

WHEN IT COMES TO HEALTH, DEVELOPING countries fall into two groups. In most, health care has improved dramatically in recent decades—raising life expectancies, expanding workforces, and reducing deaths from communicable diseases. As a result, by 2020 these countries are expected to achieve international objectives for basic health indicators. They will have smaller populations under 5, and their median ages will approach those in industrial countries today. Moreover, noncommunicable disease will be the leading cause of death. But these countries will still have subpopulations with health profiles similar to those in least developed economies. Further, there may be unexpected shocks that could cause countries to regress, such as the HIV/AIDS epidemic, social upheaval, and natural disasters.

In a second, smaller group of developing countries—which includes badly managed or conflict-torn economies that have seen little or no growth in recent years—health indicators have stagnated or worsened. Fertility and infant mortality rates are high. Life expectancies are low. And infectious diseases, including HIV/AIDS, are widespread. Though some of these countries are seeing slight improvements in demographics and mortality rates, they will not approach the levels of today's industrial countries by 2020.

These features offer opportunities—and create challenges. In addition to maintaining basic public health services, the first group of countries must decide how to meet the challenges of changing health patterns. Global health programs can shift their focus from women of reproductive age and children under 5 to entire families, including income earners and elderly dependents. Better health outcomes will require better management of chronic diseases, from prevention through treatment. Sustainable progress in health will require health care institutions with both capital and recurrent financing. And systems will need to respond to rising expectations for health care and to the dominance of private flows in its funding.

In the second group of countries public health interventions will have to remain focused on reproductive and maternal and child health—but must examine the strategies to do so. By 2020 nearly 9 out of 10 people in this group of countries will be African.¹ Global health programs will need to evolve to produce more effective results.

IMPROVING PEOPLE'S HEALTH

CHAPTER 3

*HEALTH INTERVENTIONS
MUST ENCOMPASS A WIDE
RANGE OF NEW
APPROACHES AND
ACTORS*

In addition, consideration must be given to external concerns that affect health outcomes—including income growth, education, water, sanitation, and good governance.

What do these issues mean for foreign assistance?

- Health interventions must encompass a wide range of new approaches and actors. Dealing with local financing institutions, employer benefit plans, and telecommunication networks may be just as important as ministries of health.
- The increase in noncommunicable diseases will be permanent, making health care more expensive. Donors and developing countries must make complementary investments involving all parties—public and private—with vested interests in a country's long-term health status, ultimately aiming for self-reliance.
- Given the rapid and diverse changes in many developing countries, donors must be flexible. Efforts to accelerate the progress of countries suffering from traditional health and disease problems must be combined with programs to help other countries address new challenges.
- Despite 40 years of effort, many countries have extremely high infant mortality and low life expectancy, now affected by high HIV/AIDS rates—suggesting a need to carefully evaluate past public health investments, develop new approaches, and better define the role of the private sector.

The changing profile of disease is affecting the economies of developing countries. Moreover, in many newly democratic countries, people are demanding better health care. U.S. medical and health care organizations have the expertise and experience to help solve many of their problems. All these points suggest that U.S. efforts to improve health care overseas must continue to evolve to benefit both the public and private sectors and the citizens of all the countries involved.

**HEALTH, DEVELOPMENT, AND AID:
CHANGES AND CHALLENGES**

Over the past few decades the world has seen significant changes in health indicators and services. This section and several that follow examine these changes and project developments over the

next 15–20 years, drawing on the socioeconomic and health factors that have driven recent changes.

Health outcomes are closely related to political and civil freedoms. Open societies generally have lower mortality. For example, countries considered “not free” are more than three times as likely as “free” countries to have infant mortality rates about 50 per 1,000 live births.² Similarly, a recent World Bank study found that an increase in any of six indicators of good governance is associated with at least a halving of a country's infant mortality rate.³

Better health is also related to higher incomes and economic growth, with the effects running in both directions. Differences in income growth over the past 30 years explain some 40 percent of differences in mortality improvements between countries.⁴ Although the direct effects of health on economic growth are difficult to distinguish at the macroeconomic level,⁵ decent health is essential for worker productivity and individual economic welfare. It is safe to assume that investments in health contribute to growth in countries with good governance, institutions, and economic policies.

DIVERSITY AND DECENTRALIZATION

Developing countries are increasingly diverse, socially and economically. Poor people in these countries—long the targets of foreign assistance—are no longer just illiterate subsistence farmers with large families, living far removed from markets in overwhelmingly agrarian economies. They are urban and rural, single and married, young and (increasingly) old, literate and illiterate, employed and unemployed, skilled, unskilled, and even professional, and from families both large and small. They live in economies that mix agriculture, basic manufacturing, and services, that receive varying amounts of foreign investment, and that have different levels of private and public ownership of means of production.

Yet within and across many developing countries, poor people still have one thing in common: they continue to suffer disproportionately from infectious diseases of global concern, including HIV/AIDS, tuberculosis, malaria, sexually transmitted diseases, and infant diarrhea. But growing numbers of poor people are also dying from diseases and conditions more common in industrial

countries. These include hypertension, stroke, coronary disease, and diabetes, which can be managed through preventive care delivered at the primary level. Although these chronic diseases are of public concern, they have not been the focus of foreign assistance programs for health.

New, more flexible approaches are needed in international health care. International institutions increasingly speak of “global health,” yet most health services—public and private—are provided locally. The number of democratic countries is growing, and within them nonprofit organizations, consumer interest groups, and private providers are emerging and bringing health care closer to patients. Decentralization requires better standards and quality control for both public and private health services.

URBANIZATION AND EDUCATION

Urbanization is generally associated with other changes that influence health status. Relative to their rural counterparts, urban households tend to have better access to education, be closer to services, and have higher incomes—all of which increase their use of health services. By standard health indicators, urban residents are in better health than rural residents. But changes in diet and more sedentary lifestyles may create new health risks for people living in cities, increasing noncommunicable diseases. Urban crowding can also increase the risk of communicable diseases, like tuberculosis, cholera, and meningitis.

According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), education levels in developing countries, a crucial determinant of health status, are changing. In 1970 just 40 percent of developing countries had medium or high literacy rates, but by 2005 that share is expected to be 88 percent. Although much of this progress is the result of rising literacy in Latin America and Asia, some countries in Africa—including Cameroon, Ghana, Kenya, and Tanzania—are projected to achieve literacy rates of 80 percent by 2005. Still, concerted commitment to education remains essential. In Mali, for example, literacy is projected to be 50 percent in 2005—and in neighboring Niger, just 19 percent.⁶

Women’s education is particularly important for health because it is highly correlated with reductions in infant mortality. Since 1970 there has been

considerable progress on female literacy in the 98 developing countries tracked by UNESCO. In 1970 fewer than one woman in three was literate in more than a third of these countries. By 2005 only four countries, all in Africa, will have such low female literacy. In two-thirds of these 98 countries, female literacy will exceed 75 percent by 2005.⁷

BROAD PROGRESS, STARTLING CHANGES, PERSISTENT QUANDARIES

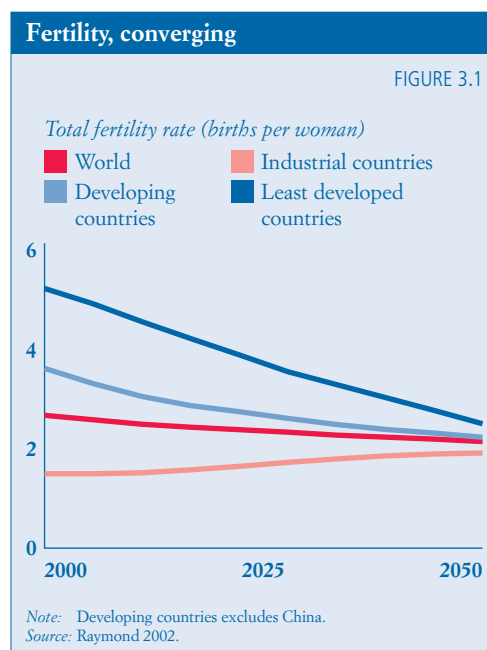
Demographics are changing in developing countries.⁸ Fertility and infant and child mortality are falling, while life expectancy is rising. As a result populations are aging, with broad implications for economic growth. How will these issues affect development prospects in developing countries, and how should assistance programs respond?

FERTILITY

Around the world, the average number of births per woman has been declining since the mid-1970s. Although there will still be a gap in 2020, the United Nations projects that by 2050 fertility rates will be nearly the same in industrial and developing countries (figure 3.1).⁹

In a March 2002 report the United Nations Population Division proposed lowering by 1 billion people its global population projection for

FERTILITY AND INFANT AND CHILD MORTALITY ARE FALLING, WHILE LIFE EXPECTANCY IS RISING



IMPROVING
PEOPLE’S HEALTH

*ECONOMIC GROWTH
CAUSES FERTILITY TO
DECLINE BECAUSE IT
GENERALLY LEADS
WOMEN TO BELIEVE THEY
ARE BETTER OFF WITH
FEWER CHILDREN*

the end of the 21st century.¹⁰ This significant revision was based on trends in some of the most populous developing countries, including Bangladesh, Brazil, Egypt, India, Indonesia, Iran, Mexico, the Philippines, and Vietnam. It had been assumed that fertility in these countries would fall to the replacement level by 2050, or an average of 2.1 children per woman. But it is falling much faster. UN demographers predict that fertility in these countries will ultimately fall below the replacement level, to 1.85 children per woman. In India alone these revised estimates suggest 600 million fewer people in 2100 than previously expected.

Although the world's population will still be growing at mid-century, reflecting momentum from higher fertility in the past, 80 percent of the world's population is projected to have fertility rates below the replacement level. As a result, during this century the world's population is expected to stop growing and start slowly shrinking.¹¹ Still, fertility rates will continue to be higher in the least developed countries (averaging 4.2 children per woman in 2015–20) than in other less developed countries (2.7 children, excluding China).

Fertility is falling for several reasons. First, contraceptive use has risen considerably and should continue to do so, lagging behind only in Sub-Saharan Africa (figure 3.2).¹² Contraceptive use is especially high—ranging from 65–85 percent of women—in countries where fertility rates are below replacement levels.¹³ Once families per-

ceive that contraceptives have contributed to their well-being, they use them consistently.¹⁴ Benefits include the reduction of maternal, child, and infant mortality.¹⁵

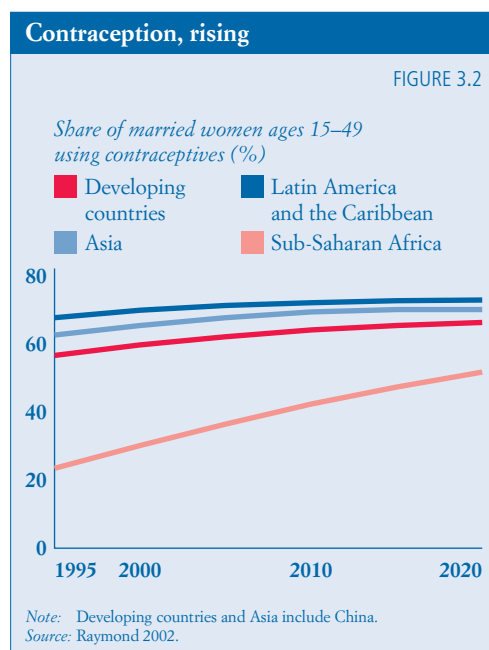
Second, economic growth is a key factor in causing fertility to decline because it generally leads women to believe they are better off with fewer children. Without economic growth, an important rationale for having large families does not change.¹⁵ Rather, changes in fertility are driven by parents weighing economic and personal choices in the face of falling infant mortality.

Over the past 20 years there have been two main debates among researchers and policymakers about the relationship between fertility and development. The first argues that lower fertility reduces poverty in developing countries.¹⁶ The second claims that targeted population programs can change women's preference for the number of children they have, increase contraceptive use, and lower fertility.¹⁷ These debates offer lessons for family planning and poverty reduction programs.¹⁸

As far back as the mid-1980s it was reported that demographic factors such as fertility decline and population growth play a role in economic development—but that good governance, adequate resources, sound economic policies, and lack of corruption are even more important.¹⁹ More recent research suggests that once fertility starts to decline, investments in human and physical capital can help reduce poverty in countries with good economic and social policies.²⁰ The conclusion, then, is that good economic policies do more to reduce poverty than fertility and family planning programs.²¹

Various questions arise when looking to the future of family planning programs in least developed countries where fertility remains high. First, in 2020 what will be the unmet need for contraception that cannot or will not be met by market forces? As economies grow and people become more educated in general and better informed about family planning in particular, they recognize the benefits of smaller families.²² With the uncertainty that AIDS poses in some parts of the world, expectations are that the momentum of fertility declines will continue unabated.

Second, how will the youth bulge (ages 15–20) in developing countries affect fertility preferences and population growth over the next decades? By 2020 most people in this age cohort will be in mid-



adulthood. Relative to their parents, they are from smaller families, are better educated, and have benefited more from economic growth.²³ Studies indicate that they desire smaller families and will likely have lower fertility rates than their parents.

As with nearly all measures of progress, countries with intense HIV/AIDS epidemics may experience very different fertility patterns. The 16 African countries with the highest incidence of HIV/AIDS are projected to see fertility fall by 23–39 percent through 2020, compared with a 21 percent decline for Africa overall.²⁴ Because HIV/AIDS is more common among people of working age, reducing poverty will be even more difficult in these countries.

LIFE EXPECTANCY

Around the world, average life expectancies are converging, with rapid increases in developing countries and flattening rates in industrial countries (figure 3.3).²⁵ In 1950 the average newborn in industrial countries was expected to live 30 years longer than in developing countries. By 2015 that gap will have narrowed to 10 years. But for the least developed countries a 20-year gap will remain in 2020, and will not narrow to 10 years until 2050.

No single factor accounts for increases in life expectancy. Falling infant mortality rates are one reason, but progress has also come from better public health and nutrition, expanded access to

health care, improved water and sanitation, more widespread education, and increased incomes.

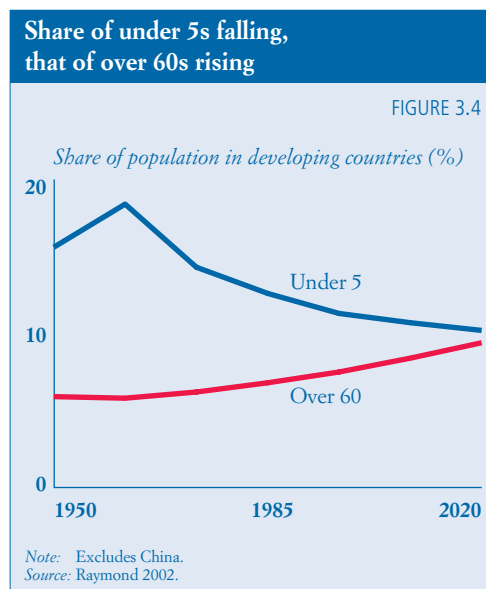
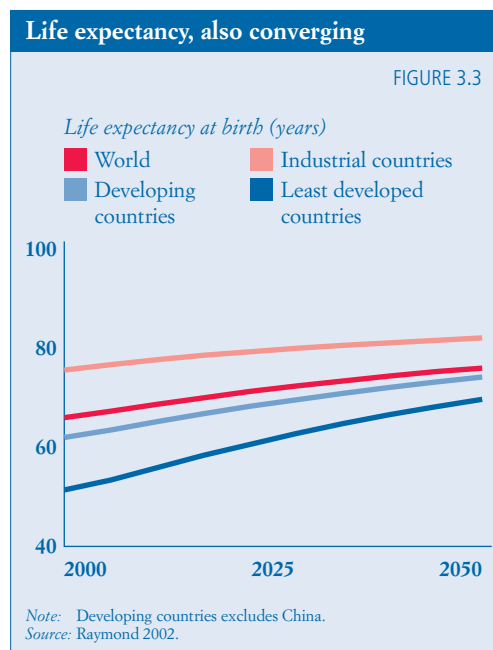
But prospects at birth provide only one perspective on expectations for life. At ages 35 and 45, people in developing countries face much higher mortality than their counterparts in even the less affluent industrial countries. Moreover, chronic diseases may occur earlier in developing than in industrial countries.

In the 35 African countries hit hardest by HIV/AIDS, life expectancy at birth is 48.3 years—6.5 years less than it would be without the disease. In the 11 countries where more than 13 percent of the population has HIV/AIDS,²⁶ life expectancy is 47.7 years—11.0 years less than without AIDS.²⁷ Projecting the demographic impact of HIV/AIDS is difficult because it is so dependent on varying assumptions and methodologies.²⁸ Thus the disease’s impact on population and health, over time and across countries, is still being studied.

AGING

Populations are aging in the 120 countries categorized by the United Nations as less developed. (Though not in the 48 countries categorized as least developed, 34 of which are in Africa.) By 2025 the percentage of the population under 5 in these countries will be smaller than that over 60 (figure 3.4).²⁹ According to one source, by 2020 the portion of the population over 65 will be higher in countries such as Sri Lanka and Thailand than in the United States today.³⁰

DEVELOPING COUNTRIES WILL HAVE MUCH LESS TIME TO ADAPT TO THEIR CHANGING AGE STRUCTURES THAN INDUSTRIAL COUNTRIES DID



**HIV/AIDS WILL
COMPOUND THE
CHALLENGES OF AGING
POPULATIONS**

Although the timing of the shift between the very young and the old differs across developing regions, the changes are similar. The crossover will occur in South America in 2005, in Southeast Asia in 2010, in Central America and South-central Asia in 2015, and in the Caribbean and North Africa in 2020. In Sub-Saharan African and other least developed countries this shift will not occur until 2050, but at that point only 18 countries will have more children under 5 than adults over 60. The precise impact of HIV/AIDS on this process has not been modeled, so these estimates are subject to change.³¹

The age shifts are also taking place in very populous countries. In China the shift occurred in 1995, and the pace of aging has gained striking momentum. In Indonesia the shift will occur in 2010, and in India in 2015.

Developing countries will have much less time to adapt to their changing age structures than industrial countries did in the past. In France it took 115 years for the population over 60 to double to 14 percent. In South America it will take 40 years—and that period began in 1980. By 2015 the median age in developing countries will be nearly 30 years, up from 19 in 1970. Moreover, by 2020 more than two-thirds of the world’s population over 60 will live in developing countries.³²

The implications of these changes extend far deeper into developing countries’ economic and

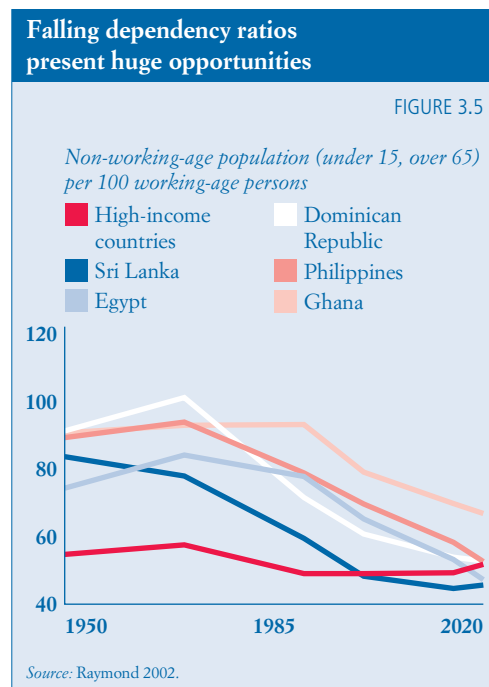
social structures than health indicators alone would suggest. Over the short term the changing age structure creates huge opportunities (figure 3.5). While Western European countries and Japan are graying (over the next decade Japan will suffer a 25 percent drop in the number of workers under 30),³³ developing countries will see their workforces expand, providing an opportunity for increased growth and productivity and perhaps absorbing jobs from more established economies. Although the composition of the non-working-age population may be different, by 2020 the dependency ratio—which compares the non-working-age population (young and old) with the working-age population—in many developing countries will equal that in industrial countries.³⁴

Over the next few decades most developing countries will be able to spend less supporting the young and the old, allowing larger investments in economic endeavors. But economic growth also requires a healthy, productive workforce—which requires identifying and preventing or managing the deadly and disabling diseases that affect this age group.

Over the long term, as the portion of populations over 60 increases, developing countries will face tremendous challenges. In Africa 70 percent of households headed by an elderly person live below the poverty line. Households containing one or more older people are also more prone to unemployment.³⁵ Despite the problems of elderly poor people, only two African countries have formal support programs for this age group.

HIV/AIDS will compound the challenges of aging populations. The adult children on whom the elderly depend will be dying faster and in larger numbers, leaving young children and elderly parents and grandparents to face economic and social uncertainty. In all countries, decisions about how to respond to the needs of the elderly must be balanced with the continued demand for disease control and public health care. In Africa these choices will be even starker given the resources drained by the battle with HIV/AIDS.

Recent work by the Organisation for Economic Co-operation and Development (OECD) examines the effect of aging on national resources in developing countries. By 2020 the direct costs of aging (pensions and labor force effects) are expected to absorb an additional 5 percent of



GDP on average, and in some cases as much as 7 percent.³⁶ Total costs, including for health care, could reach 9–16 percent of GDP—equal to 25–40 percent of workers’ taxable wages.³⁷

Even before 2020, changing demographics may pervade social and economic debates in many developing countries. The needs of the elderly will require difficult choices about how and where to spend public health dollars. The interests of the young will be weighed against those of the old, and responsibilities of public funding will need to be examined relative to individual and family resources,³⁸ which almost always exceed public funding as a source of elderly support.³⁹

Only a few developing countries, including Chile and Morocco, have begun to debate how to allocate resources in the face of changing population structures. The implications of these debates for public health policy cannot be ignored. Structuring the debates and agreeing on financial responses will be a major challenge.

HEALTH INDICATORS: ADVANCES AND OBSTACLES

With the sustained long-term effort of the global health community, people in developing countries have become much healthier. As a result remarkable changes are occurring in patterns of illness and death. Still, progress has not been even across developing countries and regions, and future improvements will require new approaches to health care and complementary efforts involving a range of other sectors.

INFANT AND CHILD MORTALITY

Over the past 20 years developing countries have also seen a near halving of child mortality, defined as deaths among children under 5. By 2020 under-5 mortality is expected to fall by another third in developing countries and by almost half in the least developed countries.⁴³

By 2020 the average infant mortality rate in developing countries will fall below 50 per 1,000 live births, surpassing the goal set at the United Nation’s Summit for Children (figure 3.6).⁴² In addition, more than a third of the least developed countries will have achieved this goal. Sustained improvements require national commitments to

past investments and continued progress on other important socioeconomic indicators, including education, employment, and governance.

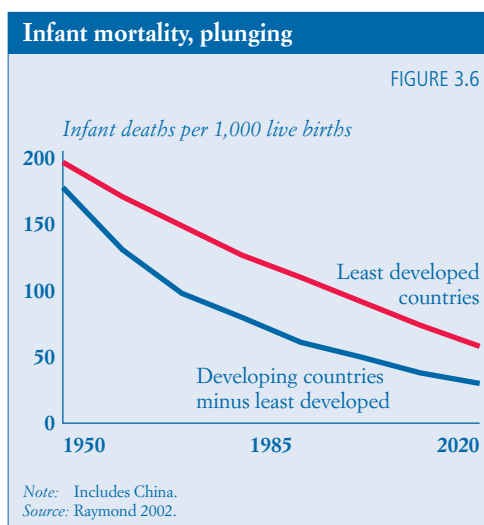
Impressive progress on infant mortality is expected to continue over the next two decades, except in countries with high HIV/AIDS prevalence. Over the past 50 years infant mortality rates have fallen by almost half even in the least developed countries, and by 2020 they are projected to drop by three-quarters.⁴⁰ In 1975–80 these countries experienced an average of 140 infant deaths for every 1,000 live births; by 2015–20 that rate will drop to 65.

Progress has been steady in nearly all developing countries—and in some, startling. During the 1990s alone infant mortality fell 38 percent in Indonesia, 36 percent in Jordan and Nicaragua, 30 percent in Peru, 28 percent in Morocco and the Philippines, and 26 percent in Egypt.⁴¹

Many reasons explain the declines in infant and child mortality. Better public health—especially more widespread immunization, supported by foreign assistance and the global health community—has been important. But other factors are also important. Regression analyses find that good nutrition, sanitation, and education are the most important predictors of falling infant mortality.⁴⁴

Some of the most extensive literature on the role of nonhealth variables focuses on women’s education, particularly for child mortality. Studies from a variety of settings indicate that women with about six years of basic education are less likely to see their children die—to some extent regardless of

FUTURE IMPROVEMENTS WILL REQUIRE NEW APPROACHES TO HEALTH CARE AND COMPLEMENTARY EFFORTS INVOLVING A RANGE OF OTHER SECTORS



IT IS HOPED THAT WHEN TODAY'S LITERATE MOTHERS BECOME TOMORROW'S LITERATE GRANDMOTHERS, CHILD SURVIVAL WILL INCREASE

their income, family size, or access to targeted services.⁴⁵ Women's education, therefore, is critical to infant survival in both developing and industrial countries.⁴⁶

Combined, aging and education could accelerate declines in infant and child mortality over the next 20 years. In developing countries women with primary education tend to maintain traditional roles (working at home and bringing goods to market) while having primary responsibility for their children.⁴⁷ With secondary education women take jobs outside the home, and illiterate grandmothers care for the children. But when that happens, mortality rates tend to rise. Thus it is hoped that when today's literate mothers become tomorrow's literate grandmothers, child survival will increase.

Recent progress does not mean, however, that infant and child mortality will continue to fall in all regions. As with many other indicators, Africa is a striking exception: infant mortality has been rising in countries hit hard by HIV/AIDS, reflecting the disease and its opportunistic infections.⁴⁸ Secondary effects of HIV/AIDS—such as changes in weaning or care-taking by infected mothers—can make infants more vulnerable regardless of their infection rates. Infant and child mortality also rise when infected parents suffer declines in their health, nutrition, and overall well-being. Elsewhere, infant and child mortality rates may also be rising in Central Asia and the southern part of Eastern Europe.⁴⁹

At the same time that food supplies and nutritional status are rising in most developing countries, nutritional deficiencies continue to afflict the least developed countries. Malnutrition takes different forms in different regions, but always affects infants and children most profoundly.⁵⁰

MATERNAL MORTALITY

Quantifying declines is harder for maternal mortality than for infant and child mortality. This is partly because measuring maternal mortality is methodologically difficult and susceptible to wide margins of error. It is also because maternal mortality requires data on causes of death, and such data are elusive in most developing countries. Where it has been tracked, maternal mortality appears to have fallen by as much as half since the 1970s.⁵¹ Still, in many countries initial mortality rates were so high

that even this progress results in startling differences. The lifetime risk of maternal death ranges from 1 in 4,085 in industrial countries to 1 in 61 in developing countries and 1 in 16 in the least developed countries (figure 3.7).⁵² And in some countries maternal mortality appears to be rising.⁵³

Given the scarcity of good data on maternal mortality, progress over the next 20 years will require better research and understanding of the source of the problem. A recent study reaffirms that maternal mortality does not result solely from poor health care at delivery or immediately after birth.⁵⁴ Further declines in maternal mortality will require diversifying approaches to caring for pregnant women and continuing to increase the presence of skilled attendants at delivery.⁵⁵

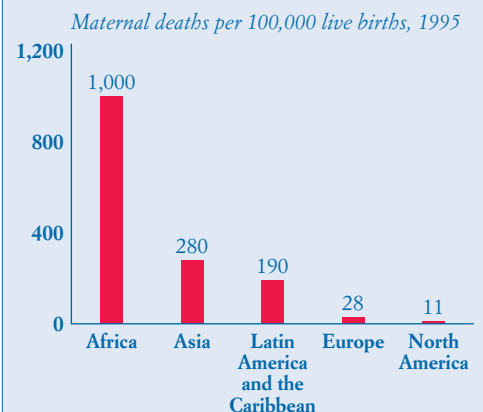
NONCOMMUNICABLE DISEASES

In all developing regions except Africa, noncommunicable diseases—including cardiovascular disease, circulatory disease, hypertension, stroke, diabetes, cancer, and injuries—have overtaken infectious diseases as the leading causes of disability and death.⁵⁶ Even countries with high child and adult mortality are well into this transition.⁵⁷ So are most tropical countries, though infectious diseases remain a concern.

By 2020 noncommunicable diseases will cause 7 of every 10 deaths in developing countries (box 3.1).⁵⁸ Given the aging of developing countries, these changing disease patterns are not surprising. Older populations have higher rates of noncommunicable diseases than infectious and parasitic diseases.

Maternal mortality, still high in Africa

FIGURE 3.7



Source: Raymond 2002.

Box 3.1. Some common communicable and noncommunicable diseases

<i>Communicable</i>	<i>Noncommunicable</i>
HIV/AIDS	Hypertension
Tuberculosis	Stroke
Hepatitis	Coronary disease
Sexually transmitted diseases	Diabetes
Diarrhea	Cancer
Measles	Chronic lung disease
Mumps	Depression
Malaria	Osteoporosis
Onchocerciasis (river blindness)	Rheumatoid arthritis
Sleeping sickness	Osteoarthritis
Schistosomiasis	Kidney disease

Few developing countries have systems for compiling comprehensive data on health events among their populations, separated by age, gender, type of illness, and cause of death. But data collected by the World Health Organization show that noncommunicable diseases strike earlier in life in developing than in industrial countries. For example, in 1990 people under 70 accounted for 27 percent of deaths from cardiovascular disease in industrial countries—and for 47 percent in developing countries.⁵⁹ With more intense mortality patterns, developing countries suffer much higher death rates among their working-age populations.

Thus developing countries face an enormous challenge in preventing and managing diseases that have not been the focus of global health efforts. Health programs have also not focused on the working-age population, which is essential to productivity and growth.

Consider diabetes. The World Health Organization estimates that by 2025 it will increase by 170 percent worldwide, with most of the growth occurring in developing countries. If correct, this means that 25–30 percent of India’s urban population could have diabetes by 2025. Egypt, Indonesia, Mexico, and Pakistan will also see large increases.⁶⁰ Future labor productivity in developing countries requires more research on the onset of diabetes, especially among women, and its implications for other health problems.

Noncommunicable diseases are also starting to affect younger populations. By 2020 injuries and noncommunicable diseases will likely account for 45 percent of the disease burden among children under 15 in developing countries, up from 28 percent in 1990.⁶¹

According to some analysts, projections of noncommunicable diseases in developing countries may seriously underestimate the problem, particularly for cardiovascular disease. External factors—such as new, higher-sodium diets—may cause much higher rates of cardiovascular disease as populations age. Diets also change as incomes rise, increasing risks for heart disease and diabetes.⁶² Low birthweight and stunted childhood growth also may increase the risk of cardiovascular disease later in life.⁶³

These new patterns of illness and mortality can undermine productivity and compromise economic progress. Moreover, chronic diseases can be more costly to treat than other diseases, jeopardizing fragile health budgets. As people live longer, treatment is required over longer periods. Such treatment also has implications for private health care initiatives and quality and safety standards.

For both infectious and chronic diseases, early diagnosis and prevention are crucial and can mitigate the need for expensive hospitalizations and surgeries. And because the causes of noncommunicable diseases are largely understood, prevention and management systems are fairly well developed. Unlike an entirely new disease such as HIV/AIDS, diseases such as hypertension, stroke, coronary disease, and diabetes follow clear patterns.

The challenge is to apply current knowledge to conditions in developing countries. For example, coronary disease and stroke are more common in Asia than in Western populations, while in Africa cardiovascular disease is falling despite no changes in behavior.⁶⁴ Where will such trends lead? How do they differ by region? And what

*DEVELOPING COUNTRIES
FACE AN ENORMOUS
CHALLENGE IN
PREVENTING AND
MANAGING DISEASES
THAT HAVE NOT BEEN
THE FOCUS OF GLOBAL
EFFORTS*

*SIGNIFICANT PROGRESS
HAS BEEN MADE ON
CONTROLLING
INFECTIOUS DISEASES IN
DEVELOPING COUNTRIES*

levels of morbidity, mortality, and associated costs will ensue? These questions require careful examination.

INFECTIOUS DISEASES

Also requiring attention are countries—primarily African—still dominated by infectious diseases and projected to continue lagging behind over the next 20 years. This disparity is creating a growing divide between these and other developing countries, though within this lagging group there is wide variation. Still, among African countries identified by the World Health Organization as having very high child and adult death rates, infectious diseases account for 55 percent of deaths. Noncommunicable diseases account for just 20 percent.⁶⁵ Moreover, nearly half of the world's deaths from infectious diseases occur in Africa.⁶⁶

Infectious and parasitic diseases have long been a major concern of global health efforts. Humans are vulnerable to multiple types of infections (bacterial, viral, and parasitic) from multiple sources (people, vectors, water, soil) with varying epidemiological implications and effects that can change over time, especially as infectious agents mutate and develop resistance to known therapies. Thus infectious diseases involve many types of and responses to disease.

For example, ebola takes only days to kill its victims. Thus it requires a very different medical response than tuberculosis, which is both an infectious and a chronic disease. Meanwhile, preventing and managing malaria is less a matter of medicine than of environmental strategies, and so calls for yet another approach.

Moreover, infectious diseases have enormous potential to develop resistance to existing therapies or to mutate into new agents. New diseases can emerge, and “super diseases” can develop based on well-known infectious agents such as influenza. The probability of such change appears to be growing in line with increasing mobility, rapid pathogen resistance, and perhaps climate change.⁶⁷ The U.S. Centers for Disease notes that as long as microbes can evolve, new diseases will appear.⁶⁸

The news is not all bad: significant progress has been made on controlling infectious diseases in developing countries. In just five years, between

1993 and 1998, deaths from measles and diarrhea dropped by a quarter and deaths from lower respiratory infections fell by nearly a fifth.⁶⁹ Still, given the nature and diversity of diseases and overwhelming unknowns, the challenge is to develop global management capacity for infectious diseases. Priorities include:

- Controlling existing problems where they are significant.
- Developing mechanisms to signal changes in disease patterns and respond quickly and comprehensively.
- Fostering the scientific discovery needed to keep prevention and cure ahead in humanity's race against pathogens.

*HIV/AIDS.*⁷⁰ The ravages of HIV/AIDS require special attention. Around the world some 37.1 million people are infected with the disease—and nearly three-quarters are in Sub-Saharan Africa, which contains just 11 percent of the world's population. In seven African countries—Botswana, Lesotho, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe—20 percent or more of the population is infected. Women have higher infection rates than men, with African rates peaking around age 25 in women and ages 35–40 in men.⁷¹

By 2010 AIDS is expected to have created 27 million African orphans⁷² and to have reduced life expectancy by 5–15 years in most countries on the continent and by as much as 40 years in some.⁷³ Elsewhere, HIV/AIDS will become more widespread in some very large countries—China, Indonesia, Nigeria—where it was once limited to high-risk groups.

The effects of AIDS are felt across the social spectrum, from farmers with reduced agricultural output to government employees with reduced capacity for service provision, including health care and education. In South Africa AIDS accounts for one-seventh of teacher attrition, and the number of pupils entering the first grade has fallen by one-quarter.⁷⁴ In Zambia HIV/AIDS is estimated to cause teacher losses equal to two-thirds of the annual output of the nation's teacher training colleges.⁷⁵

The World Health Organization estimates that the global health care costs of HIV/AIDS could total \$14 billion a year.⁷⁶ Economic impacts reverberate even more deeply in Africa. South Africa's economy is estimated to face a 0.4 percentage point annual decline in GDP because of

HIV/AIDS.⁷⁷ By 2010 nearly one-quarter of South African workers will be infected with HIV/AIDS, and benefit payments related to the disease will rise from 7 percent to 18 percent of payroll.⁷⁸ More and better estimates of the macro-economic effects of AIDS are needed to fully understand and address its devastating impact.

HIV/AIDS also threatens political stability. Widespread infection among military and security forces is another concern. So too are the destabilizing effects of broken families, tattered economies, and losing significant portions of any nation's pool of young adults.⁷⁹

It is extremely difficult to make predictions about the future effects of HIV/AIDS. Much is known about how the disease is spread biologically, socially, and geographically. But many things about the disease are unclear, making it difficult to extrapolate from what is known. For example, new strains of HIV are emerging,⁸⁰ and continued mutations are expected over the next two decades—with unknown effects on the course of the disease, transmission rates, and the effectiveness of current treatments. And though there has been success in developing therapies, it is hoped that AIDS will evolve into a chronic but manageable condition over the next 20 years, but making this change will be difficult.⁸¹ New treatments are needed, and though new strategies are under way, their timeframe is unknown.⁸²

What is clear is that the process will be expensive. Developing a new medication of any type, from pre-clinical work through clinical trials, costs an average of \$800 million—2.5 times the inflation-adjusted cost in 1987.⁸³ Over the next 20 years there will likely be better treatments, and perhaps even some type of vaccine. But when, in what shape, and at what cost is unknown. The efficacy of any future vaccine will have profound implications for the spread of HIV. The main impact so far has been in Africa, but the disease is spreading rapidly in India, China, and Russia.

There is no certainty about the nature of the virus or about the solutions available over the next 20 years. Past experience offers little guidance: for example, early projections did not anticipate the extent of Africa's crisis. There is uncertainty about why infection rates stabilize at different levels in different countries and regions, and about the willingness of public leaders to aggressively tackle the problem. So, even without the

problems created by possible viral mutations, it is difficult to predict when prevalence rates will plateau. Moreover, there is intense debate about the likely pace and progress of the disease among countries and cultures, because behavioral determinants of infection differ.⁸⁴ Thus there is much debate about the ultimate size and pace of the disease's demographic impact.⁸⁵

Leadership, scientific innovation, and integrated prevention and treatment are essential for progress on HIV/AIDS. They will also help determine the utility of new technologies and strategies to combat it. Over the next few years it will be possible to learn from and improve prevention and treatment efforts.

Tuberculosis. Once thought to be well under control, tuberculosis has resurged around the world. Each year there are 8 million new cases and 2 million deaths from the disease, and infection rates are growing by 3 percent a year. Less than a quarter of patients receive proper treatment, and 1 case in 10 is resistant to at least one therapeutic drug.⁸⁶

Though 80 percent of new cases occur in just 23 countries, tuberculosis threatens all countries.⁸⁷ Thirty years have passed since a new drug was released for the disease, though new drug combinations and protocols have been developed. Successful treatment requires that patients comply with detailed therapeutic regimes and so demands close supervision. The rise of tuberculosis strains resistant to multiple drugs has made such treatment increasingly difficult in some settings. Tuberculosis control could be dramatically improved by a rapid test, a vaccine, or new drugs.

Malaria. Malaria is also a pressing health problem. Between 1970 and 1997 the number of infections increased 40 percent.⁸⁸ Traditional treatments such as chloroquine have become ineffective in 80 of the 92 countries where malaria is a major problem.⁸⁹ In some countries nearly half of malaria infections are also resistant to newer drugs, such as mephloquine,⁹⁰ and resistance is being acquired at a growing pace.

Though more than 40 percent of the world's people live where there is risk of malaria,⁹¹ Africa is the key global challenge. Malaria deaths have been rising there since the 1970s and are much higher than in other regions. Almost 90 percent of malaria deaths occur in Africa, and for small farmers treatment can cost 5–13 percent of annual household income.⁹²

*LEADERSHIP, SCIENTIFIC
INNOVATION, AND
INTEGRATED
PREVENTION AND
TREATMENT ARE
ESSENTIAL FOR PROGRESS
ON HIV/AIDS*

*THE PERSISTENCE,
RESURGENCE, AND
EMERGENCE OF VARIOUS
INFECTIOUS DISEASES
REFLECT CHANGES,
CHOICES, AND
CHALLENGES AROUND
THE WORLD*

Technological innovations to control malaria are being aggressively sought, such as through the Global Roll Back Malaria program. But a country's health care system is a key element in the battle. Without striking technological breakthroughs, Latin America cut malaria deaths by 60 percent between 1994 and 1997 through coordinated treatment, vector control, and public education.⁹³ Even simple technology, such as insecticide-treated bednets, matters in interrupting transmission.

Related issues and responses. The persistence, resurgence, and emergence of various infectious diseases reflect changes, choices, and challenges around the world. These include:

- Aging populations—and so increased susceptibility.
- Increased travel, with more people moving within and between countries.
- Urbanization and the crowding that results.
- Inappropriate use of therapies, especially antibiotics.
- Underinvestment in public health and global surveillance.

Better understanding of infection's role in pathogen-host responses and chronic diseases will likely increase the attention paid to infectious diseases during epidemiological transitions.⁹⁴ Infectious disease pathogens are also receiving more attention because of their potential role in bioterrorism. Early global surveillance of infectious diseases and careful analysis of the resulting data are essential to isolating possible outbreaks related to terrorism. The related ability of health personnel to quickly diagnose infectious diseases with potential ties to terrorists, and to trace infections to their sources, is also essential to control communicable diseases of natural or bioterrorist origin.

**HEALTH SYSTEMS AND SERVICES:
PROGRESS, LAGS, AND A RISING
PRIVATE ROLE**

For the most part few comprehensive data are available on health care services over time and across developing countries. An exception involves data on services for children and mothers, which can be used to show general trends. Among the most important of these trends are changes in financing, with a clear shift toward private resources to provide and pay for services.

MATERNAL AND CHILD HEALTH SERVICES

Immunization rates show the progress made as part of long-standing global concerns for childhood health services. Twenty years ago less than one child in five was vaccinated against measles in developing countries. By 2000 nearly four out of five children received this immunization. As a result the number of measles cases has plummeted.⁹⁵ Similar progress has been made in immunization coverage for diphtheria, pertussis, and tetanus. But there is still a need for better coverage—particularly in Africa, which continues to lag behind other developing regions (box 3.2).

The challenge is to make developing countries self-reliant in their immunization efforts. After nearly half a century of effort, most decisionmakers (for health and nonhealth) understand the benefits of immunization. Systems for delivering and managing immunizations are also well understood. And in many countries resources are available for immunization programs, either domestically or from donors.

What country programs often lack is political leadership and public commitment. These shortcomings have also impeded progress on other health issues—as when some developing countries have ignored serious health problems or refused to use donor resources and foreign private philanthropy to treat serious infectious diseases.

Recent decades have seen a rise in public-private partnerships between multinational corporations, nongovernmental organizations, and international donors. Partnerships include efforts to develop new tuberculosis drugs, HIV/AIDS treatment and prevention programs, and malaria treatment and control efforts. Such collaboration has also occurred at the local level. For example, commercial soap manufacturers have served as financing and media partners in publicly sponsored hand-washing campaigns. The campaigns increased hand-washing and reduced diarrhea.⁹⁶ Such experiences offer a platform for innovative, collaborative efforts to control diseases and provide health services.

As in other areas, the least developed countries have seen much less progress on controlling diseases and providing services. In some African countries oral rehydration use has increased by several times in recent years. Yet in countries such as Burkina Faso and Mali, use hovers below 20

Box 3.2. Bringing new knowledge to technology: the example of vaccines

The new H influenza type B vaccine (Hib) was first licensed in the United States in 1989 and recommended by the WHO for routine childhood immunization in 1998. It is now among the safest of all vaccines. Hepatitis is also falling to the scientific sword. Hepatitis A (HAV) is highly endemic throughout the developing world. Until recently, prevention options were limited. A vaccine has been available since 1995 for long-term prevention of HAV in persons two years of age and older. It has not been widely used and is not recommended for use since Hepatitis A is not usually a fatal disease. In 2001, The U.S. Food and Drug Administration approved a new combined Hepatitis A and B vaccine. The remaining challenge is Hepatitis C, a viral infection of the liver whose causative agent was not identified until 1989, and whose genome is so highly mutable that vaccine development has been stymied.

For some diseases endemic in the developing world, particularly parasitic diseases, scientific knowledge remains inadequate to generate technological solutions in the near term. The examples of significant progress in filariasis and onchocerciasis hold out hope for broader parasitic solutions in the future. For others, such as pneumococcus vaccines for children under

two years of age, solutions have proved inadequate in children in the developing world due to differing serotypes. For others, such as the development of a vaccine for diarrheas caused by rotavirus, the cause of between 25 percent and 60 percent of all pediatric hospitalizations and 5 percent of child deaths, analysis is still under way.

Still, the next 15 years will see significant progress, standing on the shoulders of the genomic revolution and scientific advance. The Global Alliance for Vaccines and Immunization (GAVI) is focusing on three new vaccines within the next five to seven years, pneumococcal conjugate vaccines, rotavirus oral vaccines, and meningococcal A (or A/C) vaccines. The GAVI partnership, involving public, academic and industrial players, works at overcoming the financial problems of applying vaccine research and development to vaccines for high-risk populations in developing world markets. Private industry is pursuing independent research on vaccine delivery technologies based on protein carriers that will likely open new vistas for the specific problems of developing nations.

Source: Raymond 2002.

percent—even while it is 30–50 percent in countries like Ghana, the Philippines, and Thailand.⁹⁷

As noted, the presence of skilled attendants at delivery helps prevent maternal deaths. In Latin America and the Caribbean trained personnel are present for 75 percent of births. Yet in Asia only 50 percent of births are attended by skilled personnel,⁹⁸ and in Africa just 40 percent—and in some African countries, 20 percent.⁹⁹

CHANGES IN FINANCING

Financing has long been a central concern of global health efforts. Funding was traditionally seen as a matter of increasing and managing public health budgets, with most revenue coming from the state. But concerns about the adequacy of public budgets have grown as costs and public expectations have increased and as responsibilities of public health authorities have expanded.

More attention is being paid to the role of private resources in providing and paying for health ser-

vices in developing countries. Over the past 10 years middle-income countries have experimented with prepaid insurance and service fees. But private resources are also crucial in low-income countries. Surveys in Indonesia, Pakistan, and Sri Lanka have found that most consumers bypass free public services, choosing to pay for services at private facilities or through traditional sources.¹⁰⁰ In Burkina Faso just 17 percent of malaria patients were treated by professional public or private services. Most purchased treatments at pharmacies or paid traditional healers.¹⁰¹

Data collected by the World Health Organization show the enormous importance of private spending on health care in most countries—rich and poor, large and small. By 1998 more than 50 percent of health spending occurred in the private sector in most developing countries.¹⁰² Private funding exceeds 60 percent in countries as different as Bangladesh (63 percent), China (61 percent), Egypt (69 percent), India (82 percent), Indonesia (74 percent), Pakistan (76 percent), Morocco (70 percent), and Uganda (62 percent).¹⁰³ This spending is almost always out-of-pocket. In most systems

*MORE ATTENTION IS
BEING PAID TO THE ROLE
OF PRIVATE RESOURCES
IN PROVIDING AND
PAYING FOR HEALTH
SERVICES IN DEVELOPING
COUNTRIES*

IMPROVING
PEOPLE'S HEALTH

WITH A CHANGING AGE STRUCTURE, THERE IS OPPORTUNITY FOR AN EXPANSION OF FOCUS TO THE FAMILY AS A UNIT THAT ENCOMPASSES BOTH TRADITIONAL AND EMERGING HEALTH CONCERNS

little or no role is played by risk-pooled payment mechanisms, which can enable individuals and employers to pay affordable health care premiums and receive quality care.

These trends have three main implications. First, people using their own resources are making choices that affect both the health sector and other sectors in developing countries (box 3.3). Their choices control the majority of health resources and will be the main drivers of future care. Understanding these choices is crucial to international health assistance strategies. Donors should study these trends to understand health care demand and to be able to monitor drug resistance problems and adverse reactions that can emerge from both private purchases and public distribution. Because of poor quality control in manufacturing, many drugs in developing countries are substandard or counterfeit.¹⁰⁴

Second, recipients of private spending are also likely to be private. Again, understanding this dominant pattern of supply and demand is essential to understanding countries' health status.

Third, health strategies and initiatives should take into account these private elements. If private revenues are not considered, health programs will miss a large portion of potential health resources,

undermining their ability to develop sustainable systems in developing countries.

TO REVIEW THE BIDDING: FUTURE TRENDS AND CURRENT FUNDING

The momentum of past health improvements will shift health patterns significantly in many developing regions.

A majority of developing countries will experience declining dependency ratios, the time when fewer children and elderly are dependent on the working age population for resources. These countries will have greater opportunity to invest in productive endeavors. The demographic shifts will be accompanied by changes in morbidity and mortality. Many countries have reached or will soon reach the Summit of Children goal for infant mortality reduction. For them, the key public health issues will include those which affect both the productivity of their labor forces and the health costs of the elderly. This disease profile is predominantly noncommunicable and chronic.

Even as the shift takes place, many traditional problems will persist, such as infectious diseases resurging because of resistance. The future pattern will be one of a growing chronic disease

Box 3.3. New technologies and health

Striking progress in technological innovation outside of the health sector will continue to create, new opportunities for developing more effective prevention and therapy services to populations, including the poor and those widely dispersed.

Of greatest note, of course, is the future technology for accessing the internet. The availability of wireless and solar powered Internet access technologies will bring communications technologies to even remote areas. In the more developed markets of Africa, some research suggests that market penetration for such services will exceed 25 percent of the population within the next five years.

Completely integrated touch-screen systems for web-based public access kiosk applications were unveiled in mid-2001. The kiosks have internal wire management systems and sealed ports and slots, making them adaptable to even

harsh conditions. Market targets include retail trade, banking, and health care in West Asia, North Africa and India. The technology exists to solar power such kiosks, equip them with everything from telephones to video recorders, and place them in pharmacies, clinics, examination offices, and even school classrooms for health education.

Improved telecommunications provides a range of opportunities for deepening health capacity without investing in physical infrastructure. Telemedicine, for example, extends the expertise of advanced diagnostics to paramedical personnel at remote sites. Distance learning can provide continuing education without the costs of transport and meeting space.

Source: Taylor, Shakoor, Behrens, and others 2001; *Hindu Business Line* 2001; Mayor and Daviss 1998.

burden overlaid on top of a persisting reservoir of communicable diseases.

Simultaneously, some countries, many in southern Africa, will continue to have demographic and disease patterns more characteristic of past trends—high infant mortality, low life expectancy, and epidemiology dominated by infectious diseases.

For both old and new problems, the central concern will be self-reliance so that economic progress can be tied to the maintenance of public health progress. In turn, a central concern of self-reliance will be financial diversity, including private finance that already represents over half of all health resources. Political commitment is also key. For many developing countries, self-reliance in such traditional concerns as immunizations is increasingly not a matter of inadequate resources. It is more a matter of political will, commitment, and management.

IMPLICATIONS OF TRENDS FOR FUTURE DIRECTIONS: SHIFTING OPPORTUNITIES

Opportunities in global health are a direct result of the changing demographics, epidemiology, and diversity in the populations of developing countries. The opportunities do not imply that humanitarian programs should be eliminated where such needs continue to dominate national landscapes.

Nor do they imply, in the majority of developing countries currently in the health transition, that core public health functions dealing with conventional problems do not need to be maintained. Clearly, the scaffolding of public and private services that supports progress is a pre-requisite to transition itself. In coming years, however, where economic progress and democratic governance advance alongside epidemiological change, the burden for maintaining that scaffolding can rest on the countries themselves.

INFECTIOUS DISEASES—HELP WANTED: GLOBAL PUBLIC HEALTH INFRASTRUCTURE

Much has been written about the importance of global systems for infectious disease surveillance.¹⁰⁵ The priority is for using technology to decentralize data collection and improve data sharing. An equal need is for improved clinical

and laboratory capacity to diagnose and study patients with potentially “new” diseases or syndromes, and to quickly disseminate findings,¹⁰⁶ as well as for the local personnel, skills, and systems needed to intervene.

Given the importance of nutrition to infectious diseases, the intersection between health strategies and nutrition and food security is also important. In contrast to surveillance strategies, however, nutrition linkages would need to be addressed at a variety of points within national development strategies, from households to agricultural strategies to national distribution and financial systems.

Increasing both the availability and quality of food will remain critical, especially in light of the World Health Report findings on the importance of undernutrition and micronutrient deficiency to child mortality. Future agricultural strategies should complement the current cadre of successful interventions to reduce micronutrient malnutrition, especially vitamin A deficiency. Agriculture has a role to play in addressing health and nutrition issues, not only through the production of food supplies, but also in generating the incomes of poor rural populations. New agricultural approaches, such as biofortification of staple crops, should continue to be explored. Using crop breeding techniques to improve the density of three key nutrients (iron, zinc, and beta-carotene) in staple crops primarily consumed by the poor—for example, rice, wheat, maize, cassava, and common beans—agricultural researchers could provide a relatively cost-effective and sustainable means of delivering micronutrients to the poor.¹⁰⁷

Box 3.4. Malnutrition and child mortality

“In poor countries today, there are 170 million underweight children, over three million who will die this year as a result. All ages are at risk, but underweight is most prevalent among children under five years of age, and WHO estimates that approximately 27 percent of children in this age group are underweight. This caused an estimated 3.4 million deaths in 2000, including about 1.8 million in Africa and 1.2 million in countries in Asia. Significantly, it was a contributing factor in approximately 60 percent of all child deaths in developing countries.”

Source: The World Health Report 2002. Geneva: World Health Organization.

BIOFORTIFICATION TO IMPROVE THE NUTRIENT DENSITY OF STAPLE CROPS COULD PROVIDE A RELATIVELY COST-EFFECTIVE AND SUSTAINABLE MEANS OF DELIVERING MICRONUTRIENTS TO THE POOR

IMPROVING
PEOPLE'S HEALTH

*DISEASE MANAGEMENT
CONVERTS CHRONIC
DISEASE FROM A
THERAPEUTIC, ACUTE-
CARE MODEL TO A
PREVENTIVE MODEL*

**FAMILIES: KEEPING BREAD-WINNERS
HEALTHY AND TAKING CARE OF PARENTS**

With a changing age structure, there is opportunity for an expansion of focus from “women of reproductive age and children under five” to the family as a unit that encompasses both traditional and emerging health concerns.

The absolute number of under fives will decline in the first (and larger) group of developing countries with improved health care. In many regions, the numbers of youth will rise, at least until 2020, when the demographic “bulge” of this group will move into mid-adulthood. Grandparents and great aunts and uncles will survive middle age.¹⁰⁸ Whether they live independently or with their mature children, their health problems will become a concern for family bread-winners. The health problems of the mature, productive age populations will impact family life and economic viability. The elderly will live longer and develop their own health care needs and demands. When both aging dependents and productive bread-winners are chronically ill, then a family’s future is bleak indeed. Hence, the importance of health strategies that aid economic growth.

A full picture of resource flows also makes clear that families finance health care. Their choices about sources of care and therapeutics influence the health care “market.” Their expenditures power the directions of both content and availability of services.

The near-term challenge is to learn more about families including the problems they face, their aspirations and how they are adapting to changes in living patterns and health status. How are they allocating their resources to meet changing demands and how can foreign assistance help that process?

**FINANCE: WHO WILL PAY, HOW, AND FOR
WHAT?**

Private payments for health care now represent a larger part of the health care dollar than public funds. This is true for large countries and small, advanced and poor. Linkages to private resources will be essential in virtually all health programs.¹⁰⁹

In addition to this trend, health in the future will become more expensive, as measured by health

care costs, economic impacts, and social support costs. As the causes of morbidity and mortality shift to those more common in industrial countries, unit costs will rise. The estimated cost of vaccinating a child with five antigens is estimated to be on the order of \$20, all costs included.¹¹⁰ Of that cost, the vaccines themselves cost between \$2 and \$3. In contrast surgery for breast cancer in the United States costs on average \$14,000 per case.¹¹¹

Assuming that the cost of first generation generic anti-hypertensives is about \$1 per month,¹¹² but must be continued indefinitely, it would cost a total of \$240 in drug costs for a patient living 20 years with managed hypertension to prevent more serious disease onset. This is more than 10 times the cost of an immunized child and 120 times the cost of the vaccine.

Although the comparable numbers are not available for many developing countries, in the U.S. health care costs per capita for those over age 65 are 3 to 5 times the costs for those under age 65.¹¹³ For developing countries in demographic and epidemiological transition, the future will mean that health sectors face complex choices.

**DISEASE MANAGEMENT: TOO LITTLE TO
WASTE PART I**

As epidemiology changes to chronic diseases patterns in developing countries, there are disease management lessons from the more advanced health care systems. These systems are focused on improving outcomes, eliminating waste, and increasing quality. In effect, disease management converts chronic disease from a therapeutic, acute-care model to a preventive model. Disease management combines public awareness, early identification, risk-factor management and patient behavior change, with intense patient monitoring, especially regarding preventive and therapeutic compliance.

The key to quality management for noncommunicable diseases is the recognition that many of these conditions are not binary. In infectious diseases, for example, one has or does not have diarrhea. One has or does not have measles. But vascular disease is much more complex. One may, indeed, have genetic predisposition to vascular disease, and even initial stages of vascular disease, without overt symptoms. And the disease may

persist for a long period of time. The key is to manage the disease so that its more serious binary incident, stroke, does not occur.

Even now, the problem of quality in service provision and disease management is a significant one in developing countries. The quality issue is crucial *both* to lagging countries and to the majority of developing countries.

- In a study of 125 deceased children in Guinea-Bissau, 93 percent of the children had been seen at a hospital or health clinic during the two weeks before death. A previous study in the same geographic area had found that 78 percent of child deaths had occurred soon after consultation at a health facility.¹¹⁴ The analysis indicated that quality assurance in diagnosis and better discharge criteria were essential.
- In Bangladesh, a study of infant deaths upon discharge after diagnosis of diarrhea indicated that 7 percent of the discharged infants died within 6 weeks, and the median survival time was 11 days.¹¹⁵
- In a study of diagnosis and treatment of all non-surgical general consultations in six health centers in Burkina Faso, only 2 percent received treatment that was compliant with medical guidelines.¹¹⁶ This level was based on observed treatment; actual treatment behavior absent third-party observation may be even lower.
- Examination of 21 hospitals in Bangladesh, Dominican Republic, Ethiopia, Indonesia, Philippines, Tanzania, and Uganda found that 14 lacked quality monitoring systems, and 76 percent of children seen were inadequately assessed, treated and monitored.¹¹⁷
- Studies in Cambodia and Uganda indicate that health workers trained in the evidence-based practice guidelines “Integrated Management of Childhood Illness” provided full assessment and treatment services to between 80 percent and 100 percent of children visiting health clinics, compared to 5 percent to 30 percent of those without such training. However, one year later, the diagnosis and treatment behavior of trained workers had deteriorated by about 50 percent on some measures, indicating that quality enhancement is a system problem.¹¹⁸

Tragically, the result of failed quality is illness and death. It is also a tremendous waste of resources. Higher quality means lower costs. For even the

poorest countries, such assessments of quality argue for new approaches. And especially for the poorest, they testify to levels of waste that are insupportable on constrained budgets.

SYSTEMS MANAGEMENT: TOO LITTLE TO WASTE PART II

The diversity of epidemiology, broadening of demand in an aging of the population, and raised expectations will make the management of health services more complex in the future. Decentralization of responsibility, which has often accompanied democratization and economic liberalization, will bring about new challenges in the public sector, including in health.

A second management issue of decentralization and economic reform will be the evolution of public roles in health. With the rise in private provision alternatives and more diverse financing schemes, the role of public ministries will change from service provision to standard-setting, and oversight. How well such systems are developed will affect the overall quality and sustainability of national health systems, both public and private. Deepened capacity, in both the public and private health sectors, to manage dispersed networks of health care delivery, rather than centrally controlled systems of health services, will be required.

With the demographic and epidemiological transition, one significant area of management change may be in pharmaceuticals. For many noncommunicable diseases, prevention and treatment combine in disease management. Indeed, many of these diseases entail continuous lifelong pharmaceutical use compared to communicable diseases, with the exception of HIV/AIDS therapies, for now. Rising literacy, education, access to information, and globalization, will also spur demand for pharmaceuticals. Given the effectiveness of modern medications, rising access to therapeutics can contribute to a more productive workforce at all ages.

Quality and safety concerns are important for pharmaceuticals since studies show that some one-third of drugs being sold in developing country markets are sub-standard. These issues of sub-standard and counterfeit drugs are particularly relevant to least developed countries where inadequate treatment of HIV/AIDS and TB can result in the development of multi-drug resistant disease strains.

DECENTRALIZATION OF RESPONSIBILITY WILL BRING ABOUT NEW CHALLENGES IN HEALTH

*THE NEWEST MODEL IN
INTERNATIONAL
COOPERATION IS THE
GLOBAL FUND TO FIGHT
AIDS, TUBERCULOSIS,
AND MALARIA*

Quality management systems, of course, are intimately tied to quality service provision. Where diagnoses are wrong and prescribing patterns are inappropriate, the best-managed systems cannot be efficient. A study in Ecuador, for example, found that failure of diagnosis and inappropriate prescriptions nearly doubled the costs of pharmaceutical inputs for childhood illnesses.¹¹⁹

**COMMUNICATION AND PUBLIC HEALTH
EDUCATION**

Changing demography, rising urbanization, and spreading literacy may provide opportunities for pursuing comprehensive approaches to public health education using new communications technologies. Indeed, such strategies may be essential. Many noncommunicable diseases, especially cardiovascular conditions and cancer, have deep roots in behavior. Encouraging prevention through health-promoting behaviors brings prevention to the forefront for these diseases and can be incorporated into existing primary health care initiatives for infectious diseases.

The future will see greater opportunities for health education for more people. Research in industrial countries indicates that as people age, they begin to be more attentive to health problems and their consequences.¹²⁰ The absorptive capacity of the population for health information deepens. Technological innovation will make reaching people easier. Even now, solar-powered, satellite-based Internet connectivity is spreading to rural areas in many developing countries.¹²¹ Cell phone market penetration is greater than in some areas of the United States.¹²² Distance learning methods and technologies are becoming widespread even now. The evolution of bottom-up wireless mesh routing (known as Wi-Fi or 802.11) is rapidly becoming a low-cost method for weaving networks of wireless telecommunications capacity without major investments.¹²³ Anticipated extension of such networks into developing countries will significantly increase the capacity to deliver health care messages and consultation to larger populations for lower costs than ever before.

Moreover, economic growth and the strengthening of the private sector will generate a change in capacity not normally associated with global health in developing countries. As economic growth proceeds, developing countries will see a deepening of their own advertising, public relations, media,

and communications industries. This capacity will provide a powerful future partner for public health education messages that benefit from new understandings of what motivates in the marketplace, including what motivates the very behaviors public health may seek to change.

**COLLABORATION: GLOBAL IMPERATIVE
AND NATIONAL OPPORTUNITY**

As epidemiology changes and more diverse health challenges spread across economies and population segments, the future will see both the opportunity and the imperative to broaden and deepen partnerships and coalitions. The interests of business, voters, government, of labor and management, of patients and providers can be aligned to create new opportunities for health leaders to be seen as partners across national economies.

There is, of course, significant international precedent for cooperative approaches to health, especially as regards infectious diseases. Formed in 1999, the Global Alliance for Vaccines and Immunization (GAVI) is a collaborative effort of international organizations, bilateral agencies, governments, research institutes, philanthropy, and the pharmaceutical industry to expand vaccine and immunization research and provision. GAVI is focused on using collaboration to expand immunization commitment and availability in developing countries.

Similarly, the Global Alliance for TB Drug Development combines the expertise and resources of private industry, academic research, philanthropy, professional and disease associations, and public agencies in an attempt to spur the pace of discovery and development of a new generation of drugs to address the global tuberculosis resurgence. The approach of the TB Alliance is to invest resources as an incubator rather than a grant maker, to take advantage of scientific advances and array its resources to ensure continued momentum toward drug development, rather than acting as an initial source of research funding.

Vaccines and tuberculosis do not stand alone, of course. Similar partnerships have been developed for malaria, trachoma, guinea worm, onchocerciasis, leishmaniasis, polio, maternal and neonatal tetanus, lymphatic filariasis, and sleeping sickness. All are problems with complex causes whose

resolution requires more skill, expertise, and resources than any one organization can bring to bear. Multinational pharmaceutical companies are part of all of these efforts, in tandem with non-profits, academic medical centers, professional associations, and public agencies. The newest model in international cooperation is the Global Fund to fight AIDS, Tuberculosis, and Malaria.

Within countries, there is promise for creating such collaborative arrangements that attract professions, industry, and government within health sectors, and those who also share health care stakes in other sectors. In transition countries particularly, changing demographics and disease patterns create long-term stakes for a spectrum of organizations and leaders. The power of health care as a convening issue where noncommunicable disease mortality is overlaid on continued concern for infectious disease is great because no one is spared risk. Mutual interests in defining better approaches to risk management and, in creating financing mechanisms for those approaches, may be more easily identified than in the past. Program portfolios based on collaborative strategies between the U.S. and its partner countries can be the center of gravity for drawing wide-ranging networks of institutions within countries to the health tasks at hand.¹²⁴

IMPLICATIONS FOR THE PHILOSOPHY AND PURSUIT OF “FOREIGN ASSISTANCE”

After more than four decades, foreign assistance programs in health, focused largely on public health endeavors aimed at women of reproductive age and children under five, look out on a changed health landscape. Decisions about how to allocate and manage “aid” on that landscape can be guided by various considerations.

First, resources confront a growing diversity of complex problems many of which will be of increasing seriousness. The world is very different than it was even 20 years ago; it will be different still 20 years hence. What is striking is the progress that has been made, albeit with continued serious lags in the least developed countries. Entirely new generations of public health problems require entirely new portfolios. Health conditions not previously considered part of a “foreign assistance” portfolio are increasingly worthy of attention. New skills, such as finance, become as important as public health credentials.

Second, progress in health is not just in health programs. Health portfolios must be interdisciplinary, combining the best of health and medical innovation with simultaneous attention to problems as diverse as capital investment capacity, biofortification in agricultural systems to correct micronutrient deficiencies, wireless communication distribution systems, and women’s education. In turn, this will mean that portfolios will need to be fairly slim; one cannot undertake multiple complex partnerships in one place (let alone many places) at once. Limited resources means being selective about investments with an eye to their economic contributions, staying rigorous and brutally honest about measuring impact, and being insistent on the long-term self-reliance of partners.

Third, public health challenges of tomorrow argue for flexibility. No longer are there simple categories of health challenges, if there ever were. Nor are the challenges defined by narrow age categories or by gender. Achieving equality in partnerships means that the U.S. must have the flexibility to adapt the discussion to priorities as defined by the emerging health conditions. Accelerating the progress of some countries still in the grip of conventional global health and disease problems must be combined with the ability to help other countries address new challenges not conforming to old categories.

Fourth, despite 40 years of effort, health progress in some countries continues to lag and only slow progress is projected for the future. Clearly quality, impact and sustainability have remained elusive. The prospect of continuing need for future investment in conventional problems argues for frank and open discussion with partners on new approaches to achieving results. Newly recognized problems with impact and sustainability suggest that money is not at the heart of the matter. The partnership dialogue with countries still struggling to make health progress requires that entirely new strategies be explored and developed.

NOTES

By way of caveat, all projections depend on assumptions about the present situation, about cause and effect, and about the continuation of past trends at future times. So, the farther out the projections, the more vulnerable they are to error.

1. Raymond 2002.
2. Freedom House 2002. Infant mortality reports are from the World Bank (1999).
3. Kaufman, Kraay, and Zoido-Lobaton 1999.
4. Pritchett and Summers 1996.
5. WHO 2001d. The report acknowledges, “Although all of

*ENTIRELY NEW
GENERATIONS OF PUBLIC
HEALTH PROBLEMS
REQUIRE ENTIRELY NEW
PORTFOLIOS*

IMPROVING
PEOPLE’S HEALTH

the studies mentioned in this paragraph attempt to separate direct effects of health from a poor institutional, policy and governance environment more generally, we recognize that further research with more refined data ...will shed further light on the specific effects of health versus other social conditions that may be correlated with health.”

6. UNESCO, various years.
7. UNESCO, various years.
8. Unless otherwise specified, demographic data are taken from the United Nations' 2000 estimates. See United Nations (2001). All projections are from the Medium Variant model. The assumptions behind this model include: that fertility in high fertility countries declines at an average pace of nearly one child per decade starting in 2005 or later; that fertility in medium-fertility countries reaches replenishment before 2050; and, that fertility in low-fertility countries remains below replacement during much of the projection period, reaching by 2045-50 the fertility of that cohort of women born in the early 1960s or, if that information is lacking, reaching 1.7 children per women if current fertility is below 1.5 children per woman or 1.9 children per woman if current fertility is equal to or higher than 1.5 children per woman.
9. UN 2001. Unless otherwise noted, data for fertility analysis is taken from *World Population Prospects 2000*.
10. UN 2002.
11. UN 2002.
12. UN 1999.
13. UN 2002.
14. Sinding 2000.
15. Bulatao 1998.
16. Merrick 2002.
17. Freedman 1997.
18. For further summaries of alternative views, see Sinding (2000), Eberstadt (2000), and Hernandez (1981).
19. National Research Council 1986.
20. Birdsall and Sinding 2001.
21. Merrick 2002.
22. Freedman 1997.
23. Raymond 2002.
24. Stanecki 2002.
25. UN 2001.
26. The 11 countries are Botswana, Central African Republic, Kenya, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe.
27. UN 2001.
28. See Kault (2000) for an example.
29. See Kault (2000) for an example.
30. Smith and Ebrahim 2001.
31. Raymond 2002.
32. Ebrahim 2000.
33. UN 2001.
34. Raymond 2002.
35. Walker 2001.
36. OECD 2001.
37. CSIS 1999.
38. Mason, Lee, and Russo 2000.
39. George 1998.
40. Projections based on the Medium Variant models of the United Nations' *World Population Prospects 2000*. UN 2001.
41. UN 2001.
42. UN 2001.
43. Projections based on the Medium Variant models of *World Population Prospects 2000*. United Nations 2001.
44. See for example, Hertz, Hebert and Landon 1994.
45. Rao and others 1996; Vitora and others (1992); Bender and McCann (2000); Adentunji (1995); Kiros and Hogan (2001); Mahalanabis (1996). An alternative analysis is presented by Pena (1999) looking at 30-year influences. Maternal education was important in fertility decline, which in turn contributed to infant mortality decline, but direct health interventions in poverty

groups had an important independent influence.

46. The education effect is pervasive around the globe. In Norway, for example, infants of women with less than 9 years of education are three times more likely to die of neonatal causes compared to those of women with 12 years or more of education. Cnattingius and Haglund (1992).
47. Adentunji 1995.
48. USAID 2001.
49. Data from UNICEF (Raymond 2002) and the U.S. Census Bureau (2000) point in opposite directions, with the former showing improvement and the latter deterioration. Possible reasons for the rise in mortality may involve changes in social safety net and care giving patterns. The may also, however, reflect changes in data collection. Under the Soviet system, a child was not declared alive unless it weighed 1500+ grams. At a lesser weight, or if the child did not survive 7 days, it was classified not as a death but as a still birth. These data collection differences are unlikely to fully explain the mortality patterns, however, as new definitions and registration systems are not universally applied in the region.
50. Gillespie and others 2002.
51. Kobinsky and others 2000.
52. USAID 2001.
53. Ahmed and others 1999.
54. Ahmed and others 1999.
55. Inter-agency Group for Safe Motherhood. 1998.
56. Though the trends analyzed in this section are clear, they should be seen as orders of magnitude in causes of death rather than as reliable data points. Only 77 countries worldwide collect data on causes of death, often for just 5–20 percent of their populations. Moreover, health systems often have limited diagnostic capacity. And, absent autopsies or examinations of underlying causes, multiple diseases make it difficult to attribute deaths to a single cause.
57. World Health Statistics for 2000 contains data based on new life tables for 191 countries, and mortality data are calculated for 5 “mortality strata.” Not every stratum is present in every country; the data presented here utilize the lowest (i.e., highest mortality pattern) stratum common to all regions.
58. WHO 2001b.
59. Murray and Lopez's data is presented in Seedat (2001).
60. WHO 1998.
61. Deen and others 1999.
62. See for example, Reddy (1993); Enas, Yusuf and Mehta (1992).
63. Pearson 1999.
64. Walker and Segal 1997.
65. From WHO, World Health Statistics Quarterly, various years.
66. National Intelligence Council 1999.
67. Patz, Engelberg and Last 2000.
68. MMWR 1999.
69. MMWR 1999.
70. Stanecki 2002.
71. Stanecki 2002.
72. Morrison 2001.
73. Collins and Rau 2000; Stanecki 2002. See also Stover and Way (1998).
74. Estimate from the Health Economics and HIV/AIDS Research Division of the University of Natal, Durban in 2001.
75. Kelly 1999.
76. Fauci 1999.
77. Estimate by ING Barings. Raymond 2002.
78. Estimate from the Health Economics and HIV/AIDS Research Division of the University of Natal, Durban. 2001.
79. In 2000, the UN Security Council began to take up this issue. See also Sepkowitz 2001
80. Fauci 1999.
81. Steinbrook and Danzen 2001.
82. Steinbrook and Danzen 2001.

83. Harris, Gardiner 2001. "Adverse Reaction: AIDS Gaffes in Africa Come Back to Haunt Drug Industry at Home." *Wall Street Journal*, 23 April. Harris's article is about a study of drug costs by Joseph MiMasi of Tufts University.

84. Raymond 2002.

85. See Kault 2000.

86. Raymond 2002.

87. WHO 2001c.

88. NIC 1999.

89. NIC 1999.

90. NIC 1999.

91. WHO 1999.

92. WHO 1999.

93. WHO 1999.

94. Cohen 2000.

95. WHO, Vaccine Surveillance, 1980–1999.

96. Saade, Bateman, and Bendahmane 2001.

97. Raymond 2002.

98. Inter-agency Group for Safe Motherhood 1998.

99. USAID 2002.

100. Filmer, Hammer, and Pritchett 1998.

101. Phillips and Phillips-Howard 1996.

102. Data calculations based on World Health Status Report, 2000. Raymond 2002.

103. Raymond 2002.

104. Taylor, Shakoor, Behrens, and others 2001.

105. Raymond 2002.

106. Morse 1996.

107. WHO 2002.

108. Raymond 2002.

109. Schieber and Maeda 1999.

110. Estimates vary depending on setting. A four country study found that \$20 per fully immunized child is an approximate average. See Kaddar, Levin, Dougherty and others (2000). The cost of adding Hib to the mix will be about \$10 for the 3-dose regime.

111. U.S. Congress Joint Economic Committee, as reported in Morton Kondracke, "Investing Billions in Health Research Can Save Trillions," *Roll Call*, 6 May 2000.

111. This is approximately the public procurement cost in Russia. Choosing a higher unit cost for anti-hypertensives, of course, would only magnify the illustration of the life-time costs of chronic disease management relative to immunization.

113. Peterson 2001.

114. Soderman and others 1997.

115. Islam 1996.

116. Krause 2000.

117. Nolan 2001.

118. Black, Bryce, Burnham, and Troedsson 2001.

119. Raymond 2002.

120. Raymond 2002.

121. Mayur and Daviss 1998.

122. *Tri-State Trends* 2000.

123. See Harmon, A. 2002. "Good (or Unwitting) Neighbors Make for Good Internet Access." *New York Times*. 4 March. Also see Markoff, J. 2000. "The Corner Internet Network vs. the Cellular Giants." *New York Times*. 4 March.

124. An interesting example of such collaboration among professional societies across borders is the Renal Sister Centre Programme of the Commission to Advance Global Nephrology of the International Society of Nephrology which is developing collaborative relationships for kidney disease between Bolivia, whose domestic resources are virtually non-existent, and nephrology centers in developed countries, with an emphasis on developing protocols which are appropriate to Bolivia and which also focus on elements of kidney disease which are known risk factors for cardiovascular morbidity and mortality. See Schieppati, Remuzzi, and Garattini (2001).

BACKGROUND PAPER

Raymond, Susan. 2002. "Improving People's Health."

Available at www.usaid.gov/NatsiosReport/backgroundpapers

REFERENCES

Adentunji, J. A. 1995. "Infant Mortality and Mother's Education in Ondo State, Nigeria." *Social Science and Medicine* 40 (2): 253–63.

Ahmed, Yusef, P. Mwaba, C. Chintu, and others. 1999. "A Study of Maternal Mortality at the University Teaching Hospital, Lusaka: The Emergence of Tuberculosis as a Major Non-Obstetric Cause of Death." *International Journal of Lung Diseases* 3 (8): 675–80.

Bender, D. E., and M. F. McCann. 2000. "The Influence of Maternal Intergenerational Education on Health Behaviors of Women in Peri-Urban Bolivia." *Social Science and Medicine* 50: 1189–96.

Birdsall, Nancy, and S. W. Sinding. 2001. "How and Why Population Matters: New Findings, New Issues." In Nancy Birdsall, A. C. Kelley, and S. W. Sinding, eds., *Population Matters: Demographic Change, Economic Growth, and Poverty in the Developing World*. New York: Oxford University Press.

Black, R., J. Bryce, G. Burnham, and H. Troedsson. 2001.

"Multi-Country Evaluation of Integrated Management of Childhood Illness (IMCI) Effectiveness, Cost, and Impact." Child Health Research Project Seminar Series. U.S. Agency for International Development, Washington, D.C.

Bulatao, Randy. 1998. *The Value of Family Planning Programs in Developing Countries*. Population Matters series. Rand: Santa Monica, Calif.

Cnattingius, S., and B. Haglund. 1992. "Socio-Economic Factors and Feto-Infant Mortality." *Scandinavian Journal of Social Medicine* 20 (1): 11–13.

Cohen, Mitchell. 2000. "Changing Patterns of Infectious Disease." *Nature* 406 (17 August): 762–67.

Collins, J., and B. Rau. 2000. "AIDS in the Context of Development." United Nations Research Institute for Social Development, Geneva.

CSIS (Center for Strategic and International Studies). 1999. *Global Aging: The Challenge of the New Millennium*. Washington, D.C.

Deen, J. L., and others. 1999. "Injuries and Noncommunicable Diseases: Emerging Health Problems of Children in Developing Countries." *Bulletin of the World Health Organization* 77 (6): 518–24.

Eberstadt, N. 2000. *Prosperous Paupers and Other Population Problems*. New Brunswick, N.J.: Transaction.

Ebrahim, Shah. 2000. "Review of The Ageing and Development Report 1999." *British Medical Journal* 321 (7259): 517.

Enas, E. A., S. Yusuf, and D. Mehta. 1992. "Prevalence of Coronary Artery Disease in Asian Indians." *American Journal of Cardiology* 70: 945–49.

Fauci, A. 1999. "The AIDS Epidemic: Considerations for the 21st Century." *New England Journal of Medicine* 341 (14): 1046–60.

Filmer, Deon, and Lant Pritchett. 1997. "Child Mortality and Public Spending on Health: How Much Does Money Matter?" Policy Research Working Paper 1864. World Bank, Washington, D.C.

Filmer, Deon, Jeffrey Hammer, Lant Pritchett, and others. 1998. "Health Policy in Poor Countries: Weak Links in the Chain." Policy Research Working Paper 1874. World Bank, Development Research Group, Poverty and Human Resources, Washington, D.C.

[<http://econ.worldbank.org/docs/365.pdf>].

- Freedman, Ronald. 1997. "Do Family Planning Programs Affect Fertility Preferences? A Literature Review." *Studies in Family Planning* 28 (1): 1–13.
- Freedom House. 2002. *Freedom in the World 2001–2002*. Somerset, N.J.: Transaction.
- George, L. K. 1998. "Intergenerational Transfers: Who Gives and Who Gets?" *Journal of the American Society of CLU and ChFC* 52 (2): 28–33.
- Gillespie, Stuart, Milla McLachlan, and Roger Shrimpton. Forthcoming. "Eliminating Malnutrition." UNICEF-World Bank Nutrition Assessment.
- Hernandez, D. J. 1981. "The Impact of Family Planning Programs on Fertility in Developing Countries: A Critical Evaluation." *Social Science Research* 10: 32–66.
- Hertz, E., J. R. Hebert, and J. Landon. 1994. "Social and Environmental Factors and Life Expectancy, Infant Mortality, and Maternal Mortality Rates: Results of a Cross-National Comparison." *Social Science and Medicine* 39 (1): 105–14.
- Hindu Business Line. 2001. "ToughWays Unveils Portable e-Kiosks." 21 August.
- Inter-Agency Group for Safe Motherhood. 1998. "The Safe Motherhood Action Agenda: Priorities for the Next Decade." Report on the Safe Motherhood Technical Consultation, 18–23 October 1997, Colombo, Sri Lanka. Family Care International, New York. [http://www.safemotherhood.org/resources/pdf/e_action_agenda.PDF].
- Islam, M. A. 1996. "Death in a Diarrhoeal Cohort of Infants and Young Children Soon after Discharge from Hospital: Risk Factors and Causes for Verbal Autopsy." *Journal of Tropical Pediatrics* 42 (December): 342–47.
- Kaddar, M., A. Levin, L. Dougherty, and others. 2000. "Costs and Financing of Immunization Programs: Findings of Four Case Studies." Report 26. Partnerships for Health Reform, Bethesda, Md.
- Kaufman, D., A. Kraay, and P. Zoido-Lobaton. 1999. "Governance Matters." Policy Research Working Paper 2195. World Bank, Development Research Group, Washington, D.C. [<http://econ.worldbank.org/docs/919.pdf>].
- Kault, D. 2000. "Uncertainties in Predicting the Demographic Impact of AIDS." *Theoretical Population Biology* 57 (4): 309–24.
- Kelly, M. J. 1999. "The Impact of HIV/AIDS on Schooling in Zambia." Paper presented at the 11th International Conference on AIDS and STDs in Africa, 12–16 September, Lusaka, Zambia.
- Kiros, G.-E., and D. P. Hogan. 2001. "War, Famine and Excess Child Mortality in Africa: The Role of Parental Education." *International Journal of Epidemiology* 30: 447–55.
- Kobinsky, Marge, Colleen Conroy, Nazo Kureshy, and others. 2000. "Issues in Programming for Safe Motherhood." MotherCare, Arlington, Va. [http://www.jsi.com/intl/mothercare/PUBS/Women's%20Health%20and%20Safe%20motherhood/Guidance_Print.PDF].
- Krause, G., and others. 2000. "From Diagnosis to Drug Taking: Staff Compliance with Guidelines and Patient Compliance to Prescriptions in Burkina Faso." *International Journal for Quality in Health Care* 12 (1): 25–30.
- Mahalanabis, D. 1996. "Maternal Education and Family Income as Determinants of Severe Acute Diarrhoea in Children: A Case Control Study." *Journal of Biosocial Science* 28: 129–39.
- Mason, Andrew, Sany-Hyop Lee, and Gerard Russo. 2000. "Population Momentum and Population Aging in Asia and Near-East Countries." East-West Center Working Papers, Population Series 107. East-West Center, Honolulu, Hawaii.
- Mayur, Rashmi, and Bennett Daviss. 1998. "The Technology of Hope: Tools to Empower the World's Poorest Peoples." *The Futurist* 32 (7): 46–59.
- Merrick, Thomas W. 2002. "Population and Poverty: New Views on an Old Controversy." *International Family Perspectives* 28 (1): 41–46.
- MMWR (*Morbidity and Mortality Weekly Report*). 1999. "Control of Infectious Diseases." Vol. 48, 29–30 July: 627.
- Morrison, J. S. 2001. "HIV/AIDS in Africa: Opportunities and Critical Choices for U.S. Foreign Policy." Center for Strategic and International Studies, Washington, D.C.
- Morse, S. S. 1996. "Patterns and Predictability in Emerging Infections." *Hospital Practice*, 12 April.
- NIC (National Intelligence Council). 1999. "The Global Infectious Diseases Threat and Its Implications for the U.S." NIE 99-17D. Washington, D.C. [<http://www.cia.gov/cia/publications/nie/report/nie99-17d.html>].
- National Research Council. 1986. *Population Growth and Economic Development: Policy Questions*. Washington, D.C.: National Academy Press.
- Nolan, T. 2001. "Quality of Hospital Care for Seriously Ill Children in Less-Developed Countries." *Lancet* 357 (9250): 106–10.
- OECD (Organisation for Economic Co-operation and Development). 2001. "Fiscal Implications of Age-Related Spending." *OECD Economic Outlook* 1 (1).
- Patz, J. A., D. Engelberg, and J. Last. 2000. "The Effects of Changing Weather on Public Health." *Annual Review of Public Health* 21: 271–307.
- Pearson, T. A. 1999. "Cardiovascular Disease in Developing Countries: Myths, Realities, and Opportunities." *Cardiovascular Drugs and Therapy* 13 (2): 95–104.
- Pena, R. 1999. "Fertility and Infant Mortality Trends in Nicaragua, 1964–1993: The Role of Women's Education." *Journal of Epidemiology and Community Health* 53 (1): 132–37.
- Peterson, P. G. 2001. "A Graying World: The Dangers of Global Aging." *Harvard International Review* 23 (3): 66–70.
- Phillips, M., and P. A. Phillips-Howard. 1996. "Economic Implications of Resistance to Antimalarial Drugs." *Pharmacoeconomics* 10 (3): 225–38.
- Pritchett, Lant, and Lawrence H. Summers. 1996. "Wealthier Is Healthier." *Journal of Human Resources* 31 (4): 841–68.
- Rao R., B. Chakladar, N. Nair, and others. 1996. "Influence of Parental Literacy and Socio-Economic Status on Infant Mortality." *Indian Journal of Pediatrics* 63 (6): 795–800.
- Reddy, K. S. 1993. "Cardiovascular Disease in India." *World Health Statistics Quarterly* 46 (2): 91–96.
- Saade, Camille, Masee Bateman, and Diane Bendahmane. 2001. "The Story of a Successful Public-Private Partnership in Central America: Handwashing for Diarrheal Disease Prevention." U.S. Agency for International Development, Bureau for Global Programs, Office of Population, Health, and Nutrition, Arlington, Va.
- Schieber, G., and A. Maeda. 1999. "Health Care Financing and Delivery in Developing Countries." *Health Affairs* 18 (3): 193–205.
- Schieppati, A., G. Remuzzi, and S. Garattini. 2001. "Modulating the Profit Motive to Meet Needs of the Less-Developed World." *Lancet* 358 (9293): 1638–45.
- Seedat, Y. K. 2001. "The Limits of Hypertensive Therapy: Lessons from Third World to First." *Cardiovascular Journal of South Africa* 12 (2): 94–100.
- Sepkowitz, K. A. 2001. "AIDS: The First 20 Years." *New England Journal of Medicine* 344 (23): 1764–72.
- Sinding, S. 2000. "The Great Population Debates: How Relevant Are They for the 21st Century?" *American Journal of Public Health* 90 (12): 1841–45.
- Smith, G. D., and S. Ebrahim. 2001. "Epidemiology: Is It Time to Call It a Day?" *International Journal of Epidemiology* 30: 1–11.
- Soderman, M., and others. 1997. "High Mortality Despite Good Care-Seeking Behaviour: A Community Study of Childhood Deaths in Guinea-Bissau." *Bulletin of the World Health Organization* 75 (3): 205–12.
- Stanecki, K. A. 2002. "The AIDS Pandemic in the 21st Century." U.S. Census Bureau, Washington, D.C.

- Steinbrook, R., and J. M. Danzen. 2001. "AIDS: Will the Next 20 Years Be Different?" *New England Journal of Medicine* 344 (23): 1781–82.
- Stover, John, and Peter Way. 1998. "Projecting the impact of AIDS on mortality." *AIDS* 12 (supplement 1): S29–39.
- Taylor, R. B., O. Shakoob, R. H. Behrens, and others. 2001. "Pharmaceutical Quality of Drugs Supplied by Nigerian Pharmacies." *Lancet* 357: 1933–36.
- Tri-State Trends*. 2000. "Broadband Infrastructure Shows Upstate Disconnect." Vol. 2, no. 5: 1–4.
- UN (United Nations). 1999. "Levels and Trends of Contraceptive Use as Assessed in 1998: Key Findings." Department of Economic and Social Affairs, Population Division, New York.
- . 2001. *World Population Prospects 1950–2050: The 2000 Revision*. Vol. 1, Comprehensive Tables. Department of Economic and Social Affairs, Population Division, New York.
- . 2002. "The Future of Fertility in Intermediate Fertility Countries." Department of Economic and Social Affairs, Population Division, New York.
- UNESCO (United Nations Educational, Scientific and Cultural Organization). Various years. *Statistical Yearbook*. Department of Economic and Social Affairs, New York. [http://unstats.un.org/unsd/cdb/cdb_source_xrxx.asp?source_code=33].
- USAID (U.S. Agency for International Development). 2001. "Children's Health and Nutrition and the Summit Goals: Progress and Challenges." Washington, D.C.
- . 2002. Data compilation on oral rehydration and home rehydration salts prevalence. Office of Health, Global Bureau, Washington, D.C.
- Vitora, C. G., and others. 1992. "Maternal Education in Relation to Early and Late Child Health Outcomes: Findings from a Brazilian Cohort Study." *Social Science and Medicine* 34 (8): 899–905.
- Walker, A. R. P. 2001. "Nutrition and Aging in Africa: Transitional Changes." *Nutrition Today* 36 (1): 37–42.
- Walker, A. R. P., and I. Segal. 1997. "Health/Ill-Health Transition in Less Privileged Populations: What Does the Future Hold?" *Journal of the Royal College of Physicians of London* 31 (4): 392–95.
- WHO (World Health Organization). 1998. "Global Burden of Diabetes." Press release WHO/63, 14 September, Geneva. [http://www.who.int/inf-pr-1998/en/pr98-63.html].
- . 1999. "Rolling Back Malaria." In WHO, *World Health Report 1999*. Geneva. [http://www.who.int/whr/1999/en/pdf/whr99.pdf].
- . 2001a. "Global Estimates of Maternal Mortality for 1995: Results of an In-Depth Review, Analysis, and Estimation Strategy." In collaboration with the United Nations Children's Fund (UNICEF) and United Nations Population Fund (UNFPA). Geneva.
- . 2001b. *Global Tuberculosis Control: WHO Report 2001*. Geneva. [http://www.who.int/gtb/publications/globrep01/PDF/GTBR2001full.pdf].
- . 2001c. "Health and Aging: A Discussion Paper." Geneva.
- . 2001d. *Macroeconomics and Health: Investing in Health for Economic Development*. Report of the Commission on Macroeconomics and Health. Geneva.
- . Various issues. *World Health Statistics Quarterly*.
- . 2002. *The World Health Report 2002*. Geneva.
- World Bank. 1999. *World Development Report 1999/2000: Entering the 21st Century*. New York: Oxford University Press.