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The Health of Adults in the Developing World

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A Summary

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A Note to the Reader

This booklet is the third in a series summarizing the main points of full-length World Bank books. *The Health of Adults in the Developing World* focuses on the fact that half or more of health sector resources in developing countries are consumed by the age group that supports society. The book makes recommendations centered around the proposition that governments are financing too much inefficient and inequitable adult health care. If such expenditure were reduced, resources would be freed for cost-effective care, especially now-neglected preventive intervention.

Contents

The Health of Adults in the Developing World

Demographic trends in developing countries have increased the absolute and relative importance of adults and their health problems without a corresponding response from policymakers. As a result of substantial reductions in child mortality during the last two to three decades, nearly 90 percent of children in developing countries survive to be adults, even in some of the poorest countries of Sub-Saharan Africa as a result of substantial reductions in child mortality during the last decade. Too many of these adults still die relatively young. In Africa, 38 percent of fifteen year olds do not survive to see their sixtieth birthdays. Among the survivors, many suffer from chronic impairments, frequent illnesses, and injuries. The ill health of adults imposes a major burden on health services as well as large, negative consequences on families, communities, and societies. The book summarized here seeks to place adult health firmly on the agenda of health policymakers and researchers, and to stimulate discussion, research, and action.

Sick adults consume more than half of health sector resources in developing countries, yet the development of policy in both the curative and preventive areas is rudimentary. A poor understanding of health needs and solutions leads to poor allocation of resources. Throughout the developing world, tuberculosis, cardiovascular diseases, cancers, and injuries are major causes of adult ill health. Yet each is, in various ways and for different reasons, seriously neglected in research and policy.

In the absence of improved understanding and policy in the area of adult health, expenditure on the treatment of sick adults will continue to grow rapidly, as it has in the developed world. Much of this expenditure may be inappropriate in the sense that there may be alternative investments of more benefit to public health. Such alternatives may lie in other forms of adult treatment, in the prevention of adult disease, and in fostering the health of children. Resources may also be more efficiently allocated by being better targeted on particularly disadvantaged groups. The efficiency and equity of the allocation of health sector resources are concerns that lie behind this booklet and demand better understanding and improved policy formulation. Adult

health issues must be identified and analyzed if the runaway juggernaut of expenditure is to be controlled and properly directed.

The Scope

Divergent views about what *adult health* means have slowed productive discussion about adult health and ill health. For some, adult health means control of chronic disease; for others, it is mainly a concern of relatively wealthy countries; for still others, the term implies a focus on urban elites rather than rural masses. For some, the term suggests prevention, whereas for others it implies sophisticated curative technology in secondary or tertiary hospitals. In this booklet, the concept of adult ill health includes all major health conditions, be they communicable, noncommunicable, or injuries. It embraces the poor and the wealthy, the urban and the rural, the employed and the unemployed, men and women. It covers both diseases experienced by adults and childhood exposures to risk factors for adult disease.

The Age Focus

This booklet defines *adults* as those aged fifteen through fifty-nine years, *children* as those younger than fifteen years—either preschool (zero through four years) or school-age (five through fourteen years), and the *elderly* as those aged sixty years and older. These categories, like any others, are somewhat arbitrary, but have several advantages. Adults, aged fifteen through fifty-nine years, include nearly all those in society who are economically productive, biologically reproductive, and responsible for the support of children and elderly dependents. Adults are not a homogeneous group, and some of the analyses in this booklet distinguish younger (fifteen to thirty-nine years) from older (forty to fifty-nine years) adults. Younger adults are more at risk from maternal ill health, injuries, and alcohol and drug use. Older adults are more likely to suffer from cardiovascular diseases and cancers.

The danger in using any set of age categories is that of forgetting that all adults were once children, that most will become elderly, and that the concern should be for the health of individuals throughout their lifetimes. Several interventions to improve adult health target children. Such interventions include hepatitis B immunization and education about sexual behavior, tobacco use, and dietary habits. Just as experiences in childhood can affect adult health, what happens during the adult years can have important repercussions for the elderly.

The classic example is tobacco. There is considerable data to demonstrate that although tobacco is an important cause of adult ill health, it is of even

greater importance for the elderly. Recommendations made in this booklet for reducing tobacco use among adults have important implications for the elderly. A separate but related intergenerational dimension of adult health is the effect that adult ill health or death has on the health of younger and older family members.

The age-based analysis in this booklet has the potential to generate a debate about the equity of investment in adult versus child health. Such a debate is unproductive because the policy decisions that need to be made are not a matter of choosing between different groups of people—they are the same people at different ages. Poor children, who suffer excessive morbidity and mortality rates, become poor adults, who also suffer excessive morbidity and mortality rates. Given that cost-effective interventions exist to improve adult health, it is equitable to seek to preserve the health of disadvantaged adults who were once disadvantaged children.

The Disease and Mortality Focus

Most adult mortality is due to fewer than ten major causes, and in some countries half of all adult mortality is attributable to only three causes—cancers, cardiovascular diseases, and injuries—widely thought to be afflictions of affluence. A detailed understanding of what is known and not known about these major causes of death is essential to formulating appropriate prevention and case management policies.

However, focusing on diseases and injuries, and more specifically on mortality from specific diseases and injuries, has limitations. It falls short of addressing the World Health Organization's concept of "positive health"—a state of complete mental, physical, and social wellbeing. Such a focus underplays the significance of diseases such as mental illness, osteoarthritis, guinea worm, and onchocerciasis, whose morbidity and disability effects are disproportionately high with respect to their mortality effects. A focus on mortality may misrepresent the importance of several underlying causes of death, such as diabetes and malnutrition. Outcomes not related to death, but which nonetheless increase welfare, such as attentive health staff and comfortable health service surroundings, also are minimized implicitly in importance. Furthermore, the choice of disease groupings, which are to some extent arbitrary, may influence the conclusions about priority diseases.

Available data, however, present a vague and incomplete picture of morbidity and fail to provide any solid information on several important causes of adult morbidity (for example, mental illness). Although mortality data misrepresent the importance of several health conditions, the reality is that mortality statistics represent the only continuous source of information on an unequivocal manifestation of health status.

The need to go beyond a disease-specific approach is most acute when analyzing determinants and consequences and when making recommendations for policy. Many diseases share common determinants and children become orphans when their parents die from whatever cause. To overcome the danger that a partial health picture, drawn from cause-specific mortality data, may influence recommendations for priority action inappropriately, particular attention should be paid to determinants that are likely to have major effects on morbidity and whose effects are broader than a single disease. The prime example is tobacco use, which is a major risk factor for three groups of important adult diseases—cancers, cardiovascular disease, and chronic obstructive lung disease. This booklet identifies prevention of tobacco use as being, partly for this reason, especially cost-effective.

The book summarized here does not emphasize health services issues such as financing, training, decentralization, or the balance among primary, secondary, and tertiary facilities. These substantial topics, which concern the whole population and not just adults, have received considerable attention elsewhere. In addition, many of the solutions to adult ill health lie outside traditional health services. The book attempts only a superficial analysis of socioeconomic determinants of adult ill health and the macroeconomic solutions they imply.

The Need

Developing countries and most international agencies, including the World Bank, lack policies that explicitly address major health problems among adults, except those associated with pregnancy or caused by tropical disease (for example, malaria). Except for the World Health Organization, few agencies or governments have, or are even thinking of, policies for reducing tobacco use and traffic accidents, even though these issues may be as important for the health of developing country populations as diarrhea or leprosy.

The Adult Health Policy Vacuum

Over the past thirty years, the focus of intellectual and research activity in international public health has been in two distinct areas—tropical diseases and the health of children. Tropical diseases are not a precisely defined group, but they are all communicable and they are caused mostly by protozoan or helminthic parasites with complex life cycles. Malaria, onchocerciasis, schistosomiasis, and the trypanosomiases are examples of tropical diseases that have received much attention. Some microbial infections, notably cholera and leprosy, have also been studied. The more recent emphasis on children's health in general, and on the communicable diseases of childhood in particular, has led to major advances in the case management and prevention of diarrhea,

measles, polio, and tetanus in childhood. Increasing efforts are now being directed to the treatment and prevention of acute respiratory infections in childhood, which are responsible for a substantial proportion of deaths in childhood throughout the developing world. In the last few years, interest has broadened to include risk factors for perinatal and maternal death, and maternal health has become a major separate focus of concern.

The origins of the interest in tropical diseases and child health were quite different. The focus on tropical diseases came from the association made in colonial times between tropical medicine and the study and treatment of parasitic diseases. The colonial powers found that the health of their expatriate civil servants and their military personnel was threatened by a group of parasitic diseases that were either of limited importance in Europe (for example, malaria) or nonexistent (for example, African sleeping sickness). The private sector, influential throughout the colonial period, found that these same diseases threatened the health of their expatriate managers and their indigenous work force. In addition, missionary doctors became involved with caring for people with selected endemic diseases, especially leprosy. The discoveries in the late nineteenth century of the basic biology and life cycles of the important parasites of people living in the tropics created a tradition of equating tropical medicine with a particular group of diseases, mainly parasitic, that continues to this day.

The child health focus has a more analytic pedigree. In the 1950s and 1960s, demographers showed the horrifying magnitude of death rates in childhood in developing countries. At the same time epidemiologists showed that the majority of these deaths were attributable to a short list of communicable diseases superimposed upon a background of low birth weight, malnutrition, and environmental squalor. This led to strategies for improving child health by immunizing against selected diseases, reducing exposure to environmental and behavioral risk factors, and promoting selected cost-effective approaches to case management. More recently, better documentation of the magnitude and nature of maternal illness and death has stimulated a parallel concern for the health status of mothers. With the exception of malaria, the diseases principally responsible for the high sickness and death rates of children and their mothers are not those traditionally equated with tropical medicine.

Tropical diseases and children's health have not only dominated thinking in the academic and research community over the past thirty years, they also have influenced the strategies of development agencies and developing-country governments profoundly. Development agencies, particularly bilateral and nongovernmental agencies, have concentrated their efforts on tropical diseases, children's health, and maternal health. Developing-country governments have tended to target these same areas through special programs in the context of the overall development of health services. This strong focus has been both

appropriate and effective. As a result, the incidence of some tropical diseases and the rates of child death in developing countries have been reduced greatly.

However, a large and obvious gap in knowledge remains. Adult health problems not caused by tropical diseases have not been addressed. They include the following:

- Cancers
- Cardiovascular diseases
- Chronic obstructive lung disease
- Diabetes
- Injuries
- Sexually transmitted diseases (including AIDS)
- Tuberculosis

For some of these conditions, especially tuberculosis, the epidemiology is well known, and agencies have had considerable experience in case management and prevention. For others, such as injuries, little is known about their levels, causes, distribution, and determinants among adults, and many developing countries have yet to initiate specific preventive measures. This policy vacuum within governments and agencies has serious consequences that are discussed in the following paragraphs.

The Importance of Adult Health

Adults comprise more than half of the population of the developing world, numbering about 2.05 billion in 1985 or 56 percent of the population (table 1), and this adult population is growing (figure 1). Even in Sub-Saharan Africa, the region with the lowest proportion, 49 percent of the population is adult. The majority of adults live in Asia and the Pacific (1.41 billion). China alone has more adults than the three non-Asian regions combined, and India has twice as many as any non-Asian region (figure 2).

Adult death rates in developing countries are higher than generally recognized. Boys who reach fifteen years of age in developing countries have about a 25 percent chance of dying before age sixty, and in some countries this risk is over 50 percent, compared with the average in industrial countries of about 12 percent. More than 10 million adults die in developing countries each year. This mortality and the morbidity that inevitably accompanies it place considerable demands on health services: adults are major consumers of health sector resources.

Health risks that adults take may have adverse effects on the health of other age groups. This can happen directly, as in the effects of maternal smoking on the fetus, or indirectly as a result of the important role adults play in their

Table 1. Population by Broad Age Groups, World and Major Regions, 1970–2015

Region and year	Percent of population aged (years)			Population aged 15-59 years (millions)		
	0–14	15–59	60+	Men	Women	Total
World						
1970	37.5	54.2	8.3	1004	1000	2004
1985	33.7	57.5	8.8	1414	1371	2784
2000	31.2	59.2	9.6	1866	1805	3672
2015	27.5	61.3	11.2	2350	2280	4630
Industrialized Countries						
1970	26.6	59.2	14.2	299	322	621
1985	22.1	61.9	16.0	364	366	730
2000	19.9	61.7	18.4	392	388	780
2015	18.7	59.8	21.4	398	391	789
Developing Countries						
1970	41.8	52.2	6.0	704	679	1383
1985	37.5	56.0	6.5	1050	1005	2054
2000	34.1	58.6	7.4	1476	1415	2891
2015	29.3	61.7	9.1	1953	1887	3840
Industrial Market Economies[a]						
1970	26.0	59.0	15.0	196	205	401
1985	20.7	62.0	17.3	236	235	471
2000	18.6	62.4	19.0	255	250	505
2015	17.4	59.4	23.2	251	245	496
Industrial Nonmarket Economies[a]						
1970	27.7	59.6	12.6	103	117	220
1985	24.5	61.5	13.7	127	130	257
2000	22.4	60.4	17.2	137	137	273
2015	21.0	60.7	18.3	147	146	292
Latin America and the Caribbean						
1970	42.5	51.5	6.0	74	73	147
1985	37.6	55.7	6.8	112	112	224
2000	31.9	60.5	7.6	160	160	320
2015	25.5	64.3	10.2	206	206	412
Sub-Saharan Africa						
1970	44.8	50.5	4.7	73	75	148
1985	46.0	49.4	4.6	111	114	226
2000	45.1	50.4	4.5	180	183	363
2015	41.0	54.2	4.8	292	295	587

(Table continues on the following page.)

Table 1 (continued)

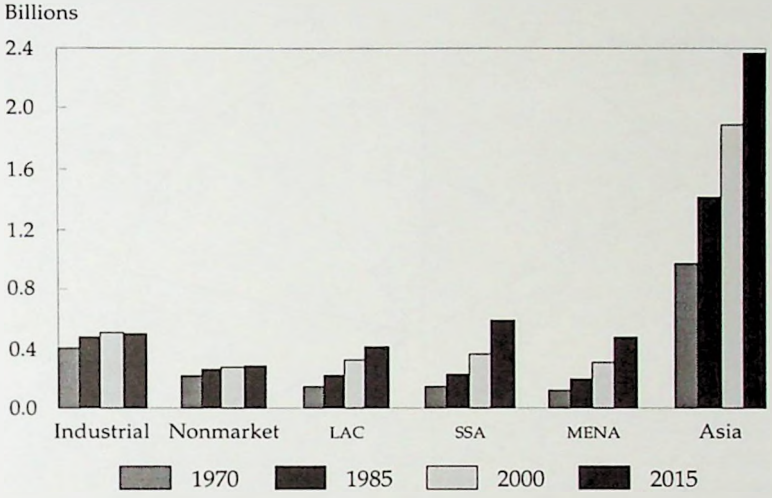
Region and year	Percent of population aged (years)			Population aged 15-59 years (millions)		
	0–14	15–59	60+	Men	Women	Total
Middle East and North Africa						
1970	44.6	49.6	5.7	63	61	124
1985	42.7	52.1	5.2	101	95	196
2000	41.3	53.4	5.3	158	148	306
2015	35.4	58.5	6.1	241	229	471
Asia and the Pacific						
1970	40.9	52.8	6.2	492	469	961
1985	35.0	58.0	7.0	727	684	1411
2000	30.6	61.1	8.4	980	925	1905
2015	25.1	64.1	10.8	1214	1158	2373
India						
1970	40.4	53.6	6.0	154	144	297
1985	39.2	54.6	6.3	217	201	417
2000	33.4	59.4	7.2	309	291	600
2015	27.4	63.8	8.7	405	383	788
China, Hong Kong, and Taiwan						
1970	39.7	53.5	6.8	237	217	447
1985	29.6	62.2	8.2	345	317	662
2000	26.4	63.3	10.2	426	396	823
2015	21.6	64.5	14.0	485	461	946
Other Asia and Pacific						
1970	44.0	50.5	5.5	109	108	217
1985	39.0	55.1	5.8	165	167	332
2000	33.4	59.7	6.9	244	237	481
2015	27.2	64.0	8.8	24	314	638

a. Throughout this book, the developed countries (or industrialized countries) are divided into those with market economies and those with nonmarket economies (the former communist countries), as listed in appendix tables A-1e and A-1f. No account is taken of recent political and economic changes in central Europe, because the data analyzed predate these changes.

Source: Bulatao and others (1990).

families. Adults form the majority of the productive work force and the majority of those on whom others depend. When adults become ill or die, dependents may suffer from lack of care or from a deterioration in the family food supply or income. The effect is likely to be greater in developing countries where the dependency burden per capita is higher (0.78 dependents per adult) than in developed countries (0.61 dependents per adult). Among developing countries, the dependency burden is lowest in Asia, at 0.73, and highest in Sub-Saharan

Figure 1. Growth in the Adult Population by World Region, 1970–2015



Source: Bulatao and others (1990).

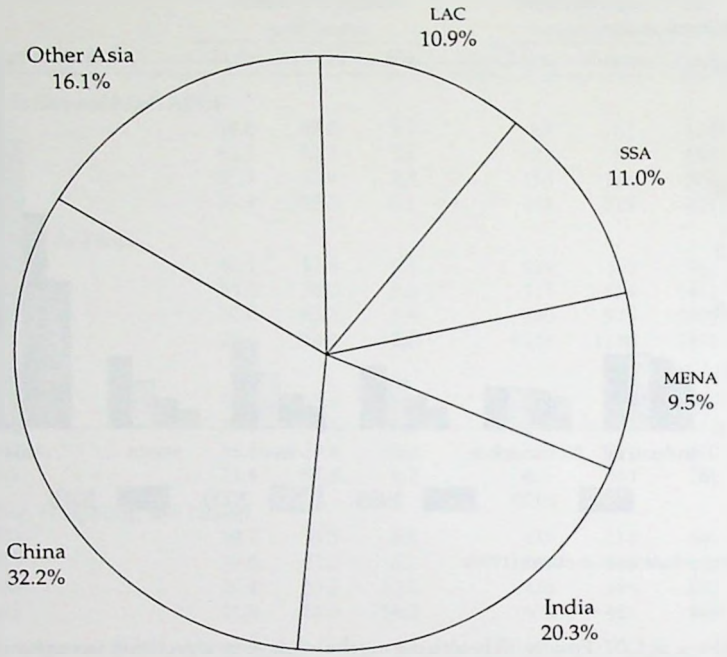
Africa, at 1.02. Finally, ill health during the adult years is probably an important determinant of subsequent ill health as adults age and become elderly.

Not only does adult ill health impose a substantial burden on society, but the nature of this ill health differs in several important respects from childhood illness. Adult ill health involves more noncommunicable disease, more long-term morbidity and more disability, and is more strongly related to lifestyle risk factors. Because of these differences, policymakers cannot reduce adult ill health simply by expanding policies that have been effective in improving child health.

Some may worry that emphasizing adult health will shift attention away from the health of children. They may point out that infectious diseases and malnutrition in childhood still constitute unfinished business, that many of the factors making it imperative to improve child health still exist. Some argue that the elderly rather than children or adults are the proper new concern of developing countries; that the elderly are at greater risk of ill health and often are less well served than adults by current health care systems; and that they are, as a group, growing at a faster rate than the adult population.

All this is true, but would not be affected by the proposal that more attention be devoted to adult health since such attention does not require that resources

Figure 2. Distribution of Adult Population by Developing Regions, 1985



LAC: Latin America and the Caribbean
SSA: Sub-Saharan Africa
MENA: Middle East and North Africa

Source: Bulatao and others (1990).

should be shifted away from children or the elderly. The proposal is simply that policymakers and researchers should examine what is known and not known about adult health and decide whether current practices and allocation of resources are appropriate for this large and growing segment of the population.

The Changing Picture of Adult Health—The Health Transition

Paradoxically, the shift in prominence toward diseases suffered by adults and the elderly in developing countries is being accompanied by a fall in age-specific

death rates from some of these diseases—including noncommunicable diseases. The picture is complex and the terminology used to explain it is not always consistent. For these reasons, and because an understanding of the nature of these changes in disease patterns is essential for designing effective adult health policy, this booklet offers a new characterization and a new terminology for these phenomena.

The phrase *health transition* is used here to refer to all those changes in the levels and causes of illness and death that are occurring in developing countries and have taken place to a large extent already in developed countries. The term *epidemiologic transition* is sometimes used to describe this, but because it refers also to the more limited phenomenon of shifts in the relative importance of different diseases, it is not used in this booklet. The health transition is the net result of the operation of three components, not all working in the same direction: the demographic component, the risk factor component, and the therapeutic component.

THE DEMOGRAPHIC COMPONENT. The age structures of populations are changing throughout the developing world. As a result of declining fertility and mortality rates, populations are becoming older and the median age is rising. The growth in the adult population in developing countries is more rapid than the growth in the population as a whole. For example, between 1970 and 1985, the adult population grew at an annual rate of 2.6 percent, whereas the total population grew only at 2.2 percent. Although these growth rates are expected to slow, adult growth rates will still be larger than for the whole of the population over the next few decades. As a result, adults will continue to increase as a proportion of the total population, reaching 62 percent by 2015, and almost doubling in number between 1985 and 2015 (table 1). The adult population will grow fastest in Sub-Saharan Africa, at an annual rate of 3.2 percent between 1985 and 2000, with the Middle East and North Africa next (3.0 percent), followed by Latin America and the Caribbean (2.4 percent) and Asia and the Pacific (2.0 percent). Between 1985 and 2015, the number of adults will increase 160 percent in Sub-Saharan Africa, 140 percent in the Middle East, 80 percent in Latin America, and 70 percent in Asia.

This aging of the population—the faster growth of the adult population compared with that of children or of the population as a whole—results in adult illness (notably from noncommunicable disease) and adult deaths becoming relatively more common. In the absence of commensurate declines in morbidity and mortality rates, the rapid increase in the number of adults leads to rapid increases in the number of adults who become sick and who die.

THE RISK FACTOR COMPONENT. Changes in the prevalence of exposure to risk factors, and in the magnitude of the risks, alter age-specific morbidity and

mortality rates. The risk factor component of the health transition influences the demographic component through changes in age-specific mortality rates, but is unaffected by the demographic component. It takes the form of changes in exposure to the underlying causes of specific diseases in specific age groups, such as those that accompany the development process—urbanization, industrialization, and changing lifestyles—as well as particular risk-averting interventions, such as vaccination and environmental sanitation. Risk factor effects are manifest in both absolute and relative terms. In absolute terms, rates of adult communicable and reproductive ill health are declining overall (although the rates of some specific diseases are increasing, notably AIDS and tuberculosis) because of declining exposure to certain, fairly well understood risk factors. Somewhat counterintuitively, adult death rates from many noncommunicable diseases are declining also, although for reasons not clearly understood. Some suspected risk factors for noncommunicable disease in adults are difficult to measure (for example, certain social and psychological factors) and others remain unidentified (for example, putative viral etiologies for certain cancers). In relative terms, because disease and death rates are declining faster among children than adults, and because rates of communicable and reproductive ill health are declining faster than rates of noncommunicable disease, the risk factor component works to increase the relative importance of noncommunicable disease and adult ill health.

THE THERAPEUTIC COMPONENT. The therapeutic component refers to changes in the probability that an ill or infected individual will become chronically ill or die (the case-fatality rate) as a result of changes in access to, use of, and effectiveness of curative health services. As with the demographic and risk factor components, the therapeutic component of the health transition causes changes in both absolute and relative rates of chronic impairment and death. In absolute terms, improvements in modern chemotherapy reduce the rates of adult death and chronic impairment from several causes, such as tuberculosis and onchocerciasis. In relative terms, there has been generally more progress (due largely to antibiotics) in reducing communicable disease case-fatality rates than the case-fatality rates from injuries, cardiovascular diseases, or cancers. The result is that these latter causes of death become relatively more important in the absence of other changes.

The increase in the absolute number of sick and dead adults is due to the demographic component, the effects of the risk factor and therapeutic components being in the opposite direction. The relative increase in adult deaths compared to childhood deaths is caused by the demographic and risk factor components, although mainly by the former. The relative increase in certain causes of adult ill health (notably many noncommunicable diseases) compared with other causes is due to the risk factor and therapeutic components.

Vague statements about the rising importance of noncommunicable diseases and injuries—statements that fail to clarify whether they refer to the number of deaths, proportions of deaths, or crude, age-standardized or age-specific rates of death—have created much confusion. However, despite a widespread belief to the contrary, age-specific rates for many particular noncommunicable diseases and for noncommunicable diseases as a whole are declining in developing countries, while their numbers, both absolutely and relative to communicable diseases, are increasing. The dominant cause of the increased importance of noncommunicable disease during the health transition is demographic change, combined with declining rates of communicable diseases caused by changes in risk factors and therapeutic services.

Current health sector and development policies affect the health transition in several ways. They have an impact on the demographic component, accelerating the aging of the population by reducing mortality and fertility rates and increasing life expectancy; they have a complex influence on risk factors, tending to reduce exposure to many risk factors and increase exposure to others; and they lower case-fatality rates by improving health services. The relationship between development and the health transition has yet to be fully elucidated.

For policymakers, the central adult health problem is the rising absolute number of adults who are sick and dying from noncommunicable diseases and injuries. The demands of this politically vocal group will inevitably lead to rapidly growing expenditure unless preventive action is taken. The main cause of this central adult health problem is the growth in the adult population, much of which is unavoidable during the next few decades. The main solution lies in reducing exposure to risks (thereby reducing age-specific disease rates) and lowering case-fatality rates by increasing the use of effective curative services.

The Emerging Agenda for Adult Health

The remainder of this booklet summarizes findings based on already available data that sometimes confirm and sometimes challenge existing assumptions about adult health. The booklet also identifies areas for further research and makes recommendations for action. Recommendations are centered around the proposal that governments focus on reducing expenditure on inefficient and inequitable adult health care and thereby free resources for the implementation of cost-effective interventions, many of which are preventive. This reflects, in part, a concern that improvements in the health of adults should not be at the expense of children.

The Findings

The review of adult health on which this booklet is based supports some widely held views, but also challenges several generally accepted notions, especially regarding adult mortality. The key findings are summarized below.

Surviving childhood is not the only health hurdle in developing countries.

- Mortality statistics clearly support current international concern for the health of children in developing countries: 38 percent of all deaths in developing countries occur among children younger than five years old, and 97 percent of these deaths are avoidable. However, it is also true that 27 percent of all deaths in developing countries occur in the adult age group (fifteen to fifty-nine years), and 72 percent of these are avoidable. Deaths of adults account for about half of all potential years of life lost (using productivity weighting and discounting at 8 percent).
- In some developing countries (for example, Sierra Leone), the probability of dying in the forty-five years between the ages of fifteen and sixty years is greater than 50 percent. The average in developing countries is 25 percent for men and 22 percent for women, very much higher than in the developed market economies, where the average is about 12 percent for men and 5 percent for women.
- The burden of adult ill health is increasing. The adult population of developing countries is large (comprising 56 percent of the total) and growing at a faster rate than the whole population. If adult mortality rates do not decline steeply, adult deaths (particularly those from noncommunicable diseases and injuries) will increase, both in number and relative to all deaths.
- High adult mortality rates are accompanied by substantial levels of morbidity, although methodological problems frustrate efforts to quantify this in a consistent and comparable fashion.

The ill health of adults has serious consequences for the individual, his or her family and society.

- Adult ill health consumes a major proportion of health care resources (more than three-quarters in some countries). Families bear an important part of this burden, spending on average at least as much as governments spend on health care.
- Adults comprise the majority of the labor force, and the ill health or death of adults generally has adverse effects on productivity. The losses are probably substantial, though difficult to measure because they are often

obscured, deflected, or delayed through compensatory reallocation of labor away from income-generating activities, education, or child care. These coping mechanisms, which ameliorate the impact of adult ill health, themselves impose costs.

- Adults are the ones on whom other family members depend. The death or ill health of adults can harm the health of, or even kill, other members of the household—the mortality rates of infants whose mothers die can be as high as 90 percent.
- Poor adults suffer more frequently from severe ill health, are more likely to depend on regular physical work, have fewer resources with which to cope, and consequently are more heavily penalized by ill health. In the poorest households, ill health can be catastrophic, leading to asset sales and irreversible impoverishment.
- Societies probably cope with the frequency and unpredictability of adult ill health by maintaining a labor surplus and minimizing labor specialization. The efficiency losses from these coping processes may be of immense importance in understanding the slow pace of development in some countries.

The nature, distribution, and trends of adult mortality challenge preconceptions.

- Noncommunicable diseases (including cardiovascular diseases and cancers) and injuries are the leading causes of adult death in most developing countries with adequate mortality data. Furthermore, these diseases, which are commonly thought of as diseases of the rich, in aggregate cause higher rates of death in poorer countries than in less poor countries and higher rates of death among poorer people within a country. Many developing countries face these major challenges from noncommunicable diseases and injuries while at the same time continuing to have high rates of certain communicable diseases of adults, such as tuberculosis.
- Age-specific adult death rates of most diseases, including many noncommunicable diseases, are falling. Fifty percent of the recent decline in adult mortality rates in some countries is due to a fall in noncommunicable disease. Despite this, adult deaths from noncommunicable diseases are increasing both in absolute numbers (because of the growing number of adults) and in relative importance (because mortality rates from communicable and childhood diseases are decreasing even more rapidly).
- Men aged fifteen through fifty-nine years have higher mortality rates than women of the same ages in nearly all developing countries, and the difference in some countries is large. Even during the reproductive years (fifteen to thirty-nine years), men in nearly all countries have higher

mortality rates than women. Although death rates are lower among women than men, comparisons with developed countries reveal that women's avoidable mortality is higher.

- In countries with acceptable cause-specific data, injuries are responsible for about 25 percent of the adult male mortality rates and 37 percent of age-standardized adult years of potential life lost. Rates are generally lower among women. There are no consistent patterns over time or in relation to overall mortality risk. Injury rates appear to be determined by distinct, location-specific sets of social, cultural, and economic factors.

Although information on the determinants of adult health is incomplete, enough is known to improve adult health through preventive interventions.

- The determinants of adult health are many and diverse, providing multiple opportunities to promote health and prevent disease.
- Many determinants of adult ill health in developing countries are behavioral and include smoking, alcohol consumption, and dietary habits. The prevalence of some important risk factors (notably smoking) is increasing. Past and present increases in these risk factors and the lag between exposure and disease development mean that death rates from some diseases (notably lung cancer) will rise inevitably over the next few decades.
- There is no clear relationship between overall adult mortality levels and the cause-of-death structure, which suggests that the health transition and its determinants are not the same everywhere. Child mortality is not closely associated with adult (especially male) mortality, and the socioeconomic correlates of adult mortality are distinctly different from those for child mortality. These observations suggest that developing countries cannot address adult health problems by expanding successful child health policies. They also suggest that countries are not locked into an inevitable experience of the health transition and that they can take action to avoid some of the undesirable manifestations of the transition—for example, by curbing tobacco use by women before it is too late.

The lack of data on adult ill health in developing countries is a serious obstacle.

The picture of adult health can be sketched only vaguely and is least clear for mortality in poorer countries, for morbidity everywhere, and for the consequences of adult ill health.

An Agenda for Improving the Information Available for Decisionmaking

Government policymakers need to know the rates and distribution of disease to plan new programs and evaluate them. Relevant data can be obtained through two complementary approaches: the routine collection and analysis of health statistics, and a research program focusing on practical questions regarding the diseases, other health issues, and the delivery system of a particular country.

HEALTH STATISTICS. Basic health data collection is often considered in two categories: *surveillance* (including diseases and/or risk factors such as cases of tuberculosis or cervical cancer, numbers of cigarette smokers or alcohol drinkers) and *vital statistics* (birth and death records). Few developing countries give priority to either. Data quality may be questionable even when collection occurs. Data that are collected may not be analyzed or used to influence health policy.

RESEARCH. When countries are struggling to provide even basic health services, it is not difficult to view research as a luxury that they can ill afford. The contrary view, cogently argued in 1990 by the Commission on Health Research for Development, is that research is essential for these countries precisely because of the need to empower those who must accomplish more with fewer resources. The research agenda to clarify the nature, causes, and consequences of adult ill health is potentially a very large one. Ignorance in itself, however, is insufficient justification for research. Fortunately, the topics that merit investment in research (that is, for which the benefits outweigh the costs of research) are a small subset of this vast sea of unknowing.

The following sections identify general areas in which ignorance is a serious obstacle to good decisionmaking and research has a high probability of providing the necessary information at reasonable cost. Some of these research topics are appropriate areas of involvement for international and donor organizations. But the majority must be undertaken by developing countries themselves, with external assistance where necessary, for the purpose of establishing their own health policies. If the 1990 proposals by the Commission on Health Research for Development for fostering research on the health problems of developing countries are heeded, there is a good chance that the research topics outlined below will be more than a wish list. They will require the establishment of appropriate institutional and financing mechanisms to expand research capacities.

Researching the Levels and Causes of Adult Ill Health

The conclusions presented in this booklet provide a provocative counter to the argument that the study of the levels and causes of adult ill health is unnecessary because enough is known already about the major problems. Without an examination of the existing evidence, for example, how many policymakers would have predicted that the three leading causes of adult female death in El Salvador and Mauritius are the same as those in the United States—namely, cardiovascular diseases, cancer, and injuries? Such findings, based on the routine collection of mortality data, are an important start, but major information gaps remain.

Low health standards and poor data quality go together. The result is that the least is known about countries where adult health is the worst. For example, mortality analysis can only be done in countries that have reasonably good cause-specific data. This excludes Sub-Saharan Africa, the poorest region in the world. The relative importance of causes of adult ill health is likely to be different in the poorest countries. The data from India hint at this. Countries with good data may be an inappropriate basis from which to make global generalizations. More information is needed on adult mortality in the poorest countries, particularly those in Sub-Saharan Africa and South Asia.

There are good reasons why acceptable data have not been generated in many poorer countries: collecting data is expensive, and increasing coverage and accuracy adds substantially to costs. Modeling is a potential alternative. However, the dangers of using modeling to generate data on adult mortality are particularly severe for the least developed countries, for which the baseline data are poorest. Even for those countries that have reasonably reliable mortality data, questions remain about the real importance of certain causes of death. Current approaches to attributing cause of death can seriously underestimate the role of certain chronic conditions such as diabetes and chronic obstructive lung disease. Inexpensive and easy-to-use methods for collecting and analyzing data on adult mortality, by improving vital statistics systems or adopting innovative approaches, need to be developed.

Reliable, comparable data are even more scarce for adult morbidity than for mortality. It is tempting to conclude that any research on adult morbidity in developing countries would be worthwhile. This would be a mistake. Many previous studies, for example, have focused on single diseases—an approach that can lead to overestimates—and have employed inconsistent definitions and measurements of morbidity. Basic methodological work is needed to clarify the kinds of morbidity data that are useful and how they should be interpreted. Once some consensus on methods is achieved, selected countries should collect

data on the nature and level of community morbidity and disability. Determining the relationship between adult morbidity and mortality in these countries will clarify the ways in which mortality statistics are inadequate for identifying priority health problems and will help to generate simpler methods for estimating morbidity.

Much greater attention should be paid to the collection and use of good data on health services utilization. Such data tell policymakers precisely what kinds of morbidity prompt people to seek care and what demands are placed on private and public health care systems—information that is crucial for health care planning and resource allocation.

Exploring the Consequences of Adult Ill Health

Morbidity and mortality statistics are summary measures for distressing and sometimes catastrophic events, but inadequate for capturing the full effect of these events especially on poor families. Reliance on such indicators probably explains why the current understanding of the ramifications of adult ill health and death is so rudimentary.

There are at least two important reasons for exploring further the consequences of ill health and death. First, such exploration opens up new possibilities for ameliorating the effect of adult ill health. These possibilities include attacking the root causes and reducing the occurrence of morbid events. There may also be scope to enhance existing coping strategies and to facilitate family recovery. Second, ill health is not a homogenous state and can have very different consequences from one individual to another depending not only on the nature of the ill health but also on the social and economic environment. Rational justification of intervention priorities should take these differences into account. What distinguishes the consequences of different kinds of ill health, of ill health experienced at different ages, in different economic circumstances, or by men or women? The effect of catastrophic illness or injury and mortality in poorer households deserves particularly close attention.

Coping processes that societies have evolved for mitigating the consequences of ill health will need special attention both for an understanding of how they might appropriately be reinforced and to capture the full costs of adult ill health and death. Formal and informal insurance are two coping mechanisms that should be studied in diverse cultural contexts. Too little is known about the efficiency losses incurred in developing countries that establish national insurance programs. An assessment of these costs arrayed against the benefits of such programs would provide information for making better decisions about the extension of insurance programs to other developing countries.

Identifying the Determinants of Adult Ill Health

The basic pathogenesis and pathophysiology of several important diseases of adults in developing countries (For example, most cancers) are not understood adequately. This ignorance is an obstacle to the development of techniques for prevention or cure. Most of these health problems, however, are shared by industrial countries, which have both the incentive and the resources to undertake basic biomedical research the results of which are likely to be broadly applicable everywhere.

A similar rationale argues against major investments by developing countries in basic research on the nature of associations between adult diseases and their risk factors. Much of this basic research is being conducted already in industrial countries and can be applied to less developed countries. It is highly likely, for example, that the relationship between the quantity, type, and years of cigarette smoking and the risk of lung cancer is similar in Britain and Burkina Faso. Existing data and research on risk factors should be exploited.

Nevertheless, there is some justification for supporting certain original studies of certain risk factors in developing countries. In some settings, such research may play an important advocacy role. In addition, there may be environmental or genetic factors that have received little attention because they occur infrequently in industrial countries. Infectious causes of noncommunicable diseases are one example. Some puzzles, such as the apparently inverse trends in the rates of certain noncommunicable diseases and their putative risk factors, might be explained by previously unknown or underestimated etiologies. Furthermore, some risk factors have been evaluated inadequately in industrial countries (for example, certain lifestyle and socioeconomic risk factors, various risk factor combinations, and exposure to risk factors in childhood). Examples of much needed risk factor research in selected developing countries include the study of diet and indoor air pollution in relation to a variety of diseases of the lungs and circulatory system.

In contrast to the cultural transferability of date on the effects of risk factors, the level of exposure to these factors varies greatly by location. The high rates of smoking in Papua New Guinea tell nothing about smoking rates in Paraguay. Data on exposures to many key risk factors are poor and must be improved—alcohol and tobacco use, diet, exercise, sexual habits, environmental and workplace exposures, and injury risk factors are important examples. Without information on the nature, extent, time trends, and combinations of exposures to important risk factors, it is difficult to design appropriate preventive strategies. It is also important to know which people are at risk and how they are likely to respond to government action. This information helps to target and mould interventions. Strategies may be different for men and women, for younger and older adults, for urban and rural populations, for industrial workers

and bureaucrats. In the United States, for example, the young are more responsive to increases in the price of cigarettes than is the population as a whole.

For the same reason, it is crucial to understand the determinants of determinants—why, for example, do people smoke or not smoke? Information on the nature and relative importance of cultural, economic, and educational factors in influencing risky behavior is needed for the design and delivery of interventions. Such information may be largely specific to a particular country or population group.

An Agenda for Action

The results from the research proposed above should arm developing countries with information on the major health problems of their adults, as well as the consequences and determinants of these problems. Good health policymaking depends on such information. But it requires more. It requires an understanding of the options available for tackling these problems and their full costs and benefits. That adult health problems exist, or even that they are demonstrably serious in their effects, is not enough to justify a role for government in prevention or treatment: the technology may not be available or may be hugely expensive and largely ineffective, or the private sector may provide services efficiently and equitably.

This booklet does not attempt to analyze policy options. Its objective—to document what is known of health problems facing adults in developing countries—is more modest. Nevertheless, the major findings derived from existing data are pregnant with implications for action. Not to clarify these, where possible, and not to warn against possible misreadings of the data would be both irresponsible and a wasted opportunity.

Principles and Provisos

There are several observations and some caveats to stress in presenting this set of proposals. First, any analysis requires some organizing principle with which to categorize problems and responses. These categories inevitably impose limitations. Diseases and their determinants have largely structured the analyses summarized in the main book and have directed the nature of the recommendations that emerge. Reanalysis from a different perspective, perhaps using institutions, inputs, or income levels as the organizing principle, could reveal a complementary set of proposals.

Second, the database on the effectiveness and resource requirements of interventions is not very firm. Much of the information available about the costs and benefits of alternative strategies is limited to government costs and

direct health outcomes and ignores equity despite the fact that most societies value it. Even within this limited framework, there is substantial ignorance about the achievements and costs of alternative approaches to improving adult health. Further research on this topic is strongly recommended.

Third, generalizations can be dangerous. Countries differ not only in the diseases with which they are grappling, but also the technical, economic, and political environments in which they must implement health policy. Not all the proposals have equal relevance everywhere. The focus on common, important and generally poorly managed diseases has generated a list of interventions likely to be broadly relevant, but these interventions need careful consideration by each developing country government in the light of its own particular circumstances.

One factor that may critically influence the desirability of investment in any given intervention in a particular country is the nature of the alternative investments that must be sacrificed. Appropriate decisions about government investment in adult health depend on how such investments would be used otherwise. If governments devote more resources to pain relief for cancer sufferers, would this be at the expense of fewer surgeries for advanced cancer patients, fewer actions for preventing motor vehicle collisions, fewer vaccinations for children, or fewer improvements in housing? Assessment of the desirability of investing in pain relief may well depend on the answer. Political, institutional, and financial structures all constrain choices for government spending in ways that have rarely been studied and are difficult to generalize. In the absence of information on the nature of these choices, the following are general observations on broadly defined options that developing countries may be considering:

- A shift of resources from direct investment in child health toward adults most probably would be inefficient and inequitable. This is particularly likely if resources were simply to follow current patterns of investment. Many interventions in child health are highly cost-effective, due both to the nature of the relatively inexpensive and effective interventions and the fact that they can be applied early in life with relatively immediate benefits. Furthermore, income-related health differentials are greater among children than adults and the poor tend to be younger because of higher fertility rates, implying that investment in children is likely to address inequalities more effectively.
- Communicable diseases of adults are generally more cost-effective to treat than noncommunicable diseases. Many communicable diseases are readily cured with drugs (for example, dysentery, bacterial pneumonia, and ascariasis). Noncommunicable diseases, conversely, are often difficult to manage. Some, like lung cancer, are essentially untreatable or involve

high treatment costs with extremely modest benefits in terms of extra years of healthy life. Resources invested in noncommunicable diseases will benefit the poor and probably the poor more than the rich since many noncommunicable disease rates are higher among the poor, but investment in communicable disease control will probably be even more relatively beneficial to the poor. Major shifts in government health services from communicable to noncommunicable diseases, particularly while diseases like tuberculosis remain important problems, therefore do not seem appropriate. (Some important specific exceptions are discussed below.)

- Cases of noncommunicable disease and injury in adults are increasing in number and in relative importance and are an appropriate target of concern for developing countries. Sizeable amounts of resources are already devoted to the treatment of these diseases with often questionable results. A redirection of some of these resources towards prevention is justified. Not only are some of these preventive strategies demonstrably more cost-effective than their therapeutic alternatives, but differences in the economic characteristics of treatment and prevention suggest that the private market in health is likely to underinvest (from a social perspective) in preventive strategies.
- It is hard to judge the relative merits of tradeoffs outside the health sector between economic development and health. A good case, however, probably could be made for some redistribution of the substantial resources employed by many governments in agriculture, industry, and price subsidies for the middle classes toward health and safety concerns.
- Finally, there is one transfer that is potentially efficient and dramatically equitable: shifting resources from industrial countries to improve adult health in developing countries. A shift of resources for health research is similarly attractive.

Specifics for Action

Ten areas of action are identified below. The first concerns the withdrawal of resources from some adult health programs. The other nine are specific interventions that merit more attention. All are cost-effective (less than US$500 per discounted year of healthy life gained) and address problems of importance in all developing countries (cancer, traffic injuries, maternal ill health, sexually transmitted diseases, tuberculosis, and diabetes). Important tropical diseases are excluded. Some, such as malaria, are not being controlled adequately, others, such as onchocerciasis are, and these diseases already receive considerable attention in international and national health programs.

Withdraw Resources from Inefficient and Inequitable Government Health Services for Adults

Anecdotal evidence supports the suspicion that much investment on adult health in developing countries is inefficient and inequitable. Cancer treatment is one example. An estimated two-thirds of cancers in developing countries are incurable when diagnosed. Technology offers little hope to those who contract stomach, esophageal, liver, or lung cancer. Even in the United States, the five-year survival rates of people who have these cancers are less than 15 percent, the survival rates of people with esophageal and liver cancers being only 2 to 3 percent. Overall, cancer treatment provides only small gains in life expectancy, and such gains often are associated with great discomfort and distress. Furthermore, cancer treatment is expensive. Cost-effectiveness estimates average more than US$50,000 per discounted year of healthy life gained. Too often, the use of aggressive therapeutic attempts to achieve minor prolongation of the act of uncomfortable dying predominate over the concern for the quality of death in a familiar environment. Governments should withdraw resources from the nonpalliative treatment of most cancers. More appropriate approaches (cancer pain relief, cervical cancer screening and treatment, tobacco control, and hepatitis B vaccination) are discussed below.

Other medical interventions that are highly costly in relation to adult health returns in terms of discounted healthy years of life gained have been identified. Medical management of hypertension (US$2000), medical management of hypercholesterolemia (US$4000), antiviral therapy for acquired immunodeficiency syndrome (AIDS) (US$5000), and coronary artery bypass surgery (US$5000) are all immensely unattractive investments for public funds. Furthermore, these four conditions can be effectively and economically reduced by primary prevention involving behavioral and dietary practices.

This is a short list of some of the more obvious examples of technologies for which government spending should be discouraged. There are others. How commonly employed they are in developing countries has not been the subject of much attention. Health ministries should take a close look at the health services they provide to adults. An honest appraisal of the way existing health services meet the needs of adults is likely to reveal substantial room for improvement in a variety of administrative, training, financing, and technical areas. To constrain what would otherwise be a daunting task, the initial approach should focus on technical areas and, in particular, on the few diseases of adults for which substantial resources are invested in treatment, such as injuries, cancer, cardiovascular diseases, and tuberculosis. How do current services manage adult illnesses and injuries? What are the costs and effects and the factors important in determining them? What are the alternatives, their likely costs and effectiveness, and their effect on the poor? What are the

implications of these findings for the broader health services issues of financing, administration, and training?

Minimizing government support for treatments of highly doubtful value may antagonize entrenched interests. For this reason, governments need to consider carefully their policies that influence health care staffing. Unless medical curricula, scholarships, specialty training, and salary structures all reflect identified health care priorities, powerful medical lobbies may seek to apply therapeutic advances in all areas without regard to cost-effectiveness. Policies toward technology assessment and adoption need to be developed with great care and determination. This is an area in which industrial-country governments are only just beginning to make progress. Some, such as the United States have already found they have essentially no means of putting a brake on the use of excessively costly or ineffective technology.

Stop Smoking

Tobacco use, particularly cigarette smoking, plays an important role in undermining the health of adults in the developing world. Tobacco use creates a burden of smoking-related morbidity and mortality, the full effect of which has yet to be felt. Recent estimates suggest a current worldwide annual toll of three million tobacco-related deaths—a quarter of which occur in India alone—rising to more than ten million by the 2020s. Most of this increase will occur in developing countries. Fifty million Chinese alive today will die as a result of tobacco use.

Industrial-country experience has clearly demonstrated that smoking habits can be changed. Changing public opinion through combined legislative and educational policies is promising. Legislation to require health warnings on tobacco product packages and bans on advertising and on smoking in public areas has been enacted in several industrial countries and appears to be effective.

Education through individual counseling (for example, by physicians) and high-quality mass media campaigns have been shown to work in some countries, although more for encouraging nonsmokers never to start smoking than for helping smokers to stop. Education that targets children is especially promising and needs strengthening in most countries.

Taxing cigarettes is one of the most effective public health tools governments have for reducing cigarette smoking. Cigarette taxes deter nonsmokers from taking up the habit and reduce smoking among the poor and the young. Price increases of 10 percent are estimated to reduce consumption by 4 percent in the United States and Western Europe. The first report from a developing country showed that an increase in tobacco tax (not price) of 10 percent in Papua New Guinea reduced demand for cigarettes by 7 percent. Simultaneous increases in the cost of all tobacco products are necessary to discourage

consumers from switching to cheaper (and perhaps even more hazardous) products.

Others have analyzed the limited data available on the costs and effectiveness of strategies to reduce cigarette smoking and concluded that educational interventions are highly cost-effective. They found costs of about US$25 per discounted year of healthy life gained in countries with gross national products (GNP) of US$1,500 per capita, and possibly having costs as low as US$15 if cigarette taxes are increased. There are other costs not captured by these figures, such as the discomfort suffered by individuals who give up smoking or the temporary unemployment and loss of national income suffered by those countries with large tobacco growing or cigarette manufacturing industries. But there are also additional benefits including reductions in smoking-related domestic fires and the saving of wood used for curing tobacco.

Demonstrating that the social benefits of reduced tobacco consumption exceed the costs does not imply that reforms can be implemented easily. Groups that have vested interests in maximizing cigarette consumption (cigarette manufacturers, distributors, and advertisers) have considerable influence. Consumers in developing countries have relatively weak lobbying power, are generally poorly informed, and do not currently face a major problem with tobacco-related diseases. They are less likely to play the role that their industrial-country counterparts have in stimulating antitobacco activities. The governments of developing countries, which almost universally benefit from taxation applied to cigarettes, may be reluctant to adopt measures they fear will harm this lucrative source of income. In fact, the demand-deterrent effect of moderate increases in tobacco taxes is less than the price increase, and the net effect is that a 10 percent increase in taxes is estimated to increase revenues by some 5 to 8 percent. Some governments have understood this and have taken firm action in the face of strong opposition from the tobacco industry.

The challenge is great. Each developing country should establish a national agency to plan and coordinate efforts against tobacco use. Procrastination cannot be justified. The control of tobacco use is one of the most, if not the most, important public health issue facing the world.

Make Road Travel Safer

Injuries from motor vehicle collisions are a major cause of death for adults in developing countries and have become increasingly important in the last two decades: two- to threefold increases in mortality rates were common during the 1970s. Crude death rates from motor vehicle collisions are higher in developing than industrial countries, and when adjustments are made for the number of vehicles, the difference is even more dramatic: the number of fatalities per thousand motor vehicles is ten to twenty times greater in devel-

oping countries. These high death rates are accompanied by substantial levels of serious morbidity and disability and destruction of property. Motor vehicle collisions result in estimated economic losses of 1 to 2 percent of GNP in some developing countries.

Two important features distinguish the developing-country picture: the high percentage of people injured in motor vehicle collisions who are pedestrians, and the variety of vehicles on the road—bicycles, animal-drawn carts, and high-speed trucks—all jostle for space in narrow roads. Fatalism is the first obstacle to overcome in reducing these deaths and injuries. Motor vehicle collisions are not accidents. They have determinants that are largely controllable: dangerous road design (characterized by poor lighting and lack of traffic segregation), dangerous driving (involving high speeds, young or inexperienced drivers, and drivers under the influence of alcohol), and dangerous vehicles (characterized by insufficient protection for drivers and passengers, poor maintenance, and oversized loads). Legislation, pricing policies, direct investment, and education are all potentially effective.

Alcohol plays an important, though inadequately studied, role in motor vehicle collisions in developing countries. Several strategies, including price increases, have been successful in moderating general alcohol consumption and in reducing motor vehicle related mortality, especially among young drivers. Legislation, including penalties for drunk driving and limits placed on the hours and conditions of alcohol sales, is another approach, though generally less successful.

Unfortunately, there is little evidence of the cost-effectiveness of any of these strategies in developing countries. Further investigations are urgently needed. The relative importance of different causes of traffic collisions varies in different countries, and the variation that this implies for specific preventive strategies suggests that governments should collect location-specific data as an essential complement to their efforts to make road travel safer. In the meantime, it would be highly prudent for governments to make traffic safety a high priority and focus improving road design and modifying driver behavior. The latter could be achieved through such measures as the enactment and enforcement of legislation governing speed limits, seat-belt provision and use, the use of helmets and headlights by motorcyclists, and improving road design. Special attention should be given to reducing alcohol use—which has health effects beyond motor vehicle collisions—improving pedestrian safety and accommodating slow and mixed traffic.

Vaccinate against Hepatitis B

Worldwide, more than 300 million people are carriers of hepatitis B. Of these, 25 to 30 percent will die of hepatitis B-virus-induced cirrhosis or liver

cancer. Liver cancer is one of the most common cancers in southeast Asia and the Pacific and is a common cancer in parts of Sub-Saharan Africa. It is essentially untreatable. Up to 80 percent of liver cancers are attributed to hepatitis B virus. The risk of developing liver cancer is 200 times greater for hepatitis B carriers than noncarriers.

The cost of the hepatitis B vaccine recently fell as a result of technological developments and competitive pricing (from more than US$100 to less than US$3 for prophylaxis that is 75 to 95 percent effective in preventing the hepatitis B carrier state). The vaccine, intended for administration to newborns and infants, can be delivered through the infrastructure already in place for other childhood vaccinations, thereby increasing the feasibility and reducing the cost of delivery. Several developing countries, including the Gambia and Taiwan (China), already have started national hepatitis B vaccination programs, and Italy is considering compulsory hepatitis B vaccination for all infants.

As with many preventive strategies, the financial attractiveness of vaccinating for hepatitis B is modified by the delay between investment in the intervention and the realization of benefits (i.e., avoided cancers). Nevertheless, the cost per discounted year of healthy life gained is likely to be in the range of US$25 to US$50. This calculation takes into account all mortality related to hepatitis B—principally liver cancer, but also cirrhosis of the liver and hepatitis itself. Most developing countries will find hepatitis B vaccination a highly worthwhile investment.

Make Motherhood Safe

Maternal health problems are widespread and should be priorities for intervention. The maternal mortality ratio (the number of maternal deaths per 100 thousand live births) is in the range of 100 to 2,000 in developing countries, compared to less than 30 in most industrial countries. The lifetime risk of dying of maternal causes (which combines maternal mortality ratios with fertility rates) is one in twenty in much of Africa and one in ten thousand in northern Europe. Three-quarters of all maternal deaths are caused by hemorrhage, sepsis, or eclampsia, and a considerable proportion of the hemorrhage and sepsis is attributable to abortion or obstructed labor.

The majority of these maternal deaths are preventable. Appropriate preventive activities vary from country to country, but developing-country governments should consider the following: (a) screening to detect women at high risk (including very young women and women with sexually transmitted diseases and other reproductive tract infections); (b) referring women with complicated pregnancies to higher-level care and encouraging them to deliver in health facilities; and (c) providing tetanus toxoid immunizations, iron/folate

supplements, and, where necessary, malaria prophylaxis. Other measures worth serious consideration are monitoring of weight and blood pressure during pregnancy, educating of pregnant women about signs of premature labor, and measures to ensure that all pregnant women receive pelvic examinations. High priorities for care at delivery include providing hygienic supplies, the training of birth attendants (both traditional and health service staff), and the maintenance of referral systems for complications and emergencies. Programs that improve general education and literacy also benefit maternal health, and interventions that help women avoid unwanted pregnancies are highly cost-effective.

Cost and effectiveness data for these measures are scarce. However, the averting of maternal mortality through the combined effects of antenatal care, safe delivery and emergency referral measures (i.e., the package described above) are among the more cost-effective interventions for adults.

Because the risk factors for maternal morbidity and mortality are almost identical to those for neonatal morbidity and mortality, these measures also benefit newborns by increasing birthweights and neonatal survival. If the effect on perinatal mortality is taken into account, the cost-effectiveness of this same package becomes even more favorable.

Promote Safe Sex and Treat STDs

Sexually transmitted diseases (STDs), especially AIDS and syphilis, contribute considerably to morbidity and mortality in many parts of the developing world. AIDS, an incurable and fatal disease caused by infection with the human immunodeficiency virus (HIV), is a growing problem and already the major cause of productive days of life lost in parts of Africa.

A variety of strategies can be used to prevent the spread of HIV, which is transmitted through sexual contact, intravenous drug use, blood transfusions, and intrauterine transmission. Legislative measures are controversial, but pricing policies (e.g., reducing the cost of condoms, needles, and syringes; stopping payment for blood donations), voluntary partner notification, and investment in improved blood screening may be effective and worthy of more attention. The success of educating individuals to have fewer sexual partners and use condoms to prevent the spread of HIV has been mixed and not always well evaluated. Education efforts are most cost-effective when targeted at high-risk groups. Developing-country governments should promote the use of condoms, especially among the promiscuous, and should screen blood donors for HIV antibodies. These interventions are cost-effective in reducing HIV transmission. Depending on the prevalence of HIV infection, the cost-effectiveness per discounted year of healthy life gained is US$7 to US$50 for condom promotion and US$1 to US$250 for blood screening. If the benefit of condom use in the

prevention of other sexually transmitted diseases is taken into consideration, the cost-effectiveness of this intervention is even greater.

AIDS has provoked a global response, and substantial funding is being directed to AIDS research and prevention. All countries should exploit this opportunity to develop institutional capacities and effective ways of using health education to promote safe sex. The control and treatment of other sexually transmitted diseases is also highly cost-effective. Such control and treatment may also reduce HIV transmission, partly by the direct effect of interventions, such as safe sex promotion, and partly because some of these diseases are major risk factors for HIV transmission.

Improve Case Management for Tuberculosis

Tuberculosis is widespread throughout the developing world and one of the major killers of adults. An estimated two million adults in developing countries die annually from tuberculosis, representing nearly 20 percent of all adult deaths and probably more than 25 percent of all avoidable adult deaths. Tuberculosis is one of the most common opportunistic infections of people in Africa who are HIV positive, and the prevalence of tuberculosis is increasing in areas with epidemics of HIV infection and AIDS. Effective diagnostic tests and chemotherapeutic agents exist, but their use has been undervalued in recent years by much of the international health community. Vaccination with bacillus Calmette-Guérin (BCG) is an additional and cost-effective approach to control in some countries.

Treatment of tuberculosis has been demonstrated to give excellent results in developing-country field conditions, even in large-scale, national interventions (such as in Tanzania) in which the challenge of achieving compliance for the necessary six to eighteen months of treatment is great.

Treatment is highly effective (cure rates approach 90 percent; reductions in transmission are parallel) and also inexpensive. Passive case detection (using sputum microscopy) combined with short-course chemotherapy for sputum-positive cases appears to be the most cost-effective approach, having an estimated cost of less than US$10 per discounted year of healthy life gained.

Developing-country health ministries should devote special energies to reassessing their current approaches to tuberculosis control and to designing and implementing new programs using short-course chemotherapy.

Screen for Cervical Cancer

Cervical cancer is the most common cancer in developing countries and leads to substantial morbidity and mortality when it reaches an advanced symptomatic stage. If detected early, however, it is almost 100 percent curable.

The technology for early detection (cytological screening in the form of Papanicolaou tests), is technically straightforward, sensitive, and relatively inexpensive. Well-organized cervical screening programs (for example, in Canada and Iceland) have reduced cervical cancer mortality by 50 to 60 percent, and cost-effectiveness calculations indicate that cervical cancer screening and early treatment are worthwhile investments. Screenings every five years of women aged thirty-five to sixty years are estimated to cost between US$75 and US$400 per discounted year of healthy life gained (depending, among other things, on the prevalence of cervical cancer and the ability to detect and treat cervical cancer in its earliest stages) in a country where the average GNP per capita is US$1,500.

Fewer than 5 percent of women in developing countries have been screened for cervical cancer in the last five years, and the little screening that has been done has tended to focus inappropriately on younger women who have lower risk. Developing countries should consider investing more in cervical cancer screening and treatment, especially for women aged thirty-five to sixty years. Developing countries (e.g., Brazil and China) that have extensive health care systems (including the ability to obtain pathology reviews, do surgical procedures, and avoid postoperative infections) are more likely to be able to identify and treat cervical cancers cost-effectively than are countries with rudimentary health care systems.

Relieve Cancer Pain

Cancer is one of the three leading causes of death in adults in developing countries and will continue to be important even if the cancer prevention and screening measures advocated in this chapter are adopted. An estimated 30 to 40 percent of people with early stages of cancer and 45 to 100 percent of people with advanced stages of cancer experience moderate to severe pain. The technology to alleviate this pain exists. The World Health Organization has developed a method to relieve 80 to 90 percent of pain by administering drugs on a schedule instead of on demand and moving from nonopiates to weak and then strong opiates until the patient is free from pain. The average cost (including the costs of drugs and outpatient services) is estimated at US$75 to US$250 per discounted year of healthy life gained.

Despite cheap and effective means for relieving cancer pain, most cancer patients in developing countries are not offered pain relief. For example, in India, which has about 20 percent of the cancers in the developing world, only about 5 percent of cancer patients are treated for pain at specialized treatment centers; the rest are largely neglected. In many countries, misguided national drug legislation limits the availability of pain-relieving drugs and poorly managed drug procurement and distribution systems further limit supplies. Among

health specialists, ignorance about appropriate drug strategies and misplaced fears of creating addiction further constrain the use of these drugs.

Developing countries should pay serious attention to the options for making cancer pain relief more widely available through appropriate legislative, logistic, and training arrangements. New legislation, training protocols, and retraining programs for physicians, although not without cost, are likely to involve relatively small one-time investments. Some controls on the use of addictive drugs are clearly appropriate. The challenge is to design systems that achieve this without penalizing the many people who, without access to these drugs, will suffer unnecessarily painful deaths.

Treat Diabetes

Diabetes is a more serious problem for adults in developing countries than generally acknowledged. In some countries, diabetes accounts for more than 5 percent of the mortality risk of adult women; in Trinidad and Tobago and Nauru, it is as high as 15 percent. Diabetic persons may develop a variety of serious complications—including blindness, renal disease, heart disease, and peripheral nerve damage—and have a shorter than average life expectancy. Treatment of complications imposes a substantial burden on health care facilities in some countries.

Treatment of non-insulin-dependent diabetes with oral hypoglycemic drugs may be a cost-effective proposition, at about US$330 per discounted year of healthy life gained, and many of the dietary and behavioral changes recommended for prevention of cardiovascular disease are very likely to assist in the prevention of diabetes.

Treatment of insulin-dependent diabetes may be even more worthwhile. Characterized by lifetime dependence on daily insulin injections, without which the patient dies, insulin-dependent diabetes frequently goes untreated in developing countries. The basic costs for insulin and syringes are estimated at about US$150 per discounted year of healthy life gained. Although this is an underestimate of total costs, it suggests that insulin treatment is relatively cost-effective, even if costs are doubled to allow for patient monitoring and project administration.

Education programs for diabetic patients and their health care providers are highly cost-effective in some developed countries (e.g., the United States). Teaching diabetic patients proper foot care (i.e., how to bathe and dry feet, how to clip toenails, what types of footwear to use) reduces the rate of foot and leg infections and prevents amputations. Blindness can be prevented or delayed by ophthalmologic screening (which relatively uneducated workers can be trained to do) followed by laser repair of pathologic changes in the retina. The relatively sophisticated technology is expensive, but so is the social and eco-

nomic cost of blindness. A trial program of retinal screening for persons with diabetes should be done to determine the appropriateness of using this intervention in developing countries.

Policies toward diabetes in developing countries should be reviewed, and consideration should be given to additional subsidies for treatment of insulin-dependent and non-insulin-dependent diabetes and for patient and health care provider education.

Other Important Agenda Items

The interventions highlighted above are those that are both relatively cost-effective and likely to have a substantial effect on morbidity and mortality levels in most developing countries. These interventions are not an exhaustive list of cost-effective options. Other interventions deserve close attention but do not lend themselves to global recommendations at this time. Several of these are mentioned below.

DIETARY INTERVENTIONS. Diet plays a major role in a variety of adult illnesses. Specific dietary problems, however, differ markedly from one country to the next. Furthermore, good evidence on the cost and effect of dietary interventions is not available. Dietary interventions merit further research and experimental implementation in some developing countries.

POLLUTION CONTROL. Much is known about the hazards of severe pollution and specific toxic agents, the technology of pollution control, and government actions that are effective in controlling pollution. Furthermore, pollution control is an area in which market failure demands some response from government. For some cities in the developing world, it would be foolish for governments not to take steps to control pollution through appropriate regulations and pricing policies. The specific strategies required will vary depending on the nature and extent of the pollution in these cities.

OCCUPATIONAL ILLNESS AND INJURY INTERVENTIONS. Occupational hazards are an important cause of adult morbidity and mortality, and many are preventable at reasonable cost. While important and worthy of further research and intervention investment by developing countries, occupational hazards are too varied and too location-specific for global recommendations to be appropriate.

Questions for Intervention-Related Research

The interventions highlighted in the previous section simultaneously serve as proposals for action and provocations to research. They are some of the best

bets given present knowledge, but the evidence for them is by no means cut and dried.

Preventive programs as a whole are poorly developed in many countries. This is sometimes because determinants have not been identified or do not appear readily amenable to modification. Often, however, it is simply that prevention has been an unjustifiably low priority. Research is needed to evaluate how worthwhile selected preventive strategies are and to determine how best to implement such strategies. One way of accomplishing this is to conduct field trials of promising interventions. The results of these field trials (which should include an analysis of both costs and health consequences) should be used to select strategies for widespread adoption, and the experience gained in these field trials should be used to improve capacities for implementing these strategies.

Several issues remain to be clarified.

What are the spin-off effects for children and the elderly of investments to improve the health of adults?

- For children, the potential benefits include those resulting from (a) reduced exposure to risks such as passive smoking, (b) averting the death or disability of parents, and (c) improvements in treatment programs such as tuberculosis control. How much of an effect each of these has, has yet to be clearly and widely demonstrated.
- Saving the lives of adults simply to have them spend a disabled and unhappy old age is a questionable objective. Waiting until adults become ill and then treating them is a strategy that might increase the proportion of the elderly who are unwell. Preventing adult ill health is probably an effective way to ensure a healthy old age. More evidence is needed and uncertainty remains as to how the prevention of adult mortality affects the number of years spent subsequently in a state of frail health.

How best can equity objectives be served in meeting the health needs of adults?

- Equity considerations provide much of the rationale for the direct provision of health care services and other government interventions in the health sector. Yet the exact distributional consequences of different adult health interventions remain unclear.
- Data on socioeconomic differentials and mortality rates in developing countries show that the poor have higher rates of noncommunicable diseases than the rich. The equity effect, however, of additional govern-

ment investment in the prevention of noncommunicable diseases in adults is unclear. There are two dimensions of equity that need to be distinguished: equity of health outcomes and equity of health care costs. Whether equity of outcome is improved as a result of preventing noncommunicable diseases in adults depends on what other opportunities for health improvement are forfeited. Shifting resources from children to adults, or from communicable to noncommunicable disease control, may reduce equity. Investing in prevention at the expense of treatment is more likely to improve equity since therapeutic services are notoriously regressive, being demanded and consumed more by the wealthy than the poor. The outcome equity of prevention strategies is influenced also by the choice of media, style, geographic, or commodity focus. Televising educational messages where few people own televisions and distributing brochures where few people read are strategies that are likely to benefit the rich.

- Improvements in the equity of health outcomes are sometimes accompanied by a deterioration in the equitable distribution of costs. For example, taxes on cigarettes and alcohol will depress demand more among the poor, bringing them greater health benefits than the rich. However, this may well be achieved at a financial cost to the poor that is proportionally greater than that to the rich, for whom cigarette purchases constitute a relatively small share of total expenditure.

What are the appropriate sources of finance for the proposed adult health interventions?

- In addition to the finances generated by withdrawing government funds from inefficient and inequitable health care of adults, there are a number of potential sources of funding for the strategies proposed above. Non-health sectors can be called on (for example, to improve road construction) or fees can be charged for certain services. Several of the recommended interventions actually have the potential to generate resources for the health sector: taxation of cigarettes, alcohol, gasoline, and private vehicles could increase government resources while at the same time reducing health risks, depending on the level of tax and the responsiveness of demand to price. If extra funds are generated, health ministries will be competing with other government bodies to secure these resources. Health ministries will, therefore, need carefully prepared proposals for taxation that stress the explicit objective of health improvement through the combined use of both price increases and additional health-related investments.

Beyond the provision of health services, what is the appropriate role for government in improving adult health?

- Much of the health care of adults takes place outside government health facilities. The government share in the health sector of developing countries is generally less than 50 percent. Government can still influence practices in the rest of the health sector through, for example, governing medical training and certification and regulating the use of medical technology and drugs. Given the importance of nongovernment health services, these avenues of influence deserve attention.
- Many of the attractive options for improving adult health are preventive and do not involve health services at all. Some take the form of direct investment, for example, in safer roads or working environments. Others imply a role for legislation and pricing policies. These tools have not been studied adequately, and their appropriate use needs to be better defined through careful analysis of costs and impacts.

An Agenda for Policy

The number of adults in developing countries is increasing rapidly—from 2.1 billion in 1988 to an estimated 3.8 billion in 2015, and the increase is most rapid in the poorest countries. Adults are influential politically and likely to demand increasing expenditure on sophisticated curative health services. As the number of adults increases, developing countries cannot afford to delay the articulation of adult health policy and action. They need to identify important information gaps and fill them through the development of disease surveillance and improved vital statistics systems and through action-oriented research. They need to make strenuous efforts to reduce the prevalence of risk factors through prevention and to improve the cost-effectiveness of therapy. Governments must target specific modifiable determinants of adult ill health—such as tobacco use, dangerous roads, and hepatitis B infection—and take systematic action to reduce exposure to these risk factors. The cost-effectiveness of the substantial resources already expended on treating ill and injured adults should be examined carefully. Public funds should be spent on curative services that offer good value for the money and not on expensive means to achieve minor prolongation of life.

Policy formulation for adult health needs to start now. The longer it takes, the more vulnerable health resources will be to pressures from adults for high-cost, marginally effective technology, and the greater the adult health problems of the future will be.

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Half or more of health-sector resources in developing countries are consumed by the age group that supports society—adults between the ages of fifteen and sixty. A substantial proportion of these resources could be better allocated. To improve such allocation, we must first improve our understanding of adult health. This book is an important contribution to that process.

Some findings in this book were unexpected. In nearly all developing countries, adult male mortality exceeds adult female mortality, even in the reproductive age range. In all countries for which adequate data exist, noncommunicable diseases are the leading causes of adult mortality, and death rates from noncommunicable diseases decline as a country develops. Ignorance of such trends can only result in the wasteful misallocation of resources.

Much ignorance about adult health remains, and the authors of this collection identify important areas for further research. Although comprehensive policy prescriptions for adult health cannot be made, the authors conclude by recommending actions that every developing country should seriously consider. These include programs concerning tobacco, tuberculosis, road safety, hepatitis B immunization, sexual health, safe motherhood, certain cancers, and diabetes.

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