

Education and health: Where do gender differences really matter?

Investments in health and education—human capital endowments—shape the ability of men and women to reach their full potential in society. The right mix of such investments allows people to live longer, healthier, and more productive lives. Systematic differences in investments between males and females, independent of their underlying causes, adversely affect individual outcomes in childhood and adulthood and those of the next generation. Left uncorrected, these differences translate into large costs for societies.

Where do gender differences arise in human capital endowments, how are they reduced, and when do they persist? Global comparisons of *participation in education* and *mortality risks among women and men* show that progress has been tremendous where lifting a single barrier is sufficient—for households, markets, or institutions.

Consider the increasing participation of women at all educational levels. Gaps in primary enrollments have closed, and in secondary and tertiary enrollments, new gaps are emerging—for boys. College enrollments increased sevenfold for women over the past three decades, fourfold for men. The reason is that interventions targeted at any one of households or markets or institutions have all increased enrollments. Where all three drivers have come together, change has accelerated. Conversely, where all three have not changed, progress has stalled. Further reducing girls' disadvantages in educational participation requires sharpening the focus on *severely disadvantaged populations*, for whom all the drivers of progress are missing.

Overall, progress has been slower where multiple barriers among households, markets, and institutions need to be lifted at once or where there is only a single effective point of entry for progress. Consider each in turn.

Although girls participate equally (or more) at all education levels, the educational streams they choose are remarkably different and stable across countries at very different incomes. Men continue to study engineering while women continue to learn how to be teachers. While part of the problem lies in the educational system, these patterns are reinforced by gender norms in households and markets. Some gender norms relate to care in the household (overwhelmingly provided by women) and its implications for the kinds of jobs that women choose. Others have to do with the continuing “stickiness” in employers' attitudes toward family formation and childbearing. Equal gender participation in different fields of studies requires simultaneous changes among households, markets, and institutions. That has not happened so far.

Things can also get stuck where there is only one point of entry: households or markets or institutions.

Health disadvantages for women fall in this category. Consider girls missing at birth (a deficit of female births relative to male ones) and excess female mortality after birth (women and girls who would not have died in the previous year had they been living in a high-income country *after* accounting for the overall mortality of the country they live in).

Globally, girls missing at birth and deaths from excess female mortality after birth add up

to 6 million women a year, 3.9 million below the age of 60. Of the 6 million, one-fifth is never born, one-tenth dies in early childhood, one-fifth in the reproductive years, and two-fifths at older ages. Because those who died in the earlier ages also had the longest to live, they account for the bulk of lost women years around the world.

The problem is not getting any better. In 1990, missing girls and excess female mortality below the age of 60 accounted for 4 million women a year; in 2008, the number was 3.9 million, fueled by a near doubling in Sub-Saharan Africa. Unlike Asia, where population-adjusted excess female mortality fell in every country (dramatically in Bangladesh, Indonesia, and Vietnam), most Sub-Saharan African countries saw little change in the new millennium. And in the countries hardest hit by the HIV/AIDS epidemic, things got worse. In South Africa, excess female deaths increased from (virtually) zero between the ages of 10 and 50 in 1990 to 74,000 every year by 2008.

Comparisons with Europe, where excess female mortality existed during the early 20th century but disappeared by 1950, suggest that the patterns today reflect a combination of overt discrimination before birth, and poor institutions combined with the burden of HIV/AIDS after birth. More than 1.3 million girls are not born in China and India every year because of overt discrimination and the spread of ultrasound technologies that allow households to determine the sex of the fetus before birth. Informal institutions that generate a preference for sons are the primary bottleneck.

After birth, overt discrimination plays a smaller role. Instead, poor institutions of public health and service delivery exact a heavy burden on girls and women. In parts of Sub-Saharan Africa, HIV/AIDS risks have compounded the problem. But where countries have improved basic institutions of public health and service delivery, excess female mortality has declined. Even in countries where historical studies identified discrimination against girls (like Bangladesh), better public health measures improved life-chances for both boys and girls, but more so for girls.¹

Clearly, excess female mortality is not a problem in all countries. In the Russian Federation and some other post-transition countries, mortality risks have increased for both sexes—but particularly for men. In these contexts, there is excess male mortality relative to high-income countries today. Unlike mortality risks among

“ ... [we want] sons. Everybody does. They can work and earn. Girls have to marry.

Adolescent girls, rural India

In-laws decide how many children to have. If the first child is a girl, then they will ask to have more children until a son is born.

Young woman, urban India

women, which arise from poor institutions, excess male mortality is often tied to behavior deemed more socially acceptable among men, such as smoking, heavy drinking, and engaging in risky activities.

Understanding both sorts of mortality risks and what can be done about them is critical for any notion of human justice. Solving excess female mortality requires institutional changes; solving missing girls at birth and excess male mortality delves fundamentally into social norms and household behavior—both of which are more difficult to understand and tackle.

ENDOWMENTS MATTER

Education and health investments have a huge impact on the ability of individuals—whether men or women—to function and reach their potential in society. For both boys and girls, childhood investments in health affect outcomes throughout the course of life. Low birth weights and childhood exposure to disease have been linked to lower cognitive development, schooling attainment, and learning in adolescence. Less healthy children are at an elevated risk of becoming less healthy adults.² Poorer health outcomes in adulthood in turn affect economic outcomes, reflected in health-related absences from the labor force and lower work hours and earnings.³

“ Educated women do not sit around and wait for men to provide for them. They do not need a man to buy things for them.

Young woman, urban South Africa

Similarly, as chapter 5 shows, investments in education determine women's ability to earn higher wages and to own and operate productive farms and firms. On average, differences in education explain a significant fraction of the variation in wages and incomes among adults. In both high- and low-income countries, gender differences in education have contributed significantly to the productivity and wage gap between men and women.

Health and education investments in women are also special in three ways. First, in their roles as mothers, educated women pass on the benefits of higher education to their children. Children born to more educated mothers are less likely to die in infancy and more likely to have higher birth weights and be immunized.⁴ Evidence from the United States suggests that some of the pathways linking maternal education to child health include lower parity, higher use of prenatal care, and lower smoking rates.⁵ In Taiwan, China, the increase in schooling associated with the education reform of 1968 saved almost 1 infant life for every 1,000 live births, reducing infant mortality by about 11 percent.⁶ In Pakistan, even a single year of maternal education leads to children studying an additional hour at home and to higher test scores.⁷

Second, women face particular risks during pregnancy and childbirth: 1 of every 11 women in Afghanistan and 1 of every 29 in Angola dies during childbirth.⁸ Compare that with 1 of every 11,400 in Sweden. As this chapter shows, maternal mortality and excess female mortality in the reproductive ages are closely linked. But high maternal mortality rates also have implications for educational investments and the ability of women to participate in society. As the risk of dying in childbirth declines, educational investments increase (and more so for girls).⁹ In Sri Lanka, reductions in the maternal mortality ratio increased female literacy by 1 percentage point.¹⁰ And because reductions in maternal mortality ratios also reduce maternal morbidity (in the United States in 1920, one of every six women suffered from a long-term disability stemming from giving birth), improvements in the conditions of childbirth can drive increases in the labor force participation rate of married women.¹¹

Third, overt discrimination that leads to male-biased sex ratios at birth can have long-

run implications for society. If more boys than girls are born, eventually many men will be unable to find wives. Recent research suggests that such a "marriage squeeze" is already well under way in China and India.¹²

These basic themes—educating girls and women, improving health outcomes in childhood, lowering the risks of giving birth, and addressing skewed sex ratios at birth (the latter two leading to excess female mortality and missing girls at birth)—play out consistently in the rest of the chapter. The focus throughout is twofold: first, separating the problems that will likely diminish with income growth from those that will remain "sticky," and, second, understanding how and where policy can be effective through the framework of this Report—the interactions between households, markets, and institutions.

EDUCATION

A decade into the new millennium, there are many reasons to feel optimistic about the state of women's education around the world. Progress has been remarkable, and many of the gaps salient in the 20th century have closed. Today, girls and boys around the world participate equally in primary and secondary education. In tertiary education, a clear bias is emerging that favors women—with enrollments increasing faster for women than for men.

These gains have been possible because, for enrollments, lifting *single barriers*, whether stemming from households, markets, or institutions, has been sufficient. These multiple entry points have allowed policies to circumvent bottlenecks arising from adverse preferences, low returns to female education, or poor institutions.

But the optimism has to be tempered on three fronts. First, in some countries and in

“ It is good to go to school because as a woman if you are an educated person, then men won't take advantage of you. So it is important that you go to school. ”

Young woman, urban Liberia

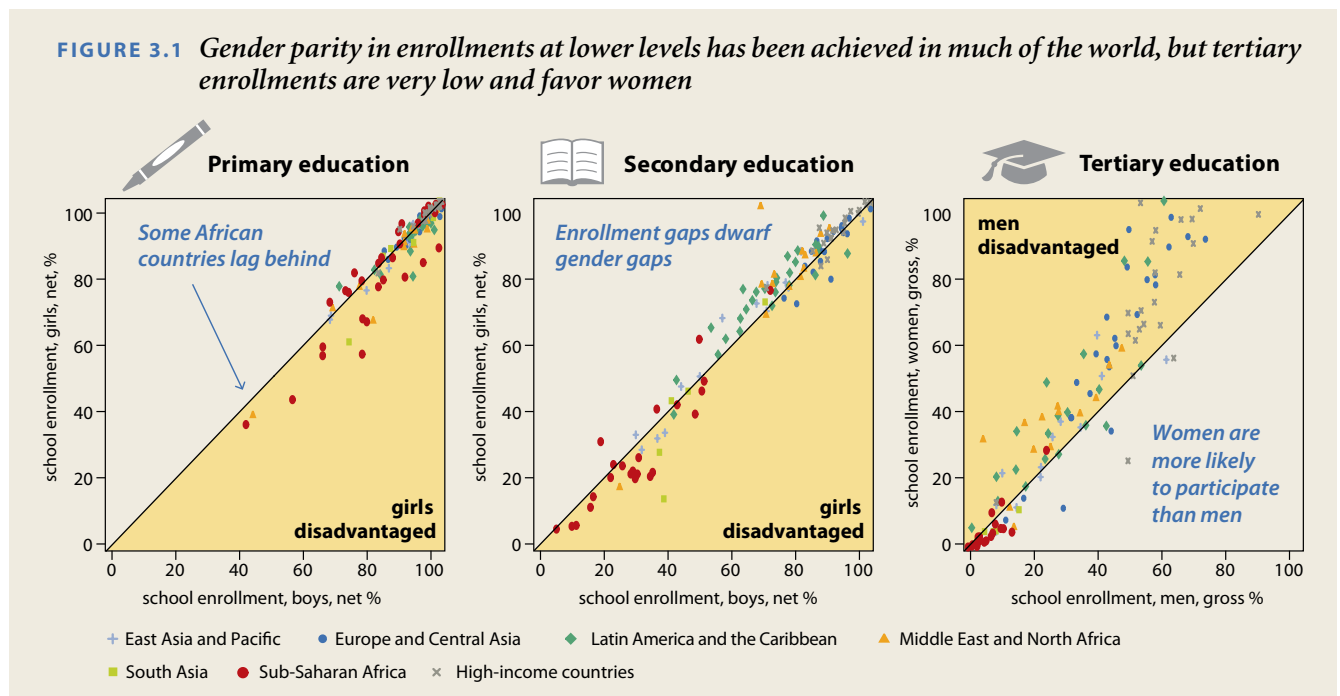
some populations within countries girls are still the last to enroll and the first to drop out in difficult times. These severely disadvantaged populations face a host of different problems, and the “best” solution to their problems will be context specific. Second, children in low-income countries learn far less than their high-income counterparts. Low learning affects both boys and girls, and gender differences are small. In a globalizing world, poor skills will dramatically affect the future outcomes of all children.

Third, women and men continue to choose very different fields of study in secondary and tertiary education. These patterns of stream divergence are similar across poor and rich countries, suggesting that increases in enrollments and learning are necessary, but not sufficient, to even the playing field in later life. The fields of study that men and women choose feed into their occupational choices, which in turn affect the wages they earn throughout their adult lives. There has been less success in addressing stream divergence because *many barriers* need to be lifted at the same time—households, markets, and institutions need to change simultaneously, through complex policies that act on multiple fronts.

The good news

Most countries around the world have attained gender parity in primary education, with an equal number of boys and girls in school. Among children currently not attending primary school, 53 percent are girls, with a concentration of gender disadvantage in some African countries, including Benin, Chad, Niger, and Togo. But, even in these countries, progress has been substantial: in Sub-Saharan Africa the number of girls for every 100 boys in primary school increased from 85 in 1999 to 91 in 2008.

Moving from primary to tertiary enrollment shows three patterns (figure 3.1). First, most children participate in primary schooling, but secondary enrollments range from very low to very high across countries; again, some countries in Sub-Saharan Africa stand out for their particularly low rates of participation. In tertiary education, low participation is the norm in developing countries. Therefore, increases in secondary (and tertiary) enrollment for both boys and girls are necessary in several countries. Second, at low overall levels of secondary enrollment, girls are less likely to be in school, while at high levels the pattern reverses with the bias



Source: WDR 2012 team estimates based on World Development Indicators.

Note: The 45° line in each figure above shows gender parity in enrollments. Any point above the 45° line implies that more women are enrolled relative to men.

now against *boys*. The number of countries with girls disadvantaged in secondary education is similar to the number with boys disadvantaged. Third, in tertiary education, girls are more likely to participate than boys—a difference that increases with overall participation rates. Between 1970 and 2008, the number of female tertiary students increased more than sevenfold (from 10.8 million to 80.9 million), compared with a fourfold increase among males.

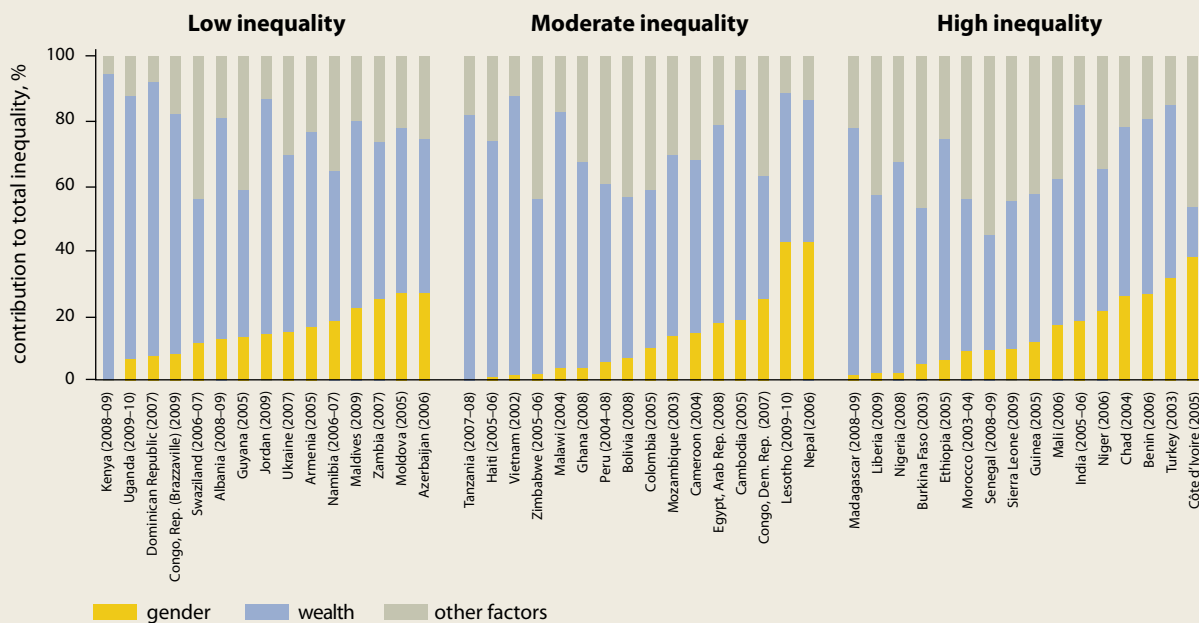
While these results are positive, they illustrate disparities by gender only. An alternative question is whether there are other dimensions of disadvantage, and if so, what is the relative weight of gender versus (say) poverty in the production of inequality in schooling participation? Decomposing overall inequality in the educational system into four components—location, parental education, wealth, and gender—helps answer this question.¹³

Suppose that in two countries there is an equal number of rich and poor households with boys and girls in every income group. In Country A,

all the rich, but only 50 percent of the poor, are enrolled, and enrollment is no different for boys and girls. In Country B, all rich and poor boys, but only 50 percent of rich and poor girls, are in school. Both countries have equal total inequality in the educational system, but the patterns are very different. Decomposing total inequality in these countries would show that inequality is generated entirely by wealth (with all differences across wealth groups) in Country A but entirely by gender in Country B.

Repeating this exercise across many countries represented in the Demographic and Health Surveys shows that in most of them, the situation is similar to Country A—with differences in wealth accounting for most educational inequality—not to Country B (figure 3.2). Poverty rather than gender feeds overall educational inequalities in most of the world. In fact, even in countries with high total inequality (countries where the differences in school enrollment between advantaged and disadvantaged groups are high), gender accounts for at most 38 per-

FIGURE 3.2 *In most countries with moderate or high total inequality in educational outcomes, less than one-fifth of inequality stems from gender*
Inequality in school attendance among children 12–15 years old



Source: WDR 2012 team estimates based on Demographic Health Surveys in various countries during 2002–10.

Note: The measure of inequality refers to the percentage of total opportunities that must be reallocated to ensure that all possible combinations of circumstances have the same average enrollment. Low inequality is between 0.3 percent and 2.1 percent, moderate inequality is between 2.3 percent and 6.4 percent, and high inequality is between 6.5 percent and 26.7 percent. Results are sorted by size of gender contribution to total inequality.

cent of overall inequality; in contrast, poverty frequently accounts for 50 percent or more of the total. Almost all countries where gender inequality is a problem, and where total inequality is high, are in Africa—with India and Turkey the only exceptions.

This basic description of progress on education shows that change has come to every country and region, and that in most countries, the remaining inequalities are concentrated around poverty and other circumstances (notably, rural or urban residence) rather than gender. A global focus on inequality would thus imply that, in most contexts, redistributive efforts should now be directed to poverty.

What explains the progress?

One key message of this Report is that progress has come in areas where lifting a single barrier is sufficient. Consistent with this message, studies now show that increasing the returns to educational investment in girls *or* removing in-

stitutional constraints *or* increasing household incomes is sufficient to increase female participation in education (figure 3.3). When all three have happened simultaneously, change has been even faster. Take each in turn.

Changing returns. Starting from the early 1980s, empirical evidence emerged that when returns to women's education increased, so did parental investments in the schooling of girls. These early studies showed that changes in the agriculture technology that increased the returns to female education also led parents to invest more in girls' schooling. A new generation of work brings together globalization and returns to education in the context of changing technologies.

The rise of outsourcing in India is offering new work opportunities—particularly for women. The opening of a new information-technology-enabled service (ITES) center, for example, increased the number of children enrolled in a primary school by 5.7 percent,

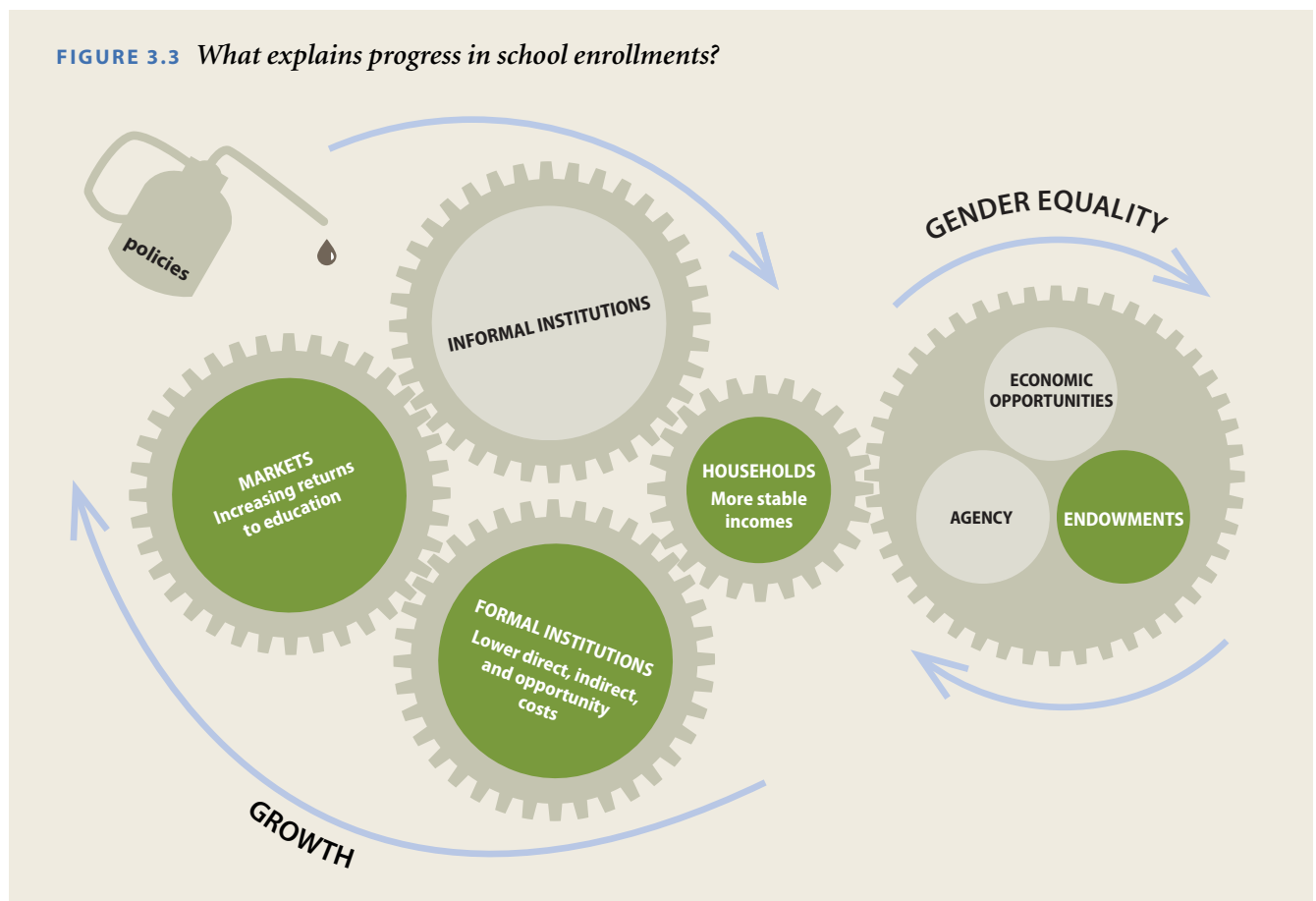
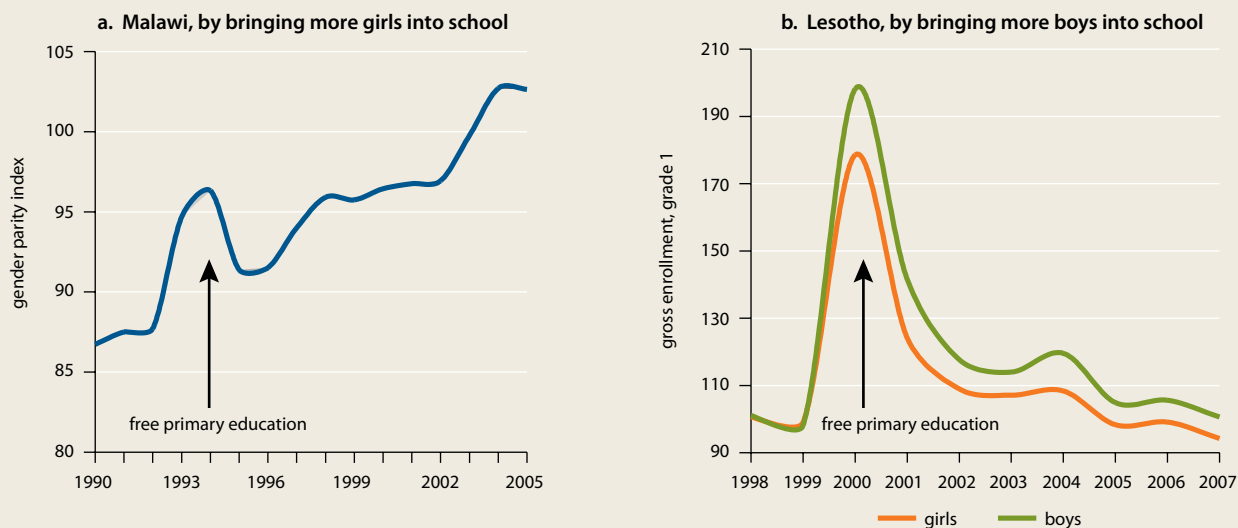


FIGURE 3.4 Free primary education reduced gender gaps in enrollments

Source: WDR 2012 team based on Edstats.

with the increase driven primarily by higher enrollments in English-language schools.¹⁴ This increased enrollment was equally large for boys and girls, reflecting very local information markets on the returns to education.

Similarly, business process outsourcing (BPO) opportunities affect education of women.¹⁵ In randomly selected villages in India, three years of BPO recruiting services were provided to women primarily to increase awareness and information about the employment opportunities. Given that the intervention was at the level of the village, the study found large effects—three years later, girls ages 5–15 in the villages that received the intervention were 3–5 percentage points more likely to be in school, had a higher body mass index (a measure of health), and were 10 percent more likely to be employed in wage work. Human capital investments for boys did not change. The intervention did not change either structures within the household (for instance, the bargaining power of the mother) or the way schools functioned. Information about market returns alone sufficed to increase female enrollment and improve outcomes for girls.

Changing institutional constraints. If female enrollment responded only to increasing returns, progress would have been slower—returns can be notoriously slow to move and can take a long

time to evolve. But even where returns have been low, changes in the structure of formal institutions have increased educational attainment. These pathways are perhaps best illustrated by looking at changes in the price of schooling—where the costs incurred could be direct (fees and uniforms), indirect (distance to school), or result from forgone opportunities (wages that children could earn outside school).

Reductions in schooling fees erode the need for families to differentiate educational investments across children. The free primary education programs launched across Sub-Saharan Africa, for instance, increased student enrollments 68 percent in the first year in Malawi and Uganda and 22 percent in Kenya. The abolition of education levies contributed to bringing more girls relative to boys into school and reducing the existing gender gap in primary education in Malawi (figure 3.4). In Lesotho, the government launched a similar program phased in yearly beginning in the first grade, and participation jumped 75 percent (see figure 3.4).¹⁶ In contrast to Malawi, boys in Lesotho have been historically less likely than girls to be enrolled in primary school, particularly in the higher grades. Free primary education supported a significant influx of overage boys into the educational system.

Reductions in the distance to school have also helped. In Pakistan, adult women who grew

up in a village with a school by the time they were seven years old reported higher primary schooling than those whose villages received a school after they were seven or those whose villages never received a school.¹⁷ In Afghan communities randomly selected to receive a school, enrollment of girls increased by 15 percentage points more than that of boys—over and above a 50 percent increase in attendance for both sexes.¹⁸ After six months, the girls in the villages with such schools also reported far higher test scores.

The price of schooling also reflects opportunity costs stemming from forgone child labor, either in the formal labor market or at home in household chores. Higher children's employment tends to be associated with lower school attendance.¹⁹ Employment rates for 14–16-year-old boys and girls in urban Brazil increased as labor markets improved, and children were more likely to leave school as local labor market conditions became more favorable.²⁰ For Ethiopia, an increase of 10 percentage points in the adult employment rate generated a 10–25 percentage point increase in the probability of finding employment for youth ages 10–24.²¹ This effect was stronger for youth who never attended school. On average, boys are more likely to engage in agricultural or other paid or unpaid productive work: the opportunity cost of education is often higher for males than females, leading more boys out of education and into nondomestic child labor.²²

The flip side of greater male involvement in the formal labor market is that girls bear a larger share of domestic labor. Households rely heavily on children, especially girls, for natural resource collection and caring for family members. Malawian girls ages 6–14 spend 21 hours a week on domestic work, while boys spend 13½ hours; in rural Benin, girls spend 1 hour a day collecting water compared with 25 minutes for boys.²³ In the Arab Republic of Egypt, a 10 percentage point increase in the probability of domestic work—measured by household access to piped water, piped sewerage, and garbage collection—reduces the marginal probability of girls' schooling by 6 percentage points.²⁴ In Peru, in-house water supply has a significant impact on the grade-for-age of girls but not of boys.²⁵ And in Kenya, simulation models suggest that reducing the distance to a source of water by 2 kilometers would increase overall enrollment and attainment twice as much for girls as for boys.²⁶

Changing household constraints. Higher and more stable sources of household income have helped bring girls into school even when returns and salient institutional features remained unchanged. Household income has been tied to greater enrollments for children—more so for girls—and increases in maternal income have a greater impact on girls' schooling than increases in paternal income.²⁷ When households face a sudden drop in income, perhaps because of poor harvests, they immediately reduce investments in schooling. Whether these reductions affect boys more than girls depends on the underlying labor market conditions.

In villages affected by droughts in Côte d'Ivoire in 1986 and 1987, school enrollment fell 14 percentage points for boys and 11 percentage points for girls.²⁸ During the same period, enrollment increased 5 percentage points for boys and 10 percentage points for girls in villages not affected by droughts. Girls in primary and secondary schools in Turkey were more likely than boys to drop out in the face of household budget constraints.²⁹ Similar results are found in countries ranging from Ethiopia (1996–2000) to Indonesia (1993).³⁰ In higher-income countries, by contrast, a reduction in job opportunities for school-age children brought about by economic contractions may support investments in schooling, as work opportunities for children dry up.³¹ Typical results from Latin America—notably Argentina, Mexico, and Nicaragua—all show that reductions in labor market opportunities increased enrollments in school for boys relative to girls.³²

Unsurprisingly, programs that provide income to households and help them weather economic downturns keep children in school. Perhaps the most convincing evidence on this front comes from studies of conditional cash transfers—cash given to households only if their children attend school for a minimum number of days. Giving the household the ability to protect educational investments in children when times are bad is precisely one of the roles these transfers were intended to play, and the evidence shows that they work.³³

The bad news

Despite significant progress, gender disparities in education have not been entirely erased. Girls in many regions of the world continue to face severe disadvantages in primary and secondary school enrollment, and across the board,

children in low-income countries learn little in school. As countries grow richer, the problems of enrollment and learning become less salient, but girls and boys continue to choose very different fields of study in secondary and tertiary education. These choices have repercussions for the occupations they choose and the wages they earn. Consider each in turn.

Severely disadvantaged populations in primary and secondary enrollment

In specific regions, missing economic drivers of female education combined with other area-specific ecologies—such as poor safety, scattered populations, and linguistic differences—give rise to gender disadvantages, which mostly, but not always, work against girls. These ecologies are likely very different, and policies that finely target local problems will vary across severely disadvantaged populations. Six examples clarify the problem for different populations.

Afghanistan and Pakistan are two of the few countries where female enrollment remains low even at the primary level. It is widely believed that this is because households discriminate against girls in their schooling decisions. Yet, new evidence suggests that families are as eager to send their girls to school as boys when the school is close by, but are more reluctant to enroll their girls in schools that are farther from their houses. In Pakistan, a half-kilometer increase in the distance to school decreased female enrollment by 20 percentage points.³⁴ Among families living next to a school, girls are as likely as boys to go to school in both Afghanistan and Pakistan. Part of the “distance penalty” for girls could reflect safety concerns in crossing settlement boundaries within the same village.³⁵ In this severely disadvantaged population, solving the problem of distance to school for female enrollment, rather than tackling any innate discrimination at the household level, will yield large dividends.

The population in the highlands of northeast Cambodia is scattered in remote and small villages. Lack of access to land, religious suppression, and limited learning and use of Khmer (the national language) all marginalize these communities and de facto restrict access to education. The indigenous Kreung and Tampuen communities in 2001 had high child mortality (twice the national average for children under five) and low literacy rates—only 5 of 1,970

adults surveyed had completed primary education. There were very few schools, and grade five completion was low; often more children were out of school than in school. Attendance rates varied among these villages, ranging from 10 percent to 60 percent for girls. Many out-of-school girls were caring for siblings or working in the fields. While most members of these communities suffered from hunger and malnutrition, girls were particularly disadvantaged—the last to eat, they did not receive nutritious food, such as meat.³⁶

Of 945,000 children ages 6–14 not studying at any school in Turkey in 2006, 194,000 said they could not afford school expenses, while 22,000 had to work and thus could not study. Among these children, thousands are seasonal workers. At the crucial 14–15 age range, when children typically transition from primary to secondary school, children in advantaged groups (in households with fewer children living in urban areas of better-off regions) had 100 percent enrollment compared with 10 percent for those in disadvantaged groups (in households with more children, living in worse-off regions).

In recent years, Jamaican boys have underachieved in school, starting in the early years and increasing in secondary and tertiary education. With declines in boys’ participation in secondary schooling, the gender parity ratio in secondary education in 2008 was 1.04 in favor of girls, with boys twice as likely as girls to repeat a grade. Apart from technical vocational subjects and physics, girls outperform boys in the Caribbean Secondary Education Certificate examinations, with 30 percent of girls passing five or more subjects compared with only 16 percent of boys.³⁷ A recent program identifies four key challenges in boys’ development³⁸: low self-esteem among young boys, violence and a lack of discipline, masculine identities that drive boys and young men away from better academic performance, and limited opportunities for jobs after graduation.

As a region, Sub-Saharan Africa stands out in the low participation of females in schooling. The disadvantage has narrowed dramatically between 1990 and 2008, with the ratio of female to-male primary completion increasing from 0.78 to 0.91. Yet girls remain at a significant disadvantage in Central and West Africa, where only 8 girls complete primary school for every 10 boys.³⁹ Take Burkina Faso. Estimates suggest

that three-fifths of the population live on less than \$1 a day and more than four-fifths live in rural areas, many surviving on subsistence agricultural activities. Of every 1,000 children born, 207 will die before age five—the ninth-highest child mortality rate in the world. Schooling—at a net enrollment rate of 42 percent for boys and 29 percent for girls—is among the lowest in the world. Not only are schools distant and difficult to access, there often is insufficient room for children who do enroll, and high out-of-pocket expenses further discourage participation.⁴⁰

The problems in these six severely disadvantaged populations are very different—from distance in Pakistan and Afghanistan, to poor economic opportunities in Cambodia, to high costs and low income in Turkey, to violence and masculine identities in Jamaica, to low physical access and overall poverty in Burkina Faso. One way forward is to develop context-specific strategies that address the specific issues. Community schools in Afghanistan have reduced the distances girls must travel, and in villages where these schools have been built, female disadvantages in enrollment have vanished.⁴¹ Turkey has conducted large campaigns to promote the enrollment of girls in school, some targeting disadvantaged regions, such as “Father, send me to school” and “Girls, off to school.” Similarly, Jamaica is involving fathers in schooling and making the curriculum more boy-friendly, and a school-feeding program in Burkina Faso has increased boys’ and girls’ enrollment by 5–6 percentage points.⁴²

But in each of these regions, alleviating institutional or household constraints also helps—whether by increasing supply through more school construction or by increasing demand through easing households’ financial constraints. Pakistan, Turkey, Cambodia, and Jamaica all have programs that give cash to households if they send their children (in some cases, specifically girls) to school, and these have increased enrollments for targeted children. The increases have been fairly large: 10 percentage points for primary-age girls in Pakistan, 11 percentage points for secondary-age girls in Turkey, 30 to 43 percentage points for girls transitioning from primary to secondary schools in Cambodia, and 0.5 days a month in Jamaica.⁴³ Preliminary results from a financial transfer pilot in Burkina Faso suggest similar results.⁴⁴ Similarly, school construction in countries like Burkina Faso

(through satellite schooling facilities) and Afghanistan (through community schools) helps reduce the costs of travel and again brings girls into school.⁴⁵ A comparison of the characteristics of children in and out of school in Sub-Saharan Africa suggests that in 11 countries out-of-school children are very similar to enrolled children and that policies that have been effective in expanding enrollments in the past will bring these children in.⁴⁶

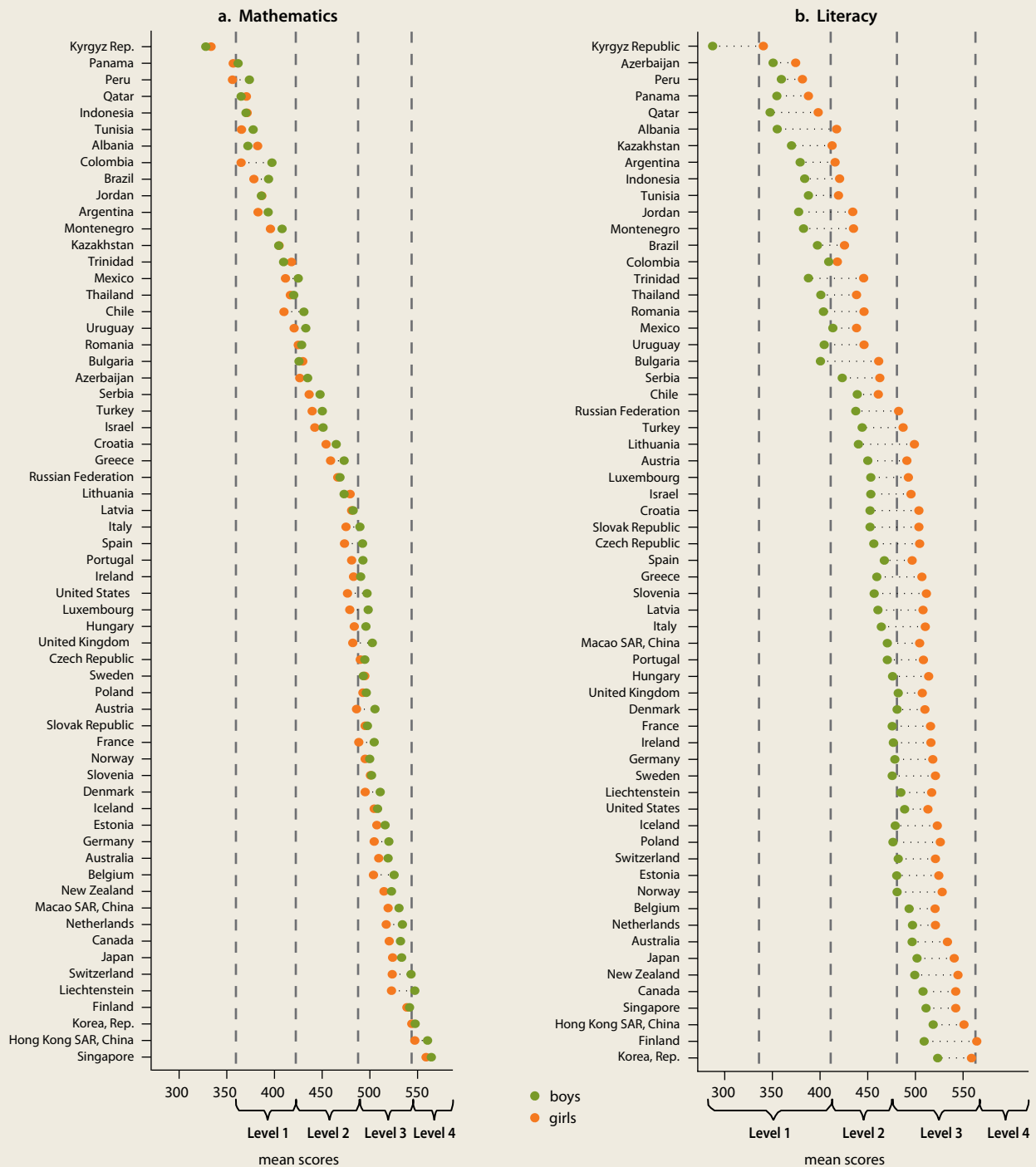
The precise policy to be followed depends on the context and how much is known about it. For instance, financial transfers to households conditional on school attendance bring girls in. But if the purpose of the transfer is purely to increase educational participation (these transfers also benefit poor households directly), they are expensive tools, because transfers also reach households that would have sent their children to school even without the added incentive—in most of these countries, the cost of the transfer per *additional* child enrolled is close to the country’s per capita GDP. But numerous conditional cash transfer programs are producing results across countries, suggesting that if specific policies are hard to design, a uniform “second-best” solution—conditional transfers to households—could work just as well but cost more. The problems of severely disadvantaged populations for education could, in part, be solved by getting more money to households—provided that adequate educational facilities exist.

Poor learning for girls and boys

In addition to the problems of severely disadvantaged populations, a second issue, common to many low-income countries, is poor learning. Children in low-income countries typically learn less and more slowly relative to their high-income counterparts. Although there are small differences across boys and girls (where these exist, boys tend to do better at mathematics and girls at reading), the gender difference is dominated by the difference across countries (figure 3.5).

To see how big these differences are, look at the raw numbers. Only 27 percent of children ages 10 and 11 in India can read a simple passage, do a simple division problem, tell the time, and handle money. This low learning is not an Indian problem; it recurs in nearly all low- and middle-income countries. For the developing

FIGURE 3.5 *Cross-country differences in mean scores on the 2009 PISA dwarf gender differences within countries*



Source: WDR 2012 team based on Edstats.

Note: The highest level is 6. In mathematics, at level 1, students answer clearly defined questions involving familiar contexts; at level 3, students execute clearly defined procedures; at level 5, students develop and work with models for complex situations. In literacy, at level 1 students are capable of completing only the least complex reading tasks; at level 4, students demonstrate an accurate understanding of long or complex texts whose content or form may be unfamiliar; at level 6, students make multiple inferences, comparisons, and contrasts, which are both detailed and precise.

countries as a whole, 21.3 percent of 15-year-old children tested by the Program for International Student Assessment (PISA) could not achieve level 1 proficiency in mathematics—the most basic skills. In Argentina, the figure was 64 percent, in Brazil 72.5 percent, in Indonesia 65 percent, and in Thailand 53 percent. In a globalizing world, the top performers also matter. Just over 13 percent of children in developed countries perform at competency level 5 or above. Compare that with 1 percent or less in Argentina, Brazil, and Indonesia. Clearly, fixing poor learning is imperative for both boys and girls.

The problem of stream divergence

As countries grow richer and systems of service delivery improve, enrollment deficits for severely disadvantaged populations and the overarching issue of poor learning may become less of a problem. But the playing field will still not be level for women and men. Significant and persistent gaps remain in the fields of study that women and men choose as part of their formal education, and the patterns of these choices are very similar in rich and poor countries.

As with enrollment and learning, these choices matter because, as chapter 5 shows, they translate into gender differences in employment and ultimately into differences in productivity and earnings: gender differences in occupation and sector of employment account for 10–50 percent of the observed wage gap in 33 low- and middle-income countries (of 53 with data). As countries grow richer, gender disparities may shift from enrollments and learning to segregation in fields of study. So, policy attention may have to shift accordingly.

These gender differences in education trajectories emerge early and grow larger as young men and women acquire more education. At the secondary level, women are more likely than men to choose general education and less likely to choose vocational education. In 63 percent of countries (109 of 172), the fraction of women enrolled in general secondary education is higher than that of women enrolled in vocational secondary education.⁴⁷ At the tertiary level, these differences magnify. Across the world, women are overrepresented in education and health; equally represented in social sciences, business, and law; and underrepresented in engineering, manufacturing, construction, and science (table 3.1).

A REFLEX (Research into Employment and Professional Flexibility) study uncovers similar patterns. For example, Italian men and women are equally represented in about half the fields of study, but large gender disparities exist in the other half.⁴⁸ Women are more likely to obtain a degree in education and humanities, and men in engineering, architecture, and agricultural and veterinary science. The gender distribution of graduates in social sciences, business, law, science and mathematics, health, and social services corresponds to that of the population of tertiary graduates.

The sharp divergence in fields of study does not reflect the capabilities of men and women in different subjects. There is no systematic evidence of large gender differences in average or subject-related ability at the secondary level. Test scores from standardized secondary school graduation tests are similar for men and women in Indonesia but are slightly higher for women with a college education in both Indonesia and Italy.⁴⁹ What matters instead is stronger sorting on ability among men, combined with significant gender differences in attitudes. In the REFLEX study, male top performers on the secondary graduation tests were 10 percent more likely to choose a male-dominated field than other males, while the impact of test scores on choice was insignificant for female-dominated and neutral fields and among female top performers. Moreover, “choosing a demanding/prestigious field

TABLE 3.1 *Gender segregation in field of study: In most countries, women dominate health and education studies and men dominate engineering and sciences*

Field of study	Fraction of countries where the field of study is			Number of countries
	Female dominated %	Male dominated %	Neutral %	
Agriculture	3	74	22	89
Education	84	6	10	97
Engineering, manufacturing, and construction	0	100	0	97
Health and welfare	82	4	13	97
Arts and humanities	55	6	39	96
Science	13	68	20	96
Services	21	59	21	87
Social sciences; business and law	23	16	61	97

Source: WDR 2012 team estimates based on data from UNESCO Institute for Statistics.

of study” significantly increased the probability of enrolling in a male-dominated field for men but not for women, and it decreased the probability of enrolling in a female-dominated field for both. Countries pay a heavy cost when the average quality of every field is reduced because of the mismatch between training and ability.

Stream divergence is difficult to address precisely because it requires policies that act on households, markets, and institutions simultaneously.

Part of the problem lies in the educational system, which generates expectations about what girls and boys are “supposed” to study. For example, some English subject textbooks currently in use in Australia and Hong Kong SAR, China, tend to depict women in a limited range of social roles and present stereotyped images of women as weaker and operating primarily in domestic domains.⁵⁰

Part of the problem lies with informal institutions that influence household aspirations. The Young Lives study looked at educational aspirations and noncognitive skills of boys and girls at ages 8, 12, and 15 for 12,000 children across Ethiopia, Andhra Pradesh in India, Peru, and Vietnam. Parental aspirations for the education of their children were biased toward boys in Ethiopia and India by the age of 12 and toward girls in Peru and Vietnam. By the age of 15, these biases had been transmitted to children, with clearly higher educational aspirations shown among boys in Ethiopia and India and among girls in Vietnam. Also by age 15, measures of agency or efficacy showed a strong male bias in India and Ethiopia but not in Peru or Vietnam. Asked “when you are about 20 years old, what job would you like to be doing,” 31 percent of girls and 11 percent of boys in India chose “teacher,” whereas 35 percent of boys and 9 percent of girls wanted to enroll in university. In Peru, 21 percent of boys (5 percent of girls) wanted to be engineers, while in Vietnam there were few notable differences.⁵¹

Part of the problem lies with markets and firms that have been unwilling to experiment with new forms of flexible production and employment that support family formation and childbearing, even in countries where other gender differences are notably smaller. Reducing stereotypes in education can go only so far if there is no maternal leave down the line and the woman has to do 90 percent of the housework,

even when she brings home all the income—as in Ghana (see figure 5.10 in chapter 5). Reducing the time allocated to care at home will go only so far if schooling reinforces gender norms about what girls should study and parental aspirations feed into how much children want to study and what they want to be when they “grow up.” And unless firms are willing to experiment with hiring women in male-dominated occupations and vice-versa, shifting the allocation of tasks at home or changing the field of study is not going to help (it may even hurt). The school system needs to say that it is acceptable for a man to be a nurse and a woman to be an engineer. Firms need to be willing to hire male nurses and female engineers. And tasks at home need to be allocated according to individuals’ time constraints and capabilities, not gender norms. Unless all three happen simultaneously, change will be hard.

From education to health

Despite dramatic improvements in educational participation, much remains to be done for severely disadvantaged populations around the world. Poor learning affects both boys and girls and hampers the future ability of young populations to participate in an increasingly globalized world where, as chapter 6 shows, jobs are shifting from those based on “brawn” to jobs based on “brain.” And girls and boys systematically choose different fields of study in all countries; these are choices that shape later life employment choices and hence wages. The framework of households, markets, and institutions helps illustrate that progress has been rapid where improvements in any one has helped circumvent potential bottlenecks in another; progress has been slower where all three need to move together.

Health issues, by contrast, are different. First, unlike education, where biological differences may play a smaller role, women and men are intrinsically different physically and in the health risks they face. Given the same inputs, girls and boys may achieve similar educational outcomes, but because of biological differences, the same health inputs may result in very different health outcomes. Any analysis of health issues needs to account for these fundamental differences. Second, health outcomes reflect a type of irreversibility that is different from that in education outcomes. True, health and education investments during childhood and their

timing will irreversibly affect cognitive development and learning outcomes throughout the course of life. But a teacher absent from school on any given day harms learning in a completely different way from a doctor who happens to be absent from a facility at the time a woman goes into labor, a situation that can turn life-threatening within minutes. So, *formal* service delivery institutions will naturally play a larger role in health, and for some health issues, they will be the primary bottleneck.

HEALTH

Gender disadvantages in health can arise in both sickness and death. Yet because women and men are biologically different, ascribing gender differences in mortality and morbidity to biological differences is fraught with conceptual dangers. If women live longer than men (which they do in most countries⁵²), is it because they are biologically stronger or because there is discrimination against men? Further, biological differences may still be malleable: a biological predisposition may be easy to fix, much like a pair of glasses will fix genetically poor eyesight. But when men and women are biologically susceptible to different diseases (breast or prostate cancer), how can we judge whether one is more crippling than the other? Cutting across the conceptual issues are poor data: in many countries, the information on morbidity is sparse and of uneven quality. More troubling, regions with good data may be precisely those where gender differences are smaller, leading to misplaced policy priorities.

To present a global picture, this chapter adopts a reductionist approach, focused entirely on sex ratios at birth and mortality after birth. If the disadvantages thus uncovered are small, it would be a mistake to argue that gender disadvantages in health are small—they could well emerge in comparisons of morbidity. But four findings suggest that mortality disadvantages are not small.

First, the well-known problem of skewed sex ratios at birth in some countries remains unresolved. Second, compared with developed economies, the rates at which women die relative to men are systematically higher in many low- and middle-income countries around the world. Third, while men die more than women at all ages in developed economies, in

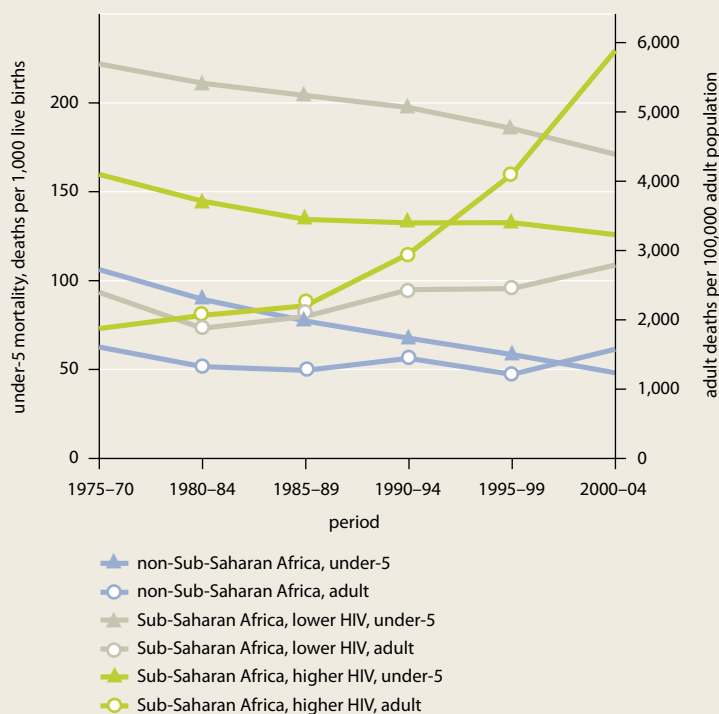
many Sub-Saharan African countries the pattern is reversed, and differences are increasing, as are overall adult mortality risks for both sexes. Worsening female mortality rates are particularly notable in the HIV/AIDS-afflicted countries, but even in Central and West Africa, where HIV/AIDS prevalence rates are lower, mortality risks are getting worse. Sub-Saharan Africa is the only region in the world where relative mortality risks are worsening for women. Fourth, male mortality risks have increased in many post-transition countries, reflecting particular types of behavior and health risks that appear to have worsened over the last three decades.

The findings—interpreted within the framework of households, markets, and institutions—yield sharp policy conclusions. Depending where they are in the life cycle, women and men face disadvantages for different reasons. Missing girls at birth arise from household discrimination. Any solution to this problem has to come through household decision-making processes. These processes can be manipulated through markets and institutions, but markets and institutions alone will not do the trick. After birth, although discrimination remains salient in some countries, in many other countries high female mortality reflects poorly performing institutions of service delivery. Improving institutions is the key to reducing female mortality. Even in populations with discrimination, better institutions can help reduce the adverse impacts of differential treatment. High male mortality usually reflects types of behavior that are socially deemed more acceptable among men. Because there is a single point of entry for each of these problems, solving them will be hard. But for any notion of human justice, it is imperative.

The facts on dying and death in low-income countries

Some issues that this chapter highlights are better known than others: skewed sex ratios at birth in North India and China, high female mortality in infancy and early childhood in South Asia, and rising male mortality in some post-transition countries have all received attention in the past decade. Less well known is that excess female mortality is a continuing phenomenon beyond childhood and a growing problem in Sub-Saharan Africa. Simple comparisons of

FIGURE 3.6 *Adult and child mortality in Sub-Saharan Africa*



Source: de Walque and Filmer 2011. Adult mortality rates are based on sibling rosters from 83 Demographic and Health Surveys collected over time from 46 countries, and are estimated between 1975 and the most current period, typically 2000; they show the likelihood of dying in every five-year period of the data.

male and female mortality risks over time help make that point.

Of every 1,000 adults between the ages of 15 and 60 in the rich countries, somewhere between 56 (Iceland) and 107 (United States) men and women will die each year.⁵³ In India, that number rises to 213 (in China to 113). In Central and West Africa, adult mortality rates are higher, routinely exceeding 300 and in many countries 400. Compare that with conflict countries like Iraq (285) and Afghanistan (479). And in HIV/AIDS-affected countries, the numbers rise to between 481 (Malawi) and 772 (Zimbabwe). In their mortality risks, these countries are worse than Afghanistan (and far worse than Iraq or Pakistan).

Comparisons over time highlight the dramatic difference between Sub-Saharan Africa and other regions of the world (figure 3.6). Here are the patterns⁵⁴:

- Infant and early childhood mortality (under-five mortality) has declined in both Sub-

Saharan Africa and other countries, although the rate of decline has been slower in the former.

- Adult mortality rates in other countries have remained roughly stable over the past 25 years, but in Sub-Saharan Africa, they doubled between 1980 and 2000.
- A large portion of this increase in Sub-Saharan Africa is attributable to HIV/AIDS, with adult mortality rates in high HIV-prevalence countries reaching more than half the levels seen in the years of the genocides in Rwanda and Cambodia—but on a sustained and rising basis.
- Particularly surprising is the fact that adult mortality did not decrease, and actually increased, in several countries in Sub-Saharan Africa with low HIV/AIDS prevalence, particularly those in Central and West Africa.

Figure 3.7 uses World Health Organization (WHO) estimates for all countries between 1990 and 2008, to show how the relative rates of adult mortality for women and men have changed over this period. Countries below the solid maroon line saw a worsening of relative mortality risks for women, and those to the right of the dashed black line saw a worsening of adult mortality (so countries in the lower right quadrant, for instance, saw a worsening of both). Although the numbers are not strictly comparable to those in figure 3.6 (partly because of different time periods, and partly because of the measure of adult mortality), the broad story remains similar (also see box 3.1).

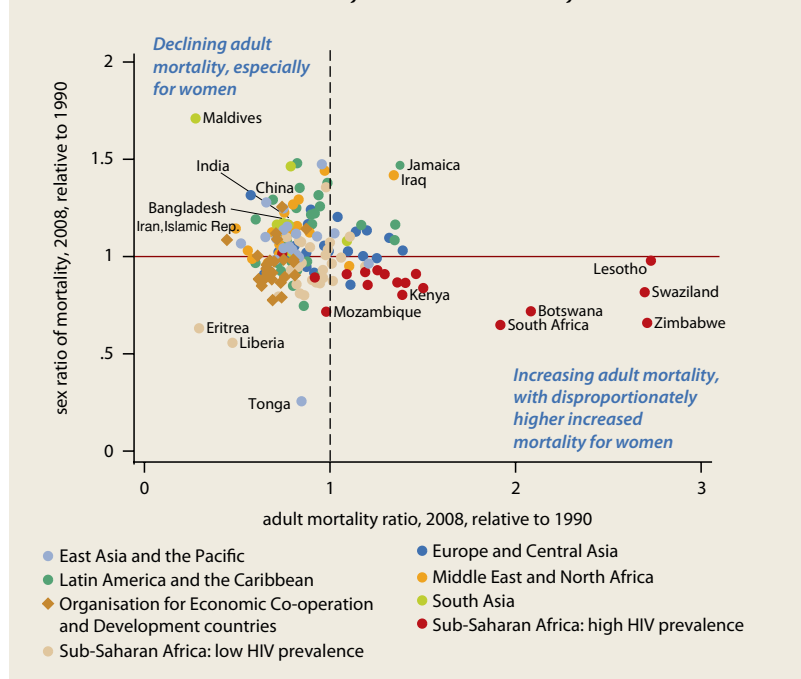
In most countries, adult mortality risks declined. In the HIV-affected Sub-Saharan African countries (those with a prevalence above 5 percent in 2008), mortality risks are getting worse, and relatively more women are dying than men. Surprisingly, a large number of African countries saw very small improvements in mortality, with greater improvements for men; over this period, almost no country in Africa saw relative declines in mortality risks for women. In contrast, the majority of countries around the world experienced declines in adult mortality and relative improvements for women. Less surprisingly, the other main country grouping that stands out prominently in figure 3.7 consists of some Eastern Europe and Central Asian coun-

tries, where again mortality risks have gotten worse, but more so for males.⁵⁵

In 2008, the 14 countries with the highest adult mortality risk for women (in descending order) were Zimbabwe, Lesotho, Swaziland, Zambia, South Africa, Malawi, the Central African Republic, Mozambique, Tanzania, Chad, Uganda, Cameroon, Burundi, and Nigeria. Afghanistan comes in at number 15, and Pakistan at number 64. For child mortality (under five, per 1,000 births), the worst places for girls (in descending order) were Afghanistan, Angola, Chad, Somalia, Mali, the Democratic Republic of the Congo, Nigeria, Sierra Leone, Guinea-Bissau, the Central African Republic, Burkina Faso, Niger, Burundi, Equatorial Guinea, and Liberia.

This basic description highlights the approach in the rest of the chapter. We will show that the focus on female mortality is slowly shifting from childhood to adulthood and from South Asia to Sub-Saharan Africa, while the problem of missing girls at birth remains rooted in India and China. To do so, the argument triangulates by looking at every country over time, by examining the historical context

FIGURE 3.7 Adult mortality: Over time and by sex



Source: World Health Organization 2010.

Note: Adult mortality is expressed as the probability of death between the ages of 15 and 60. The sex ratio of mortality is male adult mortality divided by female adult mortality.

BOX 3.1 Adult mortality risks: Who are the outliers?

Several countries in figure 3.7 highlight particular stories, help motivate the analysis in the remainder of this chapter, and remind us why any particular summary of the data can be problematic, requiring country-by-country analysis.

In *Eritrea* and *Liberia* the cessation of conflicts around 1990 reduced mortality risks for men (and somewhat for women). The drop in male mortality rates, however, worsened the *relative* mortality risk for women. A good thing for both men and women, this shows how a misinterpretation can be avoided by comparing mortality with a single reference for all countries, instead of within countries and over time (as the figure implicitly does).

Iraq and *Jamaica* saw large increases in relative male mortality risks. In both countries, crime and violence are taking men's lives and increasing overall mortality risks. The link between conflict, violent crime, and male mortality is taken up in the chapter's discussion of male mortality and specific issues in Sub-Saharan Africa.

Between 1990 and 2008, overall mortality risks declined dramatically in *Maldives*, especially for

women, who benefited from the country's focus on maternal mortality and safe motherhood. The chapter highlights the fundamental role of maternal mortality and related health issues in contributing to female mortality in the adult population.

Tonga saw large increases in relative female mortality risks. The problems that this chapter focuses on are absent in Tonga: It has high immunization rates among children, very few infant deaths, and no maternal deaths in 2008. But Tonga also has severe problems with noncommunicable diseases and one of the world's highest diabetes rates: 75 percent of women are obese relative to 56 percent of men. Heart attacks accounted for 48 percent of all deaths in 2006. Although the chapter only touches on morbidity and mortality caused by noncommunicable diseases, Tonga reminds us that the problems today may well be different from those tomorrow and that every region will have its own specifics that a global report cannot adequately address.^a

a. Somanathan and Hafez 2010.

of the now-rich countries, and by ensuring that the facts and interpretations are robust to alternative data sources. At the end, “stress-testing” yields robust conclusions that point to the need for fundamental institutional reform, better provision of public goods such as clean water and sanitation, and a continuation of the war against HIV/AIDS.

Missing girls at birth and excess female mortality post-birth

Ideally, analysis of mortality risks by sex and age would look at the relative age-mortality profiles of women and men across countries and over time. But that is hard to do because it requires comparing different age-mortality functions, especially difficult when mortality risks across comparison groups cross (perhaps multiple times) at different ages. To summarize this complex data in a readily understandable manner, the chapter computes two measures.

Missing girls at birth are estimated through comparisons of the sex ratio at birth in countries around the world with those in comparable populations with no discrimination.⁵⁶ It also computes *excess female (male) mortality* by comparing the mortality risks of women relative to men in every country and every age with those seen in developed economies today—the “reference population.”⁵⁷

This excess mortality measure is computed for all countries around the world at three points in time—1990, 2000, and 2008. To understand what may drive these mortality risks, the same measure is computed for 13 developed countries historically—in some cases going back to 1800. Changes in the relative mortality profile by age for developed countries affect the computation of excess mortality in *other* countries. So, to better interpret patterns across countries and over time, the chapter always maintains the same “reference” for all computations. Assumptions built into this particular summary of the mortality data are discussed in the technical annex to this chapter.

These two computations suggest that missing girls at birth and excess female mortality after birth add up to more than 6 million women a year. Of these, 23 percent are never born, 10 percent are missing in early childhood (under five years), 21 percent in the reproductive years (15–49 years), and 38 percent in the age 60 and older group. These are the three most dangerous

periods in a woman’s life after birth. But because women under 60 years also have the longest to live, they account for 81 percent of the annual years lost around the world to excess female mortality. Excess male mortality accounts for 1 million men a year, primarily concentrated in some post-transition countries (more than half) and some Latin American countries. Because of the greater life-years lost to mortality before 60 and because of greater sensitivity to the choice of the reference group in the older years (see technical annex), the focus of this chapter is on mortality risks below age 60, particularly in the three critical periods for women—at birth, in infancy and early childhood, and in the reproductive years.


While missing girls at birth are indeed concentrated in India and China, consistent with the earlier discussion, excess female mortality after birth is highest in Sub-Saharan Africa, the only region where the numbers are going up over time (table 3.2 and map 3.1). These three population groupings—China (with a population of 1.3 billion), India (1.15 billion), and Sub-Saharan Africa (0.8 billion)—together account for 87 percent of the world’s missing girls and excess female mortality.

But the age profiles are very different. In China, most excess female mortality is at birth. In India, missing girls at birth and excess female mortality in early childhood and in the reproductive years each account for roughly a third. In Sub-Saharan Africa, excess female mortality in the reproductive years accounts for 78 percent in the HIV/AIDS countries and 55 percent in the low-HIV countries. Sub-Saharan Africa is the *only* region in the world where the numbers increased between 1990 and 2008—both absolutely (from 0.6 million a year to 1.1 million) and as a fraction of the female population.

At the outset, we rule out one explanation for excess female mortality and missing girls at birth—lack of income growth (figure 3.8). There is a strong relationship between income and excess female mortality—Sweden, unsurprisingly, has lower excess female mortality than Cameroon, but there is little or no relationship between the change in excess female mortality between 1990 and 2008 and economic growth in the same period. Some countries that have grown (Angola and South Africa) have seen little change or a worsening in excess female mortality; others with less growth (Nepal) have seen a dramatic decline. The lack of a relationship be-

TABLE 3.2 *Skewed sex ratios at birth and excess female mortality persist across the world, leading to females missing at birth and excess female mortality during childhood and the reproductive years*

Missing girls at birth and excess female deaths (in thousands)



	girls at birth		girls under 5		girls 5–14		women 15–49		women 50–59		Total women under 60	
	1990	2008	1990	2008	1990	2008	1990	2008	1990	2008	1990	2008
China	890	1,092	259	71	21	5	208	56	92	30	1,470	1,254
India	265	257	428	251	94	45	388	228	81	75	1,255	856
Sub-Saharan Africa	42	53	183	203	61	77	302	751	50	99	639	1,182
<i>High HIV-prevalence countries</i>	0	0	6	39	5	18	38	328	4	31	53	416
<i>Low HIV-prevalence countries</i>	42	53	177	163	57	59	264	423	46	68	586	766
South Asia (excluding India)	0	1	99	72	32	20	176	161	37	51	346	305
East Asia and Pacific (excluding China)	3	4	14	7	14	9	137	113	48	46	216	179
Middle East and North Africa	5	6	13	7	4	1	43	24	15	15	80	52
Europe and Central Asia	7	14	3	1	0	0	12	4	4	3	27	23
Latin America and the Caribbean	0	0	11	5	3	1	20	10	17	17	51	33
Total	1,212	1,427	1,010	617	230	158	1,286	1,347	343	334	4,082	3,882

Source: WDR 2012 team estimates based on data from the World Health Organization 2010 and United Nations Department of Economic and Social Affairs 2009.

Note: Totals do not necessarily add up due to rounding.

tween gender disadvantages in mortality and income growth is consistent with a large literature that comes to the same conclusion.⁵⁸

To examine why there are missing girls at birth and excess female and male mortality and what can be done about it, we need alternative explanations. Given the age-grouping of disadvantage around birth, infancy, and the reproductive years, each of which may have different causes, the chapter develops the arguments in turn.

Girls missing at birth—The India-China problem

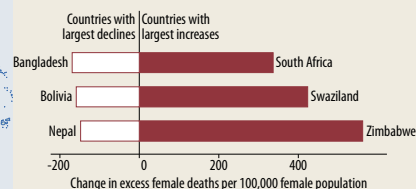
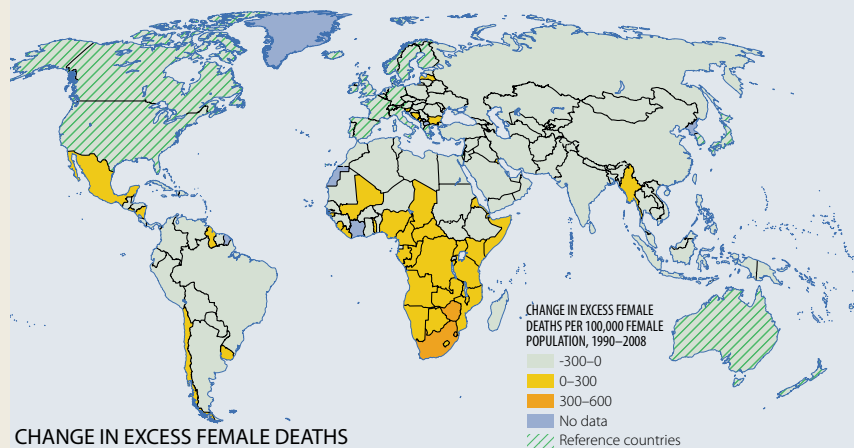
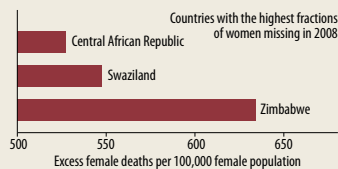
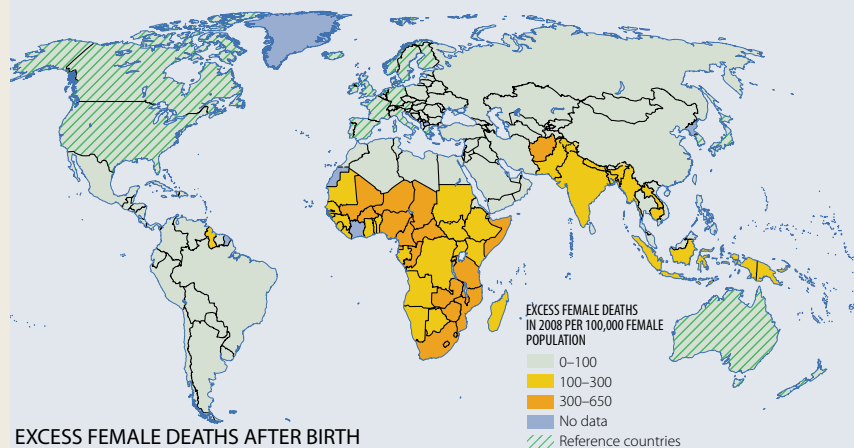
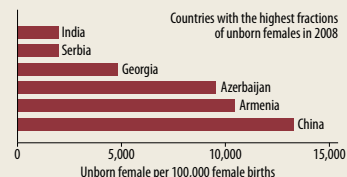
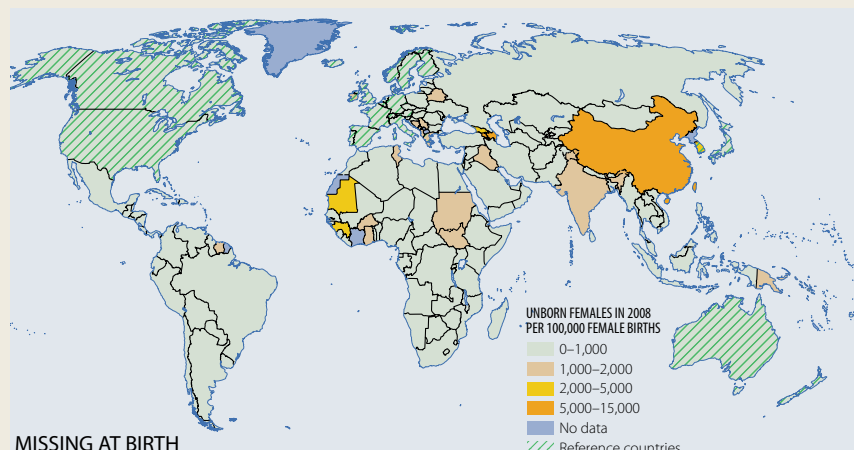
The problem of many missing girls was first documented, separately, by Coale, Das Gupta, and Sen.⁵⁹ Subsequent studies confirm the geographical variation within India and China—in India initially in the northern belt but gradually spreading south, and in China a gradual spreading inland from the eastern coast.⁶⁰

“The firstborn must be male. After that it’s all the same.”

Young man, rural Serbia

A deadly combination of three factors led to increasing numbers of unborn girls in the late 20th century (figure 3.9). First, fertility started dropping as female education and the returns to it in the labor force increased; in China, the one-child policy reduced fertility. Second, ultrasound became widely available (allowing for prenatal sex determination), starting from big cities and moving to small towns and rural areas. Third, the preference for sons remained unchanged—families now want two children, but they want at least one son.

MAP 3.1 *In China and India, the number of girls missing at birth remains high, and parts of Africa experienced large increases in excess female mortality during 1990–2008*



Source: WDR 2012 team estimates based on data from World Health Organization 2010 and United Nations Department of Social and Economic Affairs 2009.

FIGURE 3.8 *Income growth did not reduce excess female mortality during 1990–2008 in low- and middle-income countries*



Source: Staff calculations based on data from World Development Indicators 2009; World Health Organization 2010; and United Nations, Department of Economic and Social Affairs, Population Division 2009.

Note: Growth is defined as changes in log GDP per capita during 1990–2008. Missing women numbers are expressed as a fraction of female population in relevant age group.

To see how these factors play out, think of an earlier time when every household had four children. In this scenario, if the first child was a girl, the likelihood would still be high that one of the remaining children would be a boy. But if households had only two children, and the first one was a girl, there was an even chance of having yet another girl—rather than the son they wanted. As ultrasound became available, so did the “solution”—if the unborn child was a girl, the parents could abort the child and try again.

Unfortunately, this is precisely what the data indicate. In the absence of sex-selective abortion, the odds are even that the second child will be a boy or a girl independent of the sex of the first. The data show, however, that the probability of the second child being a boy or a girl is

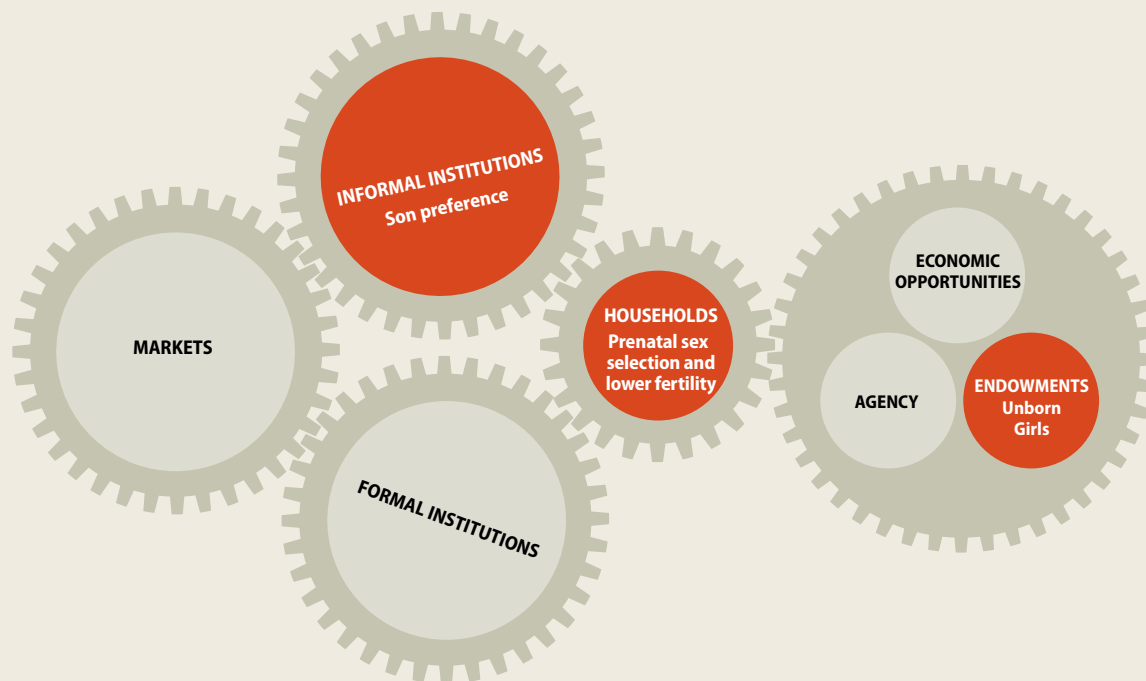
even when the first child is a boy, but when the first child is a girl, the second child is much more likely to be a boy. This phenomenon has been demonstrated in China, the Republic of Korea, and India; for India, it is particularly strong for educated Hindu women in northern India.⁶¹ In addition, antenatal investments, like inoculation against tetanus, were higher when women were pregnant with boys rather than girls—and even higher when the first child was female.⁶²

These last results hold not only for northern India but also for Bangladesh, China, and Pakistan, suggesting that forms of disadvantage against unborn girls may be widespread across South and East Asia.⁶³ And they may be very hard to change: as in their own countries, Chinese and Indians living in the United States show

“ Sons would ensure continuation of their family, would take care of parents at old age and perform funeral rites when parents die. ”

Young woman, rural India

FIGURE 3.9 *Why are so many girls missing at birth?*



Source: WDR 2012 team.

very similar patterns of sex selection in first and second births.⁶⁴

Not only does son preference affect the gender composition of birth, it may also affect the way children already born are treated. One argument demonstrates the nuanced links between son preference and gender disadvantages for already born children.⁶⁵

Take again the simple framework of son preference and instead of fixing fertility, let fertility itself be a matter of choice. In some families, the first child will be a son. If their “stopping” rule is the birth of a son, these will be single-child fam-

ilies with one son. If the first child is a daughter, the family will have another child, stopping if it is a son and carrying on if it is a daughter. The result? Girls will disproportionately have many more siblings than boys.⁶⁶

One result of son preference is that girl children receive less nutrition than boys in northern India (but not worldwide, as nutritional differences show). Given the repercussions of son preference on the different number of siblings for boys and girls, could it be that some share of the female disadvantage stems from the number of siblings rather than from overt discrimination? As it turns out, once family size is appropriately controlled for, there is no female disadvantage in nutrition. That is, the entire observed difference in nutrition between boys and girls is attributable to the difference in the numbers of their siblings. Gender disadvantage in the unborn child—manifest in fertility behavior—has no further impacts on the nutritional outcomes of the born child once fertility behavior is controlled for.

In a similar fashion, families may wait less time to have a second child following the birth of a girl than the birth of a boy. The desire to have

“ Lhamo was told that if she gave birth to a daughter again, he was going to leave her once and for all. Lhamo was soon conceived with her third child. He would often beat her, but she was still willing to take the chance of giving Dorji a son so that their lives would come back to normalcy. ”

Adult woman, Bhutan

“Nowadays, men and women are equal. But according to tradition, we still prefer having a son to carry on the family line.”

Young man, rural Vietnam

a son following the birth of a girl may result in disadvantages for the born female, if the mother reduces breast-feeding to increase fertility and hasten conception.⁶⁷ The fundamental insight from these findings is that preferences over the unborn child drive gender disadvantage—potentially manifest in children already born.

The intersection between son preference, declining fertility, and new technologies has added to the number of girls missing at birth and may well disadvantage children already born through the number of siblings and the timing of births. Changes in informal institutions and, through them, household behavior are key to resolving this problem. And it can be done. Korea, where the male-to-female ratio at birth first increased sharply and then declined, suggests that broad normative changes across society brought about by industrialization and urbanization can ultimately return sex ratios at birth to normal ranges.⁶⁸

Excess female mortality in early childhood

What causes excess mortality among girls during infancy and early childhood? One possible explanation that has received a lot of attention is discrimination by parents toward girls. Certainly, in parts of the world like Afghanistan, China, northern India, and Pakistan, such discrimination is a serious problem. Studies have shown delays in seeking medical care and lower expenditures for girls, and in the 1990s, even in a period of sharp economic growth, anthropometric outcomes for boys improved faster than for girls.⁶⁹ An economic rationale for such discrimination is a link to the structure of returns—for instance, in districts within India, where the soil is amenable to higher female labor use in agriculture, excess mortality among females is lower than the average in India.⁷⁰ Higher women's wages are associated with greater female mobility and authority, while higher male wages have the opposite effect.⁷¹ Beyond economics, the

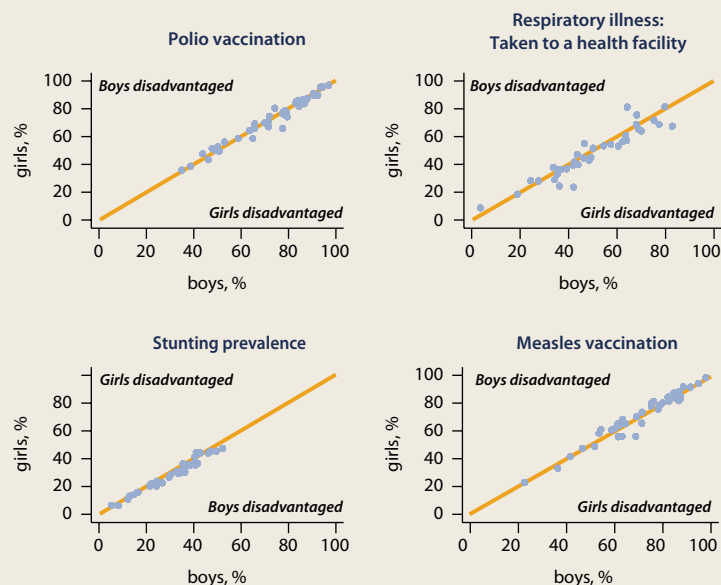
impact of kinship structures on the value placed on girls has also been advanced as the dominant hypothesis for why excess female mortality is seen in some societies but not others.⁷²

Is such discrimination against girls a widespread pattern linked to excess female mortality in early childhood? Perhaps, as was discovered in Bangladesh in the early 1970s and India in the 1980s, girls are less likely to be vaccinated, less likely to be given medical care, and less likely to receive nutrition at home.⁷³ But a comparison of countries around the world shows two things. First, these differences are small or non-existent to begin with (in Sub-Saharan Africa, for instance, it is the boys who suffer nutritional deprivation). Second, there is little association between excess mortality among girls and disadvantages in vaccination, differential use of medical care, or differences in childhood nutrition as measured through the heights and weights of boys and girls (figure 3.10). Nor is there any association with female labor force participation. These patterns too reflect similar findings in the previous literature.⁷⁴

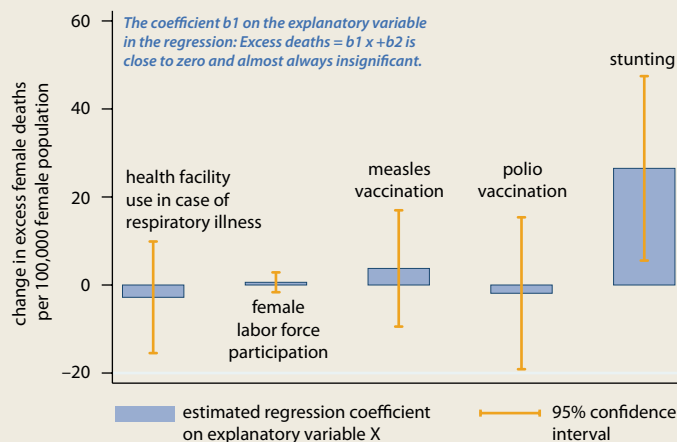
Even if *households* treat boys and girls similarly, it could be the case that health care providers might discriminate against girls. To assess this possibility, researchers observed more than 30,000 interactions between doctors and patients in seven countries around the world—Afghanistan, Burkina Faso, India, Mozambique, Paraguay, Rwanda, and Uganda—and recorded the time spent, questions asked, and examinations completed, all markers of medical care that correlate with overall quality of care. Surprisingly, the main finding was that girls and boys are treated very similarly once they are taken to health care facilities. There were no differences between boys and girls (or between women and men) (figure 3.11). In all seven countries, doctors spent the same time, asked the same questions, and completed the same number of examinations regardless of the sex of the patient.⁷⁵

If neither households nor providers discriminate against girls, what is the source of excess female mortality in early childhood? Historical forensics provide the key to this puzzle. In the early 20th century, European countries faced the same patterns—no girls missing at birth but high excess mortality among girls in early childhood. Between 1900 and 1930, the excess mortality vanished in almost all of them (figure 3.12).

FIGURE 3.10 *There is little or no gender disadvantage in vaccination rates, nutrition outcomes, or use of health services when a child falls sick*



Small differences do not explain the variation in the fraction of excess deaths across countries



Source: Staff calculations based on data from the World Health Organization 2010; United Nations, Department of Economic and Social Affairs, Population Division 2009; World Development Indicators 2009; and Demographic Health Surveys 1985–2008.

Note: Data for vaccination coverage and health service use were pooled over the years 1990–2008.

This sharp decline—after virtually no change during the entire 19th century—was coincidental with large investments in public health, notably clean water and sanitation (broadly defined to include waste disposal, drainage, toilets, and vector control), along with outreach to improve

domestic hygiene practices. In the United States, clean water and sanitation accounted for the entire decline in infant mortality during this time and in the disappearance of excess female mortality in infancy.⁷⁶

Epidemiological changes caused by these public health investments explain both declining infant mortality and the disappearance of excess female mortality in infancy and early childhood. Between the early 1900s and 1930, the share of infectious diseases as a cause of death declined, increasing the share of perinatal and congenital factors.⁷⁷ Although girls were (and are) more robust than boys for both infectious diseases and perinatal conditions, they are even more robust than boys for perinatal conditions relative to infectious diseases. Boys always had a disadvantage in mortality, and as infectious diseases declined, their disadvantage increased. Today, a high burden of infectious disease in countries where poor public health systems do not provide clean water, sanitation, waste disposal and drainage, is part of the reason for higher relative female mortality risks in early childhood compared with the rich countries.

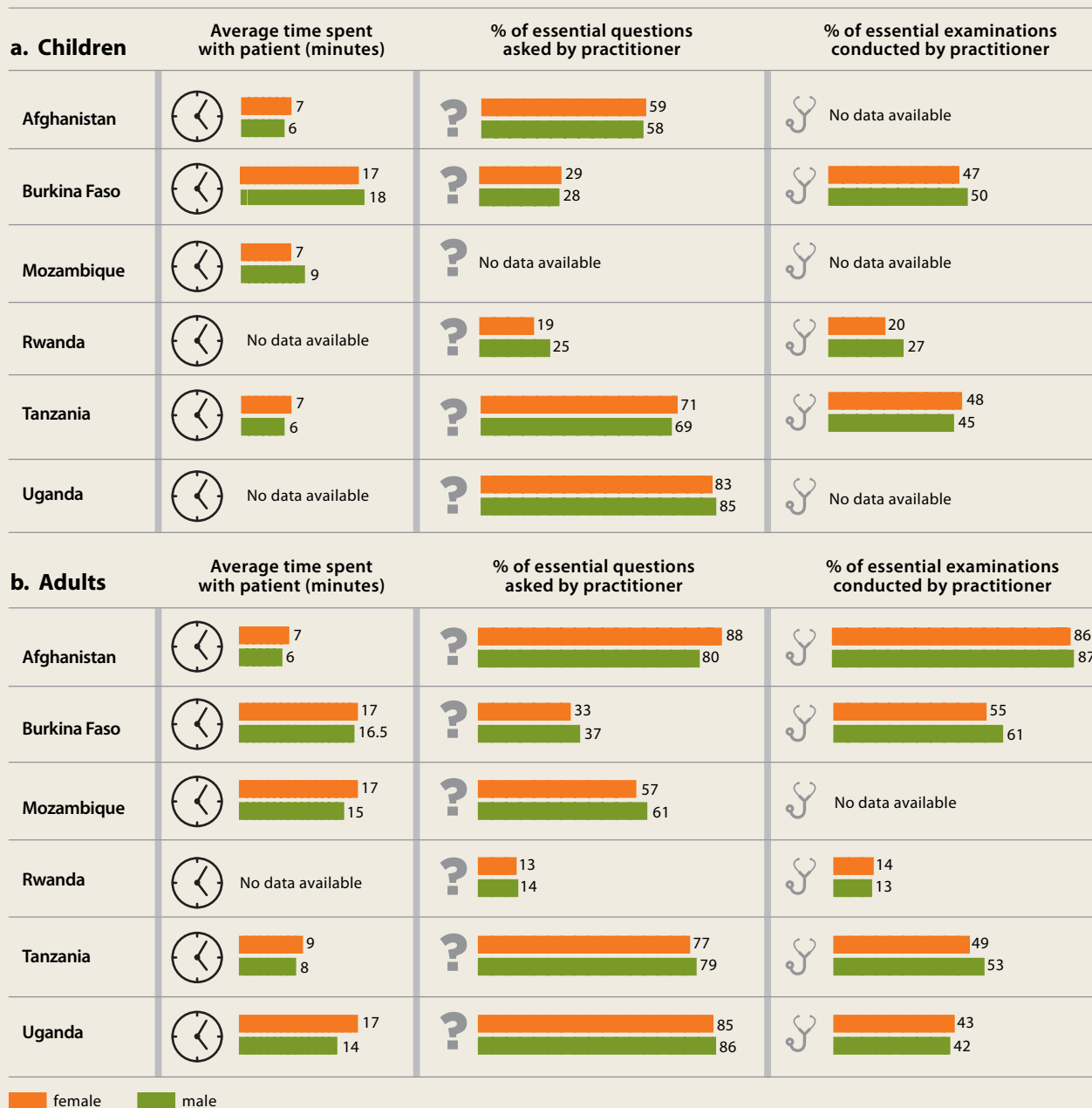
If this institutional-biological hypothesis were true today, one would expect to see less excess female mortality in countries with lower infant mortality. And that is indeed the case: the relationship between excess mortality for girls and overall infant mortality is exactly the same in 2000 as it was in 1900 for the European countries (see figure 3.12). Bangladesh, China, and Vietnam, which have managed to reduce overall infant mortality through clean water and better sanitation, have also reduced the excess female mortality in infancy and early childhood. But in much of West Africa, there has been less focus on clean water and sanitation: between 1990 and 2005, the fraction of urban households with piped water actually declined from 50 percent to 39 percent in 32 African countries. Not surprisingly, countries like Burkina Faso and Nigeria

“Before pollution, we could cook and drink the river water. Now oil palm pollution has spoiled our river . . . we have no choice but we have to drink the water from the river.”

Adult woman, rural Papua New Guinea

FIGURE 3.11 *Men and women, boys and girls, are treated the same when they visit health facilities*

Average period of time spent with practitioner at each visit and questions asked and examinations conducted by practitioner



Source: Ali and others 2011.

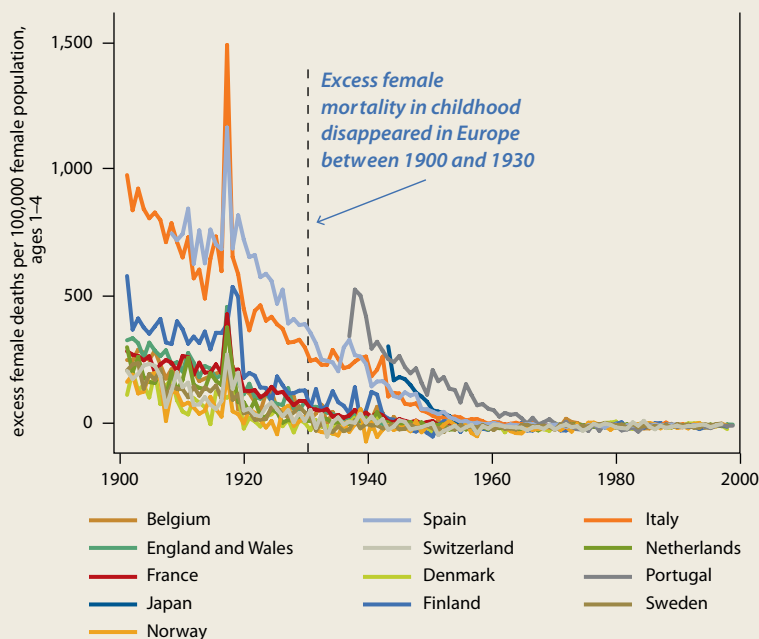
Note: There were no significant differences between boys (men) and girls (women) conditional on disease.

have seen a much slower decline in early childhood excess female mortality.

Bringing down mortality risks for boys and girls in low-income countries today is largely a question of providing the basic public health

services that governments in most European countries provided in the early part of the 20th century. Reducing the burden of infectious diseases will produce declines in child mortality, more for girls than boys.

FIGURE 3.12 *Levels of excess female childhood mortality in high-income countries in the early 1900s were similar to those of low- and middle-income countries today . . .*



. . . and the excess female mortality declined with reduction in overall childhood mortality



Excess mortality in adulthood—Women

Excess female mortality also affects women ages 15–60, particularly women in their reproductive years (ages 15–49) who live in low- and middle-income countries. In this age group, excess female mortality has declined in absolute numbers and as a proportion of population in every region of the world except Sub-Saharan Africa, which divides into two regions: the HIV/AIDS-affected countries, where excess female mortality has increased even as a fraction of population; and those countries, mainly in Central and Western Africa, where HIV/AIDS is less of a problem and where excess female mortality has declined, albeit slowly. Two mechanisms drive excess mortality in the reproductive years—maternal mortality and morbidity related to childbirth, and HIV/AIDS. Maternal mortality is fundamentally different from excess female mortality at other ages in that, to reduce it, societies must focus on an intrinsically female condition and specifically on improving the maternal health-care system. Throughout this Report, “maternal mortality” implies not only death during childbirth but also concurrent morbidities brought on by the experience of pregnancy and childbirth. These include severe anemia (and its relationship with malaria) and obstetric fistula.⁷⁸

As in early childhood, adult women in some populations around the world experience significant discrimination in health expenditures and health-seeking behavior. But, again as with early childhood, this discrimination does not appear to be systematic. In countries ranging from India to Egypt to South Africa, a small bias favors women in overall health expenditure and sometimes in use of the health system (chapter 1). Clinical observations of practice in seven countries were also unable to uncover differences in the way men and women were treated by health providers (see figure 3.11). While these findings could still be consistent with discrimination, due to biological differences and different health needs, they also suggest that evidence of such discrimination will be difficult to find. In contrast, the two issues discussed next—maternal mortality and HIV/AIDS—have very clear and obvious pathways to women’s health, particularly to their mortality.

Maternal mortality

In high-income countries, there were a total of about 1,900 maternal deaths in 2008. In India,

Sources: WDR 2012 team estimates based on data from World Health Organization 2010; United Nations Department of Economic and Social Affairs 2009; and Human Mortality Database 2011, Max Planck Institute for Demographic Research, and University of California, Berkeley.

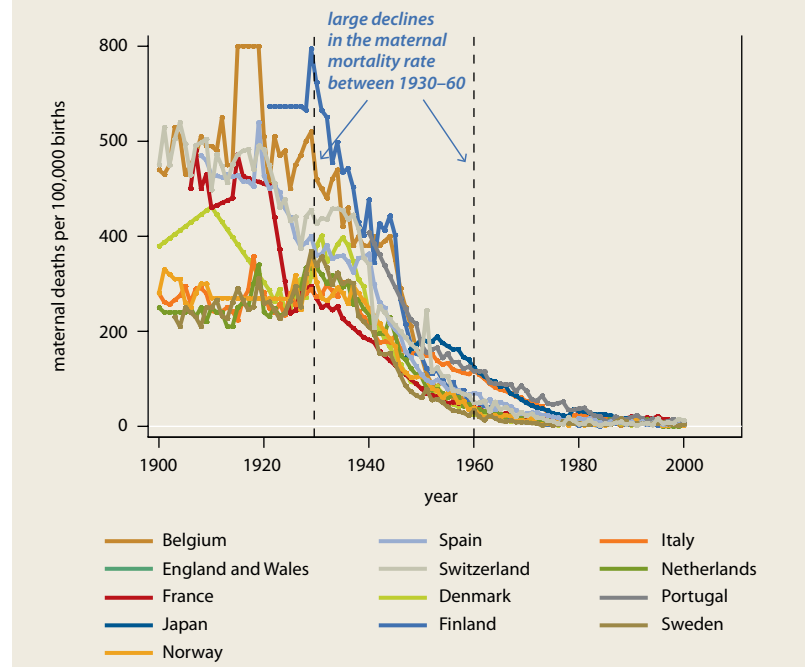
there were 63,000, and in Sub-Saharan Africa, 203,000 (56.7 percent of the global total). One of every 14 women in Somalia and Chad will die from causes related to childbirth. As a proportion of all births, more women die in childbirth in India today than did in Sweden at the beginning of the 1900s—and in Liberia today than in Sweden in the 17th century.⁷⁹

Between 1930 and 1960, the maternal mortality ratio—the risk of death for every birth—fell significantly in developed countries (figure 3.13). The ratio began to drop sharply in the late 1930s in most countries, driven in part by the introduction of sulfa drugs in 1936 and by an increase in the number of institutional births with better care.⁸⁰ The ratios then converged strongly across countries in the 1940s and 1950s—most countries reached modern levels in the early 1960s; Italy, Japan, and Portugal reached those levels in the mid-1970s. Declines were sharper in the Anglo-Saxon countries relative to the Nordics, which already had low maternal mortality rates in 1935.

The United States stands out as the country with the highest maternal mortality ratio for 1900–30, but like the others, sharp declines began around the mid-1930s and fell to current levels by 1960. These declines were brought about largely by simultaneous improvements in the medical system at the point of delivery and in services to pregnant women, and by shifts in expectations of where to deliver—from home to hospital.⁸¹

The patterns are fully reflected in changes in excess female mortality in the reproductive-age groups for selected countries (figure 3.14). For these countries, excess female mortality in adulthood remained fairly high until 1930 (with

FIGURE 3.13 Maternal mortality ratios declined steeply in selected countries during 1930–60



Source: Albanesi and Olivetti 2010.

a spike downward coinciding with World War I and a peak in 1918 with the flu epidemic) and then declined sharply to zero between 1930 and 1960.⁸² The late declines are precisely for countries—Italy, Japan, and Portugal—where maternal mortality rate declines occurred latest.

For all countries in 1990–2008 and for high-income countries with historical data, the basic pattern remains similar with higher maternal mortality ratios associated with greater excess

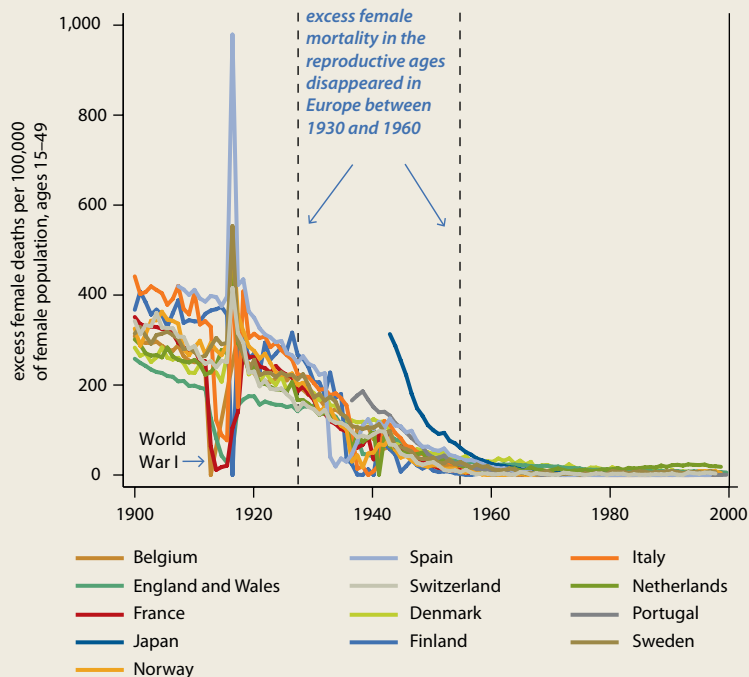
“ Nobody in this village has access to drinking water. People bring water from a spring and a water pool that are at a 100–1,000 meter distance from the village. Those also dry out during some seasons and the children and especially the girls spend more than five hours daily to bring water. . . .

Between the neighboring villages, sometimes violence occurs over drinking water and residential places because there is not enough water for people and they don't have shelters and they make homes for themselves in the desert. And they sometimes fight each other over this. ”

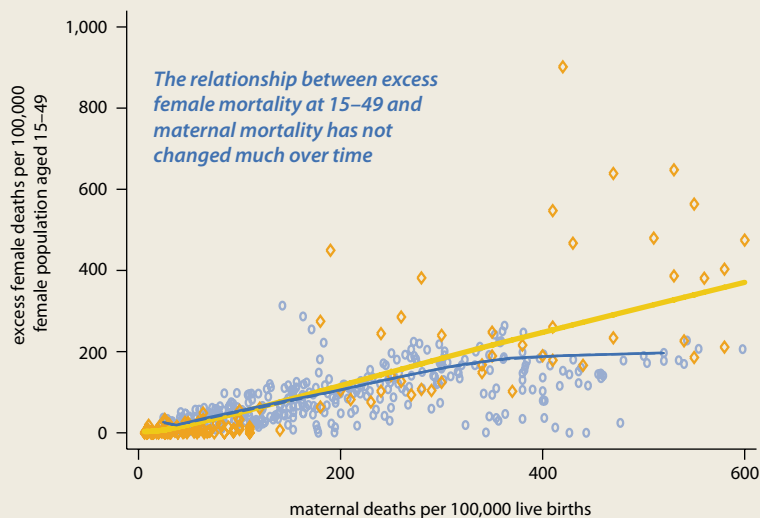
Adult man, rural Afghanistan

FIGURE 3.14 *High income countries today had excess female mortality at the reproductive ages during the first half of the 20th century . . .*

Excess mortality among women in 13 European countries, 1900–2000



. . . and the excess mortality at all income levels declines with reductions in maternal mortality

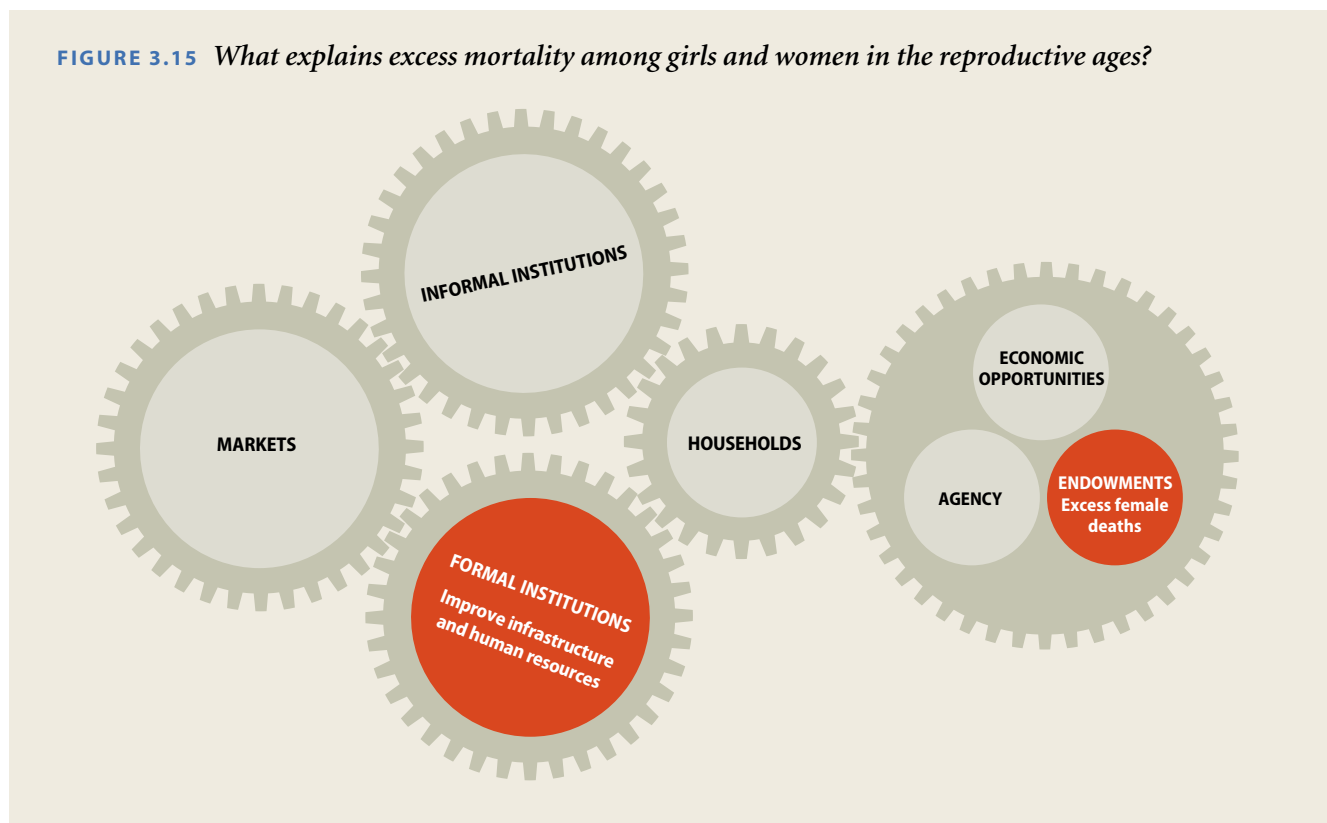


Sources: WDR 2012 team estimates based on data from World Health Organization 2010; United Nations Department of Economic and Social Affairs 2009; Human Mortality Database 2011, Max Planck Institute for Demographic Research, and University of California, Berkeley; and Albanesi and Olivetti 2010.

female mortality in adulthood. Reducing maternal mortality rates is thus critical for reducing excess female mortality in adulthood. This can be done in one of two ways—reducing fertility so that women are less exposed to the risk of death (including the risk from unsafe abortions) or reducing the maternal mortality ratio (the risk of death for every birth).

Take each in turn. When fertility rates are high, reductions in the rate will reduce the risk of dying from causes related to childbirth. Maternal mortality risks depend on the age of the mother (slightly higher in young ages than the average across age groups and then increasing in older ages in a “J” shape); parity, or number of children borne by a woman (the first pregnancy and higher parities increase mortality risks to the mother); independent cohort effects (mothers born in cohorts that smoked more, for instance, would have higher risks); and time effects (later decades imply better medical care). In rich countries, changes in maternal age and shifting parity distributions accounted for 18 percent of the decline in maternal mortality.⁸³ Studies in a limited number of low-income countries (typically subnational) report similar estimated reductions of around 25 percent, using models that eliminate births after parity five and those outside the safest ages for birth (20 to 39).⁸⁴ So, changes in the age and parity structure of birth in high fertility contexts could reduce maternal mortality by 20 percent or so.

The studies from low-income countries were for periods when total fertility rates were high—more than 6 births per woman in Bangladesh, for example. Today, fertility rates are that high in just six countries—Afghanistan, Chad, Niger, Somalia, Timor-Leste, and Uganda. Forty countries have fertility rates higher than 4, and all but Afghanistan, Guatemala, Papua New Guinea, Timor-Leste, and the Republic of Yemen are in Sub-Saharan Africa. For the most part, however, fertility has declined dramatically over the past 30 years in most low- and middle-income countries. In countries with fertility at 3 or less, further shifts in the age and parity distributions may not have large impacts on the maternal mortality ratio. Because family planning policies account for 10–15 percent of the reductions when starting from initially high levels, these policies could continue to help in selected

FIGURE 3.15 *What explains excess mortality among girls and women in the reproductive ages?*

Source: WDR 2012 team.

countries but are unlikely to substantially reduce the number of women who die from childbirth every year.⁸⁵ The best way to reduce the unacceptably high number of women who die from childbirth (and related causes) every year in low-income countries will likely be region specific and will depend both on fertility reductions and specific policies to reduce the maternal mortality ratio (figure 3.15).

HIV/AIDS

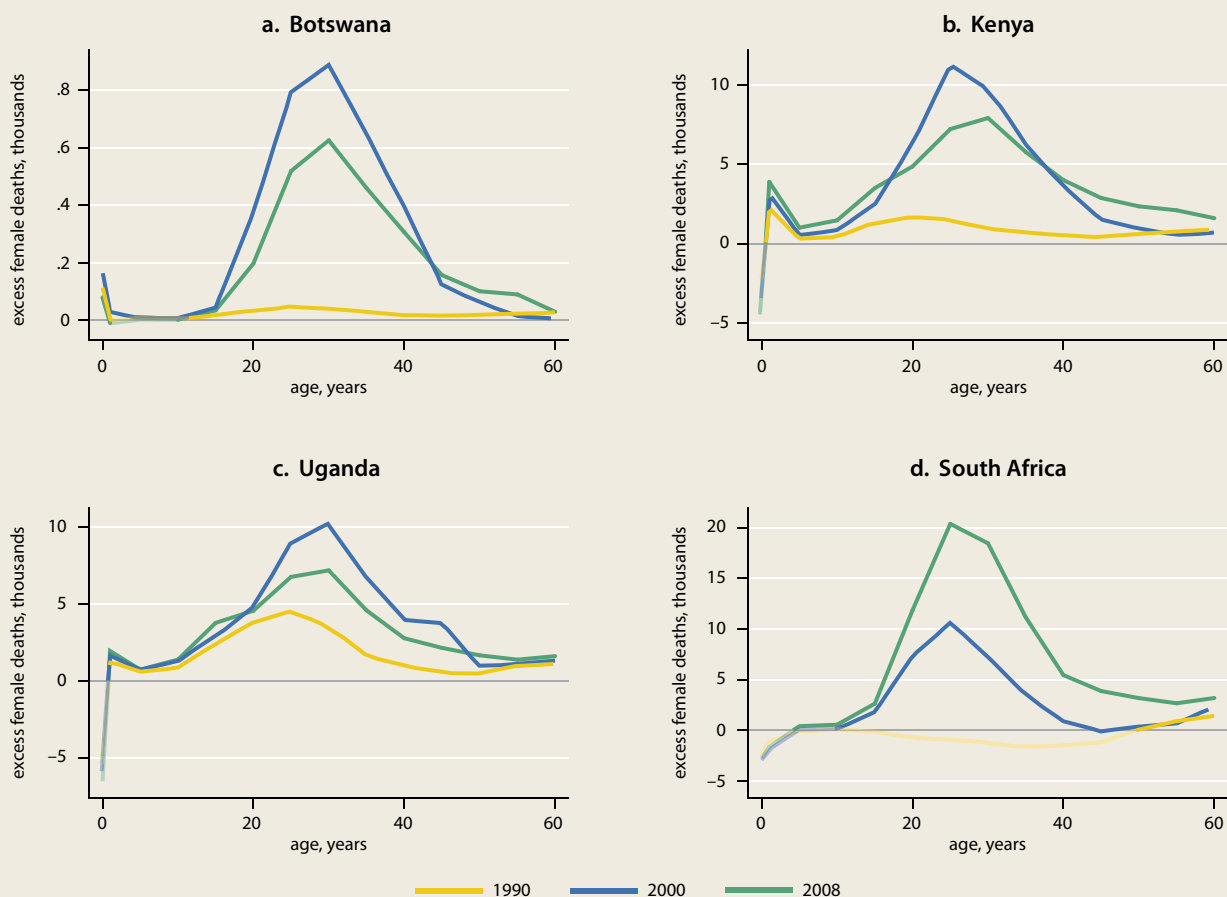
In addition to maternal mortality, the HIV/AIDS epidemic is contributing to excess female mortality in Africa (figure 3.16). In Sub-Saharan Africa, women account for 60 percent of all adult HIV infections,⁸⁶ with the gender gap in prevalence largest for younger adults. The ratio of female to male prevalence for 15–24 year olds is 2.4 across Sub-Saharan Africa.⁸⁷ Comparisons of age-infection profiles for women and men show that after age 34, HIV prevalence rates are similar for men and women.⁸⁸

Biology and behavior have both contributed to greater prevalence of HIV among women—referred to as the “feminization of AIDS.”⁸⁹

Women are biologically 1.2 times more likely to acquire the virus because women’s bodies are more susceptible to infection than men. Sexually active young women, whose bodies are still developing, may be especially vulnerable. Sexually transmitted diseases (such as herpes simplex virus type 2) that affect men and women differently also contribute to the greater susceptibility of women to HIV infection.⁹⁰ With respect to behavior, women date and marry men who are a few years older, which also contributes to a differential age-gradient among men and women in HIV infection rates.

Without treatment, HIV infection develops into AIDS and, after 7–10 years, death. But the HIV/AIDS link to excess female mortality in Africa is not relevant for all countries in the region, particularly those in Central and West Africa. It is concentrated among the set of high-prevalence countries in Southern Africa and parts of East Africa, which bear a disproportionate share of the burden of AIDS in Africa as well as globally (box 3.2).

Not only has HIV/AIDS hit women the hardest, but coping with the crisis has had system-

FIGURE 3.16 *Excess female mortality by age in four countries with high HIV prevalence*

Source: WDR 2012 team estimates based on data from World Health Organization 2010 and United Nations, Department of Economic and Social Affairs 2009.

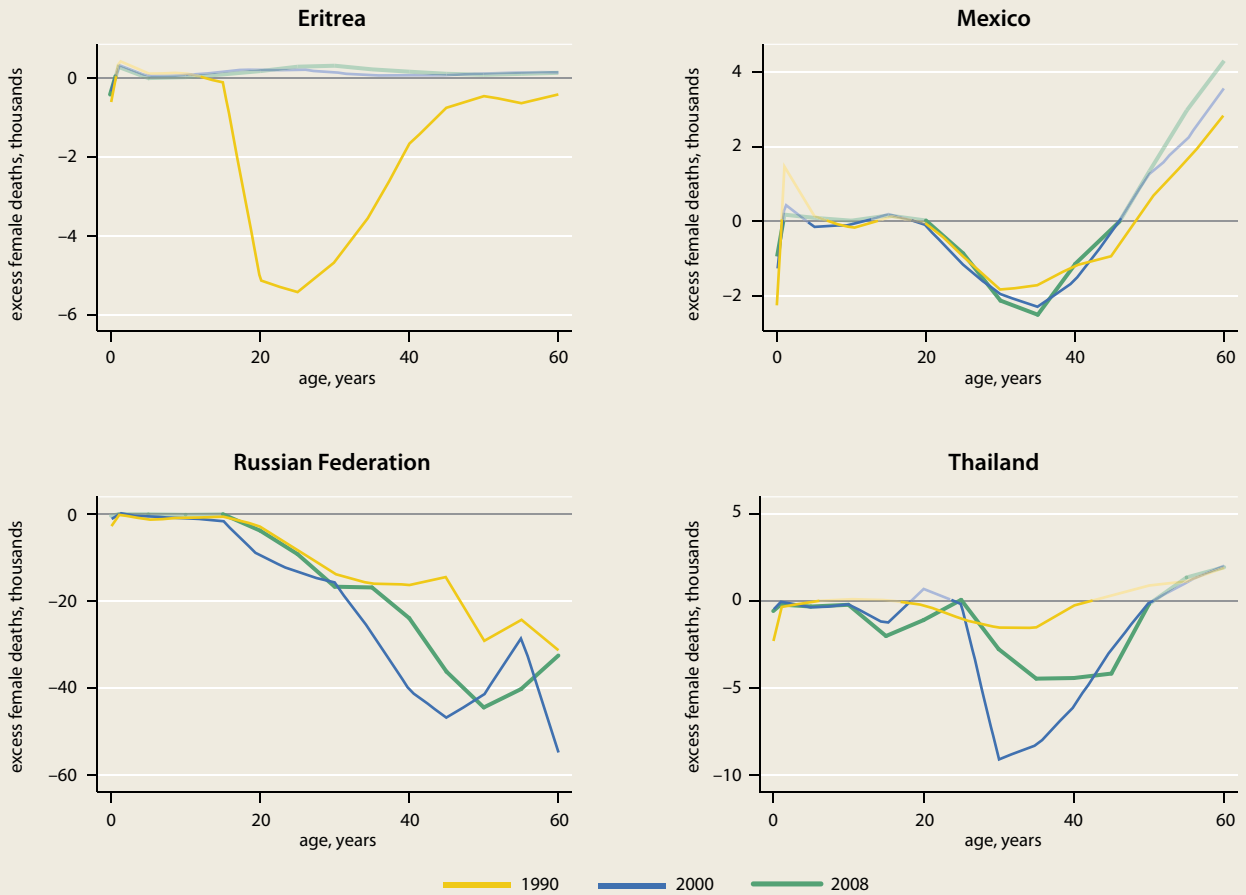
wide impacts on the delivery of health services. Prenatal care, care during birth, and children's vaccination rates have suffered where HIV rates are the highest in Sub-Saharan Africa.⁹¹

Encouragingly, these patterns are now changing, and so will excess female mortality, both as life-prolonging treatment becomes available and as incidence rates change. As of end-2009, an estimated 5.2 million people in low- and middle-income countries were receiving anti-retroviral therapy (ART) and in Sub-Saharan Africa, nearly 37 percent of people in need of treatment could obtain those life-saving medicines.⁹² In the countries with the highest prevalence, treatment coverage varies: 83 percent in Botswana, 48 percent in Malawi, 36 percent in South Africa, 43 percent in Uganda, 68 percent in Zambia, and 34 percent in Zimbabwe. This

coverage is an extraordinary achievement: as recently as 2003, only a few privileged HIV/AIDS patients had access to ART in Africa. And it will reduce the number of deaths from HIV/AIDS—and decrease female mortality rates in adulthood. Botswana, Kenya, and Uganda—which have high ART coverage rates—experienced a reduction in excess female mortality between 2000 and 2008 (although the levels are still significantly above those in 1990). In contrast, with a high HIV prevalence, large population, and slower expansion of ART, South Africa saw a steady increase in excess female mortality from 1990 to 2000 and a further increase to 2008.

Excess mortality in adulthood—Men

In some countries, the analysis illustrates patterns of excess male mortality. In the formerly

FIGURE 3.17 *In some countries, there is excess male mortality*

Source: WDR 2012 team estimates based on data from World Health Organization 2010 and United Nations Department of Economic and Social Affairs 2009.

Note: A value on the y axis less than zero implies excess male mortality. For example, at age 20, about 5,000 excess male deaths occurred in Eritrea in 1990.

socialist countries, in countries and regions with high rates of violent crime or periods of war and conflict, and in those experiencing localized epidemics of HIV in parts of the male population, men die at a significantly higher rate relative to men in high-income countries, after accounting for overall mortality conditions in their country of residence.

First, men are the immediate victims of armed conflict. A study of conflicts in 13 countries during 1955–2002 found that 81 percent of violent war deaths were among males.⁹³ An example is Eritrea, where a 30-year war of independence ended in 1991. Figure 3.17 illustrates the significant excess male mortality that occurred there in the last full year of the war.

Outside situations of warfare, violence remains gendered: men stand charged for 80–90 percent of all violent crimes in Australia, Europe and the United States, and the higher prevalence of male criminal behavior translates into higher incarceration rates for men.⁹⁴ More male deaths result from homicide than from armed conflict. Of all violent deaths globally in 2000, just under a third were victims of homicide, the vast majority among men. Latin America had the highest homicide rate (27.5 per 100,000), more than three times the rate reported in any other region. Mexico, in particular, experienced most of the region's drug-related violence.⁹⁵

Most victims of homicide in Latin America are young males from low socioeconomic backgrounds, and rates peak among males between the ages of 15 and 24 years.⁹⁶ In addition to its relation with drugs and turf battles among competitive cartels, violence in Latin America has also been linked to ideals about masculinity that force men to confront others when challenged. Studies of youth violence in República Bolivariana de Venezuela, for example, show the importance among males of “earning” respect in front of others, and acts of violence are one way to achieve this status.⁹⁷ Excess male mortality in Latin American countries is precisely in the 20–40 age group where such behavior becomes salient.

Second, the formerly socialist countries are the location of a stark male disadvantage in health. In addition to the economic and social upheavals the populations of many of these countries endured, they also experienced sharply rising death rates—the only region other than Sub-Saharan Africa to do so during the last three decades. In Russia, male life expectancy at birth declined by 6.6 years between 1989 and 1994 (from 64.2 to 57.6 years), and prime age men were hit hardest. Studies have identified increased alcohol consumption and psychosocial stress, likely brought on by changes in the economic environment and weakening social safety nets, as the primary factors causing the spike in mortality among men.⁹⁸ More broadly, deaths and disability rates related to alcohol and substance abuse are higher for men than for women across the world.⁹⁹

In Thailand, male mortality in the late 1980s rose as the first wave of the HIV epidemic struck intravenous drug users, mostly men. Because the epidemic diffused into the general heterosexual population much later, from commercial sex workers to their clients, and then from clients to their spouses, the peak in mortality among men occurred earlier and reached a higher level than among women.¹⁰⁰ In addition, proportionately more women (53 percent) received antiretroviral therapy than men, who typically presented with a more advanced stage of the disease than women.¹⁰¹ Studies note the role of social norms that condoned risky sexual behavior among men, for whom visits to commercial sex workers before and after marriage, often in the company of peers, were widely accepted.¹⁰² Women, by contrast, were expected to be abstinent before marriage and faithful afterward.¹⁰³

Higher male mortality, whether from substance use, violent crime, or risky sexual behavior, is not a feature of these low- and middle-income settings alone. These behaviors also prevail among men across the industrialized world, where women live on average 5 to 10 years longer than men. This female advantage in longevity is not purely genetic (and where genetic factors play a role, they continue to be malleable). Studies show that differences in mortality are sensitive to environmental factors. Men smoke more than women, have poorer diets, and internalize stress differently. Improvements along any of these dimensions would narrow the gender gap in life expectancy.

This finding raises a more pertinent question: What are the factors that mediate men’s risk-taking, substance use, and increased health risks? Do societies condone these behaviors among men, because they reflect underlying ideals about “masculinity” or “manliness,” at least up to a certain point? A growing body of literature suggests this might indeed be the case, and at least in the high-income countries health systems have started to emphasize both “behavior” change and institutional improvements. Although policy levers to effect behavioral change are multifaceted and difficult to pinpoint (after all, they require a shift from understanding the body to understanding the brain), the success of antismoking campaigns in the West suggests that this challenge is now being addressed around the world.¹⁰⁴

Poor institutions and bad default options

To repeat: missing girls at birth and excess female mortality below the age of 60 account for nearly 3.9 million women a year. Excess male mortality, primarily resulting from conflict and risky behavior, also leads to unnecessary deaths. There has been little change in the numbers in the past three decades, and in several countries in Sub-Saharan Africa, mortality risks are worsening. The solutions for reducing female mortality risks after birth are largely institutional: clean water and sanitation for infancy and early childhood, and better care for expectant mothers, and reductions in HIV/AIDS and improved family planning services in some countries for the reproductive years.

Skeptics may question why a century of increased medical knowledge and better medical care has not reduced the salience of the institutional provision of clean water and sanitation or

BOX 3.2 *Four Africas*

Between 1980 and 2000, school enrollments in most of Sub-Saharan Africa increased and mortality in early childhood decreased (albeit more slowly than in other low-income countries), but mortality risks for adults *increased*. Data from the Demographic and Health Surveys show that the increases were largest among men with less than primary education—although mortality increased for both men and women and for those with and without primary schooling.^a Ten years later, after a period of rapid growth in many African countries, where do mortality risks stand? And how does Sub-Saharan Africa compare with countries in South Asia, such as Afghanistan, India, and Pakistan, usually thought of as places with high gender discrimination? There are now four Africas, each of which has a different effect on women's ability to acquire and enjoy a healthy life: progressive countries throughout the continent, where education levels are high and mortality risks low; the HIV/AIDS Africa, primarily in the South; conflict countries like Eritrea and Liberia; and, curiously, West and Central Africa.

Progressive Africa. Countries such as Ethiopia, Ghana, Madagascar, and Togo have largely escaped the HIV/AIDS epidemic. Mortality rates of children under age five are around 100 per 1,000 live births (under 76 in Ghana). Excess female mortality after birth is lower, and school enrollments are relatively high. Reductions in fertility rates have decreased exposure to mortality risks during childbirth; total fertility rates are now between 4 and 5. In health and education, these countries look like Pakistan but with somewhat higher enrollments at the primary school level. Fertility rates are still higher than in India (2.7) and Pakistan (3.9), as are under-five mortality rates.

Conflict Africa: Sub-Saharan Africa has experienced two types of conflicts over the past three decades. During the 1980s and 1990s, outright war in countries like Eritrea and Liberia claimed the lives of many young men. Except for periodic flare-ups, these are decreasing over time. Yet the effects last. In Bargblor Town in Liberia, no one has access to electricity, piped water, public stand pipes, or a sewage system. There is no public transport, and the nearest hospital takes approximately 3½ hours to reach by foot. In an emergency, women report having to run or walk to the hospital. Children who die in the hospital are carried home to their village to be buried. In other countries, widespread civil conflict continues to extract a heavy toll among women. A recent study suggests that in the Democratic Republic of Congo, 29 of every 1,000 women were raped between 2006 and 2007—58 times the annual rate in the United States.^b Excess female mortality increased between 1980 and 2008. Total fertility rates hover between 5 and 6, under-five mortality rates

are between 150 and 200 per 1,000 live births, and while school enrollments have increased in recent years, they are still low.

HIV/AIDS Africa: The third Africa consists of countries with high HIV/AIDS prevalence. At the end of 2009, in countries such as Botswana, Lesotho, Swaziland, South Africa, Zambia, and Zimbabwe, about one in six to one in four adults between the ages of 15 and 49 were living with HIV/AIDS. Mortality risks during early childhood, school enrollments, and fertility rates are similar to those in India today. In 1990, mortality profiles for men and women in Botswana and South Africa were similar to those in high-income countries today. But by 2000, mortality risks increased in adulthood, more so for women. In 1980, mortality risks were higher for more educated men, while women with more schooling and both men and women in urban areas had a mortality advantage. By 2000–04, less educated men and women had higher mortality risks than their more educated counterparts, and mortality rates among both men and women in rural areas were equal to those of their urban counterparts.

“ The worst abuse happening today is when a man infects a woman with HIV/AIDS . . . Unprotected sex causes fights between a man and a woman, because a woman would say she wants to use condom but a man would refuse. ”

Adult woman, South Africa

Central and West Africa: The real puzzles in Sub-Saharan Africa are the Central and West African countries, including Burkina Faso, Chad, Mali, Niger, and Nigeria, among others (Somalia is very similar to these countries). Except Ghana and Senegal, many of these countries have seen either no change or a worsening of overall mortality risks during this time. In these countries, mortality risks for women have systematically increased. Women with more than primary schooling have seen the greatest increase in the risk of dying, although even in 2000, urban and educated women still had lower mortality than other groups. Today, Burkina Faso, the Central African Republic, Chad, Mali, Niger, and Nigeria look very much like Afghanistan in their mortality risks, fertility rates, and girls' schooling. In these countries, mortality under the age of five ranges from 170 to 220 (Afghanistan is higher, at 257), total fertility rates range from 4.5 to above 7 (Afghanistan is 6.6), and adult mortality risks are virtually the same as those in Afghanistan. Their enrollments in primary and secondary school also mirror the Afghan data.

These findings are puzzling because the countries in this group have little in common. Some are landlocked, some coastal; some are anglophone, others francophone; some fast-growing, others slow-growing, and some have seen conflict and some have not. The

“ Men are just like us, we all go through this hell together. ”

Adult woman, Liberia

BOX 3.2 *Four Africas (continued)*

one thing they do have in common is that women's livelihoods, already weak, are deteriorating.

The four Africas highlight the dramatic effects of HIV/AIDS and conflict—and the fact that poor institutions and service delivery can harm women just as much, or even more, than outright gender discrimination. In determining where the international community should focus, it is worth pointing out just how little is known about

the continent, particularly Central and West Africa. Of all papers published in the top 202 economics journals between 1985 and 2004, 149 papers were on Pakistan and 1,093 on India—but there were no papers on the Central African Republic, 1 on Chad, 14 on Benin, 2 on Guinea Bissau, and 20 on Niger. Only for Burkina Faso (47) and Nigeria (148) do the numbers start picking up. Before deciding what to do, the global community should seek to understand what is going on.^c

a. de Walque and Filmer 2011.

b. Peterman, Palermo, and Bredenkamp 2011; Shannon 2010.

c. Das and others 2009.

better maternal care. Even without clean water, parents now know to boil water before giving it to children. Even when children get diarrhea, most parents know how to treat them. Households can always take pregnant mothers to hospitals. These kinds of private solutions run into two problems. First, private actions do not take into account the fact that sick children infect other children as well. These “externalities” for infectious diseases generate well known under-investments in private behavior.

Second, while private actions work well when there are few *key* choices to be made, reality can be very different. Poor people around the world are forced to make many, many choices—most of them bad—every time a child falls sick: where do they get firewood to boil the water, where should they get sugar, should they take the child to the doctor who could be five hours away, how much will the doctor charge, should the mother wait for the husband if the child needs to be carried? Each choice can have devastating consequences if things don't pan out.

Poor people everywhere have to choose and make many decisions about many things that richer people take for granted every day. When institutions are bad, so are people's default choices—and “free to choose” becomes “forced to choose.” Under these circumstances, many illnesses and many life choices create excess female mortality.

To illustrate these points, look at this example of providing oral rehydration solution to a sick child in a poor village:

The tall man pointed to the young woman suckling her baby and said, “Look, look

there—that baby is burning with a fever. I walked all the way yesterday to a nearby town to get a pill. I spent whatever money I had earned in the town yesterday and trudged back late at night, but the pill has made no difference.” I touched the baby's forehead—it was burning and he was sucking at the breast desperately but the mother did not seem to have much milk. I asked the mother if she had eaten anything. Now the others joined in the conversation and said that they were waiting for some of the men to return. There was no food in the house. They would cook something if the men managed to earn some rice or some coarse grain. Concerned about the baby's condition, I asked if they knew about oral rehydration solution. They did not know anything about it—the ANM (Auxiliary Nurse Midwife) never came up to the hamlet. . . .

The Sarpanch (headman) who was accompanying me was getting quite defensive. He said if these people do not come down, if they do not tell us what troubles them, how can we help them? I asked the Sarpanch to explain to the young mother and the older woman sitting next to her how important it was for the baby to receive fluids. In his dialect, he began to explain. “You have some salt in the house, don't you? Well take this much sugar, put in this much water and boil it and then put a pinch of salt in it and squeeze a few drops of lemon. No sugar in the house? Yes, but go down to someone on the lower hamlet—they may not give you sugar if it is for yourself, but if you say that it is needed to save the life of the

child, they will surely give you a fistful." The woman nodded. "Where will you get the water from?" I asked. Now a new problem arose, for the nearest pump was not working. They were all drinking water from a stream nearby that was stagnant and dirty. The Sarpanch told the baby's grandfather that the water must be boiled and cooled. I was beginning to see the hopelessness of the situation. No sugar, no source of clean drinking water, and a shortage of fuel. But the man who was inebriated again got aggressive, "Whatever you say, we will not go to anyone's door to beg." The women were listening more intently and I thought they intended to follow it up. "But do not just feed it to him all at once," I said, "give it in small sips." (How shall I demonstrate that?) The woman took a leaf, folded it in a kind of spoon and said, "like this?" The Sarpanch promised to help by getting a packet of oral rehydration solution.¹⁰⁵

This is not an isolated story. Take maternal mortality. Technically, much maternal mortality can be reduced if treatment is prompt and adequate. Yet that is easier said than done. A pathbreaking study from Ghana, Nigeria, and Sierra Leone illustrates that even when women are taken to hospitals, delays in receiving care can lead to devastating outcomes:

Today, Mary, the lady who helps us in the house, came late to work. I told her off for being late and asked why. She said that one of her townswomen . . . had died in the hospital while giving birth to a baby. This was her fifth delivery. She was not from a far off village but from Sokoto city itself. She had not gone too late to hospital, but rather had gone on time. . . . By the time they found a vehicle to go to hospital, by the time they struggled to get her an admission card, by the time she was admitted, by the time her file was made up, by the time the midwife was called, by the time the midwife finished eating, by the time the midwife came, by the time the husband went and bought some gloves, by the time the gloves were brought to the hospital, by the time the midwife was called, by the time the midwife came, by the time the midwife examined the woman, by the time the bleeding started . . . by the time

*the doctor was called, by the time the doctor could be found, by the time the ambulance went to find the doctor, by the time the doctor came, by the time the husband went out to buy drugs, IV set, drip, and bottle of ether, by the time the husband went round to look for blood bags all round town, by the time the husband found one and by the time the husband begged the pharmacist to reduce the prices since he had already spent all his money on the swabs, dressings, drugs, and fluids, by the time the hematologist was called, by the time the hematologist came and took blood from the poor tired husband . . . by the time the day and night nurses changed duty, by the time the day and night doctors changed duty, by the time the midwife came again, by the time the doctor came, by the time the t's had been properly crossed and all the i's dotted and the husband signed the consent form, the woman died. Today the husband wanted to sell the drugs and other things they never used to be able to carry the body of his wife back to their village but he could never trace [the body] again in the hospital."*¹⁰⁶

Every step of the way to delivering a baby safely is fraught with problems, beginning with the recognition of danger signs.¹⁰⁷ Even when danger signs are recognized, families "are also aware that there is not much the medical facility can do for her when there is no trained doctor or nurse-midwife, when blood shortages are regular, and when equipment is frequently broken. People do not bother to seek care when they know that they probably will not be cured, that they are even likely to die in the hospital."¹⁰⁸ Even the first stage of delay—the detection of danger signs—is unlikely in medical facilities. For instance, a study of provider knowledge of preeclampsia—a life-threatening condition of high blood pressure in pregnancy—showed that fewer than 25 percent of providers surveyed would have referred a textbook case of such a condition to a hospital.¹⁰⁹ Nor are these problems restricted to maternal mortality: a study of malaria deaths, for instance, showed that 75 percent had received care from health care providers, and some from multiple sources.¹¹⁰

The returns to solving these problems are large. The poorest 40 percent in Africa have limited access to safe drinking water and are most

likely to use contaminated water sources.¹¹¹ Treatment at the point of use has a large impact in reducing diarrhea, with similar impacts for hand washing and sanitation (water treatment at source is less effective because of recontamination). Increasing the coverage of piped water and sanitation in urban Argentina reduced diseases associated with dirty water and resulted in an 8 percent decline in child mortality.¹¹² Similarly, access to clean water in the United States at the turn of the 20th century led to nearly half the dramatic mortality reduction in the country then, three-quarters of the infant mortality reduction, and two-thirds of the child mortality reduction.¹¹³ And the returns are higher for girls. A randomized evaluation of water treatment at source showed declines in diarrhea incidence only among girls under age of three.¹¹⁴

These findings have generated debate about the relative benefits of different types of water treatment and the willingness of households to pay for clean water. To an outsider, not steeped in the nuances of clean water, this debate is far removed from the historical choices by today's rich countries.

Consider a randomized evaluation of water treatment in Kenya: households were not willing to walk 3.5 minutes more to access clean water.¹¹⁵ One explanation could be that learning about the impacts of clean water is just very hard. Even if households fully understood the etiology of diarrheal diseases, the small reduction in overall disease burden and the lack of an impact on nutritional outcomes could make it very difficult for an individual household to “infer” that clean water led to better health outcomes (for researchers, this is precisely why the impact of any intervention on mortality is impossible to detect unless samples are huge—certainly much larger than what a household would have access to). In addition, it is difficult for individuals to handle rational calculations when probabilities are small and the payoffs are huge.

An alternative, the historical pattern, is just to provide clean water at the point of use through piped delivery, ensuring that the particular choices households make in uncertain environments with poor learning and difficult evaluative models are irrelevant—whether for how to differentially treat males and females, or what particular water source to use. Although this solution is often deemed to be “too” expensive, it is never clear what the expense is compared

with: in the United States the social rate of return for the provision of clean water was 23 to 1, once the costs of mortality were taken into account.¹¹⁶ Clean water is known to dramatically reduce the burden of infectious diseases; the argument here is that it will also dramatically reduce the burden of excess mortality in infancy and early childhood for girls.

Similarly, to reduce maternal mortality, the entire system needs to work. Women need folic acid before their pregnancy, antenatal visits, identification of potentially dangerous conditions, institutionalized delivery, and a functioning hospital. Again, the myriad choices that the current system imposes on households (which hospital, where do I get the blood, where do I get the medicines, how should I get to the doctor?) need to be taken out of the equation. These institutional solutions reduce the choices that people make and move them from a situation where they are forced to choose to one where they are free to choose.

Of course, there is a question of whether institutional improvements alone will make a difference even in regions where discrimination is salient, as in parts of South Asia. Although improvements in institutions alone may not go all the way, they will definitely help. That is partly because when households have clean water, the question of whether to boil the water when a boy is sick versus when a girl is sick just does not arise. But in addition, the link between discrimination and mortality does not require households to treat girls and boys in vastly different ways. Tiny differences in the ways that boys and girls are treated can lead eventually to large disadvantages in mortality—precisely because, at a certain time, a deadly irreversibility sets in. Given that children fall sick 50–70 times between birth and age five in a country like India, actions that keep boys alive 99.997 percent of the time and girls 99.992 percent of the time when they fall sick can account for the entire mortality differential of 11 percent for boys versus 13 percent for girls in infancy. In contexts where discrimination plays out in these small disadvantages, institutions could solve most of the problems—not by reducing discrimination per se, but by making it irrelevant.

How institutions responsible for improving public health through clean water, sanitation, and maternal care can be—and have been—improved is discussed further in chapter 7.

TECHNICAL ANNEX 3.1

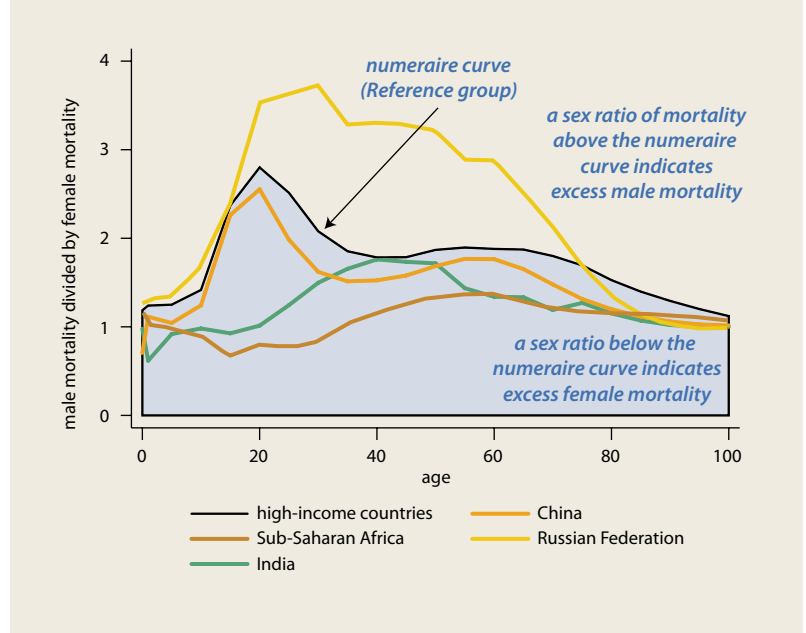
Computing the flow of missing girls at birth and excess female mortality after birth

This Report uses two measures: missing girls at birth and excess female mortality after birth. Missing girls at birth are computed by comparing the sex ratio at birth with the sex ratio in comparable populations with no discrimination—typically, high-income countries, and for Sub-Saharan Africa, black populations in the United States.¹¹⁷ Excess female mortality is computed by comparing the ratio of male-female mortality in every country and at every age with the ratio of male-female mortality in high-income countries at the same age in 2000.¹¹⁸ This gives the excess female mortality at any given age; all ages are then added up, either by age categories or over the life course to provide the accompanying estimates. The problem of excess female mortality in Sub-Saharan Africa that this measure shows has been discussed in the literature.¹¹⁹ We discuss the assumptions required for this method, and highlight issues that could arise.

A natural interpretation of such a computation of excess female mortality invokes comparisons with a “reference” group of countries. Another interpretation is that we summarize functions of mortality profiles of women and men by age into a single number by (a) assuming a functional form summarizing the relative risks of men and women at every age and (b) weighting each of these relative risks at every age. Therefore, we are interested in measures like $\sum w_i h[g(\text{men}_a), q(\text{women}_a)]$ with the summation over all ages. The first data reduction is the functional form, $h[g(\text{men}_a), q(\text{women}_a)] = \text{men}_a / \text{women}_a$. The second reduction is that the set of weights at every age, w_i are the ratios of male to female mortalities in high-income countries.

Figure 5A.1 plots relative mortality risks for men and women at every age in five contexts—the “reference” high-income countries; Sub-Saharan Africa, India, China, and the Russian Federation. For the reference high-income countries, the rates at which men die relative to women are similar in early childhood, increase steeply with a peak at age 20 and then level off with a slight hump at 60. Overall mortality rates between 15 and 60 are very low in the high-income countries. China follows a

FIGURE 3A.1 Sex ratio of age-specific mortality, 2008



Source: Staff calculations based on data from the World Health Organization 2010; and United Nations, Department of Economic and Social Affairs, Population Division 2009.

very similar pattern; in India, relative risks in early childhood are significantly lower, but the curves move closer until age 50, after which they diverge again. In Sub-Saharan Africa, relative mortality risks are similar in early childhood but worsen from age 10 onward and stay below India throughout. In Russia, by age 20 the relative mortality risks for men are significantly higher than in the reference countries and remain so until age 80.

For excess female mortality, weighting using the reference group implies that if men and women die at the same rate in a country, they will receive a higher “weight” between the ages of 10 and 30—because in the reference countries, the differences are the largest here. This weighting matters less at ages where overall mortality is low, but becomes important at ages in which overall mortality is high. For excess male mortality, it is the opposite. As a consequence:

1. Any change in the reference group mortality profile will change the computations of excess female mortality. So, throughout the analysis, we retain the same reference group for all comparisons.

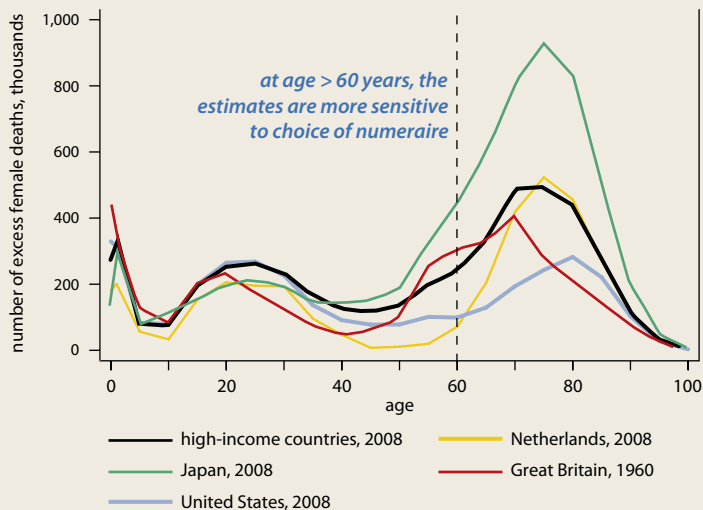
2. Increases in adult mortality differentials between men and women could occur due to changes in mortality differentials at every age (for example, behavioral changes that alter the relative risks of mortality at each age) or a change in the overall mortality profile while keeping the same *ratios* (for example, shifting the burden of death from younger to older ages).
3. Selection effects could bias the age-mortality profile, especially in high mortality regions or countries. People who survive to a particular age may be systematically different from those who die at an earlier age. Such effects imply that chances of survival in the surviving cohort would be different from those if cohort members who died earlier were still alive and part of the cohort, leading to selection biases that affect estimates of excess mortality.
4. Using the ratio as a summary implies that excess female mortality will increase when male mortality declines (as in Eritrea or Liberia). The chapter investigates specific mortality risks and ensures that the highlighted issues do not fall in this category, alerting the reader when they do.

Any summary of mortality functions will invoke assumptions; this particular weighting is close to the mortality profiles in many countries around the world and fairly robust to different “reference” group comparisons until age 60. Figure 5A.2 compares alternative computations of excess female mortality using alternative reference groups of the United States in 2000, Japan in 2000, the Netherlands in 2000, and Great Britain in 1960. Japan has unusually high life expectancies for women; the Netherlands has one of the lowest rates of traffic accidents (which kill many young men); and Great Britain in 1960 represents mortality profiles before additional deaths for males from smoking (the greatest difference in smoking prevalence by sex was for the 1900 cohort, and smoking results in excess deaths after age 60.)¹²⁰ Excess female mortality is similar using the different reference groups until age 60 but diverges quite sharply after that.

In addition to the robustness issues, choosing high-income country profiles as the weights ensures that the risks in the reference group are well understood, so problems that arise with the weighting scheme are more transparent. Choosing less researched contexts could make it harder to understand the consequences of the weighting scheme.

Alternative weighting measures include the historical mortality profile in rich countries. This literature on “missing women” focuses on identifying female mortality solely caused by discrimination.¹²¹ By comparing mortality profiles today with historical profiles, the literature tries to control for the overall institutional environment and mortality risks. In contrast, this chapter seeks not to rule out institutional differences but to rule them in. If historical mortality patterns reflect current mortality profiles plus additional deaths due to maternal mortality, a measure of discrimination would try to “control” for high maternal mortality. In contrast, we are interested in the fraction of female (and male) deaths that could be avoided by focusing on maternal mortality. There are two reasons for doing so. First, the chapter treats all deaths equally. Using historical mortality will show that there is no problem in Sub-Saharan Africa, but this interpretation would be a serious mistake. There may be no deaths from discrimination in Sub-Saharan Africa, but poor institutions combined with

FIGURE 3A.2 Excess female mortality globally at each age in 2008 using various reference groups



Source: Staff calculations based on data from the World Health Organization 2010; and United Nations, Department of Economic and Social Affairs, Population Division 2009.

HIV/AIDS make the continent one of the most dangerous for women around the world. Second, improving institutions and service delivery and tackling global health issues are fundamental goals of the global community.

A final note on the data. This chapter uses the member country life tables from the World Health Organization for 1990, 2000, and 2008, and population projections from the United Nations Department of Economic and Social Affairs. The exact numbers presented here will change with updates to the life-tables and with

new censuses in 2011. Despite improvements in the data, in many countries these data are estimates based on surveys and extrapolations. Triangulating with other data sources ensures that the results do not depend on any one particular method. The chapter presents a global picture. Focusing only where the light (data) shines could miss bigger problems in the dark. The point is not to reify existing data but to emphasize the geographical and age profile of mortality risks, leading to further analysis and better data in the future.

CHAPTER SUMMARY *In reducing gender gaps in education and health, tremendous progress has been made where lifting a single barrier—in households, markets, or institutions—is sufficient to improve outcomes. Progress has been slower either where multiple barriers need to be lifted at the same time or where a single point of entry produces bottlenecks.*

WHAT WE SEE

Gender gaps in participation in education have shrunk dramatically at all levels, although disparities persist in severely disadvantaged populations. In addition, men and women continue to study different disciplines, with similar patterns of segregation across poor and rich countries. Finally, both boys and girls learn very little in school in many lower-income countries.

Male-biased sex ratios at birth persist in China, parts of India, and some countries in the Caucasus and the Western Balkans. Mortality risks for girls and women (relative to boys and men) are higher in many low- and middle-income countries compared with their counterparts in high-income countries. This “excess female mortality,” although still widespread, has declined in many parts of world. The stark exception is Sub-Saharan Africa, where it has increased.

WHY WE SEE THIS

Education

The progress in reducing gender differences in education results from removal of a single barrier to schooling in households (more stable incomes), markets (increasing returns to education), or formal institutions (lower costs of schooling). Continued female disadvantage in severely disadvantaged populations stems from an absence of economic drivers combined with other forms of social exclusion.

In contrast, girls’ and boys’ educational paths diverge because of multiple barriers that work simultaneously to influence choices. These barriers are stereotypes within the education system, norms governing gender roles in the household that constrain a woman’s choice of occupation, and employers’ attitudes toward family formation and childbearing.

Health

Male-biased sex ratios at birth result largely from an interaction of overt discrimination expressed in preference for sons, increased use of prenatal sex selection, and declining fertility. After birth, however, poor institutions of public health and service delivery lead to excess female mortality in early childhood and the reproductive ages. In parts of Sub-Saharan Africa, HIV/AIDS risks have compounded the problem in the latter period.

WHAT THIS MEANS FOR POLICY

First, in education much remains to be done for severely disadvantaged populations, either through developing context-specific strategies or by alleviating institutional bottlenecks (e.g., school construction), or household constraints (e.g., conditional cash transfers). Second, improving learning outcomes is imperative to allow both girls and boys to participate in an increasingly globalized world. Third, reducing segregation in fields of study, which will in turn allow both men and women to develop the skills needed to enter their desired occupations, will require *simultaneous* change among households, markets, and institutions.

Changes in informal institutions that in turn change household behavior, such as those brought about by industrialization and urbanization in Korea, will solve the problem of girls missing at birth. Finally, reducing excess female mortality after birth will require fixing formal institutions: clean water and sanitation for early childhood and better maternal care for the reproductive ages, along with reductions in HIV/AIDS in Sub-Saharan Africa.

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