

Chapter 59

Adolescent Health Programs



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This chapter reviews the main direct causes of loss of productive life years among adolescents and the range of interventions to address these causes. It pays special attention to sexual and reproductive health because adolescence is when important transitions occur that can have a direct effect on young people's health as well as potential long-term consequences. In addition, a number of interventions have focused on this aspect of young people's behavior. The discussion centers on defined interventions that have some relatively rigorous evaluation component. There are some limitations to this chapter, however. First, it reviews existing research and does not carry out new research; however, it points to gaps in research and areas needing more work. Second, the chapter uses a focused definition of *health* that includes the most basic health outcomes (death, illness, timing of transitions, or specific risky or protective behaviors that research has attempted to measure). It does not attempt to cover aspects that would be included in a broad definition of health and well-being (for example, potential for growth, creativity, or participation) that are important but are poorly researched to date. Finally, although the broader environment in which adolescents live influences their behavior and responses to programs, this chapter does not attempt to review that important group of factors or the broader set of programs that have a more indirect effect on the health of young people (for example, school quality or public health promotion activities at the societal level).

NATURE AND CAUSES OF THE BURDEN OF DISEASE IN YOUNG PEOPLE

At first glance, adolescence appears to be a relatively healthy—although not hazard-free—period of life, given the relatively low mortality rates of young people.¹ Nevertheless, adolescents

and young adults engage in a range of behaviors that can affect the quality of their health and the probability of their survival in the short term as well as affect their lifetime health and survival.

Health Challenges of Adolescents

If we look only at disability-adjusted life years (DALYs) for the adolescent age group, adolescents appear to be relatively healthy. Nonetheless, more than 33 percent of the disease burden and almost 60 percent of premature deaths among adults can be associated with behaviors or conditions that began or occurred during adolescence—for example, tobacco and alcohol use, poor eating habits, sexual abuse, and risky sex (WHO 2002). Adolescence-related risk factors are a greater problem in wealthier countries, largely because of the relatively greater impact of smoking and diet-related risks in those countries, though the prevalence of these risks is expanding rapidly in many low- and middle-income countries (LMICs). Thus, although adolescents are apparently healthy, they are practicing unhealthy behaviors that will ultimately result in much death and disability. This is an immense public health issue. Therefore, focusing attention both on diseases experienced during adolescence and on risk factors with their roots in adolescence makes sense. Adolescent health efforts should emphasize prevention because so much of the disease burden is preventable and because prevention is a particularly cost-effective strategy in relation to adolescents, given the long duration over which benefits will be reaped and adolescents' greater openness to change than adults.

Burden of Disease in Adolescence

The global burden-of-disease approach used to calculate DALYs is an imperfect representation of the prevalence, morbidity, and

Table 59.1 Worldwide Distribution of DALYs for Major Categories of Diseases and Conditions by Age Group and Sex, 2002 (percent)

Category	Women		Men	
	Age 5–14	Age 15–29	Age 5–14	Age 15–29
Sexual and reproductive causes	4.6	33.4	3.9	9.5
HIV/AIDS	3.8	11.9	3.7	8.6
Maternal conditions	0.4	16.3	0.0	0.0
Other sexual and reproductive conditions	0.4	5.2	0.2	0.9
Respiratory conditions	11.9	3.7	9.9	3.7
Cardiovascular conditions	2.2	2.9	2.0	3.3
Neuropsychiatric conditions	15.5	33.8	14.9	32.0
Unipolar depressive disorders	5.4	10.1	5.6	7.1
Bipolar disorders	0.6	4.1	0.7	4.2
Schizophrenia	0.7	4.4	2.3	4.2
Other mental health conditions	1.0	4.4	0.6	2.6
Alcohol use disorders	0.1	1.1	0.3	5.7
Drug use disorders	0.1	0.6	0.2	2.3
Other	7.6	9.1	5.2	5.9
Injuries	25.0	14.0	32.4	33.1
Unintentional, road traffic accidents	5.7	2.2	7.7	7.5
Unintentional, other	16.8	7.7	21.8	12.9
Intentional, self-inflicted	1.0	2.9	0.9	3.8
Intentional, not self-inflicted (war, violence)	1.5	1.2	2.0	8.9
Other communicable diseases	31.1	7.1	27.7	11.1
Tuberculosis	1.5	3.0	1.4	3.9
Other noncommunicable diseases	9.9	9.6	9.2	10.0
Total	100.2	104.5	100.0	102.7

Source: WHO 2004a.

mortality of conditions that adolescents face. DALYs fail to capture fully the complexity of adolescent health concerns. Nonetheless, no better comprehensive and comparative measure currently exists; thus, the discussion in this section will rely primarily on available DALY data.

The World Health Organization (WHO), in 1999, commissioned a special analysis of the burden of disease in adolescence, which examined the 10 to 14 and the 15 to 19 age groups. The study found that young people age 10 to 19, who constitute 19 percent of the world's population, account for 15 percent of the disease and injury burden worldwide. It also found that more than 1 million people in that age group die each year (WHO 1999). The top three causes of DALYs were found to be unipolar major depression, transportation accidents, and falls. The profile of disease burden was significantly different for younger and older adolescents. In the 10 to 14 age group, injuries and communicable diseases were prominent causes of DALYs. For the 15 to 19 age group, the disease burden shifted to outcomes of sexual behaviors and mental health.

Using 2002 data, WHO has made more detailed calculations of DALYs by sex for the 5 to 14 and 15 to 29 age groups (table 59.1). These age ranges overlap adolescence and are, thus, broadly indicative of the 10 to 19 age group. Notably, table 59.1 shows large differences by sex in the pattern and level of DALYs. These differences are important, because they relate to the different needs of young women and young men for interventions and services. Particular interventions also potentially have different costs and benefits because of the different proportions of females and males.

Worldwide, among young men age 15 to 29, injuries and neuropsychiatric illnesses account for a high proportion of DALYs (33 percent and 32 percent, respectively). By comparison, among young women age 15 to 29, injuries account for 14 percent of DALYs, and neuropsychiatric illnesses account for about the same percentage of DALYs as among young men. However, sexual and reproductive health conditions account for 33 percent of young women's DALYs, much higher than the 10 percent for young men. For both young men and young women, all other communicable and noncommunicable

diseases account for moderate proportions of DALYs (7 to 11 percent, depending on sex and disease group).

The disease burden among 5- to 14-year-olds is markedly different from that for the 15- to 29-year-olds, and differences between males and females are quite small. Communicable diseases and respiratory illnesses account for much larger proportions of DALYs for this age group compared with the 15 to 29 age group, whereas neuropsychiatric and sexual and reproductive conditions account for much smaller proportions. HIV/AIDS accounts for less than 4 percent of DALYs for both males and females age 5 to 14.

Health Risk Behaviors among Adolescents and Young People

Young people's vulnerability to risky or unwanted sex and other unhealthy behaviors is tied to a host of individual, family, and community factors that influence their behavior and that are closely related to their economic and educational opportunities. Good health and other physical, moral, and intellectual development outcomes are often mutually reinforcing. For example, healthy children do better in school. Similarly, having more years of schooling provides essential information and skills that are linked to more protective and less risky behaviors.

Injuries. Violence and war account for more than a quarter of injury-related deaths among young men age 15 to 29. Adolescent boys and men in their 20s are an important part of the military forces in all countries that have such forces. As such, they are at high risk, particularly in areas where armed conflict is occurring. The United Nations Children's Fund estimates that approximately 300,000 soldiers under the age of 18 are involved in armed conflicts worldwide (National Research Council and Institute of Medicine 2005). Homicide is also an important cause of death for young men, in particular, and it is the leading cause of death for young men in some Latin American countries (WHO 2001b). In addition, road accidents account for significant proportions of injuries and deaths among young people. Self-inflicted injuries, including suicide, which are often related to mental illness, are also a major health problem for young people, accounting for 4 percent of DALYs in men age 15 to 29 and 3 percent of DALYs in women age 15 to 29.

Mental Health. Depression, schizophrenia, and other mental illnesses are important causes of illness and death among young men and women and account for a significant proportion of DALYs for both men (18 percent) and women (23 percent) age 15 to 29; for 5- to 14-year-olds, it is about 9 percent for boys and 8 percent for girls. The relative importance of mental illnesses is much greater in the high-income countries.

Smoking, Alcohol, and Drug Use. Most adult smokers worldwide begin smoking in adolescence or earlier (World Bank 1999a). An estimated 15 percent of young men and 7 percent of women age 13 to 15 are currently smoking cigarettes, according to more than 100 surveys that have been conducted since 1999 by the Global Youth Tobacco Survey Program and carried out under the auspices of WHO and the U.S. Centers for Disease Control and Prevention (National Research Council and Institute of Medicine 2005). Every day, worldwide, almost 100,000 young people start smoking, more than two-thirds of them in LMICs (World Bank 1999a). Of the 300 million young people smoking today, half will eventually die from tobacco use (WHO 2001b). By 2030, tobacco is expected to be the single biggest cause of death worldwide, accounting for about 10 million deaths per year (World Bank 1999a).

Although discouraging young people from starting to smoke and providing means for them to quit is extremely important, deaths caused by tobacco tend to occur many years later. Therefore, tobacco use as an underlying risk factor accounts for very few DALYs in the 5 to 29 age group (WHO 2002). Alcohol and drug use account for 8 percent of all DALYs for young men age 15 to 29 but for only 2 percent for young women. Evidence indicates that young people are starting to drink at earlier ages. Longitudinal studies have found that the earlier young people start drinking, the more likely they are to experience alcohol-related injuries and alcohol dependence later in life (WHO 2001a).

Nutrition and Exercise. Nutritional deficiencies such as anemia are widespread in both young men and women. Worldwide, these conditions account for almost 5 percent of DALYs among girls age 5 to 14 and almost 4 percent among boys of the same age, with anemia being an important component for both girls and boys. Although nutritional deficiencies are relatively less important among 15- to 29-year-olds (just over 1.0 percent among young men and about 1.5 percent among women), anemia accounts for the bulk of these deficiencies. Chronic undernutrition that causes stunting among young people delays growth and physical maturation, increases risks to pregnant mothers and their newborns, and decreases the capacity to learn and to work (Behrman and others 2004; Hoddinott and Quisumbing 2003). Malnutrition can take other forms, some of which lead to being overweight or obese, thereby increasing the risks for diseases such as diabetes. Such forms of malnutrition are of increasing relevance in middle-income countries such as Brazil, China, the Arab Republic of Egypt, Mexico, and South Africa and at times coexist with undernutrition (see, for example, Doak and others 2000).

Nutritional deficiencies increase the risks that girls and young women face during pregnancy and childbirth (Delisle, Chandra-Mouli, and de Benoist 2001), and evidence is emerging about the connection between poor maternal nutrition and

greater risk of transmission of HIV from mothers to their infants (Piwoz and Greble 2000).

Diet and lifestyle-related chronic diseases—many with their roots in childhood and adolescence—are emerging as one of the most important health problems in LMICs. Cardiovascular diseases, which are responsible for 10 percent of DALYs lost in LMICs, typically occur in middle age or later; however, risk factors are determined to a great extent by behaviors learned during childhood and adolescence and continued into adulthood, such as dietary habits and smoking. Throughout the world, these risks are starting to appear earlier. Physical activity has decreased markedly in adolescence, particularly in girls, and obesity has increased substantially (MacKay and Mensah 2004).

Sexual and Reproductive Behaviors. Worldwide, the majority of young people initiate sexual activity during adolescence. Significant proportions—in some regions and countries, the majority—marry and become parents (table 59.2). Globally, the age of onset of puberty has been decreasing progressively for both boys and girls (National Research Council and Institute of Medicine 2005). The age at first marriage has also increased in most parts of the world over recent decades, except in Latin America (Mensch, Singh, and Casterline 2003). The decline in the age at puberty, combined with the general trend toward later marriage, increases the period of time during which adolescents may be sexually active before marriage and may result in sexual initiation at an earlier age (National Research Council and Institute of Medicine 2005).

Young women typically make the transition to marriage and parenthood at an earlier age than young men, and early marriage predisposes girls to HIV infection through unprotected sex, because the partner, by virtue of age, has an elevated risk of being HIV positive. In addition, marriage changes adolescent girls' support systems, thereby limiting their access to knowledge about HIV/AIDS (Bruce and Clark 2003).

All these key transitions to adulthood bring with them the potential for risks to health that may have both immediate and longer-term effects. Among young women age 15 to 29, illnesses related to pregnancy and childbearing account for 16 percent of their DALYs. Some have unwanted pregnancies, and in countries where abortion is legally restricted, unsafe abortion is an important source of mortality and morbidity for young women, with abortion complications accounting for almost 3 percent of DALYs worldwide among females age 15 to 29. (WHO 2004c).

Even though adolescent childbearing has declined in recent years, the proportion of young women who become mothers during adolescence remains high in most LMICs, and very early childbearing remains an issue in some regions (table 59.2). Childbearing before age 16 also brings with it a high risk of health consequences, both for the mother and for the newborn (Save the Children U.S.A. 2004; WHO forthcoming-b).

In the most recent surveys carried out in LMICs, high proportions of adolescents report that they have heard of contraceptive methods; however, little is known about the quality and accuracy of young people's knowledge of contraception. Moreover, substantial proportions of young women appear to have an unmet need for contraception; they are not using contraception even though they are sexually active and do not want to have a child (CDC and ORC Macro 2003; Westoff and Bankole 1995).

In addition to having a risk of early and unwanted pregnancy, adolescents are also at risk of acquiring sexually transmitted infections (STIs), including HIV. HIV/AIDS accounts for most of the sexual and reproductive health DALYs lost by young men age 15 to 29 (almost 9 percent). Among young women age 15 to 29, HIV/AIDS accounts for a higher proportion of DALYs than for young men (almost 12 percent) because of their higher levels of susceptibility. STIs and other sexual and reproductive health disorders together account for just over 5 percent of young women's DALYs, much more than among young men. About half of all HIV infections occur in people under age 25, and for biological, social, and economic reasons, young women are disproportionately affected, especially in Sub-Saharan Africa, where young women have twice the prevalence rate of young men (UNAIDS 2003).

Poverty and Adolescent Health

Poverty and inadequate health systems compound adolescents' vulnerability to sickness and early death. At the same time, poor health exacerbates poverty by disrupting and cutting short school opportunities, by weakening or killing young people in the prime of their working lives, or by placing heavy financial and social burdens on families.

Poor adolescents bear a disproportionate burden of the health problems in their age group. An analysis of data from demographic and health surveys (Macro International 1990–98, unpublished raw data) indicates a strong association between poverty and the health status of adolescents and between poverty and adolescents' use of health services. For example, the poorest 20 percent of young women are between 1.7 and 4.0 times as likely to have an early birth as the richest 20 percent of young women. Similar disparities between rich and poor adolescents are seen for indicators such as early marriage, skilled attendance at birth, use of contraception, and knowledge of HIV/AIDS transmission, and these disparities tend to be greater for adolescents than for older women. For example, surveys in 45 countries show that the poorest 20 percent of women age 15 to 49 have a total fertility rate almost double that of the richest 20 percent, whereas among adolescents age 15 to 19, total fertility among the poorest 20 percent is more than triple that of the richest 20 percent (Macro International 1990–98, unpublished raw data).

Table 59.2 Indicators of Sexual and Reproductive Behaviors among Adolescents and Youth by Gender and Age Group, Late 1990s to Early 2000s

a. Sexual Activity

Region	Percentage of females age 20–24 who became sexually active before age			Percentage of males age 20–24 who became sexually active before age		
	15	18	20	15	18	20
East and Southern Africa	17	57	77	14	45	65
West and Central Africa	21	59	77	12	40	61
Caribbean and Central America	13	44	62	31	70	84
South America	9	41	61	31	73	87
Former Soviet Asia	1	20	53	—	—	—
Middle East	—	—	—	—	—	—
South and Southeast Asia	—	—	—	—	—	—

b. Marriage

Region	Percentage of females age 20–24 who married before age		Percentage of males age 20–24 who married before age		Percentage of men age 20–24 ever married
	18	20	18	20	
East and Southern Africa	37	55	14	28	
West and Central Africa	45	60	12	27	
Caribbean and Central America	35	53	22	38	
South America	23	38	14	29	
Former Soviet Asia	16	50	—	24	
Middle East	23	40	—	17	
South and Southeast Asia	42	60	—	41	

c. Childbearing

Region	Percentage of females age 20–24 who had a child before age		Percentage of males who ever fathered a child at age	
	16	18	15–19	20–24
East and Southern Africa	9	27	2	24
West and Central Africa	13	31	2	13
Caribbean and Central America	7	22	2	27
South America	4	16	3	23
Former Soviet Asia	0	4	—	—
Middle East	3	11	—	—
South and Southeast Asia	9	24	—	—

d. Contraceptive Use

Region	Percentage of sexually active females age 15–19 using contraception		Percentage of sexually active females age 20–24 using contraception	
	All	Unmarried	All	Unmarried
East and Southern Africa	21	28	30	42
West and Central Africa	20	26	23	35
Caribbean and Central America	24	—	36	—
South America	28	38	33	59
Former Soviet Asia	25	—	43	—
Middle East	—	—	—	—
South and Southeast Asia	—	—	—	—

Source: National Research Council 2005.
— = not available.

INTERVENTIONS

Improving the health of young people is complex and difficult, arguably more so than for other age groups. Compared with children, adolescents are less protected by their families and communities and less amenable to simple solutions to their health problems, many of which are behavior based. Compared with adults, adolescents know less about how to stay healthy and have fewer resources to prevent or treat health problems. By contrast, their behaviors are less firmly entrenched, and they are often involved in institutional activities, such as schools, training programs, and the military, where programs with high coverage can be sustained. The influences on young people's behaviors are becoming better understood (Blum and Mmari 2004; Pitts and others 2004), but even given what is known about such influences, the challenge of designing interventions to reinforce protective factors and mitigate risk factors remains. Many of the factors associated with less risky health behaviors, such as family connectedness and academic performance, go far beyond the purview of health program managers.

Programs will have to seek multisectoral solutions that link health sector interventions with other types of interventions delivered through other sectors, either at the program level or at the policy level. The difficulty in attributing improvements in health outcomes among adolescents to interventions delivered in multiple settings or sectors reflects the challenges involved. Programs aimed at young people are relatively new and untested. Nevertheless, accumulated experience, backed by an increasing body of research, has created international consensus around a multi-intervention approach centered on the following (WHO 1999):

- Young people need information and skills to make the right decisions about behaviors that affect their health, such as whether and when to have sex and whether to use tobacco.
- Young people need access to a broad range of health services that give them the means to act on their knowledge, including access to condoms.
- Young people need a social, legal, and regulatory environment that supports healthy behaviors and protects them from harm.

Interventions to improve adolescent health have typically reflected this consensus and are echoed in goals that have been adopted internationally.

This section summarizes what is known about the effectiveness of such interventions. Note that the health community's consideration of adolescent health has only occasionally advocated attention to those health conditions that are of relatively greater importance to the adolescent age group, at least as measured by indicators such as DALYS. Much of the focus has been on sexual and reproductive health and on risky behaviors

such as tobacco and drug abuse. The lack of age-specific data and traditional reliance on mortality and morbidity statistics contribute to the unbalanced attention. Another factor may be that such behaviors tend to have longer-term health consequences that are not reflected in standard DALY calculations. An additional reason for the imbalance in adolescent data may be the significant social impacts of sexual and reproductive behavior (for example, the contribution of high fertility to rapid population growth); the social and economic implications of large proportions of HIV-infected adolescents in many countries; the mortality implications of initiating tobacco use during adolescence; and the antisocial behavior associated with substance abuse. Public health systems' efforts to address health problems associated with road safety, malaria, and mental health have devoted inadequate attention to developing and implementing programs that target adolescents.

Evidence on Sexual and Reproductive Health Interventions

Two recent reviews summarize research on the effectiveness of adolescent sexual and reproductive health interventions. Table 59.3 presents the results of the FOCUS on Young Adults (2001) review. The FOCUS report looks at interventions in LMICs and is based on relatively rigorous evaluations of 40 programs. The general findings from the FOCUS review, supplemented by more recent research findings, are as follows:

- *Almost all programs are effective in promoting positive knowledge and attitudes.* Almost all the rigorously evaluated programs that FOCUS reviewed improved knowledge of reproductive health and selected attitudes.
- *Most programs effectively influence behaviors.* A majority of programs significantly changed at least one important adolescent behavior pertaining to reproductive health. Often, however, programs tried and failed to improve many important behaviors. Where research has found programs to be effective in changing behaviors, such changes have typically not been large.
- *All six categories of interventions studied proved effective at influencing reproductive behavior in at least one study.* However, maintaining that certain models are more effective than others is impossible because the period of observation and the behaviors that were influenced varied by study. Moreover, further replications in multiple settings are necessary to provide a basis for identifying the key features or elements of successful interventions.
- *The evidence base is limited in a number of ways.* Few studies look at the effects on ultimate health outcomes, such as pregnancy rates or rates of HIV infection. Furthermore, many promising approaches have not been rigorously evaluated. Only a few studies assessed effects on the use of health services, and none examined the effect of creating a

Table 59.3 Effectiveness of Adolescent Sexual and Reproductive Health Programs, LMICs

Type of program	Number of studies ^a	Number of programs showing significant impact/Total number of programs studied					
		Improved knowledge and attitudes	Impact on key behaviors				
			Delayed sex	Reduced number of partners	Increased contraceptive use	Increased service use	Improved at least one behavior
All programs	40	33/36	6/17	6/10	18/23	4/9	23/30
School	21	17/19	4/11	3/6	6/10	1/3	9/14
Mass media	6	5/6	1/4	2/3	5/5	1/2	5/5
Community	4	4/4	1/1	—	4/4	—	4/4
Youth development	(1)	1/1	—	—	1/1	1/1	1/1
Peer education	(3)	3/3	1/1	—	3/3	—	3/3
Workplace	4	4/4	—	—	2/2	—	2/2
Health facility	4	2/2	—	—	0/1	2/3	2/4
Youth-friendly services	(3)	1/1	—	—	—	2/3	2/3
Youth center	(1)	1/1	—	—	0/1	—	0/1
Multicomponent	1	1/1	0/1	1/1	1/1	0/1	1/1

Sources: Multicomponent program: AMREF, LSHTM, and NIMR 2003; all other programs: FOCUS on Young Adults 2001.

— = not available.

a. Numbers of studies in parentheses are subsets.

supportive environment on behaviors. Furthermore, much of the available evidence from strong studies is for small-scale programs that are carried out over short periods of time, and little evidence is available on long-term effects on behaviors (Speizer, Magnani, and Colvin 2003). A recent study in Tanzania provides the first rigorous evidence that the benefits of adolescent sexual and reproductive health programs in low-income countries can last for at least three years (AMREF, LSHTM, and NIMR 2003).

Kirby's (2001) review covers roughly 70 rigorously evaluated programs in Canada and the United States. The review divides programs into three categories: (a) programs that focus on sexual antecedents, such as sexuality and HIV education and clinical programs; (b) programs that focus on nonsexual antecedents; and (c) programs that incorporate both youth development and reproductive health components. Kirby finds that programs in all three categories proved effective in reducing sexual risk taking, pregnancy, and childbearing among teens. In relation to youth development programs, Kirby finds that a type of intervention known as *service learning*, in which students work on community projects, had the strongest evidence of effectiveness. By contrast, other types of youth development programs were not effective in improving reproductive health outcomes. Programs that incorporate both youth development and reproductive health components were effective over long periods.

In synthesizing U.S. and international data, Kirby (2003) finds that programs are effective with different groups of adolescents in different countries. Also, programs seem to be particularly effective for adolescents who are at especially high risk of negative sexual and reproductive behaviors. In addition, programs do not hasten or increase sexual activity—a common criticism of opponents of adolescent programs. Of all the programs that have been rigorously evaluated, none has reported a decrease in the age of sexual debut or an increase in sexual activity among young people. A recent effort to review the evidence on interventions for preventing HIV among young people has made tentative conclusions about the effectiveness of and subsequent support for wide-scale implementation (WHO 2004b).

On the basis of these international reviews, relatively strong evidence of effectiveness on a range of outcomes has emerged for the following interventions:

- *Life-skills and health and sexuality education in schools.* Well-designed, well-implemented sexuality and reproductive health education can provide young people with a solid foundation of knowledge and skills to enable them to engage in safe and responsible sexual behavior.
- *Peer education.* Peer education programs are especially appropriate for young people who are not in school and for hard-to-reach, at-risk subsets of the youth population, including sex workers and street children.

- *Mass media and community mobilization.* Mass media and community mobilization efforts that engage influential adults, such as parents, teachers, community and religious leaders, and music and sports stars, can help normalize positive adolescent behaviors and gender roles as well as direct young people to appropriate health services.
- *Youth development programs.* Youth development programs typically address a range of key adolescent needs, including life skills, education, jobs, and psychosocial needs. U.S. programs with a voluntary community service component have successfully improved key reproductive health behaviors, but no evidence is available for developing countries.
- *Clinical health services.* Although some young people seek care through the formal health system, many others are deterred by the often judgmental attitudes of health workers, particularly when seeking care and advice on matters related to sexuality.
- *Social marketing.* This approach involves the use of public health messages to promote healthy behaviors and the use of condoms and other health products and services. Effective programs bring products and services to places in the community that young people frequent, such as shops, kiosks, and pharmacies.
- *Workplace and private sector programs.* Programs that reach young people do so at their places of work and through private channels, such as pharmacies and for-profit medical services, where many young people prefer to seek care. Many successful U.S. youth development programs have a work component.

Evidence of Other Adolescent Health Interventions

Data on the effectiveness of other adolescent health interventions are more scattered, partly because some issues have not been recognized as adolescent-specific problems that require youth-focused interventions.

Nutrition. Because anemia is a critical health problem in many countries, many efforts have focused on improving the iron intake of adult women. Interventions aimed at adolescent girls have found that daily iron supplementation effectively lowers anemia and iron deficiency (Elder 2002; MotherCare 2000). Obesity is rapidly becoming a serious health problem among adolescents in many middle-income countries and is often also associated with loss of self-esteem among adolescents. A few studies show that preventing obesity is more successful among adolescents than among adults (Delisle, Chandra-Mouli, and de Benoist 2001).

Mass Deworming. In the Busia district of western Kenya, an ongoing World Bank study is evaluating the effect on learning outcomes of providing deworming treatment to all students in

a school. After two years, observed effects of deworming treatment included fewer absences and lower dropout rates, but no effect on test scores (World Bank 2002a). The treatment also resulted in health and school participation benefits among untreated children in the same schools, as well as in neighboring schools, suggesting that the deworming had positive externalities.

Tobacco. Price increases are the most effective tool for reducing or deterring the use of tobacco products by young people. Studies in the United States have shown that price increases have a greater effect on tobacco use by young people than on use by older age groups (University of Illinois at Chicago Health Research and Policy Centers 2001). Other interventions have also reduced tobacco use among young people, such as comprehensive bans on all advertising, including bans on the promotion of tobacco products and trademarks (World Bank 2002c). Programs that give young people the skills to resist peer pressure and other social pressures to smoke have demonstrated consistent and significant reductions or delays in adolescent smoking. School-based programs are also more effective when combined with communitywide supportive efforts. Information campaigns that help young people see how the tobacco industry tries to manipulate their behavior through advertising have been highly effective in changing behavior and attitudes toward smoking among young people in the United States (American Legacy Foundation 2002).

Promising but Unproven Interventions

Many promising adolescent-focused interventions have not yet been rigorously evaluated. These interventions include programs aimed at providing young, newlywed couples with reproductive health information and services (Alauddin and MacLaren 1999); programs that combine livelihoods skills with reproductive health information and services (Rosen 2001b); voluntary counseling programs on and testing for HIV (YouthNet 2002); actions aimed at changing social norms such as gender roles (Horizons 2004); and interventions that address the political and social context (WHO forthcoming-a). A few studies of multipronged approaches are just becoming available and have shown mixed results. Findings from a four-country study found little or no effect of such an approach on key reproductive health behaviors among adolescents (Frontiers, Horizons, and YouthNet 2004). By contrast, a study in Tanzania found that a multicomponent approach had a significant effect on key reproductive health behaviors but no effect on health outcomes (AMREF, LSHTM, and NIMR 2003).

Other possibly promising efforts include suicide prevention programs, tuberculosis education linked with health education (interpersonally or through the mass media), and malaria treatment programs that focus on young people. Adequate

evaluation is available on the efficacy of programs promoting the use of seat belts and crash helmets through enforcement of related laws and the support of intensive publicity and information campaigns, as well as on the efficacy of programs preventing alcohol use among adolescents. The evaluations are sufficient for building confidence for investment, and they serve as a basis for intervention design (National Research Council and Institute of Medicine 2004; WHO 2004d).

COSTS AND COST-EFFECTIVENESS OF INTERVENTIONS

Good cost studies of adolescent health programs in LMICs are rare. The reported cost of such programs varies greatly depending on the country, type of intervention, target group, and so on. For example, such programs cost between US\$0.03 per adolescent reached in a family life education radio program in Kenya and US\$71.00 per year per adolescent reached in a school-based HIV prevention program in Zimbabwe. Of the 32 programs studied, 12 have a unit cost of less than US\$10 per year, and others have a unit cost of US\$10 to US\$25 (table 59.4). Cost estimates are available only for certain types of interventions, with most of the estimates being for reproductive health and HIV education programs. A few studies have tried to measure cost per DALY of adolescent sexual and reproductive health interventions; however, the estimates vary widely. For example, in India, a youth-focused HIV prevention program costs US\$66.20 per DALY gained; in Honduras, the cost of a voluntary counseling and testing program aimed at youth is US\$5,873 per DALY gained.

The estimates shown in table 59.4 should be interpreted with great caution. Comparing costs across types of programs and countries is difficult, but so is choosing comparable effectiveness measures.^{3,4}

ECONOMIC ANALYSIS

Economic analysis of adolescent health programs can provide important information on their value relative to other interventions.

Economic Benefits of Interventions

The macro approach to measuring the economic benefits of interventions is to define the benefits of investing in youth in terms of the investments' effect on economic growth, which typically is measured in terms of growth in gross national product per capita. Some research suggests that investments in young people—whether in access to reproductive health care, in education, or in other key facets of their lives—have

synergistic effects that promote overall economic development (Birdsall, Kelley, and Sinding 2001). For example, shifts to smaller family size and slower rates of population growth in East Asia appear to have played a key role in the creation of an educated workforce, the accumulation of household and government savings, the rise in wages, and the spectacular growth of investment in manufacturing technology. The shift to smaller families that is taking place in many countries will open another window of opportunity as workers have proportionately fewer old and young dependents to support.

If societies invest in health, education, and job creation, the resulting economic gains will improve their overall quality of life. Education, particularly for girls, is strongly related to reproductive behavior. In most countries, girls who are educated are more likely to delay marriage and childbearing, whereas girls with less education are more likely to become mothers as adolescents. Unfortunately, the causal relationships involved are not clear. Are girls more likely to get married when they leave school, or do some girls prefer to terminate their schooling and marry early? The difference is critical. In the first case, the appropriate policy response would focus on improving schooling opportunities for girls. In the second case, research would need to be done first to determine the underlying reasons for girls'—and their parents'—preferences for early marriage instead of additional schooling. The next step would be to assess whether these reasons appear to reflect the girls' (and society's) best interests and, if not, to find interventions to address the root causes of this preference.

The micro approach to measuring the economic benefits of interventions is to build on microeconomic estimates of direct productivity effects that can be measured in monetary terms. For other effects that cannot readily be translated into monetary terms, analysts can use the cost of the most cost-effective alternative to achieve the same effects. Knowles and Behrman (2003a) use this approach to estimate the benefits of various youth-focused investments, including in health. They summarize the three types of effects: (a) those that can be directly valued in monetary terms, (b) those that may require indirect valuation, and (c) those that are particularly difficult to monetize. Table 59.5 presents examples of these effects.

Cost-Benefit Analysis

Cost-benefit analysis is well suited to the economic analysis of projects aimed at youth, in part because many investments in young people yield multiple benefits, such as additional schooling and improved health. Finding any effectiveness measure that adequately reflects the wide range of benefits obtained from some types of investments in youth is difficult, but cost-benefit analysis has the advantage of allowing comparisons across a range of interventions that may vary considerably in terms of type and effects.

Table 59.4 Cost and Cost-Effectiveness of Adolescent Health Programs

Region and country	Program type (name)	Number served per year	Unit cost (US\$)	Unit	Cost per DALY gained (US\$)	Source
Sexual and reproductive health interventions						
<i>Latin America</i>						
Brazil	School-based HIV/AIDS prevention program	—	0.70	Per condom	—	Antunes and others 1997
Honduras	School-based reproductive health program to prevent HIV/AIDS	—	10.44	Per targeted adolescent	1,323	World Bank 2002b
Honduras	Social marketing of condoms to adolescents	904,612	10.20	Per targeted adolescent	3,292	World Bank 2002b
Honduras	Symptomatic treatment of STIs	—	48.97	Per adolescent treated	28,306	World Bank 2002b, as cited in Knowles and Behrman 2003b
Honduras	Voluntary counseling and testing for youth	1,000	18.29	Per adolescent undergoing voluntary counseling and testing	5,873	World Bank 2002b, as cited in Knowles and Behrman 2003b
Honduras	Workplace information, education, and communication	1,000	20.88	Per worker	2,623.77	World Bank 2002b
Mexico	Community peer educators	4,000	63.64	Per active user of contraception per year	—	Townsend and others 1987
Mexico	Youth center	4,000	203.47	Per active user of contraception per year	—	Townsend and others 1987
Peru	School-based sexuality and HIV/AIDS prevention education	604	3.00	Per student reached	—	Caceres and others 1994
<i>Europe and Central Asia</i>						
Hungary	School-based HIV/AIDS prevention program	41,250	1.40	Per student per year	—	Soderlund and others 1993
Newly independent states	School-based HIV/AIDS prevention program	—	1.33	Per student reached	—	Forrai, personal communication, 1992
<i>Asia</i>						
India	Information, education, and communication programs targeted to youth	—	1,324	Per HIV infection averted	66.20	World Bank 1999b
<i>Sub-Saharan Africa</i>						
Africa	School-based HIV/AIDS prevention program	—	75–200 (primary school); 121–241 (secondary school)	Average unit cost of teacher training and simple materials	—	UNECA 2000
Africa	School-based HIV/AIDS prevention program	—	1.40–7.90	Per student reached	—	Watts and others 2000
Africa	Peer education	—	8.00–10.81	Per out of school adolescent reached	—	Kumaranayake and Watts 2001
Cameroon	School-based HIV/AIDS prevention program	10,000	6.72	Per student reached	—	Kumaranayake and del Amo 1997
Kenya	Radio program delivering family life education (Youth Initiatives Project)	3,354,000	0.03	Per adolescent reached	—	Knowles and Behrman 2003b

Table 59.4 Continued

Region and country	Program type (name)	Number served per year	Unit cost (US\$)	Unit	Cost per DALY gained (US\$)	Source
Mozambique	Community based “stepping stones” approach (Action Aid)	500,000	0.30	Per person per year	—	World Bank 2003
Mozambique	Voluntary counseling and testing, peer education	11,726	18.40	Per person per year	—	World Bank 2003
Senegal	Multipronged school, clinic, and community interventions	—	68,215–111,714	Total intervention cost over a two-year period	—	RamaRao and Diop 2003
South Africa	Television show, mass media campaign (Soul Buddyz)	6 million	0.38	Per person per year	—	World Bank 2003
South Africa	Mass media campaign (LoveLife)	—	20 million	Annual budget	—	World Bank 2003
Tanzania	Primary school peer education (MEMA kwa Vijana)	2,850	1.37	Per person per year	—	World Bank 2003; Ross, personal communication. 2003
Tanzania	Secondary school peer education (School Health Education Program)	16,250 (over three years)	24.12	Per person per year	—	World Bank 2003
Uganda	Outreach program for street children (GOAL: Baaba Project)	5,000	18.50	Per person per year	—	World Bank 2003
Uganda	Newsletters, radio show (Straight Talk)	Nationwide program reaching all schools	630,000	Amount spent in 2001	—	World Bank 2003
Zambia	Life skills for teachers and pupils (AIDS Action Program for Schools)	—	0.16	Additional cost of one child-year of AIDS education	—	Knowles and Behrman 2003b
Zambia	School clubs, health clinics, peer education (Kafue Adolescent Reproductive Health Program)	53,000 (over five years)	2.26	Per person per year	—	World Bank 2003
Zimbabwe	Secondary school clubs, income generation, peer education (Africare)	35,200 (over two years)	8.89	Per person per year	—	World Bank 2003
Zimbabwe	Secondary school clubs, counseling, peer education (Midlands AIDS Service Organisation)	2,000	71.00	Per person per year	—	World Bank 2003
Other health interventions						
LMICs	Tax on tobacco products	—	—	—	5–17	World Bank 1999a
LMICs	Iron supplementation for 13- to 15-year-olds	—	0.18	Per child per year	—	Knowles and Behrman 2003a

Source: Authors.
— = not available.

One of the few cost-benefit analyses specific to adolescent health is Knowles and Behrman’s (2003a) study that examines three interventions: a program to provide iron supplementation for secondary schoolchildren, a school-based program of health education to prevent HIV/AIDS, and a tobacco tax. The study estimates benefits and costs over a youth’s life cycle, discounted back to the age of 18. The study uses direct estimates of benefits that could be readily estimated in monetary terms (such as gains in labor productivity) and indirect estimates of other benefits, such as reduced fertility and improved health, that could not be easily monetized. The latter were estimated as

the least cost of investments currently made to obtain the same benefit; for example, the cost per birth averted in a family planning program was used to value reduced fertility. Table 59.6 summarizes the findings of these cost-benefit studies, together with estimates of the benefit-cost ratios for selected other youth-targeted interventions.

The examples of cost-benefit studies cited here and other calculations of benefit-cost ratios show that health interventions aimed at adolescents can be good public investments; however, the results must be interpreted with some caution. For example, the relatively low benefit-cost ratio of an HIV

Table 59.5 Types of Effects of Adolescent Health Interventions Categorized According to Ease of Monetization

Type of effect	Examples
Directly monetizable effects of investments in youth	Enhanced labor productivity Reduced underutilization of labor Increased or decreased work effort Expanded access to risk-pooling services Reduced age at which children achieve a given level of schooling Reduced cost of medical care
Indirectly monetizable broad effects of investments in youth	Increased education Averted teen pregnancy Averted HIV infection Averted tuberculosis infections Improved health Improved nutritional status Delayed marriage Averted abortion Reduced tobacco use
Effects that are particularly difficult to monetize	Increased social capital Averted infertility Averted social exclusion Improved self-esteem Enhanced national security (an effect of military training)

Source: Adapted from Knowles and Behrman 2003a.

Table 59.6 Estimated Benefit-Cost Ratios, Selected Investments in Youth

Investment	Estimated benefit-cost ratio (assuming 3 percent annual discount rate)	Plausible range of estimated benefit-cost ratio
Scholarship program (Colombia)	4.4	2.8–25.6
Adult basic education and literacy program (Colombia)	27.6	8.1–1,764.0
School-based reproductive health program to prevent HIV/AIDS (Honduras)	0.5	0.1–4.6
Iron supplementation administered to secondary schoolchildren (hypothetical low-income country)	45.2	25.8–45.2
Tobacco tax (hypothetical middle-income country)	20.2	7.0–38.6

Source: Adapted from Knowles and Behrman 2003a.

prevention program in Honduras was for a program in a country where HIV incidence among young people is relatively low (0.1 percent). Where the incidence is much higher, as in many of the hardest hit countries in Africa (1 percent or more), this ratio would be proportionately higher. In addition, in the Honduran study, the benefits included were limited to the prevention of HIV/AIDS and did not include other possible benefits, such as increased education, reduced STIs other than HIV, and reduced teen pregnancies and abortions. The Honduran study also assumed that the effects of the intervention would not continue beyond one year; however, if they were to continue at the same level to age 29 (assuming that any decrease in the effect of the intervention over time would be offset by increases in the incidence of HIV infection with age), the benefit-cost ratio would increase from 0.5 to 4.6. More than anything else, Knowles and Behrman's estimates demonstrate the sensitivity of the benefit-cost ratios of investments in youth to wide variations in key assumptions, which may be equally plausible because of the limited information available on the costs and effects of many investments in youth.

Beyond the question of how sensitive such estimates are to the underlying assumptions and the context, the basic question is what guidance they provide for public policy. High benefit-cost ratios certainly point to areas that merit further consideration for possible policy interventions, but they do not indicate whether using public resources for interventions has an efficiency rationale, because they generally do not identify differences between private and social benefit-cost ratios. If the purely private benefit-cost ratios for an investment are high, then presumably incentives to use private resources for this investment are high, but an efficiency rationale for using public resources does not exist unless the social benefit-cost ratio exceeds the private one because of factors such as spillovers or market imperfections. High benefit-cost ratios that do not distinguish between social and private returns, therefore, call for further investigation. Interventions may warrant the use of public resources on efficiency grounds, but they also must answer that important question of whether the benefits are social or private.

PROGRAM IMPLEMENTATION AND LESSONS OF EXPERIENCE

Relatively few adolescent-focused programs have been tried on a large scale. Sexual and reproductive health interventions and suicide prevention are some of the few that have gone to scale, and even in those areas, large-scale interventions are relatively infrequent. The vast majority of interventions have been in relatively small programs, often through nongovernmental organizations.

Perhaps the main lesson learned from the experience to date is an obvious one: programs to reach young people are not

simply programs for adults applied to a younger population; they require different thinking and a different approach.

Determining Key Principles of Health Programming for Adolescents

Experience to date suggests that effective, youth-focused efforts share a set of common general principles. These principles include the following:

- *Recognize the diversity of the youth age group.* A sexually inexperienced 11-year-old has vastly different needs than a married 20-year-old. Programs should apply different strategies to reach youth, who vary by age, sex, employment, schooling, and marital status.
- *Involve young people.* Policies and programs are more effective when young people are involved in all aspects of their design, implementation, and evaluation. Involvement must go beyond tokenism and be genuine, meaningful, and sustained.
- *Make health services appealing to youth.* A key to rapidly expanding young people's access to health services is to make them more youth friendly by using specially trained health workers and by bolstering the privacy, confidentiality, and accessibility of care.
- *Address gender inequality.* Gender inequalities expose young girls to coerced sex, HIV infection, unwanted pregnancy, and poor nutrition. Efforts should focus on changing the factors that perpetuate gender inequalities.
- *Address the needs of boys.* Adolescence presents a unique opportunity to help boys form positive notions of gender relations and to raise their awareness of health issues. At the same time, boys seem to be disproportionately exposed to a number of adolescent health risks, including accidents and injuries, suicide, tobacco use, substance abuse, and violence. Program design should take into account the specific needs of boys and young men as well as of girls and young women.
- *Design comprehensive programs.* Comprehensive programs that provide information and services while addressing the social and political context are more effective than narrowly focused interventions.
- *Consider all important benefits.* Many adolescent health interventions focus on only one benefit. For example, a school-based sex education program may focus exclusively on HIV prevention and may neglect other possible benefits from the intervention, such as increased education, averted teen pregnancy and abortions, and other averted STIs.
- *Address the many nonhealth factors that influence adolescent health.* Linking school and livelihood opportunities to adolescent health programs, at either the policy or program level, is key to helping young people avoid risky behaviors.
- *Address underlying risk and protective factors.* Factors such as feelings of self-efficacy, attitudes and behaviors of friends, connectedness with parents and other influential adults, and

involvement in the community can either increase (risk factor) or decrease (protective factor) the chances that a young person will engage in unhealthy behaviors.

Making a Difference on a Large Scale

Adolescent health programs are complex and may not be easy to scale up because of technical, management, and political challenges. The following are examples of adolescent health programs that are national in scope. Unfortunately, little is known about the costs and effectiveness of such large-scale efforts.

National Suicide Prevention Program in New Zealand.

Among industrial nations, New Zealand has one of the highest suicide rates for both males and females age 15 to 24 (New Zealand Ministry of Health 2002). In 1998, on the basis of international good practice, the government developed the National Youth Suicide Prevention Strategy. This strategy, which includes a component for the general population and one that focuses on the indigenous Maori community, provides a framework for understanding suicide prevention and signals the steps that government agencies, communities, and service providers must take to reduce suicide. Even though the national strategy has not been in place long enough to adequately gauge its effects, in 1999, the first year following the adoption of the strategy, youth suicide rates fell to their lowest levels since 1991.

Sexuality Education in Mongolia.

Mongolia has implemented a locally developed and tested sexuality education curriculum in 60 percent of schools nationwide. Current challenges include increasing the number of hours allocated to sexuality education; developing more and better written resources for adolescents, including textbooks; developing materials that will help parents communicate better with their children on sexuality; expanding access to clinical services for adolescents through the public health system; reaching out-of-school youths and the broader community with sexuality education; and monitoring and evaluating the program regularly to assess its weaknesses and strengths and how it could be improved (Gerdt 2002).

Addressing the Health Needs of Poor Youth

The following strategies, based on what is known about services for poor people more generally and about the specific needs of young people, show promise for meeting the needs of poor youth:

- *Targeting out-of-school youth.* Out-of-school youth of a given age are likely to be more marginalized than those who are in school, and they are often those most in need of critical services, such as pregnancy prevention and prevention of HIV/AIDS and other STIs. A number of countries, including Paraguay, South Africa, and Zimbabwe, have launched effective programs targeting out-of-school youth

that combine the use of mass media, peer education, and community-based efforts. For instance, the *Arte y Parte* project targeted out-of-school youth in three cities in Paraguay using a booklet about adolescent sexuality, street drama, radio programming, newspaper columns, and distribution of promotional items (Magnani and others 2000).

- *Focusing efforts on vulnerable youth.* Young people who have been orphaned or left vulnerable by AIDS typically rely first on their extended families and communities for support. Efforts to help vulnerable youth should strengthen those safety nets. One example is the COPE program in Malawi, where a nongovernmental organization–sponsored effort works through existing government structures to help orphans and other vulnerable children (Phiri, Foster, and Nzima 2001).
- *Tailoring subsidized programs to poor youth.* Social marketing of reproductive health products and services—such as contraceptives and condoms for pregnancy and disease prevention or promotion of iron supplementation—often targets young consumers, but such efforts should ensure that they reach the desired clients—namely, those who are poor and less likely to be able to afford market prices. The Social Marketing for Adolescent Sexual Health Project in four African countries combined the use of mass media with peer education to encourage young people to practice safer sex, including condom use (Agha 2000).

Improving Health Systems to Meet Adolescents' Health Needs

The shortcomings of health systems in LMICs are well known, and adolescents in particular would benefit from the following health system improvements:

- *Strengthening human resource capacities.* The poor quality of the interaction with health workers is one of the main barriers to adolescents' use of health care in public sector facilities. Through training, supervision, and other means, health systems should encourage health workers to adopt a more youth-friendly outlook. In addition, health systems should integrate such training into the curricula of medical, nursing, and nurse auxiliary schools.
- *Involving the private sector.* Many young people already seek care from private doctors, nurses, and nurse-midwives or from local pharmacies or other drug distribution outlets. Along with encouraging private for-profit health providers to serve youth, government policies should encourage efforts to tap into the private sector as a source of health care for adolescents by means of interventions such as social marketing, contracted services, youth-focused social franchising, and programs that serve young people at their place of work. (Carranza 2003; LaVake and Rosen 2003; Rosen 2001a; Senderowitz and Stevens 2001).

- *Strengthening the stewardship oversight function of governments.* Governments have a key role to play in developing supportive policies, both within the health sector and across sectors; in contributing to cross-sectoral policies such as national youth policies; and in providing input into policy making in other sectors, especially education and labor. Ideally, governments should have an overarching adolescent health policy with specific reference to adolescent health in policy documents for specific programs or diseases, such as for AIDS, tuberculosis, malaria, sexual and reproductive health, and population (WHO forthcoming-a; POLICY Project and YouthNet forthcoming).

RESEARCH AND DEVELOPMENT AGENDA

The striking lack of good research and evaluation of adolescent health interventions limits countries' ability to address serious health problems. At this juncture, research in the following broad areas is critical:

- *Refining estimates of DALYs for adolescents.* Available DALY information is inadequate to fully explore the burden of disease for adolescent age groups. Future DALY estimates should be made for five-year age groups in the 10 to 24 age range.
- *Documenting the effectiveness of current approaches.* This area includes better process evaluation to understand the functioning of successful programs. Such evaluation necessitates more rigorous research designs so that the effectiveness of programs can be better documented, both in terms of health outcomes and in terms of DALYs saved. Another area in which more research could help is better documentation of the nonhealth effects of adolescent health interventions. Greater investment is also needed to evaluate the effects of health promotion strategies on reducing smoking, including the smoke-free spaces prevalent in the Americas and life-skills education.
- *Testing new interventions.* This area includes more research on multicomponent programs and on new types of interventions. In relation to sexual and reproductive health, new interventions include approaches such as providing anti-retroviral therapy to HIV-infected youth and voluntary counseling and testing for HIV, encouraging adolescents to have fewer sexual partners, reducing the trafficking of young people, preventing and addressing the health consequences of early marriage, and reaching young married women with information and services. Research must better inform interventions so that they reach groups at particularly high risk of poor health outcomes, such as child prostitutes, child workers, refugees, AIDS orphans, and street children. More research is also needed on a broad range of other adolescent

health interventions, especially for those health problems that are among the biggest killers and disablers of young people: HIV/AIDS and mental illnesses for both males and females, maternal conditions for females, and road accidents for males. In addition, research is needed on programs that attempt to influence gender roles and social norms and investments designed to avert drug and alcohol abuse and to improve mental health.

- *Enhancing understanding of the risk and protective factors influencing young people's behavior.* Even though our understanding of the major influences on youth behaviors has come far, more refinement of such understanding is needed, along with a better understanding of how to incorporate such knowledge into the design of programs and policies.
- *Improving cost and cost-benefit analysis.* Good cost estimates are rare, and more needs to be done to more fully estimate the costs of the range of adolescent health interventions. This effort means collecting more data on program costs and more accurate data that include programs' nonmonetary costs. Few full cost-benefit analyses of youth programs exist, and more need to be done to improve evaluations of the economic value of investments targeted at young people.

CONCLUSIONS

The health community has only recently recognized the importance of adolescent health problems. To address the unique health problems associated with the adolescent years, policy makers and the health community must expand the knowledge base on effectiveness, costs, and economic benefits and pay more attention to areas such as road safety, nutrition, mental health, and malaria. Well-documented implementation experiences from mostly small programs have produced a sound body of knowledge about how programs function. These experiences can provide the foundation for scaled-up efforts and can help the health community improve health systems in ways that will benefit adolescent health efforts.

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NOTES

1. The United Nations defines *youth* as those age 15 to 24. The World Health Organization defines *adolescence* as age 10 through 19 and uses the term *young people* to refer to those age 10 to 24.

2. Regional data cited from this report here and elsewhere in the chapter are based on nationally representative surveys carried out between the mid 1990s and 2001.

3. Knowles and Behrman (2003b) find that many cost estimates incorrectly treat income transfers as costs and frequently fail to include estimates of administrative and distortionary costs (for example, the distortionary cost of financing programs through taxes).

4. In cost-effectiveness analysis, as in cost-benefit analysis, estimates are needed not only of what has actually happened, but also of what would have happened in the absence of the program or intervention (that is, an estimate of the counterfactual). There are no exceptions to this rule.

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