Objective	Package Status	Comments
Uzbekistan	$850	Severe fiscal constraints	Social sector analysis	$30,000	Identify health priorities to be funded by the MOH in the new health system	Package design is recommended	This study complemented a more traditional epidemiological analysis.
Turkmenistan	$1,230	Significant contraction	Sector analysis	$25,000	To ration inefficient over-utilization of services	Discussion of a poss. WB loan	This is part of a larger study of the highest quality
Kyrgyz Republic	$820	Severe fiscal constraints	Lending operation	$10,000	Achieve gains MCH activities & reduce lifestyle risk factors	Appraisal	The project focused on MCH before BOD
Georgia	$850 (1992)	Contraction and social unrest	Lending operation	$50,000	Confirm that preventive interventions would be cost-effective in a loan component	Project being implemented	BOD and C-E study focus on adult health Morbidity estimates weak
Estonia	$2,760	Contraction	Lending operation	$60,000	To "fine-tune" preventive interventions	No basic package	Study was instrumental for dialogue with MOF & creation

Table 2d
Inventory of Studies on Health Priorities – Latin America and the Caribbean

Country	GNP per Capita	Macroeconomic Environment	Activity	Study Cost	Study/Activity Main Objective	Package Status	Comments
Colombia	$1,330	Moderate growth	Sector analysis	$200,000	To design a package of health services that will be subsidized to the poor under new insurance	BOD: 100 diseases with mortality & disability *** Cost: 38 interventions**	This information on costs is based on representative high quality data
Jamaica	$1,340	Stagnation	Sector analysis	<$15,000	To reallocate resources to c-e interventions now underfunded i.e., prevention of accidents, health education	BOD: 100 diseases* Cost: None	The study has increase the priority of chronic dis. and injuries.
Chile	$2,730	Significant growth	Sector	<$5,000	To complement mortality analysis of adult health	BOD: Less than 30 diseases* Cost: None	The study excluded data on children
Guatemala	$980	Contraction	Lending operation	$8,000	To assist infrastructure investment	BOD: None Cost: --- interventions & water sanitation**	Guatemala needs to use all its public funds for health to finance the package
Uruguay	$3,340	Contraction	Lending operation	$40,000	To identify gaps in priorities	BOD: 100 diseases with mortality, 10 with disability** Cost: 40 interventions*	The study is likely to be repeated by the new government
Mexico	$3,470	Stagnation	Sector analysis Lending operation	$250,000	Package to be offered to population w/o access to health services	BOD: 100 diseases with mortality & disability*** Cost: 116 interventions**	To be delivered just in marginal states/areas

Notes for Tables 2a to 2d.

Sources for the studies mentioned in these tables are provided in Appendix A: References for Country Study.
Per capita GNP: *World Development Report 1994 Infrastructure for Development*, 1994. The World Bank. New York: Oxford University Press.

Data on the macroeconomic environment is based on average annual growth 1980-92: significant growth is defined as 3% and more, moderate growth is defined as 0.6% to 3%, stagnation is defined as growth of 0.5% to -0.5%, contraction is defined as -0.6% to -3% and significant contraction is defined as -3.1% and less.

Activity: Type of activity within the Bank procedures, i.e., sector work, lending, PER, CEA.

Estimated study cost refers to the cost of the BOD and package study.

Main objective of the study/activity: If a package has been proposed, articulate main objectives.

Scope: Refers to the number of diseases studied for the burden of disease study (BOD) and number of interventions that were costed.

Technical quality: *** = Excellent, ** = Acceptable, * = Incomplete. The evaluation of the study quality has been based on the following criteria: scope of the study; number of diseases studied, interventions cost, and degree of government ownership.

Number of interventions proposed: If a package has been recommended, how many interventions are proposed.

Comments: Any opinion about key advantages/disadvantages of the study and the implementation of the package.

III
Assessing Health Needs

This chapter reviews the study component which seeks to quantify the burden of disease in the country. The methods and information used are reviewed here and the substantive results are presented in Chapter V. Due to different policy contexts, capacity to perform epidemiological and economic analyses, and information base, low- and middle-income country studies are discussed separately.

Universe and Scope of Burden of Disease Studies

Fifteen burden of disease studies were identified with sufficient results to be included in this review. Nineteen countries are included because East Africa involves five countries. In eight of the nineteen countries, only mortality was analyzed and in nine of them, less than thirty disease conditions were studied. Less than half of the countries (eight) did a comprehensive analysis of morbidity and disability with 100 diseases or more included in the study. With the exception of Andhra Pradesh, all these countries are in the middle-income category. Four of the 11 countries that did not undertake a comprehensive analysis are middle income. In the first three, the objectives of the study were very narrow.

The policy context can shed some light on why certain countries only studied mortality to assess the burden of disease. (The exceptions are the former socialist economies where only mortality was studied, yet the burden of disability is significant). The exclusive analysis of mortality in BOD assessments is usually justified because the epidemiological profile of the country in question is dominated by premature mortality (this is largely the case in low-income countries), with at least 70 percent of estimated DALYs due to premature mortality. In addition, a lack of vital statistics on mortality and weak information on disability will also lead studies that only focus on mortality.

Ideally, the proper assessment of the burden of disease should be done through the analysis of the total DALYs lost according to three criteria: diseases, risk factors and type of consequences. None of the 19 countries undertook an analysis of types of disabilities, and only two did any serious analysis of risk factors. The consequence of these omissions is that no country has proposed rehabilitatory interventions in the analysis of cost-effectiveness or the package of priority services. Given preliminary evidence that many prosthesis and physiotherapy interventions could be very cost-effective, there is significant bias in the process of priority setting.

The lack of risk factor analysis has tended to underestimate the value of preventive and other public health interventions. Protein energy malnutrition and other micronutrient deficiencies, alcohol abuse, unsafe transport, and tobacco consumption are some of the main risk factors that can be controlled with cost-effective interventions. Yet, they could be neglected if the BOD assessment ignores this dimension of the analysis.

Although the indicator to assess the burden of disease most commonly used was the DALY, half of the countries made significant modifications, and one (Russia) used a different indicator (see Table 3). Five countries did not discount future health losses, and all the countries that discounted used a three percent rate. Five countries did not apply any age weights to health losses or used different weights from those proposed in the 1993 *World Development Report.* Finally, three of the countries that studied disability used a different disability scale to assess severity. In

Table 3
Social Preferences Used in the Burden of Disease Studies

Country	BOD YLL	Indicator		Age weights	Disability scale	Discount rate	Risk factors studied
		YLD	DALY				
Guinea	+	+	-	WDR	WDR	3	-
Mauritius	+	+	+	WDR	Mod.	3	4
East Africa	+	-	-	-	-	3	1
Sri Lanka	+	+	+	Literature	Literature	-	3
Andorra	+	+	+	WDR	WDR	-	-
Georgia	+	-	-	WDR	WDR	-	-
Estonia	+	+	+	-	Mod.	-	-
Uzbekistan	+	+	+	WDR	-	3	-
Turkmenistan	+	+	+	WDR	WDR	3	-
Russia	-	-	-	-	-	-	1
Jamaica	+	+	+	WDR	WDR	3	-
Mexico	+	+	+	WDR	WDR	3	5
Colombia	+	+	+	WDR	WDR	3	-
Uruguay	+	+	+	WDR	WDR	3	-
Chile	+	+	+	WDR	WDR	3	-

Notes: WDR: *World Development Report 1993*; YLL: Years of Life Lost from Premature Death; YLD: Years of Life Lived with a Disability; DALY: Disability Adjusted Life Years; Age Weight: Relative Value of a Year of Life at Different Ages; Mod.: Modified; "-": Not mentioned, not applicable or not available.

short, only seven of the nineteen study results are comparable in terms of the indicator and scope of the study, five of them are in Latin America.

The international comparability of burden of disease assessments should not be a primary concern of countries. Social preferences should be chosen when appropriate by national policymakers. Since mortality statistics are standardized in many countries, it is possible to apply standard social preferences to the original data on deaths to obtain comparable figures on adjusted years of life lost (AYLL) due to premature mortality.[3] With the exception of Estonia and Georgia, all the studies used or adapted the information to the International Classification of Disease (WHO 1965) to codify and classify deaths by age, sex and cause of death. However, the data on deaths was seldom included in the study reports, impeding the manipulation of data to make the years of life lost comparable. As will be shown, the disability data has serious problems of comparison and no solutions are presently available to address them, which is not the case for data dealing with mortality.

Information and Methods Applied in Low-Income Countries

As mentioned, low-income countries typically assess the burden of disease without undertaking a morbidity analysis. This section addresses the sources and methods used to assess the burden due to premature mortality.

[3] Years of life lost incorporating age weights and a 3% discount rate identical to the *1993 World Development Report* cannot be referred to as DALYs because they are not disability adjusted. However, they need to be differentiated from the potential years of life lost (PYLL) proposed and used by the Center for Disease Control with 65 years as the cut-off point. They are referred to here as the adjusted years of life lost (AYLL).

Information on mortality derived from vital registration systems is only available in a few low-income countries. China and India have sample registration systems of vital events and the Central Asian countries also have a vital registration system with reasonable population coverage. During the past four decades, all countries with mortality statistics (except India) have achieved, extraordinary improvements in life expectancy at birth, largely due to sharp reductions in infant and maternal mortality rates.

The sources of information on mortality used by most SSA and other low-income countries in Asia and LAC to assess the burden of disease are medical records from hospitals, national demographic and health sample surveys, population censuses, small scale epidemiological studies and demographic models of mortality. The availability and reliability of the different information sources varies a great deal between countries. Therefore, despite recent development in indirect methods to estimate mortality in countries with poor information, no standard methodologies exist to build a data base of mortality by age, sex and cause of death.

From the studies included in this review, at least three approaches to analyze mortality in low-income countries can be identified: analysis and correction of available vital statistics; the analysis of hospital and other health facility records; and the integration of multiple sources census of population, DHS surveys and small-scale epidemiological studies. The third approach includes the development of estimates through demographic models of mortality. For both the second and third approaches, consultation with experts may be an important component to correct and improve the accuracy of the estimates on cause of death.

Vital statistics on mortality were used only in two low-income country studies—Georgia and Andhra Pradesh. Each system has its own problems, since the methods and information used to correct data in one country may very well not be applicable elsewhere. The Georgia BOD study, for example, had a narrow objective, namely to assess the DALYs gained from a discrete list of public health interventions to control noncommunicable diseases. Unfortunately, the main problems of the data were not addressed. Corrections made to Georgia's data on infant mortality indicate that as much as 43 percent of the deaths were undercounted (Murray and Bobadilla, 1996). The study reported that seven percent of the AYLLs in 1990 were due to deaths among children under five, a figure slightly smaller than the one for the Established Market Economies (EME) in the same year. Given that the corrected child mortality rate in Georgia is about three times greater than the rate for the EME (30 and 11 deaths per 1,000 children under five, respectively), it is evident that the age distribution of AYLL reported for Georgia is not reliable. The Georgia study report did not reassign deaths according to the International Classification of Diseases and resulted in determining causes of death which have no meaning for health planning purposes. (This is the case of atherosclerosis, for example, which caused 13 percent of the total AYLL in Georgia in 1990). The disability estimates for the BOD in Georgia were adapted from data of the study in Estonia. The discussion of the problems with such estimates can be found in the section dealing with BOD studies in middle-income countries.

The study in Andhra Pradesh is exceptional in its use of available information on morbidity and mortality. It is also exemplary in its application of modern demographic and epidemiological methods to correct defective information. Unfortunately, the process takes too long for the purpose of policy-making and is difficult to replicate, due to high costs and extensive consultations with experts. The resulting methods, furthermore, cannot be applied to other low-income countries because the information required is not available.

The five countries of the East Africa study and Sri Lanka used hospital information corrected for the known urban bias to assess the BOD. The main characteristic of this type of study is the lack of consistency of the BOD estimates with basic demographic information on the age structure of mortality.

BOX 3
SOURCES AND STEPS FOR A MORTALITY MATRIX

Source: Global Burden of Disease Estimates

- ***Step 1****: Abstract the age, sex-specific population values and age, sex, cause-specific numbers of deaths for Sub-Saharan Africa (SSA) in 1990. GBD data are presented in 7 age categories [(0-4),(5-14), (15-29), (30-44), (45-59), (60-69) and (70+) years of age].*

- ***Step 2****: In lieu of zero values, assume the number of deaths due to most diseases to be 500 for each age, sex category.*

- ***Step 3****: Adjust proportionally the number of age, sex, cause-specific deaths such that their sum matches the total number of deaths in SSA.*

- ***Step 4****: Collapse the data into 25 disease categories.*

- ***Step 5****: Calculate mortality rates for each age, sex, disease-stratum.*

- ***Step 6****: Calculate the ratios of sex, disease specific mortality rates among older age groups to the corresponding mortality rate among 0-4 year-olds. For maternal causes calculate the ratios of mortality rates among older age groups to the mortality rate among 5-14 year-old.*

Source: Country-Specific Childhood Mortality Data

- ***Step 7****: Adjust the mortality rates for the group aged 0-4 years to reflect data available from the country of interest. For example, there may be high quality data on deaths due to HIV infection, malaria, malnutrition, intentional injuries, etc.*

Source: Country-Specific Population and Mortality Data

- ***Step 8****: Multiply the sex, disease-specific mortality rates generated in Step 7 by the corresponding population of 0-4 year-olds in the country of interest. Sum the resulting values to yield the total predicted number of deaths among 0-4 year-olds. Adjust proportionally the sex, disease-specific mortality rates such that the predicted number of deaths matches the actual number of deaths among 0-4 year-olds.*

- ***Step 9****: Calculate mortality rates for the older age categories by multiplying the sex- and disease-specific mortality rates for 0-4 year-olds by the ratios calculated in Step 6.*

Source: Country-Specific Maternal Mortality Data

- ***Step 10****: Divide the total number of maternal deaths in the country of interest into the 5 age categories [(5-14),(15-29), (30-44), (45-59), and (60-69) years of age] such that the ratios of maternal mortality rates among older groups to the rate among 5-14 year-olds is the same as the ratios calculated in Step 6.*

Source: Country-Specific Population and Mortality Data

- ***Step 11****: Multiply the age, sex, disease-specific mortality rates by the populations of the appropriate age, sex groups in the country of interest. Sum the resulting values to yield the total predicted number of deaths for each age category. Adjust proportionally the sex, disease-specific mortality rates (except maternal mortality rates) such that the predicted number of deaths for each age group matches the actual number of deaths.*

In general, this is the less reliable approach to assess the BOD in a low-income country. Chapter V illustrates the problems encountered in the Sri Lanka study.

The East African study produced estimates of discounted years of life lost for 10 major causes of death, with no breakdown by age, sex or geopolitical area. The mortality information from hospitals in East Africa is heavily biased towards the pathology prevalent in urban areas where the more affluent population resides. The extent of the bias is quite difficult to assess without information on the mortality profile of the population that has limited access to hospital care. The corrections made by experts likely helped improve the accuracy of the estimates, but the inherent multiple data biases remain.

The study of a small number of diseases is attractive to reduce the workload and information requirements on health priorities studies. Unfortunately, the reliability of the results could be negatively affected due to the lack of caps in the number of years of life lost attributed to each disease. In the absence of information on deaths by age, the proportion of deaths that can be explained by the ten selected diseases can be exaggerated.

Finally, the use of disease clusters instead of very specific disease labels reduces the workload, but could prevent the identification of the right interventions. This is the case for injury and cardiovascular diseases which respectively include tens of conditions with different interventions. In general, disease clustering in BOD assessments should be avoided. It is only justified when the alternative interventions to control one specific disease are shared by the rest of diseases in the cluster, such as the cluster of diarrheal diseases.

The use of hospital data and expert opinion to assess the BOD is not acceptable even in countries which lack vital statistics, such as most of the countries of Sub-Saharan Africa. The third approach identified in this review, which was followed in Guinea, is equally rapid and inexpensive but much more reliable. The basic steps undertaken in the BOD assessment in Guinea are presented in Box 3.

The main limitation of the approach taken in Guinea is its method for estimating the level of adult mortality. To do so, it takes the observed child mortality rate and, through the correlation found in demographic mortality models, estimates the rate of adult mortality (Jha and Bengoura 1996). This approach, which has been extensively used in demographic projections, has been questioned by Murray (1992). Its weakness is that the demographic mortality models inadequately reflect the adult mortality structure. Due to the importance of mortality to determine the quality of the BOD analysis, the discussion on morbidity in the following paragraphs is linked to the analysis of each mortality approach found in the review, to reflect the adult mortality structure in SSA (Timaeus 1992) and probably in many other low-income countries. In many African countries, this problem has been compounded by the AIDS epidemic because of the lack of accurate figures on its impact on the adult mortality rate.

The data from a recent study in Morogoro, Tanzania, has shown that the combination of AIDS and endemic malaria can lead to extremely high adult mortality rates. Table 4 compares the probability of dying at three different age groups in Morogoro with estimates for SSA from Murray and Lopez (1994). The adult mortality rate (45ql5) for males in SSA is about 37 percent lower than that in Morogoro, with 38 and 60 deaths per hundred, respectively.

Unfortunately, there is no better way to estimate the adult mortality rate in the absence of direct population-based information. Indirect methods based on interview surveys are also unreliable and refer to many years in the past.

Low-income countries need to collect data on all deaths through some routine collection system. The sample registration system in India and the Demographic Sample Points in China offer affordable

Table 4
The Probability of Dying for Broad Age Groups in the District of Morogoro, Tanzania and in Sub-Saharan Africa (percent)

Age (years)	Morogoro Rural		WDR Estimates for SSA	
	Males	Females	Males	Females
0-14	21.8	20.2	24.3	21.7
15-59	59.5	49.3	38.0	32.2
60-69	31.0	28.8	30.8	26.6

models with reliable results. The coverage and quality of mortality statistics for the purpose of assessing health priorities and the impact of health programs in Sub-Saharan Africa is extremely poor (Hill and Graham 1988). A similar situation is presented in South Asia and the low-income countries of LAC.

Cost-benefit analysis is required of the alternative methods available to document information on deaths. This is a clear priority which has resulted from the Guinea study and is expanding to other low-income countries.

Information and Methods Applied in Middle-Income Countries

In contrast to the studies of low-income countries, the burden of disease assessments in middle-income countries are based on vital statistics on mortality, and typically include estimates of disability. Although the quality of BOD studies varies widely among middle-income countries, two models can be identified. The first model is a comprehensive analysis of mortality and morbidity that relies extensively on the local epidemiological information on the incidence and prevalence of disease. The second model only analyzes mortality, or includes morbidity estimates which borrow epidemiological sources or restrict the age or disease groups of analysis.

The first model has been applied in Colombia, Mauritius, Mexico and Uruguay. Chile and the Maghreb countries are adopting a similar approach, but no results are available to date. The studies from Mexico and Mauritius have more local information on morbidity. Mexico is the only country which documents BOD for different geopolitical regions. The study produced estimates for the rural and urban areas of the country's 32 states. A limited list of risk factors were studied only by Mexico and Mauritius.

The Mexico BOD study was the first completed after the publication of the 1993 WDR, and it developed methods and information that have been used in studies in Colombia, Uruguay and Chile. Of these four countries, Mexico probably has the most serious problems in terms of completion and accuracy of its vital statistics on mortality. The corrections which were incorporated into the mortality statistics are the most extensive and detailed ever applied. They involved using available information from demographic and fertility sample surveys to estimate the correct level of mortality among children under five. Information from surveys and population census was also

used to reconstruct data on births, neonatal and post-neonatal deaths for the 32 states and their rural and urban areas.

The distribution of deaths by cause of death also was improved in the categories of maternal causes, cardiovascular diseases, injuries and others of unknown cause. As will be shown in subsequent sections, the breakdown by state and urban/rural sectors was essential to document the inequality in the distribution of the burden of disease. Regardless of the merits and problems of the DALY or any other health indicator, the advances made in Mexico in the demographic and epidemiological analysis of mortality is invaluable. The understanding of the epidemiological profile of the country was improved substantially after these corrections were made. The corrections originally made to the mortality figures for 1991 have also been applied to data from 1992. The researchers in charge of this work have institutionalized the analysis of the Mexican burden of disease, developed a research agenda, and begun a consulting service for national and international institutions

The Mexican study of disability does suffer from many problems, but its most significant are common to global estimates of disability (Murray 1994). These include a lack of reliable information and a limit on how much disability can exist in a given population. The information is unreliable because the empirical information on incidence, case mix, and severity of disability is fragmented, nonrepresentative, and often of unacceptable quality. This is particularly true when estimates are made by a state or rural/urban area authority. The second problem arises from an incomplete understanding of the natural history of many diseases, such as Chagas disease, cisticercosis, and many injuries.

Despite the efforts made to check the consistency on incidence, prevalence and mortality, there are too many gaps that cannot be filled with epidemiological models. The most notable is the lack of information on the prevalence of treatment and rehabilitation. The former would reduce the case fatality rate of many diseases and the severity or incidence of permanent impairment, the second would affect only impairment and disability.

Another serious problem with disability estimates is the assumption that individuals can only be affected by one disease. The impact of co-morbidity, common in children and adults alike, is ignored by the disability estimates.

Risk factors are studied in Mexico and Mauritius. Both countries applied a similar methodology but with different attributable risks. The list of risk factors was limited to a handful with different criteria for the selection. The Mauritius study was concerned with the rise in noncommunicable diseases, whereas Mexico presented some semi-objective ways to identify main risk factors related to perinatal problems, infectious diseases, injuries and noncommunicable diseases. The effort to estimate the BOD due to risk factors is commendable, but unfortunately, the methods and data used are weak for reasons explained in Chapter I.

The second model applied to study the BOD in middle-income countries is simpler than the one described before. The scope of the study is significantly reduced to obtain results faster and less expensively. The studies in Uzbekistan, the Russian Federation and Chile analyzed only mortality. The studies in Jordan, Chile and Estonia examined only a limited number of diseases and injuries. The studies in Turkmenistan, Jamaica and Jordan borrowed all the information on disability. The data on mortality is not corrected for underregistration or for errors in the certification of cause of death, as in the case of Russia, Turkmenistan, Chile, Jordan and Estonia. Or the corrections are rather incomplete, as in the case of Uzbekistan and Jamaica.

The study of health priority analyzing only mortality clearly neglects many of the conditions indicated above. How important is this omission for the allocation of health resources? Lower middle-income countries generally present a mixed epidemiological

Table 5
Percent Disability for Five Conditions
Estonia (1993) and Former Socialist Economies (1990)

Conditions	Sex	Death AYLLs	Disability YLDs Estonia	Total Estonia	Percentage of Disability DALYs	
					Estonia	FSE (1990)
Ischemic Heart Disease	Female	22944	6766	29709	23.0%	21.0%
Lung Cancer	Female	1123	1071	2194	48.8%	9.2%
COPD	Female	368	11428	11796	96.9%	30.0%
Abortions	Female	35	12922	12957	99.7%	34.0%
Traffic Accidents	Male	6302	13128	19430	67.0%	5.0%
Traffic Accidents	Female	1474	5761	7235	79.0%	17.1%

Source: For Estonia, unpublished report. Costa C. and Ramos V. *A Cost-Effectiveness Analysis of Prevention in Estonia Health Projects*, March 1995. For FSE, Murray et al., 1994.

profile, with considerable burdens of infectious diseases and reproductive health problems, and increasing prevalence of noncomunicable diseases and injuries. This is largely associated with the fertility decline and moderate improvements in child mortality. Under such conditions, the relative importance of disability rises. More neuropsychiatric disorders, more people permanently disabled from injuries, and more functional limitations due to cardiovascular obstructive pulmonary diseases are some of the common examples of morbidity conditions that play a bigger role in the burden of disease. Other poverty related disabilities which could be neglected include infertility due to sexually transmitted diseases, stunting from protein/energy malnutrition, and cognitive deficiencies derived from helminthic intestinal infections in schoolchildren.

This model bases disability on expert opinion or on information (borrowed) from World Bank models for the region. Both of these methods are faulty because they could lead to spurious results in the ranking of diseases and health interventions. Table 5 compares the disability estimates for Estonia obtained from consulting experts in the country with the disability estimates derived from the WDR 1993. Estonian data systematically overestimates the importance of disability for the chronic diseases studied, sometimes ratios of disability to mortality show figures ten times higher than expected. The WDR 1993 ratios may also be subject to errors. For example, the gender difference found in the same ratio for road traffic accidents has no reasonable explanation (see last two rows).

IV
Improving Resource Allocation

This chapter draws some lessons from the cost-effectiveness component of the studies. As before, low- and middle-income countries will be treated separately.

Assessment Issues

In recent years, resource allocation tools have been used to improve the efficiency of the health system's major functions. In addition to allocative efficiency per se, the functions that have been targeted for advancement are health care coverage and equity. In order to achieve gains in coverage and equity through resource allocation, efforts have to be pointed strategically at one of three levels of the health system. As Box 4 shows, these are the macro, meso and micro levels. The country studies carried out to date have used resource allocation tools to determine health

Box 4
Levels of Priority Setting

Macro: *Overall level of funding allocated to the health system.*

Meso: *Distribution of the health budget between geopolitical areas; between essential and discretionary services; and between ambulatory and hospital services.*

Micro: *The allocation of resources to a particular form of treatment; a population group that will receive access to treatment; any individual as the maximum expenditure according to their population group.*

care priorities to achieve one of the following three objectives: to determine the size of health expenditures, to determine a package of services, or to choose the appropriate interventions. The intermediate goals that countries aim to achieve with the new priorities are an increase in the coverage of health services and a reduction in the inequity of the system. The level of per capita income in the country, a proxy for total health expenditures, has shown a differential purpose for the use of the resource allocation tools between countries. Cost-effectiveness methods were adapted to each country's policy context, and resource allocation tools were used to establish health priorities.

Resource Allocation in Low-Income Countries

Studies of health priorities in low-income countries using resource allocation tools have been undertaken throughout the world. For example, Eritrea, Ethiopia, Kenya, Tanzania and Uganda formed part of the structured approach to study of resource allocation in Eastern Africa, and separate efforts were undertaken in Guinea and Zambia. A health priority exercise was also carried out for the state of Andhra Pradesh in India, as well as in Asia, Indonesia, and the former socialist republic of Georgia. A common characteristic of these countries is a poorly developed health system. The need for change is great, and given the scarcity of resources, expectations of what can be achieved through the allocation of resources are very high. In the East Africa study, a model simulation suggested that a reallocation of 50 percent of the health budget (about US$5.20 per capita) from interventions that are not cost effective toward those that are the most cost effective could result in a 64 percent increase in the years of life saved in the region. Additional gains could be achieved with US$3 per capita if the region could reduce the burden of disease by 36 percent.

A general problem in all low-income countries is the lack of information on the costs of health care interventions and health expenditures by program. In addition, although total expenditures are low, the cost of interventions is also lower. Health care costs are lower in these countries because labor and other costs are lower than in middle- and higher-income countries. However, imported drugs and materials are not low cost. The lack of information makes it difficult to analyze health interventions. This may make it impossible as well as undesirable to carry out an initial elaborate study to demonstrate the need to collect data for a reasonable exercise in resource allocation. In these cases there is a need to question the worth of a thorough cost-effectiveness study as an initial step. That is, will the proposed changes offset the gains that could be achieved by the exercise? This question is especially relevant since there is a threshold over which increasing health expenditures leads to greater health improvements, but below which any additional health expenditures will not achieve comparable health gains (Grosse). Given the gap between the current health system and the ideal one, it may be easier to work with a flexible, modest, and incremental approach that traces the goals for the long run, and seeks gradual improvements in the short and medium term.

The following three sections are organized around three key questions that the country studies attempt to answer. The first question is: How much money is needed for the basic package of health services? The

second question is: How should the health budget be distributed? The third and final issue is the implementation of the reassignment of resources, that is, how do we make it work? It seems only a question of time before other countries will have to grapple with these issues.

How Much is Enough?

Inevitably, a general question is the overall size of health resource requirements. Indonesia, for example, explicitly sought an answer to the question of what resources, including financial, are needed to deliver an appropriate package of services. This query is particularly important in the case of Indonesia since the Ministry of Health already provides these services at varying and often low levels of intensity and effectiveness. The Indonesians adopted the list of interventions to be included in the limited package without estimating the cost-effectiveness in country or the cost of providing this care. Using information from the 1993 *World Development Report*, the study concluded that a limited package would imply a 250 percent increase in overall public spending, requiring not only a sizable increase in the health budget, but also and a significant reallocation of resources. These changes would happen in a system where the low level of public spending has made it very difficult to sustain vertical programs as well as maintain the horizontal network of hospitals and health centers. Health units run on low budgets are plagued with shortages of personnel and supplies, provide poor care, and have low utilization levels. In these settings the adoption of the limited package requires actions to improve the effectiveness of the delivery system.

Findings for Guatemala and East Africa are similar to those in Indonesia. Cost data for Guatemala is unlikely to be accurate or valid since the costing exercise relied on data from a variety of sources and included simplifying assumptions. It was, nevertheless, used to estimate total costs for the limited package shown in Table 6. The exercise led to the conclusion that additional resources are necessary to meet projected needs. A three-fold increase in resources is needed to fill the gap for ambulatory care and public health, and almost twelve times more money is needed for water and sanitation. The East Africa study also concludes that unless funding is sustained for many years, one year's worth of health expenditures is not enough to change health risks or avoid future disease. However, this conclusion is naïve as there will be an increasing demand for health care even with reductions in the burden of infectious, maternal and nutritional conditions. In contrast, middle-income countries like Mexico do not require the same increment in the health budget but mainly need to use resources more efficiently.

Table 6
Projected Cost for Universal Delivery of a Basic Package of Health Services and Current Expenditures in 1993 U. S. Dollars

Type of Services	Per Capita Expenditures (1993)	Projected Per Capita Costs (2001)	Difference
	(a)	(b)	(b)-(a)
Hospital Services	3.50	not included	
Ambulatory Care & Public Health	1.08	4.00	2.92
Water & Sanitation (6-yr. investment)	0.66	8.40	7.74
Total	5.24	12.40	

*Universal coverage for all services except for water supply which will be at 75%.
Source: Vargas, 1994.

Countries have distinct approaches to the assignment of health priorities. The East Africa prioritization, selection of interventions and resource allocation were based on detailed technical criteria in accordance with public finance theory which requires explicit assumptions. There are ten main burdens of disease in East Africa. Several interventions were selected for each of the 10 diseases by means of an exercise using

experts in the areas. The criteria for selecting interventions were cost-effectiveness and which party should bear each cost involved. The "...government policy is to focus on the health of all rather than the health of the sick" so public funds should only pay for interventions that are nonexclusive and nonrival. That is, those services that are available to all regardless of their participation or investment, and where benefits for one individual do not lessen the availability of benefits for others. Thus, public funds do not pay for the most cost-effective interventions for a given disease, but for community and preventive interventions that are very cost effective compared to other available interventions.

In Andhra Pradesh, to the contrary, the establishment of basic health infrastructure, including the managerial infrastructure, is considered the responsibility of the government. In East Africa all other activities are left to the market and individuals pay for health insurance for catastrophic expenses and all curative care. Indonesia also proposes to seek additional funds from the private sector. Specifically, the proposal is to focus public expenditure on primary care and make hospitals autonomous, charging user fees with sliding scales to protect the poor.

Other proposals varied in the stringency with which cost effectiveness was applied as the only criteria for the prioritization of health interventions. For example, in Guatemala the health care package includes the development of a water and sanitation infrastructure which cannot be justified on the basis of its health cost effectiveness. However, the criteria used to include this intervention was not made explicit. Other criteria generally come into play as countries take into consideration societal values and goals.

Allocating the Budget

In general, resource allocation exercises in lower income countries have a ground zero approach. That is, there is an assumption that all resources can be reallocated to a limited package of interventions that will substitute for the care currently provided. The cost-effectiveness of the health interventions exercise in the burden of disease study for Andhra Pradesh identified an exhaustive list of 200 interventions that could be provided. For each intervention, a typical course of events was created as the framework for the detailed cost and effectiveness estimation. The benefit of this approach was the identification of mutually exclusive and substitute interventions at each stage of the disease. As a result, decisionmakers can evaluate and decide between substitute interventions as well as decide what mutually exclusive interventions constitute the package of care for the state of Andhra Pradesh. The budget can then be allocated according to decisions made regarding the level of detail in the estimation of costs.

In contrast, the interventions in Guatemala were selected and allocated such that the entire budget would be divided between public health and outreach, with the health center evaluating the cost of only one intervention per disease. This approach does not allow the decisionmaker to select between substitute interventions; however, the findings are clear and simple. A practical approach similar to the one used in Guatemala may be enough to convince decisionmakers to use cost-effectiveness analysis and to create the need for more detailed studies. In the meantime, the skills necessary to interpret detailed cost-effectiveness analysis can be acquired. It may be the case that a decisionmaker does not want to engage in the complex analysis of detailed studies if the advantages are not apparent.

East Africa's approach to the allocation of resources was incremental and distinct from the other countries. Existing health care interventions were explicitly acknowledged. Decisions were made on the margin, to exclude old interventions, substituting for them with new, more cost-effective, nonrival, and nonexclusive interventions. However, these studies are limited by major assumptions and the lack of estimates for start-up costs. Only the Andhra Pradesh study makes most of the assumptions explicit. For instance, costs are determined using a three stage approach. The most desirable alternative for cost data, be it investment

and construction, or program costs, are calculated empirically from direct program experience. If the program data does not exist, the data is collected via a rapid assessment. When these alternatives are not viable, expert opinion is sought. There are also two stages for effectiveness. The first is to use the existing level of efficiency in the area under study, and the second is the assumption of ideal conditions for estimating optimal efficiency.

In retrospect, and after looking at the accumulated results, an important input to the resource allocation decision-making process is the intended model of care given societal goals and values. A simplified view shows three alternative publicly funded health care models in lower income countries. Two of the options target funds to a sector of the system. First, the funds can be directed toward primary care either through vertical programs, a system of horizontal care or a combination of these. A second alternative is to focus spending on a few large urban hospitals with the remaining funds going to other levels of care. The second option is not usually explicit, and satisfies the preferences of health professionals and higher income urban groups. The first alternative tends to be more equitable, while the second is highly regressive. A third alternative is the absence of a resource allocation rule where money is diluted throughout in the system. In all health systems, political forces are willing and able to shift resources between providers of care, but this is the main force behind the third alternative. Current resource allocation proposals are useful because they make rules explicit.

In Ghana, three different packages were developed to cover policy needs. The first package, which should be quite generous, will be part of the national strategic plan to be decided over the long run. The second is an essential services package for the National Health Service Operational Plan which forsees a 65 percent coverage rate during the next five years, costing about $10 per capita. The third is a real delivery package for the Annual District Health Plan that will be designed and provided by the districts and be adaptable to local conditions, including the ability to deliver services. It is hoped that all the interventions included in the essentail package will be offered through the real delivery packages at the district level.

In Zambia there were three packages developed at different stages, probably due to varying policy needs as work progressed. During the first stage, district officials were allowed to include all needed interventions without limitations. The resulting package was too expensive, so in the second stage the districts were given budget limits and explicit criteria regarding the burden of disease and cost-effectiveness data to create a technocratic package. In the final stage, district officials, the central health and financing government officials, and donors negotiated and adapted the package to each district's capacity to deliver the required interventions.

Most of the studies analyzed ignored the political process of decision-making and all ignored societal preferences for health outcomes. The Guinea study was naïve in that it assumed that implementation and political change would follow the dissemination of findings. This was not the case, major shifts are needed to reform the delivery of health care and to change the allocation of resources.

Resource Allocation in Middle-Income Countries

Middle-income countries in all regions seeking health reform have carried out health priority exercises using resource allocation tools. A general problem of the health systems in middle-income countries is that the delivery of essential interventions is not efficient and equitable. It is not surprising that the driving force behind health reform has been the issue of equity. The resource allocation exercise is only one method among many in these country studies, which include South Africa, Mexico and Colombia, as well as Turkey, Jordan, Algeria, Morocco, Tunisia, Estonia, Turkmenistan and Uruguay.

In general, middle-income countries have relatively well-developed health systems. Also, there is more information available on health care costs and expenditures, although data on the effectiveness and efficiency of health interventions usually does not

exist. The availability of information has made these exercises more complex, and has usually led to better studies and more precise results than those in the lower income countries. An added advantage in these countries has been the availability of well-qualified human resources to build capacity. These regional resources could be extremely useful to support the transfer of know-how and allocation tools to lower income countries.

Since labor costs are lower in middle-income countries than they are in the higher income countries, health care costs are also lower. In addition, there are already sound investments in health and the money that should be shifted toward cost-effective interventions is at the margin of total health expenditures. However, the total amount shifted may be more than that in lower income countries. Yet, these countries are better equipped to undertake this shift in resources since they have greater managerial capacity and relatively well-developed private systems of clinical care.

Overall, the expectations of short-run changes are lower than in poorer countries. The emphasis is on small and focused changes in the short run and major ones in the medium and long run. Cases in point are South Africa and Mexico. The documentation and dissemination of the Mexican case has been extensive, more so than other country studies. Throughout this section the many lessons learned in Mexico that are useful for others will be presented.

Closing the Equity Gap

The exercises to develop a national health care package have been very useful in unexpected ways. They have provided a new perspective that improves the dialogue, and allows inclusion of the question of health care for the poor in the agenda. At the same time, these countries need to answer two questions: Are they already spending too much? And, how can the health of the population that has a backlog of disease be improved? Fortunately the interventions that reduce the backlog are also some of the most cost-effective. The issue is how to allocate government resources to close the equity gap. To achieve different political aims South Africa and Mexico are both seeking to provide essential services to their marginalized populations. Colombia also seeks equity but through the promotion of health insurance, an issue that will be dealt with in a succeeding section.

These countries have sough innovative cost-effective and technologically appropriate interventions to reduce the burden of disease. The population that needs coverage usually lives in remote and poor areas. Thus, traditional interventions that have been used for urban populations are not likely to be either effective or efficient in providing health care to disperse rural populations. In these countries most of the alternatives for improving the value of money are at the micro level. The use of cost-effective interventions such as Oral Rehydration Therapy to reduce mortality from diarrhea in Mexico is a well-recognized success. Other examples are the change in the site of deliveries. This was necessary in Mexico City after the 1985 earthquake, and resulted in lower costs without apparent increases in mortality or morbidity.

Mexico sought to design and include interventions making clinical practice guidelines explicit and at the same time collect information on their cost-effectiveness. Usually, the selected interventions had not been widely used and empirical data was poor. Yet, cost efficiency was estimated through the use of expert opinion. The purpose of selecting these interventions was to improve the efficacy and efficiency of the health system and reduce health expenditures while improving health status. All countries should try to follow this example and evaluate all new proposed health interventions very carefully to assure that they are technologically and economically adequate.

Another useful conclusion from the Mexican study is that there should be different packages for different populations. Mexico proposed three packages of care to encompass the entire population. All of these packages where built from a list of the cost-effectiveness of interventions, using the available budget for a given population as the cutoff point for the

package. The difference between the packages is their total cost: the more money that is available, the more interventions that can be included. The first package includes essential health services and is used to expand coverage and achieve universal access. The second is a national health insurance package that, in addition to essential health services, includes cost-effective clinical services that could be made affordable through a compulsory insurance program for the workers and their families. The third is a comprehensive package that includes all of the clinical services offered through the social security insurance program which are too expensive to pay through compulsory insurance. The underlying aim of these packages was to reduce waste and get the best value for the money. During the last year, significant efforts have been made by the Ministry of Health in Mexico to implement a limited package of care to expand coverage.

Implementation of Resource Reallocation

Once a package of services is chosen, how does it get delivered to the population? Success in the delivery of a package of health services is related to political consensus and will. The implementation strategy must be carefully planned, but yet be flexible enough to yield more winners than losers on the road to a better health system. The following description is schematic and intended to highlight issues rather than reach solid conclusions.

This section is based mainly on the milestones in the road to providing a basic package of care to the noncovered rural population in Mexico. The Mexican resource allocation exercise has been repeated several times, and has been executed by researchers and staff from the government and other national institutions. In addition, the most effective projects, in terms of introducing the results of resource allocation and packages of care into the political process of health reform, have been those conducted by nationals of the countries incolved, as is the case of Mexico and Colombia. The section on middle-income countries will explore in more detail the case of Mexico.

The World Bank has conducted too many studies in low-income cuntries using external consultants and without building local capacity. This may be a factor that hinders the progress of the implementation of the selected packages of care. There is a need for creativity and a thorough knowledge of the political situation in the specific country to identify windows of opportunity to move the implementation along. This section will mainly deal with providing a limited package of care in low-income countries. In this case, it is similar to the problem of expanding coverage to the rural poor in a middle-income country like Mexico.

The first steps are related to changing the inertia of the planning cycle to focus on the limited package of care. These activities are necessary at all levels within the Ministry of Health, especially at the central level where the initiatives for change from states and districts are usually brought back on target. All those involved should understand that changes need to be made in the planning cycle, and that the process will take some time. The interventions proposed in the package usually belong to a program that is in charge of providing that care. At the central level, it is necessary that all programs have at least one intervention and that all interventions in the package have a program. The persons in charge of each program must agree on the technical details of each intervention. A budgetary exercise should also be carried out to translate the new interventions into the official budget items and estimate the financial material and human resources needed. This process may well become an nth iteration of the resource allocation exercise. The output should be a consensus of the major changes needed in the planning cycle at the national and state level, as well as a look at the changes needed to provide the care to the population directly.

A parallel exercise of understanding the new and improved interventions should be carried out by the districts. Here the objective is to understand the modifications to the provision of care, especially the improvement in the supply of inputs, and to plan for the required resources, including the need for retraining. At this level, discussions among those in charge of

vertical programs and horizontal care may lead to turf battles that must be resolved if the package is going to be provided in the most efficient manner. A possible solution is to discuss a new model of care explicitly, where the roles of all the players involved are modified in order to improve health delivery.

In the case of Mexico, the various levels of the ministry (national, state and district) participated in discussions of the basic health care package. The intra-level debates were followed by inter-level encounters most of them with an explicit agenda on the basic package. A series of iterations of the intra-level and inter-level meetings took place during the course of a year and moved the process of implementation of the package of care. Six months into the process, the President of Mexico announced that the health sector would provide a package of services. The interest of the president and the media attention that resulted led to movement in entrenched positions and fruitful discussions. At the end of a year, one state was finally able to launch the basic package of care and start the process of changing the operations of the health system. There is still much to learn about how to modify health care services on a system-wide scale to improve quality and efficiency.

V
What Health Priorities?

Results from the studies selected are summarized and discussed briefly in this chapter. Country studies were grouped into three regions: Sub-Saharan Africa and Asia(SSA), Former Socialist Economies (FSE) and Latin America and the Caribbean (LAC). Although the per capita income of the countries studied in each region differs, the countries studied in SSA and Asia are low income, and almost all of the countries studied in the FSE and LAC are middle income. This section provides information on the burden of disease to indicate the magnitude of health losses by age, sex, cause of death, and disability and risk factors. It also compares and describes priority health interventions and packages of health services.

A comprehensive description and analysis of the results from the studies is well beyond the scope of this paper. Instead, a number of key questions related to the quality and policy relevance of the studies will be answered. Those questions are:

- Are the selected health priorities plausible, given what we know about the epidemiological profile of the country?
- Are the selected priorities different from the ones derived from intuition or the informal consultation of experts?
- Does it matter which indicator is used to assess the burden of disease?
- Based on the available information, is it possible to identify epidemiological patterns that can be adapted to countries with poor information on mortality?
- What is missing in studies with a simplified scope of analysis?

Sub-Saharan Africa and Asia

There are likely to be differences between the epidemiological profile and the priority interventions in SSA and Asia. However, their results are presented together because of the lack of studies with significant results from Asia. With few exceptions, most of the low-income countries share an epidemiological profile dominated by mortality among children

of this region that have assessed their BOD reach this conclusion. As expected, Mauritius, an upper middle-income country, has a profile dominated by non-communicable diseases. Therefore, the priority interventions proposed differ between the low-income countries and Sri Lanka and Mauritius.

Diseases, Injuries and Risk Factors

The total burden of disease is determined by the size of the population, its age structure, the incidence of disease and injury, and the access to effective medical care and physical rehabilitation. The estimates of the Global Burden of Disease (World Bank 1993) show ratios of DALYs per 1,000 population that ranged from 117 for the established market economies (EME) to 574 in the SSA. The figures available for three countries show a similar range, from 535 in Guinea to 121 in Mauritius (see Table 7). Sri Lanka, not surprisingly, presents a low figure of 232 DALYs per 1,000 population, similar to the figures reported for LAC. The data for Guinea is not strictly comparable because age weights are absent, leading to fewer DALYs than expected had weights been applied.

Similarities can be found between the DALYs per 1,000 in Mauritius and the EME, but this is unlikely to mean that Mauritius has the same health status as the EME. The proper method for comparing DALYs is to construct a rate that divides current DALYs by the sum of streams of life among the people living in the country (or region) in mid-year. The crude ratio used in many reports and in Table 7 ignores the effect of the age structure. Mauritius obviously has a younger population than the EME because its fertility rate is higher.

Table 7 also shows the age distribution of DALYs. The percentage of years of life lost among children in

Table 7
Age Distribution of Disease Burden

Country	Disease Burden by AgeGroups (%)					Ratio per 1000 pop.	Units Used; Year of Study
	<5	5-14	15-44	45-59	60+		
Guinea	60	13	17	5	5	535	YLL/1000; 1992
Mauritius	15	4	38	19	24	121	DALY/1000; 1993
East Africa	--	--	--	--	--	--	--
Sri Lanka	--	--	--	--	--	214	DALY/1000; 1994
Andhra Pradesh	38	8	28	13	13	--	DALY/1000; 1991
India	47	10	23	10	10	344	DALY/1000; 1990
SSA	54	13	24	5	4	574	DALY/1000; 1990
EME	7	2	29	20	42	117	DALY/1000; 1990

Table 8
Percent Distribution of Disease Burden by Disease Groups

Country	Disease Groups			Units; Year
	I	II	III	
Guinea	70	23	7	Deaths only; 1992
Mauritius	16	74	10	DALYs; 1993
East Africa	--	--	--	--
Sri Lanka	--	--	--	--
Andhra Pradesh	54	30	16	DALYs; 1991
India	50	41	9	DALYs; 1990
SSA	71	19	10	DALYs; 1990
EME	10	78	12	DALYs; 1990

Group I: Communicable, maternal and perinatal. **Group II:** Noncommunicable and malnutrition. **Group III:** Injuries and accidents

Table 9
Ranking of the Main Causes of Disease Burden in Mauritius by DALYs, YLLs, PYLL and Number of Deaths

Diseases	DALY	YLL	PYLL	PYLL	Deaths
Cardiovascular	1	1	1	2	1
Neuropsychiatric	2	12	12	12	12
Chronic Respiratory	3	7	7	9	4
Perinatal Conditions	4	2	2	1	8
Unintentional Injuries	5	3	4	3	6
Cancer	6	4	3	4	2
Diabetes	7	5	5	10	3
Digestive Diseases	8	6	6	8	5
Infectious and Parasitic Diseases	9	9	9	7	9
Acute Respiratory Infections	10	10	10	11	7
Intentional Injuries	11	8	8	5	10
Congenital Abnormalities	12	11	11	6	14

Source: Vos et al., 1995.

Guinea would be lower if age weights had been applied, and would probably have been similar to that reported for SSA in the WDR (World Bank 1993). The age distribution of DALYs in Mauritius is more concentrated in children and young adults than in the EME.

In all studies, the burden of disease is higher among men than women. As expected, Andra Pradesh has a higher share of DALYs in women (reaching almost half of the total) than other countries. The distribution of years of DALYs by disease groups is congruent with the age distribution. As shown in Table 8, Guinea, despite the lack of age weights, shows a similar distribution of years of life lost as the SSA, with about 70 percent of the years of life lost due to infectious diseases and reproductive health problems. By comparison, Mauritius presents only 16 percent of the DALYs lost to this group, but 74 percent due to noncommunicable diseases, quite similar to the distribution in the EMEs. Andhra Pradesh shows a distribution similar to India's despite a lower proportion of DALYs lost in children under five in Andhra Pradesh. The quality of the estimates is superior in Andhra Pradesh, and perhaps the estimates for India underestimate the role of infectious diseases.

The use of DALYs produces a list of disease priorities that differs from lists based on other indicators. This is demonstrated by the results for Mauritius and Mexico. Table 9 shows the ranking of diseases in Mauritius using five different indicators of burden.

The most significant comparison can be found between DALYs and the crude number of deaths, because the latter are typically used by health institutions to assess priorities. The most striking change is in neuropsychiatric disorders which move from twelfth to second place. To reiterate, in terms of resource allocation the ranking of diseases is not critical, what matters most is the ranking of interventions by their cost-effectivenes.

Given the different indicators used in the studies, results have to be compared to mortality rates and not to years of life lost. There is a substantial difference in the burden of premature mortality among the seven countries. The overall level of mortality is much lower in Kenya than in other countries due to the success in reducing childhood mortality. Mozambique, on the other extreme, shows the highest levels of mortality, with an almost 30 percent probability of death between birth and age five. There is a substantial difference in the burden of premature mortality among the seven countries. The overall level of mortality is much lower in Kenya than in other countries, due to the success in reducig childhood mortality. Mozambique, on the other extreme, shows the highest levels of mortality, with an almost 30 percent probability of death between birth and age five.

The epidemiological profiles show some striking contrasts. All the East African countries, which applied the same methodology, present high levels of perinatal and maternal mortality. Yet, Mozambique and Guinea, which have the highest levels of mortality in many other diseases, show the lowest levels of mortality in this cluster. The perfect relation between method and level suggests that the differences may be artifactual. This is reinforced by the levels registered for the entire region (see column one, Table 10).

A similar situation can be described for the high mortality rates due to cardiovascular disease and injury in Guinea and Mozambique. In the case of cardiovascular disease, the figures for these two countries are similar to the region as a whole, whereas the rates for injury are higher than those for the East African countries as a whole and the regional estimates.

The contribution of protein-energy malnutrition (PEM) to mortality is suspiciously low. Estimates of the real contribution of PEM to mortality in East Africa show that about 30 percent of childhood deaths were attributed to moderate and severe malnutrition, representing at least 15 percent of total deaths in these five countries. In contrast to low-income African countries, countries in South Asia are more affected by protein-energy malnutrition and other micronutrient deficiencies.

Table 10
Mortality Rates for the Main Causes of Death
in Seven Low-Income Countries of Sub-Saharan Africa (circa 1992)

Diseases or Clusters of Diseases	SSA	Eritrea	Ethiopia	Guinea	Kenya	Mozambique	Tanzania	Uganda
Perinatal/Maternal	12	35	38	16	24	17	32	35
Diarrhea	17	24	26	22	11	26	10	14
Acute Respiratory Infections	20	16	25	25	8	29	8	18
Tuberculosis	11	14	9	13	2	12	8	8
Malaria	16	8	6	23	12	28	27	28
Measles	9	6	4	20	4	23*	1	7
AIDS/HIV	4	6	6	3	4	5	9	18
Protein-Energy Malnutrition	1	3	8	5	2	5	1	5
Cardiovascular Disease	18	3	4	19	6	23	6	5
Injury	6	1	2	14	3	16	9	1
Malignant Neoplasms	6	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.
TOTAL	182	178	187	168	113	211	160	200
Per Capita Income (1993)	510**	~169**	~100	500	270	90	90	180
Under-5 Mortality Rate (1993)	175**	~203**	~204	226	94	282	167	185

Sources: For East African countries: World Bank 1996; for Guniea: Jha 1995; for Mozambique: Jha and Barnum, 1995; information on per capita income and child mortality: *World Development Report* 1995.
Notes: Mortality rates expressed by 10,000 population. Age standardization was not possible due to the lack of data on mortality by specific causes and age. The effect of age structure on the rates is negligible due to the similar age distributions of poplations in the seven countries, all with children under 15 years of age representing between 44% and 50% of the total population.
SSA: Sub-Saharan Africa
***** The Guinea and Mozambique studies report deaths due to measles, poliomyelitis, tetanus, diphtheria and pertusis. Probably more than 60% of these deaths are due to measles.
****** Refers to 1990.

Tanzania and Uganda, as expected, show the highest levels of mortality due to AIDS. However, present mortality is not a very good indicator of the magnitude of the epidemic because of the prolonged lag between infection and the appearance of disease symptoms and death. Malaria is another big killer with a 3.5- fold difference between the rates at the two extremes in Eritrea and Mozambique.

From data presented in Table 10 and evidence from other sources, it can be concluded that the burden of disease in any given low-income country cannot be predicted from the level of mortality. In addition to mortality, data on the age structure of the population, child mortality rates, the crude mortality rate due to malaria and AIDS, and the proportion of children with moderate and severe malnutrition, are also needed. This information is available in most low-income countries. Simplified approaches to assess the burden of disease in low-income countries that have poor vital statistics could benefit from standard models of mortality by cause of death, based on these five parameters. Information available from India, China, Matlab in Bangladesh, and some parts of Africa and Asia where the data is reliable, could be used to build low-income mortality models. These models would represent the most common combinations of the levels of the five parameters. A rough illustration of the way these parameters change by country is shown in Table 11.

Table 11
Main Parameters to Describe
the Epidemiological Profile of a Low-Income Country

Country	Age Structure	Child Mortality	Malaria Epidemic	AIDS Epidemic	Malnutrition
China	Aging	Low	Low	Low	Moderate
Sri Lanka	Aging	Low	Moderate	Low	High
India	Young	High	High	High	Very High
Kenya	Young	Moderate	Moderate	High	High
Mozambique	Young	Very High	Very High	Very High	High
Ethiopia	Young	High	Low	High	High

The estimates from the three country studies described so far seem plausible and confirm what was already known about them. However, this is not the case of the other two studies. The results of the Sri Lanka study are faulty for reasons which will be explained below, whereas it is not possible to make a judgment in the case of East Africa because the results are aggregated.

Figure 1 shows the results for Sri Lanka where only three percent of the DALYs are due to infectious diseases and injuries. This distribution of DALYs is incompatible with any human population and has no

Table 13
DALYs Attributable to Risk Factors by Gender
Mauritius, 1993 (percent)

Risk Factor	Male	Female	Total
Tobacco	7.3	n.a.	4.4
Alcohol	6.7	0.3	4.2
Hypertension	7.2	10.7	8.7
Diabetes	8.4	11.7	9.7
Total	29.7	22.7	26.9

Source: Vos, 1005.

relation to our current knowledge of the epidemiological profile of Sri Lanka. The exclusive use of hospital data, therefore, leads to biased results. It is essential that BOD assessments establish a coherent matrix of mortality by sex and age consistent with the information available from population censuses and demographic and health surveys.

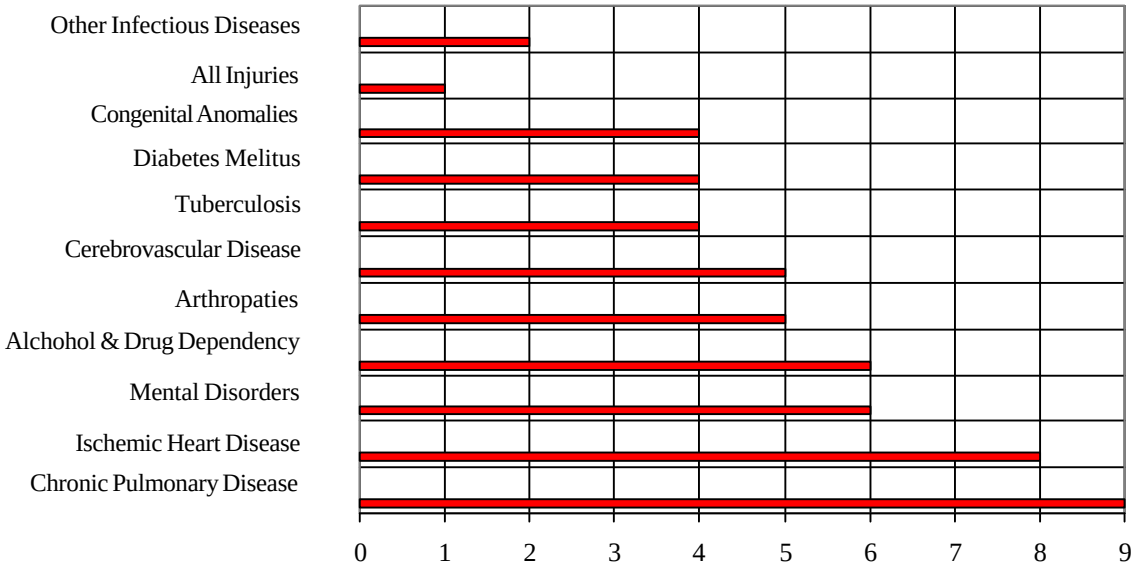
The lack of information by age and sex makes it very difficult to assess the credibility of the East African study results. Nonetheless, the profiles of the countries show variations which are potentially useful for an understanding of disease priorities in Sub-Saharan Africa. Mauritius is the only country in SSA that has assessed health losses by risk factors. Despite the problems discussed in the previous chapter and other uncertainties recognized by the authors of the study (Vos et al. 1995), the figures provide an idea of the order of magnitude for each factor. Table 13 presents the percentage of DALYs lost by risk factors and sex for the country. The significance of alcohol abuse is underestimated; more than half of the years of life lost to alcohol abuse are due to deaths and disability caused by road traffic accidents and other intentional injuries, which have not been included in the Mauritius BOD study.

Packages of Priority Health Services

Low-income countries have the heaviest burden of disease and the least resources to provide adequate health services. In all of the studies of low-income countries, the main finding is that the country cannot afford the essential package designed. The study in Guatemala deliberately excluded hospital services from the package to lower costs, which ended up at $4 per capita. The financial gap was 66 percent of the package cost. The Indonesia study yielded a similar conclusion: the cost of the package was about $10, but spending was less than $2. The studies for Guinea and the five East African[4] countries recommended services that would cost around $10, but health spending was between $3 and $8.

[4] The East Africa study adjusted per capita health expenditures by the purchasing power parity and concluded that three of the five countries could easily afford the $12 minimum package proposed in the *1993 World Development Report.* This exercise, if applied to other low-income countries, would have reached similar conclusions. Unfortunately, the estimates of the 1993 WDR were made using labor costs from low-income countries, and consequently, the adjusted spending figures cannot be compared with the cost estimates from the 1991 WDR.

Figure 1
The Burden of Disease in Sri Lanka
(Percent of Total DALYs)



The studies for Indonesia and Guatemala used a similar approach by skipping the burden of disease assessment, borrowing the minimum package proposed in the 1993 WDR and costing the interventions. Interestingly, the authors of the studies did not communicate with each other, yet both made two similar modifications to the minimum package. They excluded hospital services for obstetric emergencies and added investments in the provision of water and sewerage. Current evidence demonstrates that community-based services for pregnant women, in the absence of access to essential obstetric functions, are ineffective in reducing mortality and disability among women and children. Water and sanitation were found to be extremely expensive and not affordable in Guatemala, at ten times the cost of the essential package. Data from Ghana on the cost of water and sanitation confirm this finding.

The relevant conclusion from the inclusion of water and sanitation in these country packages is that criteria other than cost-effectiveness can and will always be considered when establishing health priorities. In the World Bank report *Better Health for Africa*, water and sanitation were added to the proposed package of basic health services but the rationale for the inclusion was not associated with the cost-effectiveness of the intervention. The studies for Indonesia and Guatemala fail to provide a reasonable justification for including water and sanitation. In fact, cost-effectiveness is an inappropriate method to assess the economic value of interventions that, like water and sanitation, produce benefits that go beyond health.

The East African study added an explicit criterion to cost-effectiveness in order to justify a publicly subsidized health service. Public finance theory indicates that governments should concentrate spending on public goods. The authors of the study conclude that even when many of the clinical interventions are among the most cost-effective, government subsidies should only be used to finance community-based and preventive services, which fulfill the public finance criterion. For example, the government should subsidize preventive measures in the case of malaria,

which is the biggest killer in the East African countries, even when their cost-effectiveness is clearly less favorable than clinical treatment.

The policy relevance of studies in low-income countries can be documented in various ways. As mentioned, it is too early to see changes in health status; however, there is evidence to suggest that new investments are targeting cost-effective interventions for some selected poor areas in Indonesia and Uganda as a result of the studies or the policy dialogue triggered by them. One of the most promising examples is Ghana, where the National Strategic Health Plan will select a list of priority interventions on the basis of cost and effectiveness. The final decision on the priorities and the delivery strategy will be made by district health authorities, but limits will be set by the menu of cost-effective interventions.

The Guinea study has yielded a proposal for a package of essential health services. This is the only package in a low-income country that was based on a proper assessment of the burden of disease and on the cost-effectiveness analysis of the interventions that could control that burden. The content of the package does not differ starkly from the one recommended by the 1993 WDR. However, the data on cost and potential benefits provide a real life illustration of a normative package of priority interventions.

The Former Socialist Economies

The Former Socialist Economies present a distinctive epidemiological profile that deserves a separate discussion. Similarly, their health system and priority-setting policy context differs substantially from other low- and middle-income countries.

Setting health priorities in newly industrialized countries is justified by the policy context of the health sector. Four elements describe the policy context:

- The relatively equitable distribution of health resources and services that characterized the Soviet health system can only be maintained if allocative efficiency is substantially improved.
- Average per capita expenditures (between US$50 and US$250) on health are insufficient to pay for the generous menu of health services which were available during the Soviet era.
- In the present planning environment the natural tendency would be to invest in equipment, technology and expensive drugs of dubious effectiveness, thus exacerbating current allocative inefficiencies.
- Many cost-effective health interventions that could control major causes of death are currently neglected, underfunded or of low quality. If the health status is to be improved such interventions need to receive greater priority.

FSE health priorities studies have concentrated on describing the burden of disease. The cost-effectiveness analysis was limited to cost estimates of a handful of diseases in Turkmenistan, Georgia and Estonia. For this reason, only the burden of disease is presented in this section.

Diseases, Injuries and Risk Factors[5]

The burden of mortality, measured in years of life lost (YLL) shows a different epidemiological profile for the European FSE and the newly industrialized nations of Central Asia. Health priorities studies have not estimated the burden of disability in these groups of nations. The European countries are dominated by noncommunicable diseases and injuries, but countries in Central Asia show a coexistence of communicable diseases with reproductive problems and noncommunicable diseases (Bobadilla and Costello, 1996).

Communicable diseases and reproductive health problems constitute 53 percent of the burden in Central Asia, but only 11 percent in the European FSE. In

[5] The description of the burden of disease in the FSE is based on two studies that have summarized the available information on mortality and risk factors: Murray and Bobadilla, 1996, and Nienssen et al., 1994.

Central Asia, respiratory infections account for almost 30 percent of the total mortality burden, followed by perinatal causes and diarrheal diseases at 10 percent and 8 percent respectively. In contrast, in the populations of the former socialist nations of Europe, diarrheal diseases cause fewer health losses, less than one percent of the total in the region, but respiratory infections and perinatal problems are among the top 12 main causes of mortality. Maternal mortality, interestingly, is not identified as one of the main causes of death in either region.

A few noncommunicable diseases are responsible for the majority of YLL in the European FSE. Two-thirds of the mortality burden is due to noncommunicable diseases. Ischemic heart disease, cerebrovascular disease and lung cancer are the main causes of death, explaining a third of the total mortality burden in the region. Lung cancer is expected to grow substantially in the next 20 years due to the gap between the current high prevalence of smoking and the clinical manifestation of and death from the disease.

Along with cardiovascular disease, injuries are the predominant cause of death in newly industrialized nations, and responsible for the largest part of the life expectancy reversals documented during the 1970s, the beginning of the 1980s and, more recently, in the period from 1990 to 1993 (Skolnikov et al, 1996). In the European region, 24 percent of all the YLL are due to injuries. Motor vehicle accidents and suicide are the biggest killers at 7 percent and 5 percent, respectively, of the total burden of mortality. Poisoning, including acute alcohol intoxication, is among the 12 main causes of mortality (3 percent of the total). Homicide is also responsible for a significant number of premature deaths.

The assessment of the burden of disease due to premature mortality, based on the International Classification of Diseases, suggests that priority should be given to the treatment of acquired diseases, mainly to reduce fatality rates and the probabilities of permanent disabilities. To complement such an approach, an analysis of premature deaths by risk factors needs to be undertaken. Unfortunately, the information needed to assess risk factors is not readily available in all the newly industrialized nations. The prevalence of risk factors is available for some small areas (which are nonrepresentative) and there is little information on the attributable risk between the risk factor and the disease.

A recent study using available information, analyzed a selected list of risk factors for three of the NIS countries (Niessen and Krameers, 1994). Table 14* shows very high prevalence rates for all factors studied: smoking, high blood pressure, cholesterol and obesity. These risk factors can account for about one third of total mortality in men and one quarter in women. Compared to the Netherlands, these figures are not vastly different for men but they are much higher for women in the newly industrialized nations.

These risk factors are very important to explain the chronic disease epidemic in the European FES. All of these can be controlled with cost-effective interventions (mostly preventive) but they have, lamentably, been neglected by governments. The overall effect of controlling risk factors for chronic diseases, including alcohol abuse, would be greater than what can be deduced from Table 15 because the lag between exposure and disease (which is anywhere from 5 to 15 years) has not been taken into consideration in the analysis. That is, current levels of tobacco use and hypertension will lead to mortality levels higher than those measured in the early 1990s. Therefore, their control would lead to a greater number of lives saved.

Information available on disease burden and the coverage of preventive programs in the newly industrialized nations (Bobadilla and Costello 1996) suggests four general priorities for health interventions:

- A comprehensive program to control alcohol abuse. This should include a professionally

* **Editor's Note**: We were unable to find this table among the author's papers, or reproduce it from the data available.

designed subprogram on information, communication and education about the health effects of alcohol abuse; a cluster of regulations to restrict alcohol sales to adolescents and combat drunk driving; and the imposition of excise taxes on alcohol.

- A similar program to reduce the consumption of tobacco, along with a complementary nationwide education campaign to modify the diet of the population, aimed at reducing fat and salt consumption.

- A program to prevent arterial hypertension. If proven cost-effective this program should be based on screening and clinical management of hypertension and counseling on diet, exercise and alcohol consumption.

- A nationwide program to improve road safety, including speed regulations (and their enforcement), compulsory use of seat belts, helmets (for motorcycle drivers) and changes in street signals to protect pedestrians.

- Improvements in the organization and delivery of emergency services to treat injuries.

- Improvements in the access to care and case management of patients with ischemic heart disease.

Table 15
Overall Contribution to Total Adult Mortality of the Health Determinants Smoking, Hypertension, Hypercholesterolemia and Obesity Through CHD, CVA, DM, LUNG CA and COLD, and their Combined Contribution by Gender (percent)

Country	Males					
	CHD	CVA	DM	LUNG CA	COLD	ALL
Kazakhstan	13	7	0.2	7	3	30
Russia	17	8	0.2	8	2	35
Lithuania	20	5	0.3	8	3	36
Poland	15	4	0.7	8	1	29
FSE	18	8	0.3	8	2	37
Netherlands	15	2	0.5	11	2	31
	Females					
	CHD	CVA	DM	LUNG CA	COLD	ALL
Kazakhstan	6	8	0.2	0.2	0.2	14
Russia	12	13	0.7	1.2	0.9	27
Lithuania	13	8	0.6	0.5	0.9	22
Poland	9	6	1.7	2.7	0.8	20
FSE	13	12	0.9	1.2	0.9	28
Netherlands	3	1	1.4	2.6	0.9	8

Source: Nienssen and Kramers, 1994. CHD: Coronary Heart Disease; CVA: Cerebro-Muscular Disease; DM: Diabetes Mellitus; LUNG CA: Lung Cancer; COLD: Chronic Obstructive Lung Disease.

VI
Research and Development Needs

The scientific basis for setting priorities has been developing during the past few decades, but it is not yet ready to influence decision-making at the systemic and programmatic levels. Concurrently, the *status quo ante* on setting health priorities is contributing to technical inefficiency, the inequitable distribution of resources and dissatisfaction among consumers. Health system managers, decisionmakers in bilateral and multilateral organizations, and some health researchers are aware of the serious biases in the current allocation of health resources in most countries. Profound dissatisfaction prevails with regards to the existing mechanisms used to discuss and set health priorities.

Existing methodologies to set priorities are incomplete because they deal exclusively with the quantitative analysis of health needs and the economic assessment of alternative options to deliver services. There is very little attention given to the other dimensions of setting priorities, particularly the political context, the decision-making process, and the ethical implications of making explicit priorities at different levels of the system. The quantitative analysis necessary to establish health priorities is weak because, in most countries, the data to assess health needs is incomplete and unreliable, and our understanding of the efficacy of health interventions is still being developed.

The available information and methods to establish priorities are not used in decision-making at a desirable level because of three interrelated factors. First, tensions between research and policy making exist regarding the time required to produce results; views on the level of sophistication of the process and the quality of information; and, on what approach is needed to set priorities. Second, decisionmakers find it politically "inconvenient" to establish explicit priorities because transparent methods and explicit priorities may lead to increased dissatisfaction on the part of organized groups, particularly those who lose benefits. In addition, politicians and policymakers realize that explicit criteria reduce their discretion and power to allocate resources. Third, the research and public health communities are not particularly interested in convincing decisionmakers to apply current methods to establish priorities. Researchers may not be interested in the scientific challenges posed by the methods and results, and public health specialists often are specialized in one group of interventions which they consider high priority and which may be threatened by the application of explicit criteria.

The list of knowledge areas that need to be developed to improve our ability to set health priorities is extensive. It is beyond the scope of this paper to describe and provide the rationale for such a list. Rather, a set of short- and long-term priority topics will be highlighted. For their selection, consideration was given to the needs of decisionmakers in low- and middle-income countries.

Short-Term Priorities in Low-Income Countries

The key priorities in low-income countries are related to the development of inexpensive methods to collect basic information on the main determinants and the technical criteria to set health priorities. Health status information, particularly on mortality, is indispensable. New emphasis on testing, verbal autopsies and the application of a sample registration system need to be replicated and strongly supported by governments and international agencies. Despite the renewed interest in community participation in the health sector, reliable methods to assess community preferences in health care remain lacking.

In many countries, public health institutions are weak and cannot guide priorities and other strategic decisions made for health care delivery. The donor agencies, as a result, make decisions which often fill the policy vacuum of health ministries and develop vertical disease control programs. Setting priorities on paper, when the leverage to implement them is weak, is clearly a futile planning exercise. Policy analysis on the degrees of freedom to change rankings appears to be a high research priority in these countries.

Short-Term Priorities in Middle-Income Countries

Many middle-income countries have population groups living in conditions similar to those in low-income countries. The research priorities for these regions, where the largest burden of disease is concentrated, are no different from those in low-income countries.

In contrast with low-income countries, middle-income countries need information on morbidity and disability, since 35 percent to 40 percent of the disease burden is due to these health problems. Although there is disenchantment with interview-based health surveys to collect morbidity data, there is only scarce research on inexpensive methods to measure temporary and permanent disability by disease and injury that caused the disability.

Epidemiological research and data collection on risk factors of the main diseases and injuries are urgently needed in many middle- and high-income countries. More and better quality research is needed to identify the attributable risk of deaths classified by immediate cause for each of the major risk factors. An international classification of health risk factors is also needed for this research.

Middle-income countries should invest more on measuring the effectiveness of alternative public health programs, including those related to environmental control. Efficacy clinical trials can usually provide useful information to assess the effectiveness of the same interventions in different countries. The results from effectiveness research of public health interventions in high-income countries, by comparison, cannot be generalized to other countries because the institutional framework and the behavioral response from the population is specific to each country, and sometimes even to each subnational region. More clinical research is needed in the health institutions of middle-income countries to understand the determinants of effectiveness associated with interventions for high burden diseases.

The need for methods to assess community preferences is similar in low- and middle-income countries, although the research questions may be different because health expenditures are higher and the menu of alternative priorities is larger.

Medium-Term Research and Development Priorities

Equity goals cannot be achieved through the provision of the most cost-effective interventions. There are some populations for whom equity goals and resource allocation efficiency goals lead to contradictory results. Dispersed and isolated rural communities are often the last population group to be reached by services.The marginal cost-effectiveness of delivering health services for these communities is very unfavorable. Most of the costs are higher than elsewhere due to the added cost of transport and the need to pay for basic services (water, sanitation, telecommunications, etc.). Furthermore, the effectiveness of interventions is lower because these communities tend to utilize fewer services and adhere poorly to medical prescriptions. Complete coverage, even when feasible, may not be warranted due to the high opportunity costs involved. Still, on equity grounds, these communities may be the highest priority to receive health services. Research is needed to assess the trade-off between cost-effectiveness and universal coverage of health services in countries where dispersed, isolated communities exist.

Partially related to the previous issue is the lack of information and research on the marginal cost-effectiveness of interventions provided at different scales. Average cost-effectiveness is useful to design a normative package of services, but could be misleading if the package is intended for delivery in different settings, as often happens with rural communities. Although the cost information could be easily collected, measuring effectiveness for the same intervention in different settings is expensive and involves complex research designs.

Most of the public institutions in the health sector operate with budgeting and programming systems that classify expenditures by using criteria that differ from those used in setting health priorities. Health facilities, salaries, equipment, transport, drugs and other medical consumables are examples of the most common categories. Their routine conversion into interventions or health programs is very difficult or impossible. Research on alternative systems of budgeting, programming and accounting in the health sector would yield valuable information. Moreover, managers and decisionmakers in the health sector would be more effective if they could assess the relationship between their expenditure patterns and the potential cost-effectiveness of a particular list of priority interventions.

Many of the disease priorities that the system should address are not expressed in the current burden of disease. Chronic diseases frequently have lag periods of 15 years or more between the exposure to a risk(s) factor(s) and the presence of disability and premature death. Setting health priorities on the basis of the current burden of disease is misleading for many chronic diseases like AIDS and liver and lung cancer, to name but a few. Given the current prevalence of risk factors, research on projecting the burden of disease is required to reduce the underestimatation of chronic diseases.

The capacity to undertake the research priorities proposed in this paper is not well developed in low- and middle-income countries. The scarcity of health researchers is a problem for all the health disciplines, but research in health priorities is negatively affected by a severe shortage of skills. The current training in epidemiology, on the one hand, and health administration, management and public health, on the other, is weak in the methodology and theory relevant to establishing health priorities. Even if an average group of epidemiologists decides to assess the health status of the population, their training may be insufficient to use morbidity and mortality statistics to generate a composite indicator of health status. A similar case can be made for economists with regards to cost-effectiveness analysis. The development of a single indicator of health status has only limited applicability in the short term. The methodologies used in setting priorities are, to some extent, specialized and their level of complexity goes beyond the public health practitioner, and are not part of the core training of researchers.

This gap means that research on establishing health priorities will not improve with " more of the same." A concerted effort needs to be made to train health sector professionals and researchers to produce and consume information on disease control priorities, the information available to set priorities, and develop methods to undertake feasibility studies.

The research available on the implementation of explicitly priorities has been particularly scarce. To date, implementation questions are the main obstacle to moving from technically designed priorities to the reallocation of resources, and ultimately better health. For example: What are the regulations, incentives, and other management tools that will be used to force or convince providers and consumers to favor priority interventions? Will these instruments be applied to doctors, hospital managers or district health authorities? How will the accounting and budgeting system be changed in order to reflect expenditures by intervention and not by health facilities? What type of changes are needed in the information system to monitor progress and establish a system of rewards?

Bibliography

Advisory Committee on Health Research. 1995. *Report of the DALY Review Group.* Geneva: World Health Organization.

Ahumada, J. et al. 1976. *Health Planning: Problems of Concept and Method.* No. 111. Washington, D.C.: Pan American Health Organization.

Anand, S. and Hanson K. 1995. *Disability Adjusted Life Years: A Critical Review.* No. 95.06: Cambridge: Harvard Center for Population and Development Studies.

Berman, P., and B.A. Ormond. 1988. Changes in Health Care Demand and Supply Accompanying Economic Development. *Research in Human Capital Development.* No 5: pg. 147-172.

Birdsall, N. 1993. Pragmatism, Robin Hood, and Other Themes: Good Government and Social Well-Being in Developing Countries. In *Health and Social Change in International Perspective,* eds. L.C. Chen, A. Kleinman, and N.C. Ware. Cambridge: Harvard School of Public Health.

Bobadilla, J.L. 1992. Main Issues in Child Health. Paper presented at the conference, Cost-Effectice Interventions for Child Health: Technical Choices, Strategic Issues, and Priorities. Johns Hopkins University, Baltimore.

Bobadilla, J.L. et al. 1994. Design, Content, and Financing of an Essential National Package of Health Services. *Bulletin of the World Health Organization.* No. 72: pg. 653-662.

Bobadilla, J.L. et al. El paquete universal de servicios esenciales de salud. *Economia y salud: documentos para el análisis y la convergencia.* México, D.F.: Fundación Mexicana Para la Salud.

Bobadilla, J.L. and P. Cowley. 1995. Designing and Implementing Packages of Essential Health Services. *Journal of International Development.* No 7: pg. 543-554.

Bobadilla, J.L. and C. Costello. (Forthcoming). Mortality Profiles and Adult Health Interventions in the Newly Independent States. In *Mortality Profiles and Adult Health Interventions in the Newly Independent State,* eds. J.L. Bobadilla and C. Costello. Washington D.C.: National Academy Press.

Bronzino, D.B., V.H. Smith,. and M. Wade. 1990. *Medical Technology and Society:. An Interdisciplinary Approach.* Cambridge: The MIT Press.

Costa, C. and V. Ramos. 1995. *A Cost-Effectiveness Analysis of Prevention in the Estonia Health Project.* Washington, D.C.: The World Bank.

Costa, C. and M. Gouveia. 1995. *The Georgia Health Project: Burden of Disease Study and Cost-Effectiveness Analysis of the Projected Health Interventions.* Washington, D.C.: The World Bank.

Feachem, R.G.A. 1993. Personal communication.

Frenk, J., R. Lonzano, M.A. Gonzalez-Block. 1994. *Economia y salud: propuestas para el avance del sistema de salud en México. Informe final.* México D.F.: Fundación Mexicana para la Salud.

Ghana Health Assessment Project Team. 1981. A Quantitative Method of Assessing the Health Impact of Different Diseases in Less Developed Countries. *Journal of Epidemiology.* No.10: pg. 73-80.

Ham, C. and F. Honigsbaum. 1995. Priority Setting and Rationing Health Services. Presented at the conference, Health Care Reform in Europe. World Health Organization, Washington, D.C.

Hill, A.G. and W.J. Graham. 1988. *West African Sources of Health and Mortality Information: A Comparative Review.* No. 58e. Ottawa: International Development Research Center.

Jamison, D., H. Mosley, A. Measham, and J.L. Bobadilla. 1993. *Disease Control Priorities in Developing Countries.* Oxford: Oxford University Press.

Jha., P. and O. Bangoura. 1995. *The Republic of Guinea: An Analytic Framework for Health Sector Reform.* Washington, D.C.: The World Bank.

King, M. 1974. Personal Health Care: The Quest for a Human Right. In *Ciba Foundation Symposium on Human Rights in Health.* Amsterdam: Elsevier-Expectra Medica.

Klein, R. 1992. Warning Signals from Oregon. *British Medical Journal.* No. 309: pg. 1457-1458.

Komarov, Y. M. et al. (Forthcoming). Loss of Working Potential in Countries of the Newly Independent States. In *Mortality Profiles and Adult Health Interventions in the Newly Independent States,* eds. J.L. Bobadilla and C. Costello. Washington D.C.: National Academy Press.

Gevin H., et al. 1991. Prioritization of Health Care Services. *Archives of Internal Medicine.* No.151: pg. 912-916.

Lafond, Anne K. 1995. Improving the Quality of Investment in Health: Lessons on Sustainability. *Health Policy and Planning.* No. 10; pg. 63-75.

McLarty, D.G., et al. 1993. *Policy Implications of Adult Mortality and Morbidity.* A bilateral project funded by the United Kingdom Overseas Development Adminisrtation and the Government of the United Republic of Tanzania. Dar es Saalam.

Mosley, H., J.L. Bobadilla, and D. Jamison. The Health Transition: Implications for Health Policy in Developing Countries. In *Disease Control Priorities in Developing Countries,* eds. D. Jamison et al.. Oxford: Oxford University Press.

Morrow, R.H., and John Bryant. 1995. Health Policy Approaches to Measuring and Valuing Human Life: Conceptual and Ethical Issues. *American Journal of Public Health. No*. 85: pg. 1356-1360.

Murray, C.J.L. 1990. Rational Approaches to Priority Setting in International Health. *Journal of Tropical Medicine and Hygiene.* No. 93: pg. 303-311.

Murray, C.J.L., G.Yang, and Q. Xinjian. 1992. Adult Mortality: Levels, Patterns, and Causes. In *The Health of Adults in the Developing World,* eds. R. Feachem et al. New York: Oxford University Press for the World Bank.

Murray, C.J.L. and A. Lopez. 1994. Quantifying Disability: Data, Methods and Results. *Bulletin of the World Health Organization.* No. 72 (3): pg. 481-494.

Murray, C. M., and A. Lopez. 1994. Quantifying the Burden of Disease: Technical Basis for Disability Adjusted Life Years. *Bulletin of the World Health Organization.* No. 72: pg. 429 445.

Murray, C.J.L. 1994. Cost-Effectiveness Analysis and Policy Choices: Investing in Health Systems. *Bulletin of the World Health Organizahion.* No. 72 (3): pg. 663-674.

Murray, C. 1995. Towards an Analytical Approach to Health Sector Reform. In *Health Sector Reform in Developing Countries: Making Health Development Sustainable,* ed. P. Berman. Cambridge: Harvard Series on Population and International Health.

Murray, C.J.L. and J. L. Bobadilla. (Forthcoming) Epiderniological Transitions in the Formerly Socialist Economies: Divergent Patterns of Mortality and Causes of Death. In *Mortality Profiles and Adult Health Interventions in the Newly Independent States,* eds. C. Costello and J.L. Bobadilla. Washington D.C.: National Academy Press.

Musgrove, P. 1995. Cost-Effectiveness and the Socialization of Health Care. In *Health Sector Reform in Developing Countries: Making Health Development Sustainable, ed. P. Berman.* Cambridge: Harvard Series on Population and International Health.

Niessen and P.G.N. Kramers. Proximate Determinants of Adult Health in the Newly Independent States. Paper presented at conference, *Adult Health Priorities in the Newly Independent States.* Washington, D.C.: National Academy of Sciences.

Resource Allocation Working Party. 1976. *Sharing Resources for Health in England.* London: Department of Health and Social Security.

Shepard, D. 1996. Personal communication.

Skoluikov, V., F. Mesle, and J. Vallin. (Forthcoming). Recent Trends in Life Expectancy and Causes of Death in Russia (l970-l993). In *Mortality Profiles and Adult Health Interventions in the Newly Independent States,* eds. J.L. Bobadilla and C. Costello. Washington D.C.: National Academy Press.

Sloan, F.A., ed. 1995. *Valuing Henlth Care. Costs, Benefits and Effectiveness of Pharmaceuticals and Other Medical Technologies.* New York: Cambridge University Press.

Timaeus, M. 1992. *Estimation of Age-Specific Mortality in Sub-Saharan Africa for Use in Modeling the World Burden of Disease.* London: Center for Population Studies of the London School of Hygiene and Tropical Medicine.

Ugalde, A. and T.J. Jackson. 1995. The World Bank and International Health Policy: A Critical Review. *Journal of International Development.* No. 7: pg. 525-541.

U.S. Congress, Office of Technology Assessment. 1994. *Identifying Health Technologies that Work, Searching for the Evidence.* No. OTA-H-608. Washington, D.C.: U.S. Government Printing Office.

Vargas, V. 1994. *Guatemala: Programa Sectorial de Salud: el conjunto básico de servicios de salud*. Washington, D.C.: Inter-American Development Bank.

Vos, E.T. et al. 1995. *Mauritius Health Sector Reform: National Burden of Disense Study*. London: The London School of Hygiene and Tropical Medicine.

Walsh, J., and K. Warren. 1979. Selective Primary Health Care - An Interim Strategy for Disease Control in Developing Countries. *New England Journal of Medicine.* No. 301: pg. 967-974.

Weinstein, M., and W. Stanson. 1977. Foundations of Cost-Effective Analysis for Health and Medical Practices. *The New England Journal of Medicine.* No. 296: pg. 716-721.

Weinstein, M.C. 1995. From Cost-Effectiveness Ratios to Resource Allocation: Where to Draw the Line? In *Valuing Health Care: Costs, Benefits and Effectiveness of Pharmaceuticals and Other Medical Technologies,* ed. F.A. Sloan.. New York: Cambridge University Press.

World Bank. *1993. World Development Report 1993: Investing in Health.* Washington D.C.: Oxford University Press for the World Bank.

World Bank. 1995. *Investing in People. The World Bank in Action.* Washington D.C.: The International Bank for Reconstruction and Development,

World Health Organization. 1992. *International Statistical Classification of Disenses and Related Health Problems.* Geneva: World Health Organization.

Years of Potential Life Lost Before 65-United States: Leads From the MMWR. *Journal of the American Medical Associntion.* 1989. No 261: pg. 823-827.

Zeckhauser, R., and D. Sheppard. 1976. Where Now for Saving Lives. *La'‘' and Contemporary Problems. No.* 40: pg. 55.

Zwi, A.B., and A. Mills. 1995. Health Policy in Less Developed Countries: Past Trends and Future Directions. *Journal of International Development.* No. 7: pg. 299-328.

Annex
References to the Country Studies

Andhra Pradesh

Center for Social Services. *1995. Andhra Pradesh: Burden of Disease and Cost-Effectiveness Study of Health Interventions.* Administrative Staff College of India, India.

World Bank. 1994. *Staff Appraisal Report: Andhra Pradesh District Health Systems Project.* World Bank, Washington, D.C.

Chile

World Bank. *1995. Chile: The Adult Health Policy Challenge.* A World Bank Country Study, Washington D.C.

Colombia

Londono, J.L., et al. 1994. *La Carga de la Enfermedad en Colombia.* Ministerio de Salud, Bogota, Colombia.

East Africa (Eritrea, Ethiopia, Kenya, Tanzania and Uganda)

World Bank. 1995. *Health Policy in Eastern Africa: A Structured Approach to Resource Allocation (Volumes I-III).* The World Bank, Washington, D.C.

World Bank. 1995. *Proceedings of the East Africa Burden of Disease, Cost Effectiveness of Health Care Interventions and Health Policy Regional Workshop.* (Mimeograph). The World Bank, Washington, D.C.

Estonia

Costa, C. and Ramos, V. 1995. A Cost-Effectiveness Analysis of Prevention in the Estonia Health Project; The World Bank, Washington, D.C.

Georgia

Costa, C. and M.Gouveia. *The Georgia Health Project: Burden of Disease Study and Cost-Effectiveness Analysis of the Projected Health Interventions.* The World Bank, Washington, D.C.

Ghana

Ghana Ministry of Health. 1994. *Ghana Cost-Effectiveness Exercise Methodology.* 1994. Mimeograph.

Guinea

Jha, P. and O. Bangoura. 1995. *The Republic of Guinea: An Analytic Framework for Health Sector Reform.* The World Bank, Washington, D.C.

Guatemala

Varga, V. *1994. Guatemala: Programa Sectorial de Salud. El Conjunto Basico de Servicios de Salud.* Inter-American Development Bank, Washington, D.C.

India

World Bank. 1995. India's Family Welfare Program: Toward a reproductive and Child Health Approach. The World Bank, Washington D.C.

Indonesia

World Bank. 1994. *Repelita VI (Indonesia) and the Health Sector.* (Mimeograph). The World Bank, Washington, D.C.

Jamaica

World Bank. 1994. *Jamaica Health Sector Review: Present Status and Future Options.* The World Bank, Washington, D.C.

Kyrgyz Republic

World Bank. 1995. Kyrgyz Republic: Health Sector Reform. The World Bank, Washington D.C.

Maghreb (Algeria, Moroco and Tunisa)

World Bank. 1994. *Health Sector Priorities in the Maghreb Issues Paper*. (Mimeograph). The World Bank, Washington, D.C.

Mauritius

Vos, E.T. et al. 1995. *Mauritius Health Sector Reform: National Burden of Disease Study*. The London School of Hygiene and Tropical Medicine, London.

Mexico

Bobadilla, J.L. et al. *1994. El paquete universal de servicios esenciales de salud. Economia y salud, documentos para el análisis y la convergencia.* Fundación Mexicana para la Salud. México D.F.

Lozano, R., et al. 1994. *El peso de la enfermedad en México: un doble reto. Documentos para el análisis y la convergencia.* Fundacion Mexicana para la Salud, México D.F.

Sri Lanka

World Bank. 1995. *Aide Memoire with Annexes; Sri Lanka: Proposed Health Services Project and Burden of Disease Study.* The World Bank, Washington, D.C.

Turkey

World Bank. 1994. *Republic of Turkey Second Health Project: Essential Health Services and Management Development in Central and Eastern Anatolia. (M*imeograph). The World Bank, Washingtong, D.C.

Turkmenistan

World Bank. 1995. *Turkmenistan: Rationalizing the Health Sector*. The World Bank, Washington, D.C.

Uganda

World Bank. *1994. Republic of Uganda District Health Services Pilot and Demonstration Project.* (Mimeograph). The World Bank, Washington, D.C.

Uruguay

World Bank. *1994. Uruguay Health Sector Development Project.* (Mimeograph). The World Bank, Washington, D.C..

World Bank. 1992. *Estimación de la carga de enfermedad en la República Oriental del Uruguay.* (Mimeograph). The World Bank, Washington, D.C.

Uzbekistan

World Bank. 1994. *Uzbekistan*: *Adjusting Social Protection.* The World Bank, Washington, D.C.

Murray, C. and X. Qiao. 1993. *Analysis of DALYs Lost Due to Premature Mortality in Uzbekistan.* Harvard Center for Population and Development Studies, Cambridge.

Zambia

World Bank. *1994. Staff Appraisal Report: Zambia Health Sector Support.* (Mimeograph). The World Bank, Washington, D.C.