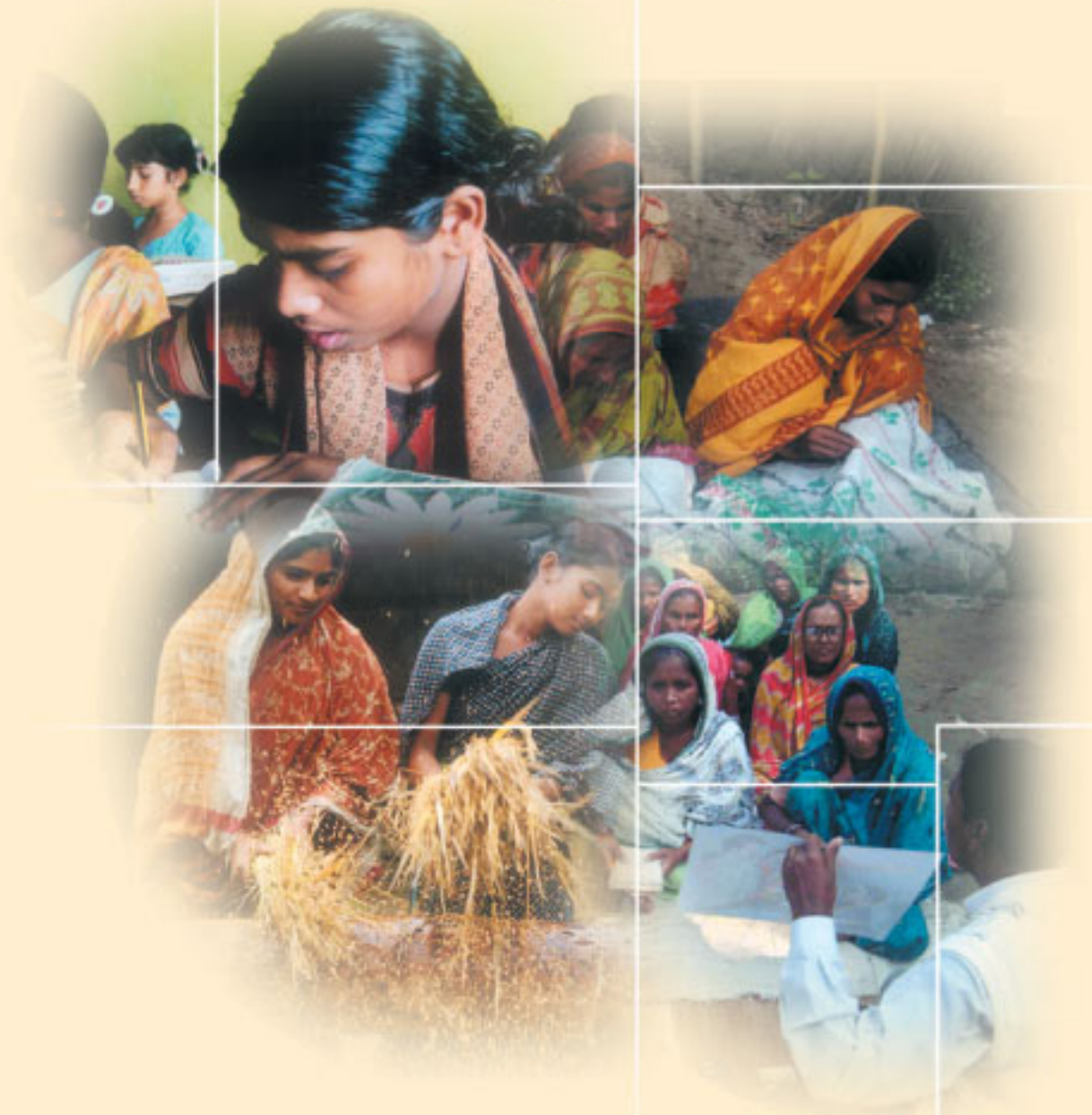


Attaining the Millennium Development Goals in Bangladesh



The World Bank

ATTAINING THE MILLENNIUM DEVELOPMENT GOALS IN BANGLADESH:

How Likely and What Will It Take To Reduce Poverty, Child Mortality and Malnutrition, Gender Disparities, and to Increase School Enrollment and Completion?

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ABBREVIATIONS AND ACRONYMS

BBS	-	Bangladesh Bureau of Statistics
BRAC	-	Bangladesh Rural Advancement Committee
BDHS	-	Bangladesh Demographic and Health Survey
CNS	-	Child Nutrition Survey
DHS	-	Demographic and Health Survey
GOB	-	Government of Bangladesh
HD	-	Human Development
IMR	-	Infant Mortality Rate
MCH-FP	-	Maternal & Child Health – Family Planning
MD	-	Millennium Development
MDG	-	Millennium Development Goal
NFHS	-	National Family and Health Survey
NSS	-	National Sample Survey
HIES	-	Household Income and Expenditure Survey
VGD	-	Vulnerable Group Development
VGf	-	Vulnerable Group Feeding
VRS	-	Vital Registration Survey

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EXECUTIVE SUMMARY

Introduction

Since the launch of the Millennium Development Goals (MDGs) at the Millennium Summit in New York in September 2000, the MDGs have become the most widely-accepted yardstick of development efforts by governments, donors and NGOs. The MDGs are a set of numerical and time-bound targets related to key achievements in human development. They include halving income-poverty and hunger, achieving universal primary education and gender equality, reducing infant and child mortality by two-thirds and maternal mortality by three-quarters, reversing the spread of HIV/AIDS and other communicable diseases, and halving the proportion of people without access to safe water. These targets are to be achieved by 2015 from their levels in 1990 (United Nations 2000).

Almost all the countries in the world, including Bangladesh, have committed themselves to attaining the targets embodied in the Millennium Declaration by 2015. Unfortunately, there is little understanding of whether Bangladesh will be able to attain all of the MDGs, and whether there are some MDGs that Bangladesh will be able to attain. There is even less understanding of what it will take – by way of economic growth, infrastructural investments, and sectoral interventions – to attain the different MDGs. Further, this report argues the importance of disaggregating the MDGs for Bangladesh, given the large geographical and socioeconomic variations in millennium development (MD) indicators across the country.

This report focuses on the attainment of five major human development-related MDGs in Bangladesh – consumption poverty, infant and under-five mortality, child malnutrition, schooling enrollment and completion, gender disparities in schooling. The selection of these MDGs for detailed analysis was based in large part on the availability of reliable sub-national data.

While one of the main objectives of this report is to present a disaggregated analysis of MDGs, availability of data limits the extent to which the analysis can be fully disaggregated. In addition, the simulations undertaken in this report are based on empirical analysis of survey data, which typically relies on many assumptions about data quality and measurement, inferences of causality between variables, and potential biases of statistical and econometric estimates. It is therefore important to note at the outset that, while the results and simulations presented in this report may give an impression of precision, they are not that. They should be treated as being indicative of possible broad trends, and could usefully be complemented with other analyses using different methodological approaches. As long as the results are used with this understanding, they can be helpful in ‘rough-order’ planning for MDG attainment.

Consumption Poverty

The poverty head-count ratio in Bangladesh fell by 9 percentage points during the 9 years between 1991-92 and 2000 – an annual rate of decline of one percentage point. From all accounts, the decline in poverty was more rapid in the 1990s than during earlier decades, possibly because of the more rapid pace of economic growth during this period. Real annual per capita consumption expenditure, which grew at an annual rate of 0.6 per cent between 1983-84 and 1991-92, grew more than four times as fast (2.7 per cent annually) between 1991-92 and 2000. National income data show the annual growth in real per capita GDP accelerating from about 1.5 per cent in the 1980s to nearly 3 per cent during the 1990s.

Bangladesh's performance on poverty reduction during the 1990s has bested that of Pakistan, where poverty was largely stagnant during the last decade, but it has fallen short of poverty reduction in India, where the poverty headcount ratio fell from 36% in 1993-94 to 26% in 1999-2000 – an annual decline of 1.7 percentage points.¹

There are large variations in poverty incidence across geographical areas. The rural areas of Faridpur, Tangail and Jamalpur, as well as the rural parts of Bogra, Rangpur and Dinajpur, are among the poorest regions of the country. There are also wide regional variations in the pace of poverty reduction during the 1990s. While there was a large decline in poverty between 1991-92 and 2000 in Dhaka, Barisal and Pathuakali, poverty actually rose (although not by very much) in Sylhet, Comilla, Noakhali and Chittagong. In general, the pace of poverty reduction during the 1990s was somewhat more rapid in areas that had higher initial levels of poverty in 1991, implying modest regional convergence in poverty headcount rates. Even more importantly, poverty is highly concentrated in a few areas. Three regions – comprising the rural areas of Bogra, Rangpur, Dinajpur, Faridpur, Tangail, Jamalpur, Sylet and Comilla – account for 42% of all the poor in the country. Six regions, out of a total of 14, account for nearly three-quarters of all the poor. The geographical concentration of the poor has important implications for the targeting of poverty-alleviation interventions.

The poor in Bangladesh tend to be typically agricultural laborers, small farmers and self-employed entrepreneurs. They also tend to have large family sizes, and are typically headed by young heads. However, there is no evidence that the poverty rates are significantly different for female-headed than male-headed households.

The Government of Bangladesh has had several in-kind food assistance programs going back to the 1970s, many of which benefit the poor. These include, among others, Food-for-Work (FFW), Test Relief, Food-for-Education, Gratuitous Relief (GR), Vulnerable Group Development (VGD), and the Vulnerable Group Feeding (VGF) program. In addition, many NGOs, such as the Bangladesh Rural Advancement Committee (BRAC), PROSHIKA, and the Grameen Bank, have played an important role in establishing micro-credit, skill development, and employment generation programs in the country. It is estimated that nearly 80% of the villages in Bangladesh are covered by some NGO program or project.

A multivariate model of poverty determination at the household level indicates that poverty is strongly correlated with land ownership and the schooling of adult males and females in a household. Infrastructure variables – such as the extent of paved roads, electricity coverage, and availability of bus transport – also have significant inverse associations with poverty. The variable that has the strongest association with poverty is the log of mean district consumption expenditure per capita – a proxy for average living standards in a district. The implied 'growth elasticity' of poverty – i.e., the percent reduction in the poverty headcount ratio associated with a one percent increase in mean district consumption expenditure per capita – is slightly more than -1 (viz., -1.14), implying that economic growth has a one-for-one association with poverty reduction. The empirical results also indicate that, controlling for mean consumption, household poverty is associated positively with consumption inequality in a district. These results thus suggest that worsening consumption (or income) inequality can substantially offset – even reverse – the beneficial effect of economic growth on poverty reduction.

¹ There has been some controversy about the Indian poverty figures. Using an alternative methodology, Deaton and Dreze (2002) report the decline to be from 29% to 22% (Deaton and Dreze 2002), which works out to an annual reduction of about 1.2 percentage points – a little more than that recorded for Bangladesh.

Based on the multivariate probit model estimated above, we have undertaken simulations of the poverty headcount ratio in Bangladesh to 2015 under the assumption that real GDP per capita grows at 4% annually between now and 2015, and that consumption inequality increases, and per capita land availability declines, at roughly the same rate as during the 1990s. Additionally, we assume that mean schooling of adult males and females increases at 0.3 years annually, and that bus transport and electricity coverage expand by one percentage point annually.

The simulations indicate that declining availability of land per capita is associated with poverty rising from about 50% in 2000 to 52% in 2015. Increasing consumption inequality is associated with another 8 percentage point increase in poverty (to 60%). However, all the other interventions contribute to reductions in poverty. Both the expansion of male and female schooling are associated with large declines (10-12 percentage points each) in poverty incidence, but the contribution of transport and electricity access are very small (less than one percentage point each over the entire period). Finally, annual per capita GDP growth of 4% is associated with the largest decline in poverty (of about 21 percentage points). Together, the seven policy and environmental variables are associated with a reduction of about 33.5 percentage points in the incidence of poverty – bringing the poverty headcount rate well below the MDG level (16% versus 30%). Indeed, the projections suggest that real per capita economic growth of 4% annually, without any increase in consumption inequality, would by itself allow Bangladesh to meet its MD target. However, if consumption inequality increases at the same rate as it has during the 1990s, this would not be possible.

What these simulations underscore is that attainment of the poverty MDG certainly appears plausible in Bangladesh, but only if the country maintains strong economic growth and continued expansion of male and female schooling, and prevents income and consumption inequality from rising, in the years ahead.

Infant and Under-Five Mortality

The infant mortality rate in Bangladesh barely dropped (from 168 infant deaths per 1,000 live births to 161 deaths) during the two decades after 1951. But since 1974, the rate has fallen secularly and rapidly, reaching a level of 125 by 1984-85, 80 in 1994-95, and 66 currently. The decline has been most rapid during the 1990s. Indeed, not only has infant mortality fallen much more rapidly in Bangladesh than in India, but the level of infant mortality is now lower in Bangladesh than in India – a country that has two times the income per capita of Bangladesh.

However, there are wide variations in infant mortality across divisions, with the division of Sylhet having an infant mortality rate that is nearly two times as high as that in Khulna. The division having the highest level of infant mortality in 1993-94 – Dhaka – experienced the slowest rate of infant mortality decline (14%) over the following six years. In contrast, Khulna, which enjoyed the lowest level of infant mortality in 1993-94, experienced a rate of infant mortality decline that was two times as much as that experienced by Dhaka. Thus, regional variations in infant mortality appear to have become more pronounced. However, there has been a remarkable convergence in infant mortality rates across rural and urban areas, thanks to much more rapid decline in infant mortality in the rural areas. While the infant mortality rate in rural areas was 27% higher than in urban areas in 1993-94, it was only 8% higher in 1999-2000.

One of the factors explaining the rapid decline in infant and under-five mortality in Bangladesh has been a very successful family planning program. The program has achieved extraordinary results by building an extensive network of health and family welfare clinics throughout the country, training thousands of female workers to take family planning advice directly to women, and

using mass media campaigns to create awareness about family planning in the population. The program has enjoyed strong political commitment from the government, grassroots-level partnership with NGOs, and generous and coordinated assistance from donors. Indeed, Bangladesh's experience has shown that it is possible to bring about fertility and mortality decline in poor countries even in the absence of strong economic growth and improving socioeconomic conditions.

Despite the successful family planning program, the quality of service delivery in the overall public health sector in the country remains poor. There is widespread absenteeism of doctors and paramedics at government health centers and sub-centers; most government health facilities are in disrepair; and the availability of drugs and medical supplies at public health facilities is very limited. One study found that absentee rates for doctors at sub-health centers were as high as 75%. In contrast, the NGO sector in Bangladesh has played an important role in the delivery of quality health services. NGOs, such as the Voluntary Health Services Society, Bangladesh Rural Advancement Committee (BRAC), Bangladesh Association for Voluntary Sterilization (BAVS), Bangladesh Women's Health Coalition (BWHC), Family Planning Association of Bangladesh, and Proshika have worked in the areas of water and sanitation, MCH and family planning, child survival, and AIDS/STD prevention, among other things.

A multivariate analysis of under-five mortality, using unit record data from the 1999 Demographic and Health Survey, indicates that while the risk of mortality is not significantly different across girls and boys, higher birth order girls have a significantly greater likelihood of dying than higher birth order boys. Maternal schooling – but not father's schooling – as well as the mother's age at the time of a child's birth are observed to be significantly and inversely associated with under-five mortality. In addition, the standard of living of a household, as proxied by the predicted log of monthly consumption expenditure per capita, has a strong and significant (inverse) association with under-five mortality. However, rather surprisingly, the availability of piped drinking water, access to toilet facilities and electricity coverage are not observed to have any significant associations with under-five mortality, after controlling for household living standards and parental schooling.

Bangladesh has made tremendous progress in expanding child immunization coverage over the last two decades. The WHO Vaccine Preventable Diseases Monitoring System indicates that Bangladesh went from virtually no measles vaccination coverage in 1980 to 72% coverage by 1998. The empirical results suggest that district-level immunization coverage of measles has a strong (inverse) association with under-five mortality, with each percentage point increase in measles vaccine coverage being associated with a reduction of 0.4 child deaths per 1,000 live births. These estimates imply that universal measles vaccine coverage would be associated with a reduction in under-five mortality of about 16 deaths per 1,000 live births.

Simulations based on the multivariate model estimated above and on various assumptions about changes in mean consumption per capita, adult female schooling, delayed child bearing among women, and expanded measles coverage suggest that the under-five mortality in Bangladesh could decline substantially – by more than 50% – over the period through 2015. The largest decline (of 18 deaths per 1,000 live births) would come about from the expansion of female schooling, followed by expanded measles vaccination coverage (15 deaths per 1,000 live births). Delayed child bearing, which reflects both a delayed age at which the first child is borne as well as better spacing among subsequent children, is also associated with a large reduction (of about 11 deaths per 1,000 live births) in the under-five mortality rate. The smallest association is observed with living standards improvement. The results suggest that real annual GDP per capita growth of 4% (or annual growth of household consumption expenditure per capita of 2.7%) would be associated with a reduction in under-five mortality of 8 deaths per 1,000 live births. Together, the four

interventions are associated with a reduction of 52 deaths per 1,000 live births in the under-five mortality rate – bringing that rate below the MDG level (46 deaths per 1,000 live births).

Thus, the simulation results suggest that it should be possible for Bangladesh to attain the child mortality-related MDG, but only with a package of interventions that includes strong economic growth, expansion of female schooling, family planning programs that motivate women to delay child bearing, and expanded child immunization coverage.

Child Malnutrition

Child malnutrition rates in Bangladesh are very high – among the highest in the world. Recent surveys indicate that nearly one-half of children below the age of 5 or 6 years are moderately underweight or stunted and about 10-18% of children are severely underweight or stunted. Thus, children in Bangladesh suffer from short-term, acute food deficits (as reflected in low weight-for-age) as well as from longer-term, chronic under-nutrition (as manifested in high rates of stunting).

However, Bangladesh has made impressive gains in reducing its child underweight rates during the last 15 years. The decline in underweight rates has been especially steep since the early 1990s. For instance, between 1992 and 2000, underweight rates dropped from 68% to 51%. More importantly, the decline in child malnutrition rates during the 1990s occurred in both the rural and urban areas of the country. Bangladesh's rate of decline of 3.6% per year in child underweight rates is comparable to Sri Lanka's decline in child malnutrition (3.9% annually between 1993 and 2000) and much better than that of India (1.9% per year between 1992-93 and 1998-99).

The prevalence of child underweight rates as well as changes in child underweight rates between 1996-97 and 1999-2000 vary significantly by division. Sylhet, which had the highest prevalence of underweight children in 1996-97 (at 64%), saw the slowest relative decline (11%) in underweight rates between 1996-97 and 1999-2000. But Chittagong, which also had very high underweight rates in 1996-97 (60%), saw the sharpest relative decline over the three years (24%). Thus, there appears to be no pattern to the decline in child malnutrition across divisions.

A high degree of concentration in child malnutrition is observed in the country. In 1999-2000, two divisions – Chittagong and Dhaka – accounted for more than one-half of all underweight children in the country, while three regions – the above two plus Rajshahi – accounted for three-quarters of all underweight children.

The Government of Bangladesh has had several nutritional intervention programs going back to the 1970s. These include, among others, Food-for-Work (FFW), Test Relief, Food-for-Education, Gratuitous Relief (GR), and Vulnerable Group Development (VGD). In addition, in response to the devastating floods of 1998, the Government started the Vulnerable Group Feeding (VGF) program, which provides some four million vulnerable households in the country with 16 kg of wheat and rice per household per month. The data suggest that, while public food transfer programs are weakly associated with overall prevalence rates of child malnutrition, they appear to have large (inverse) associations with child malnutrition rates among the poorest quintile of children. The data also show large associations between the presence of an NGO program in a village and child malnutrition rates among the poorest quintile of children in that village.

A multivariate analysis of the probability of a child being underweight, using unit record data from the Child Nutrition Survey of 2000, indicates that higher birth-order children are significantly more likely to be underweight than lower birth-order children. However, the probability of being underweight does not vary significantly across boys and girls. Maternal schooling and the

log of monthly consumption expenditure per capita (proxying for a household's living standards) are observed to have strong inverse associations with underweight rates. Access to sanitation and proximity to a bus station are both associated with lower child underweight rates. The results also suggest that children residing in villages that experienced a flood in the five years preceding the survey were more likely to be underweight than children in villages that did not experience a flood. Interestingly, even after controlling for household living standards, the scarcity of land in a community (as proxied by mean land ownership per capita in a child's district of residence) is significantly and inversely associated with child underweight rates. Finally, the results suggest that of the various government nutritional programs, the presence of the Food-for-Work program in a village appears to be most strongly associated with lower child underweight rates.

Simulations based on the multivariate model estimated above and on various assumptions about changes in mean consumption per capita, adult female schooling, sanitation and Food-for-work program coverage, access to bus transport, and vulnerability to floods suggest that the child underweight rate in Bangladesh could decline by 12 percentage points – from 51% to 39% – from now to 2015. This would put the rate just slightly above the MDG level of having no more than 34% of children being underweight. The largest declines in the child underweight rate would come about with the expansion of female schooling (about 8 percentage points) and economic growth (of 3½ percentage points). The other interventions – flood control and management measures, improved bus transport, sanitation access, and improved coverage of the food-for-work program – would be associated with smaller declines (of about one percentage point each) in child underweight rates. The simulation exercise thus suggests that even though attainment of the child nutrition MDG will be challenging in Bangladesh, it should be possible to bring child underweight rates down sharply (and relatively close to the MD target) with a package of interventions that includes economic growth, flood control and management, expansion of female schooling, improved physical infrastructure (transport and sanitation access), and greater coverage by food assistance programs, such as Food-for-Work.

Primary School Enrollment

As with the other MD indicators, Bangladesh has achieved rapid progress in expanding schooling access during the last two decades. The gross primary enrollment rate, which was only 61% in 1980, increased to 72% by 1990 and to 96% by 2000. However, as in other developing countries, gross enrollment rates tend to be greater than net primary enrollment rates because of the late entry of children (i.e., beyond age 6) into primary school and the resulting enrollment of overage children (i.e., those above age 10) at the primary level. In the case of Bangladesh, the net primary enrollment rate, as estimated from household survey data, is estimated at about 65.4%. The MDGs call for a net primary enrollment rate of 100% by 2015.

There are large regional variations in the net primary enrollment rate. The rural areas of Faridpur, Tangail and Jamalpur, for instance, have net primary enrollment rates of only 48%, while the rural areas of Khulna, Jessore and Kushtia have net primary enrollment rates of 74%. Inter-district variations in the net primary enrollment rates are even larger. The low enrollment districts are found in the eastern, western and southern parts of the country.

Another education-related MDG is the retention of students at the primary level – viz., ensuring that the entire cohort of children who begins grade 1 completes grade 5. School completion is an indicator – albeit imperfect – of the quality of schooling. In this report, where we are restricted to cross-sectional data, a child is considered to have completed primary school if he/she reported having completed class 5 at the time of the survey and if he/she was not reported as never having

attended school. In 2000, the primary completion rate thus calculated was 66.3%. A similar calculation for India yields a primary completion rate of 61.4% in 1999-2000 (World Bank 2004).

As with the net primary enrollment rate, the primary completion rate also varies significantly across regions. At 84%, Other Urban Dhaka (i.e., urban areas outside the Standard Metropolitan Area of the city) has the highest primary completion rate, followed by rural Dhaka, urban Khulna, and rural Sylhet and Comilla. The rural areas of Noakhali and Chittagong rank at the bottom, with primary completion rates of 52%.

Survey data indicate that 4.7 million children aged 6-10 years (out of a total population of 18.8 million in that age group) do not attend school in the country, with this number being highly concentrated in a few regions. The rural areas of Faridpur, Tangail and Jamalpur account for nearly one-fifth of all out-of-school children aged 6-10 in the country. Three regions (out of a total of 14) together account for nearly one-half – and six regions account for three-quarters – of all out-of-school children nationally. Thus targeting schooling interventions to these regions would reduce the out-of-school child population considerably.

The Government of Bangladesh has, for a number of years, operated several income assistance programs, one of which directly links its benefits to the school attendance of primary school-aged children (viz., the Food-for-Education program). There is some evidence that some of these programs, especially the Food-for-Education, Vulnerable Group Feeding and Vulnerable Group Development programs, are associated with higher net primary enrollment rates. But there is no such evidence with respect to the primary completion rate.

Poor governance is pervasive in the educational sector of Bangladesh. Membership of school management committees is rife with politics, and teacher recruitment is often subject to personal influence. As in the public health sector, teacher absenteeism is rampant, with teachers placing much greater emphasis on private tutoring than on teaching at schools. There have been numerous textbook production and procurement scandals over the years, with books that are supposed to be distributed for free showing up for sale in markets. Corruption in procurement has also resulted in poor quality of school construction. These types of governance problems contribute to the poor quality of education in Bangladesh, and undermine the tremendous gains made in expanding access.

As in other sectors, NGOs have played an important role in promoting basic education in Bangladesh. At the present time, more than 400 NGOs are engaged in non-formal education programs in the country. Some of these NGOs have established innovative projects to promote basic education and literacy. For instance, the BRAC Non-Formal Primary Education Program caters to older children who never attended formal school and takes them from grade 1 to 3. This program is by far the largest single non-government primary education program in the country, with more than 30,000 schools and about a million pupils. More than 90% of the children who start in BRAC schools graduate, and a large proportion of the program graduates are admitted into grade 4 or higher of the government school system.

Multivariate analysis of net primary school enrollment, using unit record data from the HIES 2000, show that after controlling for age and other factors, girls are significantly more likely than boys to be enrolled in primary school, although the magnitude of the difference is modest. The results also indicate the following variables to be strongly positive associated with net primary enrollment: household living standards (proxied by monthly consumption expenditure per capita), adult male and female schooling within the household, the extent of paved roads in a district, proximity to a bus station, and presence of the Food-for-Education and the Vulnerable Group De-

velopment program in a village. The results also suggest that lower primary school pupil-teacher ratios in a district – an indicator of improved schooling quality – are associated with higher rates of school enrollment. Thus, net primary enrollment would likely benefit (modestly) from school quality improvements in the form of a reduction of the pupil teacher ratio.

A similar multivariate analysis of primary completion is disappointing, since few independent variables turn up as significant. The only variables that are significantly associated with primary completion are the log of per capita consumption expenditure, adult male schooling, and the presence of the Food-for-Education program in a village. Of these, the last variable has a perverse (negative) association, indicating that the Food-for-Education program is associated with lower rates of primary completion. Such a result makes little sense, especially given the earlier finding that the Food-for-Education program is strongly associated with higher rates of primary school enrollment. Likewise, the significance of adult male schooling, but lack of significance of adult female schooling, is troubling, given the large body of evidence indicating stronger associations of mother's (relative to father's) schooling with children's primary school enrollment and completion. It is thus not clear how much credence one can place in these unusual and counter-intuitive findings.

Simulations based on the multivariate models estimated above and on various assumptions about changes in mean consumption per capita, adult male and female schooling, Food-for-Education (now the Primary Education Stipends Program) and Vulnerable Group Development program coverage, percent of roads that are paved in a district, proximity to bus transport, and the average primary school pupil-teacher ratio in a district suggest that the net primary enrollment rate could increase by 21 percentage points – from 65% to 86% – from now to 2015. This would put the rate well below the MDG level of 100% of children aged 6-10 being enrolled in primary school. The largest increases in the net primary enrollment rate are obtained from expansion of adult male and female schooling, increases in household living standards (consumption expenditure per capita), and paving of rural roads. The other interventions are associated with increases in the net primary enrollment rate, but their individual contributions are relatively small in magnitude.

A similar simulation exercise for primary completion shows that rate increasing by 16 percentage points – from 66% to 81% – from now to 2015. The largest increases in the primary completion rate are brought about by the expansion of adult male schooling, followed by economic growth.

What these simulations suggest is that there is a great deal of scope for raising both the net primary enrollment rate and the primary completion rate in Bangladesh over the next 12 years with a package of interventions that include economic growth, expansion of adult male and female schooling, improved physical infrastructure (mainly roads and transport), and greater coverage by government programs, such as the Primary Education Stipends Program. However, the achievements in these rates are still likely to fall short of the levels called for by the education MDGs.

Gender Disparity in Schooling

School-based administrative data show Bangladesh as having made impressive gains in reducing gender disparities in primary and secondary schooling. The ratio of females to males in primary schools has steadily increased from about 83% in 1991 to 96% in 2000. At the secondary level, thanks largely to the Bangladesh Female Secondary Stipend program, there are already more girls enrolled than boys. Ministry of Education statistics indicate that, of the 7.7 million children enrolled in junior secondary and secondary schools in 2000, 4 million were females, implying a ratio of females to males in secondary schools of 112%.

A look at age-specific school enrollment rates indicates that, until age 9, approximately the same proportion of males and females attend school. However, beyond age 9, the percent of females attending schools is consistently higher than the percent of males attending school, and this trend continues until age 18. These results are nothing short of astonishing, since they are so different from the pattern found in the other countries of South Asia as well as in other countries at Bangladesh's level of per capita GDP. For instance, between ages 10 and 18, age-specific school attendance rates for boys are higher in India than in Bangladesh. However, the pattern is completely reversed for girls. At virtually every age, Bangladeshi girls have higher enrollment rates than Indian girls.

Although there are spatial variations in the extent of gender disparity in schooling in Bangladesh, the ratio of females to males in primary and secondary schools is never lower than 86% for any region (and goes as high as 117% in some regions). Six regions, out of a total of 14, have a female majority in primary and secondary schools. These include the rural areas of Noakhali, Chittagong, Rajshahi, Pabna, Barisal and Pathuakali and the urban areas of Khulna, Rajshahi and Dhaka.

What is responsible for these unusual results in Bangladesh? The uncommonly large enrollment of girls in secondary school is largely the result of a government initiative – the Female Secondary School Stipend (FSSS) program – launched in 1994. Under the FSSS, the government provides a cash incentive or stipend to households to cover a large portion of direct school expenses incurred by girls in grades 6-10. The stipend is paid directly to an account specially set up for each girl in a nearby commercial bank. The recipient girls are expected to pay miscellaneous school fees (but not tuition fees) out of their stipend. The FSSS program also provides tuition assistance, though this part of the financial assistance is paid to the school where the girl is enrolled, rather than to the girl directly. The coverage of other costs rises with grade because extra incentives are needed in the upper grades to reduce high dropout rates. The program simultaneously has attempted to raise the number of teachers – especially female teachers – in secondary school; provide occupational skills training to girls who are about to graduate; make schools more attractive to provide a healthier and safer setting for girls; and strengthened government institutions for secondary education.

The program appears to have been hugely successful in its twin objectives of increasing the number of girl students entering secondary school as well as keeping them in school until graduation. Clearly, with this program, Bangladesh has become a pioneer in South Asia in increasing female secondary enrollments and in narrowing gender disparities at the secondary level.

To understand which variables influence male and female school attendance differentially, we have estimated a multivariate model of school enrollment at the primary and secondary levels separately for boys and girls aged 6-18 years, using unit record data from the HIES 2000. The model shows that girls have a significantly higher probability of attending school than boys, and a significantly lower likelihood of dropping out, past the age of 10 and until the age of 17, even after controlling for the effect of other variables. Interestingly, greater consumption inequality in a district is associated with reduced enrollment of girls (but not boys). Adult male schooling in a household has a stronger positive association with boys' than girls' enrollment, while adult female schooling has exactly the opposite associations. This suggests that better-educated fathers (or other adult males in the household) favor boys (in terms of offering them more schooling opportunities), while better-educated mothers (or other adult females in the household) favor girls. Among the infrastructure variables, proximity to a bus station has a stronger association with girls' than with boys' enrollment, implying that improved transport would be associated with a narrowing of gender disparities in schooling.

Two school-related variables also have differential associations with male and female enrollment. The availability of a secondary school in a village has a strong positive association with female – but not male – school enrollment. This finding reinforces the earlier finding relating to bus transport – viz., when the distance and difficulty of reaching a school is reduced (either by having better roads and transport or having a secondary school in the village), the enrollment of girls increases much more than that of boys. The second school-related variable relates to the quality of schools. Higher pupil-teacher ratios in the village primary school are observed to have a stronger inverse association with the enrollment of girls than with the enrollment of boys. This result could indicate that parents are less willing to send their daughters (relative to their sons) to low-quality schools, or it could reflect that parents are concerned for their daughters' security when there are fewer teachers to supervise a large number of students.

Conclusions

The evidence reviewed in this report indicates that, of the five MDGs analyzed here, Bangladesh has already attained (or nearly attained) the goal relating to elimination of gender disparity in schooling opportunities. Bangladesh is the only country in South Asia other than Sri Lanka to have achieved parity in male and female enrollments not just at the primary level but also at the secondary level. This is an impressive achievement for a country that is one of the poorest countries in the world, with a per capita gross national income of only US\$1,770 (in PPP terms) in 2002. The analysis in this report suggests that attainment of two other MDGs – in particular, the reduction of consumption-poverty and under-five mortality – is also feasible with a combination of interventions, including sector-specific interventions (such as expanding immunization coverage and reducing pupil-teacher ratios), economic growth, improved coverage of infrastructure, and social safety-net programs (such as the District Education Stipends Program and the Vulnerable Group Development programs). However, it will be challenging for Bangladesh to attain the child malnutrition-related MDG as well as the education MDGs relating to universal net primary enrollment and primary completion. In the case of child malnutrition, the projections suggest that Bangladesh could come very close to – within 5 percentage points of – the MD goal of having no more than 34% of its children underweight. However, it will be challenging for the country to attain rates of net primary enrollment and primary completion exceeding 83-86% by 2015.

These achievements represent extraordinary progress for a country that, until recently, was frequently derided as an “international basket case.” Indeed, a recent article by Dreze (2004) suggests that Bangladesh is now ahead of India on most social indicators. Bangladesh has lower infant and maternal mortality rates, higher child immunization rates, better access to ‘improved’ water sources and sanitation, and higher primary enrolment rates than India. As noted earlier, Bangladesh has eliminated the gender gap not only in primary education but also in secondary education, while India still has a significant gender gap at both levels. Dreze admits that “Bangladesh is no paradise of human development,... but social indicators are improving quite rapidly not just for a privileged elite but also for the population at large.” On the other hand, Dreze contends that “... in India, social progress is slower and less broad-based, despite much faster economic growth. This is one indication, among many others, that India’s development strategy is fundamentally distorted and lop-sided.”

What accounts for the extraordinary progress in improving social indicators in Bangladesh (relative to, say, the progress made by India)? Dreze provides one possible answer. According to him, Bangladesh’s better performance may have to do with the fact that public expenditure on health as a proportion of GDP is almost twice as high in Bangladesh (1.5%) as in India (0.9%). This was not always so. In 1990, Bangladesh spent only 0.7% of its GDP on health – less than what India

spent (0.9%) (UNDP 2004). Thus, Bangladesh saw public spending on health increase very sharply during the 1990s, while India experienced stagnation in public spending on health (in relation to GDP growth).

While Dreze does not note differences between the two countries in terms of their public spending on education, it is instructive to look at public educational expenditures in Bangladesh and India as well. In 1999-2001, India's public spending on education was 4.1% of its GDP – considerably greater than public spending on education in Bangladesh, which was only 2.3% of GDP (UNDP 2004). However, as in the case of health, public expenditure on education in Bangladesh increased from 1.5% of GDP in 1990 to 2.3% of GDP in 1999-2001 – an increase of more than 50%. In contrast, public spending on education as a share of GDP increased by merely 5% over the same period in India – from 3.9% to 4.1% of GDP. Additionally, there is an important difference between Bangladesh and India in the composition of public spending on education. While Bangladesh spends 45.1% of its total public expenditure on education at the pre-primary and primary level, the relevant figure for India is 38.4%. At the other extreme, India spends 20.3% of its total public spending on education at the tertiary level, in contrast to Bangladesh's 11.1% (UNDP 2004). Thus, the rapid growth of public spending on education and health in Bangladesh, combined with its better balance of educational spending across the primary and tertiary sectors (relative to India), are likely to be important factors in explaining the significant progress the country has made in its social indicators during the 1990s.

Another factor that is likely to be important in explaining Bangladesh's relative success in attaining positive social outcomes is the work of its NGOs. Bangladesh may well be the world's leader in using NGOs as vehicles of development. NGOs are involved in virtually every activity in the country – relief and rehabilitation, poverty alleviation, health, education, social protection, and environmental protection, to name a few. A villager in Bangladesh can send his or her child to an NGO school, have family planning and basic health services delivered by an NGO health worker, obtain micro-credit financing from a choice of several NGO banks, sell milk and other dairy products to an NGO dairy cooperative, and make a telephone call on an NGO telephone! Secondary education in Bangladesh is almost entirely provided by the non-government sector – viz., the NGOs, for-profit schools, and religious schools (*madrasas*). Likewise, many of the family planning programs of the 1970s and 1980s, which set the stage for the subsequent decline in child mortality, were primarily delivered through NGOs. And several studies suggest that micro-credit programs, which were pioneered by one of the best-known NGOs in the world – the Grameen Bank, have had a significant effect on reducing poverty, especially among females.

NGOs in Bangladesh differ from NGOs in other developing countries in an important way: "...Several of these organizations have become very large, very professional, and they have become a model for others. Bangladesh, one of the poorest countries in the world and the last place you would have expected this to happen, has really become a leader in showing what the voluntary sector can do" (Smillie 1998).

Yet another factor in explaining Bangladesh's success, especially its ability to eliminate gender disparity in enrollment even at the secondary level, is the use of targeted public interventions, such as the Female Secondary School Stipend Program (FSSS). The FSSS program is essentially a Conditional Cash Transfer (CCT) or a demand-side intervention for rural girls (the majority of whom are poor) to attend secondary school. By all indications, the FSSS program has been hugely successful in increasing female secondary school enrollments, especially since secondary schooling in Bangladesh is not free and parents are often unwilling to invest in the secondary schooling of their daughters.

However, Bangladesh's progress on the MD indicators during the 1990s does not mean that there are no problems going forward. Indeed, there are several areas of concern highlighted in this report. First, there are very large regional disparities in virtually all of the MD indicators in Bangladesh. Districts such as Noakhali, Pathuakali, Chittagong, Rajshahi, and Sylhet have generally not performed well on several of the MD indicators. Even if Bangladesh as a whole attains some of the MDGs, there will be several areas of the country that will remain distantly behind. The analysis in this report suggests that many of the MD indicators are geographically concentrated in a few regions. This in turn means that targeting interventions, central government resources, and economic growth opportunities to the lagging divisions and districts will speed up attainment of the MDGs.

Second, the problem of governance – in particular, poor service delivery – is widespread in the social sectors in Bangladesh. Doctors, health workers and teachers are typically absent from their assigned posts at government health centers and schools. Membership of school management committees is highly politicized, and teacher recruitment is often subject to personal influence. Procurement of textbooks and essential drugs is rife with corruption. The quality of health and education services offered at most government health facilities is generally very poor. Yet the evidence presented in this report indicates the tremendous importance of service delivery in influencing MD outcomes. Infant and under-five mortality rates have fallen most in areas where effective family planning and MCH/FP programs are delivered to rural women with low schooling; female school enrollments have increased thanks to a well-designed and well-delivered secondary stipend program that reaches its intended beneficiaries; and public transfer programs that deliver food supplies to the vulnerable in rural areas, such as Food-for-Work, Vulnerable Group Feeding and Vulnerable Group Development, are associated with large reductions in child malnutrition among the poorest children. This suggests that better governance, and improved delivery of social services in particular, would be very important to attaining the MDGs.

Better delivery of public services – whether in health, schooling, nutrition, or infrastructure – is a complex and difficult task that entails creation of the right institutions and incentives, including devolving responsibility for service delivery to local governments and communities, contracting out certain types of service delivery to the non-government sector, empowering consumers to demand better services from government health facilities, introducing competition among public providers, and ensuring the motivation of front-line workers (World Bank 2003).

There are some other findings in this report that are useful to reiterate. Although the report assesses the likelihood of Bangladesh attaining the different MDGs, it needs to be noted that the different MDGs are not always internally consistent. For instance, simultaneous attainment of the poverty and child malnutrition MDGs by Bangladesh would result in 30% of the population being poor but 34% of the children being underweight. The contrast is even greater when the results of the simulations undertaken in this report are considered. We find that, under plausible scenarios, Bangladesh could bring down its poverty headcount rate to 16% by 2015, but it would still have many as 39% of its children underweight. Thus, a large number of children who are classified as non-poor would in fact be underweight. This inconsistency indicates a problem in the manner in which poverty and/or underweight thresholds are established.

The simulations carried out in this report also suggest that economic growth that brings about an improvement in household living standards is strongly associated with virtually every MD indicator. For example, real per capita GDP growth of 4% per annum in Bangladesh could alone bring down the under-five mortality rate by about 8 deaths per 1,000 live births and the incidence of poverty by 21 percentage points between now and 2015. In addition, this growth could bring about an increase in the net primary enrollment rate of 5 percentage points by 2015. In other

words, rapid economic growth could make significant contributions to an improvement in all the MD indicators between now and 2015.

Finally, the importance of systematically monitoring MD outcomes at disaggregated levels and evaluating the impact of public programs cannot be overemphasized. There is a paucity of reliable, time-series data on most MD indicators at the district and *upazila* (sub-district) levels. The lack of such data makes it virtually impossible to monitor progress toward attainment of the MDGs at lower levels of administration. In addition, with the exception of a few food assistance and micro-credit programs, most public interventions in Bangladesh have not been subjected to rigorous, independent evaluation. In order to choose the right set of interventions with which to attain the MDGs, it is critical to know which programs have been successful in improving MD indicators and which have not.

I. INTRODUCTION

The Millennium Development Goals

Since the launch of the Millennium Development Goals (MDGs) at the Millennium Summit held in New York in September 2000, the MDGs have become the most widely-accepted yardstick of development efforts by governments, donors and NGOs. The MDGs are a set of numerical and time-bound targets related to key achievements in human development. They include halving income-poverty and hunger; achieving universal primary education and gender equality; reducing infant and child mortality by two-thirds and maternal mortality by three-quarters; reversing the spread of HIV/AIDS; and halving the proportion of people without access to safe water. These targets are to be achieved by 2015, from their level in 1990 (United Nations 2000).

Almost all the countries in the world, including Bangladesh, have committed themselves to attaining the targets embodied in the Millennium Declaration by 2015. Unfortunately, there is little understanding of whether Bangladesh will be able to attain all of the MDGs, and whether there are some MDGs that Bangladesh will be able to attain. There is even less understanding of what it will take – by way of economic growth, infrastructural investments, and social-sector interventions – to attain the different MDGs. Further, this report argues the importance of disaggregating the MDGs for Bangladesh, given the very large geographical and socioeconomic variations in millennium development (MD) indicators across the country.

This report focuses on the attainment of five major human development-related MDGs by sub-national units in Bangladesh – consumption poverty, under-five mortality, child malnutrition, schooling enrollment and completion, and gender disparities in schooling. The selection of these MDGs for detailed analysis was based in large part on the availability of reliable sub-national data. For example, reliable data on disease prevalence at the district or divisional level are simply not available, and this hampers useful sub-national analysis of the communicable disease-related MDG. The same is true of another important MD indicator – maternal mortality.

Data, Methodology and Caveats

Data. Virtually all of the analysis in this report is based on three sets of national household surveys. First, data from three rounds of the nationally-representative Bangladesh Demographic and Health Survey (BDHS), which were collected in 1993-94, 1996-97, and 1999-2000, are used to analyze the levels and correlates of infant and under-five mortality and malnutrition (NIPORT 2001). Second, unit record data from the 2000 Child Nutrition Survey (CNS) conducted by the Bangladesh Bureau of Statistics (BBS) are also used to analyze the levels and correlates of child malnutrition. Third and finally, unit record data from the 2000 Household Expenditure and Income Survey (HIES), also conducted by the BBS, are used to analyze the levels, patterns, and correlates of consumption poverty, schooling enrollment and completion, and gender disparity in schooling.

Methodology and Assumptions. The methodological approach adopted in this report is roughly as follows. We apply econometric estimation techniques to district or household data in order to analyze the socioeconomic and policy correlates of the selected MD indicators. These estimates are then used to simulate the likely trajectory of the MD indicators under alternative scenarios of change between now and 2015.

For projecting the time-path of the different MD outcomes to 2015, we consider a few common scenarios. One of these is that mean consumption expenditure per capita in Bangladesh will grow annually at about 2.7% between now and 2015. During the 1990s, per capita consumption expenditure in Bangladesh grew by 2.2% per annum, while per capita GDP increased by 3.3% over. Assuming that the same relationship holds in the future, the 2.7% consumption growth we have assumed would be consistent with an annual GDP per capita growth rate of 4%; in other words, we assume that economic growth will be somewhat (but not substantially) higher in the future than it was during the 1990s. The other assumption that is common to virtually all the simulations is an increase in adult male and female schooling. Here our assumption is that both male and female adult schooling will increase by 0.3 years annually between now and 2015. Such growth would result in mean schooling reaching a level of 7 years for females and 9 years for males by 2015 (from their 2000 values of 4.5 and 2.5 years, respectively). Admittedly, these assumptions are arbitrary, but, given the enormous investments being made in education in Bangladesh during the 1990s, the assumptions are realistic and likely to materialize over the coming decade. More importantly, as is noted throughout the report, none of the assumptions made are sacrosanct; they are only meant to illustrate the range of MD outcomes under a set of possible scenarios. The projections could be undertaken for any combination of changes in the policy or environmental variables.

Additional sector-specific assumptions are made for projecting the individual MD outcomes.² For instance, in the poverty simulations, we assume that consumption inequality will continue to rise and per capita land availability will continue to decline at roughly the rates at which these variables have changed during the decade of the 1990s. In the nutrition simulations, it is assumed that sanitation coverage and coverage of the Food-for-Work program will continue to expand and that more effective flood-control measures will reduce slightly the vulnerability of Bangladeshis to floods. Prior to each simulation, the full set of assumptions made for the simulation is detailed in the text.

Caveats. By its very nature, any empirical analysis is predicated on assumptions about data quality and measurement, inferences of causality between variables, and potential biases of statistical and econometric estimates. The analysis presented in this report is not immune to these same concerns. It is therefore important to note at the outset that while the results and simulations presented in this report may give an impression of precision, they are not that.³ They should be treated as indicative of possible broad trends, and could

² The choice of ‘policy’ variables to use in the simulations is largely dictated by the econometric model used. In other words, only policy or environmental variables that have statistically significant associations with the MD outcome variable in the econometric analysis are used in the projections.

³ In addition to lack of precision, the estimates presented in this report, like other econometric estimates, may be subject to systematic biases arising from measurement errors in the independent variables and from the omission of important variables and unobserved heterogeneity from the analysis.

usefully be complemented with other analyses using different methodological approaches. As long as the results are used with this understanding, they can be helpful in 'rough-order' planning for MDG attainment.

Finally, it is important to note an important limitation of the simulations performed in this report. The simulations are based on statistical analysis of household survey data. By its very nature, such analysis tends to over-emphasize readily-measurable variables, such as household income or consumption, adult schooling levels, and access to infrastructure, and under-emphasize qualitative variables, such as the quality of institutions, governance, and empowerment. Obviously, this does not imply that the latter variables are irrelevant to the MD indicators; indeed, institutional reform and good governance are critical to the attainment of the MDGs. It is therefore important to view the messages of this report as complementing those from the numerous qualitative (and detailed) studies of health, nutrition, schooling and poverty that have been conducted in the past.

Overview of Bangladesh's Development Record

Bangladesh has achieved considerable success in the areas of lowering population growth, fostering women's empowerment, reducing aid dependence, achieving success in human development, maintaining a decent level of macroeconomic stability with pronounced outward orientation, overcoming the shadow of famine, attaining effective disaster management capacity, and promoting NGOs as an alternative delivery mechanism. Not many countries at Bangladesh's level of income can list so many of these achievements. Especially in light of Bangladesh's dismal record at development during the 1970s and 1980s, this is remarkable progress indeed!

It is true that the level of social indicators in the country is still modest compared to the historical standards set by the East Asian economies or, for that matter, the standard set by neighboring Sri Lanka and the Indian state of Kerala. However, given Bangladesh's adverse initial conditions, high population density, vulnerability to disaster, and low stock of natural resources, its achievements are impressive. Since Bangladesh represents livelihoods at the margin, its success at improving the quality of human existence under the most extreme of conditions holds a very important lesson for all developing countries.

Bangladesh has witnessed the sharpest decline in infant mortality of any developing country (Stern 2002). It is widely seen as a successful case in the area of population control in the face of low income and low literacy through favorable public policy toward family planning, women's empowerment, and community involvement (Sen 1999, BIDS 2001, Dev *et al.* 2002). The virtual elimination of gender disparity in the enrollment rate up to the junior secondary level is another major accomplishment. Although the country is yet to attain a sex ratio consistent with the expected biological advantage associated with higher female survival, it has already achieved gender parity in life expectancy. As a result of all these achievements, Bangladesh, for the first time in its independent history, has graduated from being the "test case of development" (Faaland and Parkinson 1975) to being classified as a "medium human development" country (UNDP 2003).

II. CONSUMPTION POVERTY

Overall Trends

At the time of its independence, the incidence of poverty in Bangladesh was very high, with nearly three-quarters of the country's population in 1973-74 being poor (Hossain and Sen 1992). The country has made considerable progress in reducing poverty since then, especially during the nineties.

Figure II.1 shows the headcount ratio of poverty, using data from the Household Income and Expenditure Survey (HIES) and a new poverty line established by the BBS and the World Bank (World Bank 2003). The figure suggests that, nationally, poverty fell by 9 percentage points during the 9 years between 1991-92 and 2000 – an annual rate of decline of one percentage point.⁴ From all accounts, the decline in poverty was more rapid in the 1990s than

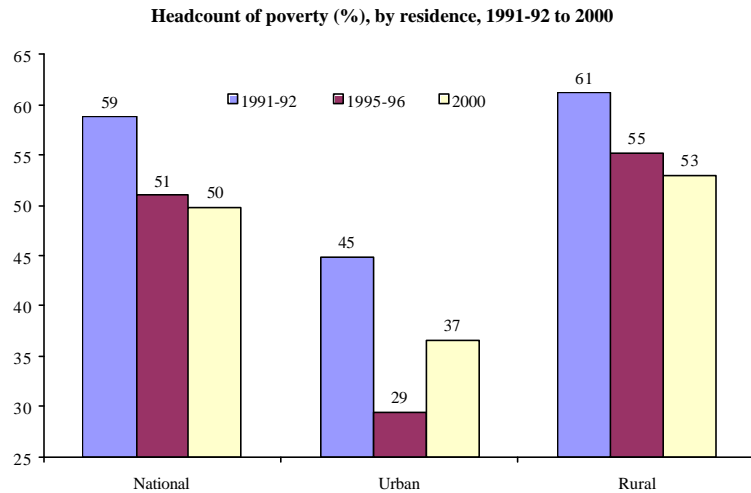


Figure II.1

during earlier decades, possibly because of the more rapid pace of economic growth during this period. Annual per capita consumption expenditure, which grew at an annual rate of 0.6% between 1983-84 and 1991-92, grew more than four times as fast (2.7% annually) between 1991-92 and 2000. National income data show the annual growth in per capita GDP accelerating from about 1.5% in the 1980s to nearly 3% during the 1990s.

Figure II.1 also suggests that the incidence of poverty declined slightly more in the rural than in the urban areas of the country. In 1991-92, poverty in the urban areas was 73% of that in the rural areas; by 2000, the ratio had declined further to 70%.

The data in Figure II.1 also suggest that the rate of decline in poverty was more rapid in the early part of the decade than in the latter part. However, other data do not corroborate this differential performance across the early and the late 1990s (World Bank 2003). In what follows, we largely use the poverty rates for 1991-92 and 2000.

⁴ Note that the reduction in poverty during the 1990s is smaller if household income (instead of consumption) is used to measure poverty.

Trends in Real Agricultural Wages

Since the poorest of the poor typically tend to be agricultural laborers, it may be worthwhile looking at the trends in agricultural wages. The trends in the agricultural daily wage rate are shown in Figure II.2. The real agricultural daily wage rate for male laborers increased from about 20 taka in 1983-84 to 24 taka in 1991 – an annual increase of 2.3%. But it largely stagnated during the 1990s, increasing by only 1.3% annually between 1991 and 2000.⁵

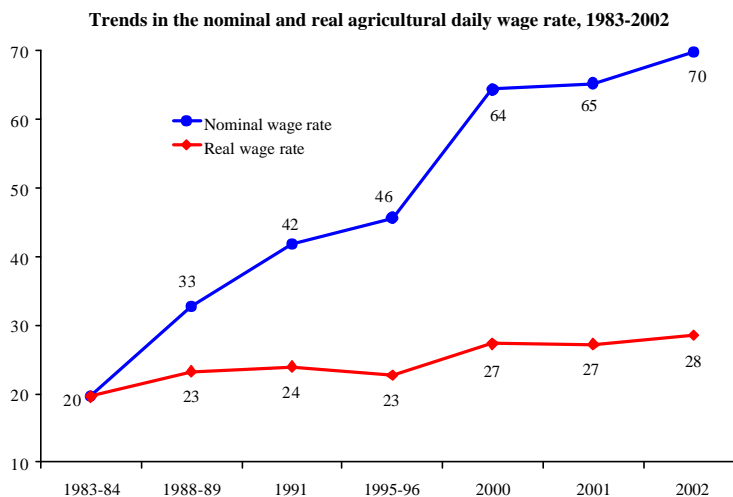


Figure II.2

International Comparisons

How does the trend in poverty incidence in Bangladesh during the 1990s compare with the trends observed in other countries of the region over the same period? Figure II.3 shows the poverty headcount ratios (based on national poverty lines) in Bangladesh, India and Pakistan at different points during the 1990s. While there are serious methodological problems in comparing poverty incidence across countries, a broad conclusion about the

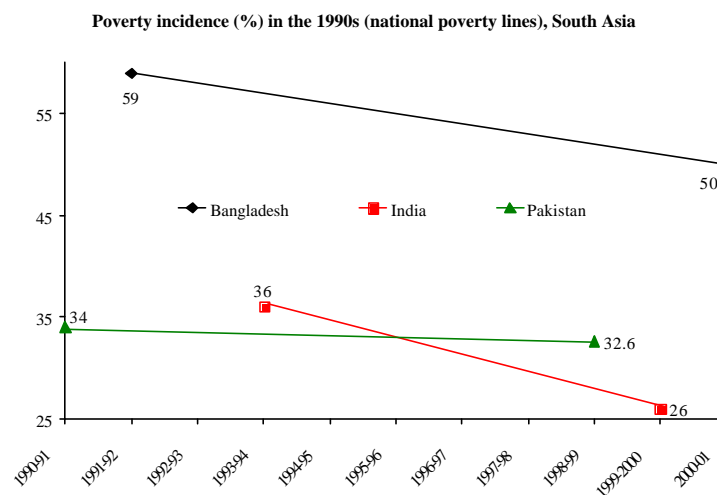


Figure II.3

pace of poverty reduction can be made – viz., Bangladesh's performance on poverty reduction during the 1990s has bested that of Pakistan, where poverty was largely stagnant during the last decade, but it has fallen short of poverty reduction in India, where the

⁵ This is so if one uses the rural CPI deflator. However, if the price of coarse rice is used as a deflator, the increase in real wages is greater in the 1990s.

poverty headcount ratio fell from 36% in 1993-94 to 26% in 1999-2000 – an annual decline of 1.7 percentage points.⁶

Spatial Variations

There are large variations in poverty incidence across geographical areas. Figure II.4 shows that the poverty headcount ranges from 27% in Other Urban Dhaka to 65% in Rural Rajshahi and Pabna. The rural areas of Faridpur, Tangail and Jamalpur, as well as the rural parts of Bogra, Rangpur and Dinajpur, are among the poorest regions of the country.

Figures II.4 and II.5 also suggest wide regional variation in the pace of poverty reduction during the 1990s. For example, poverty fell by 50% between 1991-92 and 2000 in Other Urban Dhaka and by 37% in rural Barisal and Pathuakali. In contrast, poverty actually rose (albeit by a modest 4%) in rural Sylhet, Comilla, Noakhali and Chittagong. Even Metropolitan Chittagong saw virtually no change in poverty during this period.

In general, the pace of poverty reduction during the 1990s was somewhat more rapid in areas that had higher initial levels of poverty in 1991 (Figure II.6), which implies modest regional convergence in poverty headcount rates.⁷

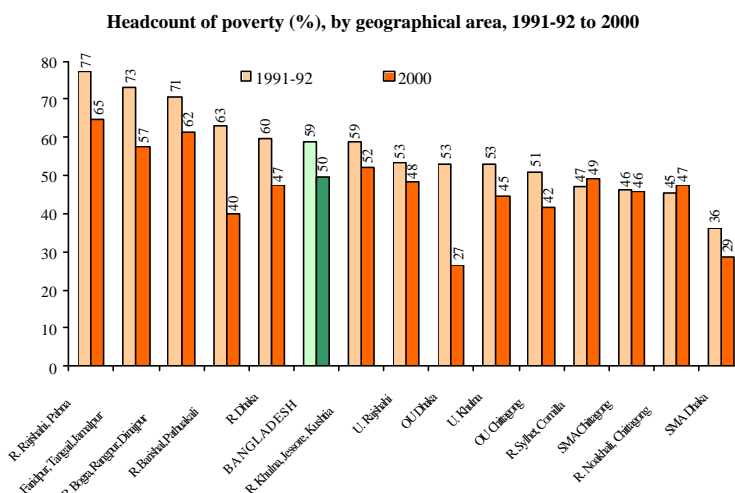


Figure II.4

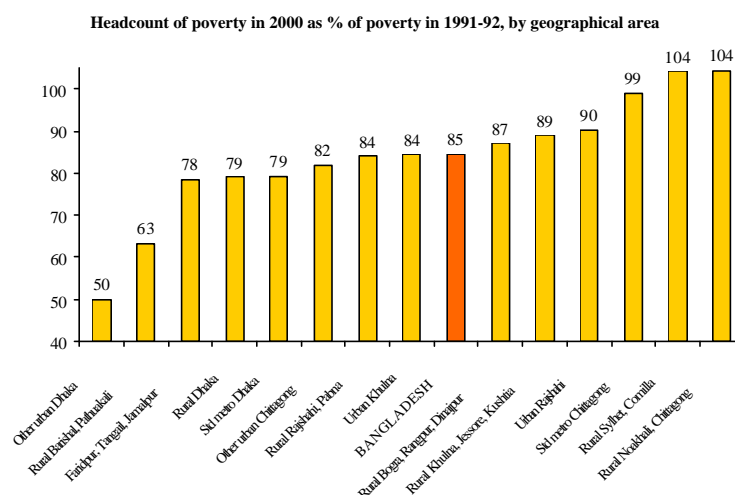


Figure II.5

⁶ There has been some controversy about the Indian poverty figures. Using an alternative methodology, Deaton and Dreze (2002) report the decline to be from 29% to 22% (Deaton and Dreze 2002), which works out to an annual reduction of about 1.2 percentage points – a little more than that recorded for Bangladesh.

⁷ Note that this does not necessarily imply reduction in overall consumption inequality over time. Indeed, the Gini coefficient increased from 0.26 in 1991-92 to 0.31 in 2000.

Map II.1 is a map of Bangladesh showing district-level variations in consumption poverty in 1995.⁸ As is obvious from the map, poverty is pervasive in the country, with a large number of districts throughout the country having high rates of poverty.

Geographical Concentration of the Poor

Since some of the most populous regions in Bangladesh also have the highest rates of poverty, the poor are heavily concentrated geographically. Figure II.7 shows that three regions – comprising the rural areas of Bogra, Rangpur, Dinajpur, Faridpur, Tangail, Jamalpur, Sylhet and Comilla – account for 42% of all the poor in the country. Six regions, out of a total of 14,

account for nearly three-quarters of all the poor. The geographical concentration of the poor has important implications for the targeting of poverty-alleviation interventions.

Growth Incidence

The growth incidence curve for Bangladesh, which shows the relative gains in per capita consumption during 1991-92 to 2000 for dif-

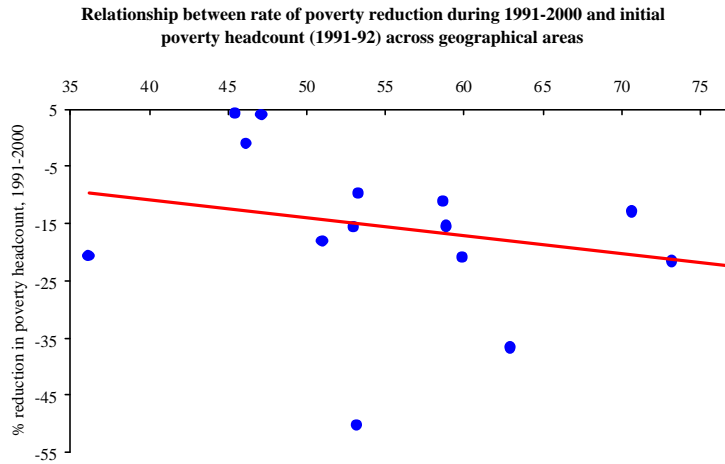


Figure II.6

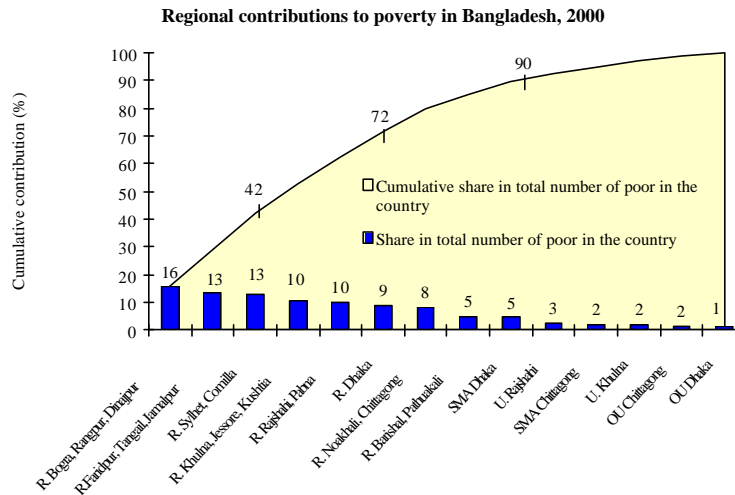


Figure II.7

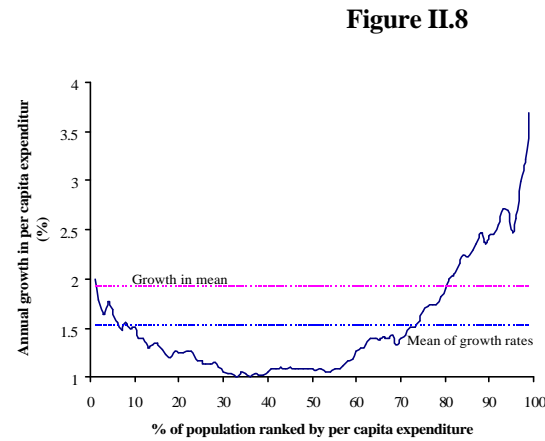
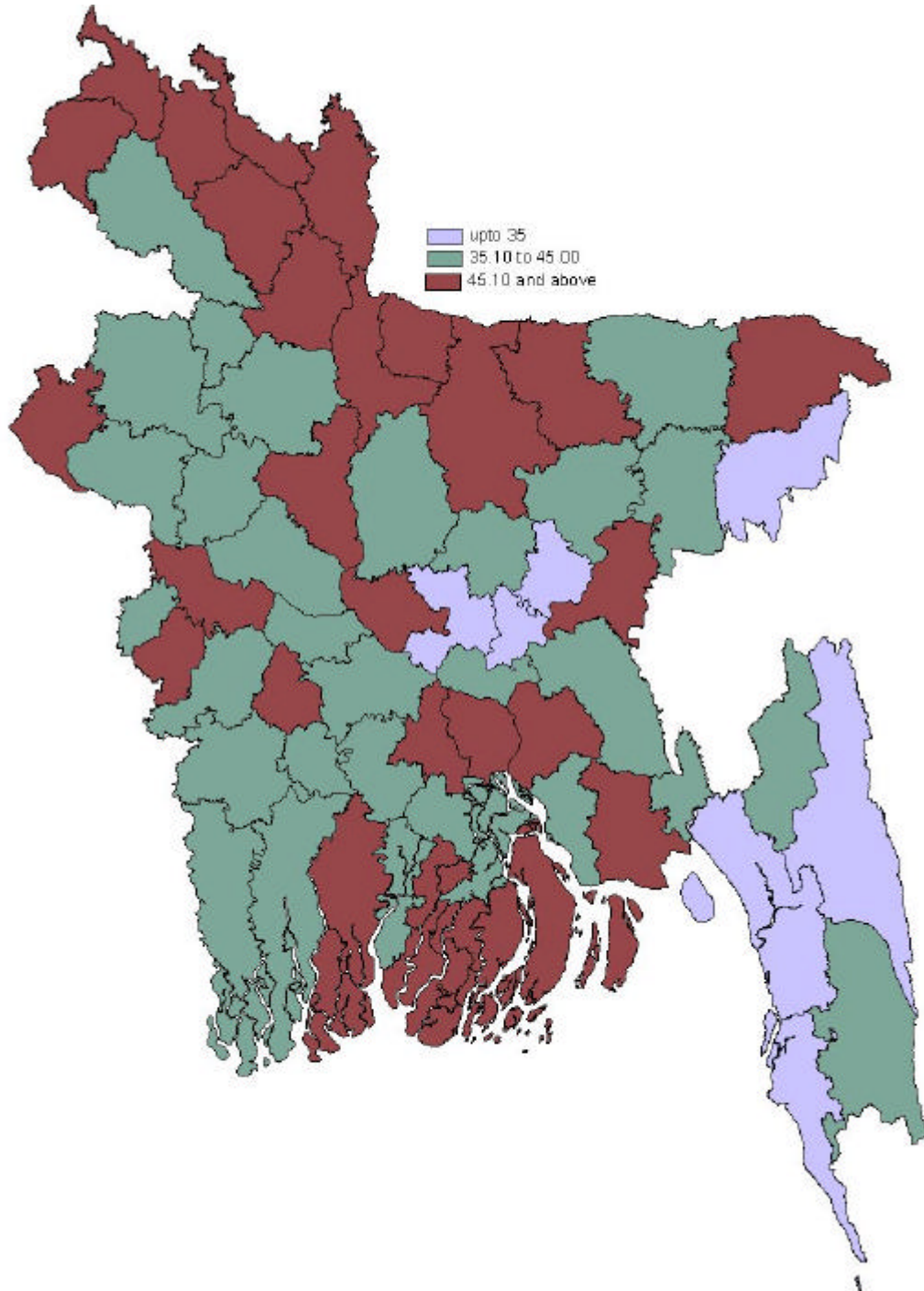


Figure II.8

⁸ More recent district estimates of consumption poverty are not available. The poverty rates shown in the map are based on the ‘old’ national poverty line, and therefore are not comparable to those discussed earlier in this chapter.

ferent deciles of the population, is reproduced from World Bank (2003) and shown in Figure II.8. The entire curve lies above zero, indicating that all segments of the population experienced growth in living standards over this period. However, the growth rates experienced by households varied considerably over the expenditure distribution, with the lowest and the highest consumption groups benefiting significantly more than the middle consumption groups.



Map II.1: District-level consumption poverty headcount rates (%), 1995

Profile of the Poor

Occupation. Who are the poor in Bangladesh? One distinguishing feature of the poor is their occupation. The group having the highest probability of being poor is agricultural (casual) laborers, with more than three-quarters of agricultural laborers in the country being poor (Figure II.9). The group with the next highest incidence of poverty is small farmers (those operating less than one acre of land), followed by self-employed entrepreneurs. Large farmers have the lowest incidence of poverty.

Land ownership. Another common trait of the poor in Bangladesh is their lack of ownership of land. This is not surprising as the Bangladeshi economy is heavily agricultural, and land is the most important factor of production in agriculture. Figure II.10 indicates that while the incidence of poverty among households owning less than half an acre of land is 57%, this ratio is only 13% among households owning 5 or more acres.

Demographic characteristics. One near-universal identifying characteristic of the poor throughout the world is their large family size. In Bangladesh, as well, there is a very strong association between

Headcount ratio of poverty (%), by occupation of household, 2000

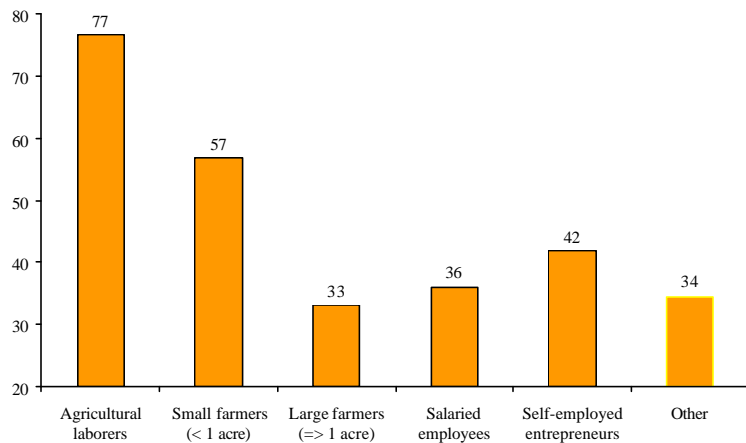


Figure II.9

Headcount ratio of poverty (%), by amount of owned land, 2000

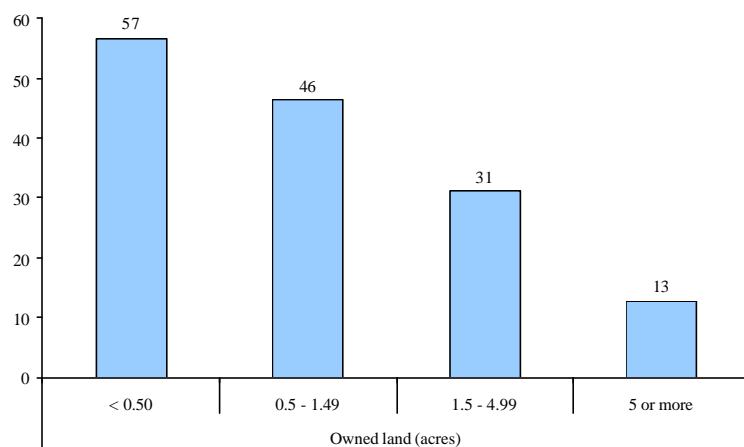


Figure II.10

Headcount ratio of poverty (%), by household size and sex and age of household head, 2000

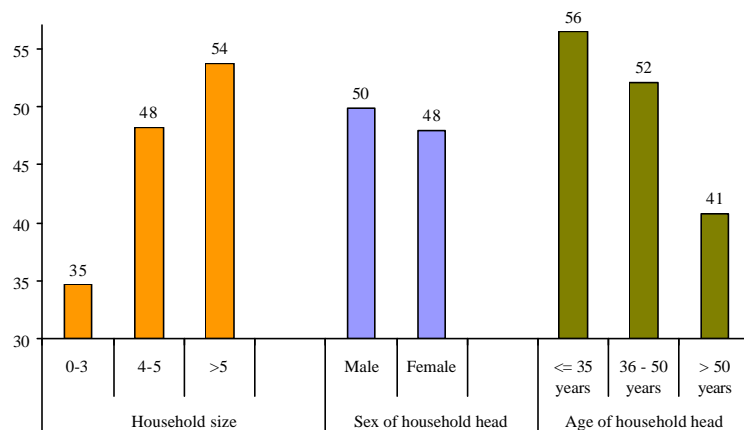


Figure II.11

poverty incidence and household size (Figure II.11). For example, in 2000, the incidence of poverty among households with three or fewer members was only 35%, as against 54% among households with more than five members.

In addition to household size, the age of the household head is an important correlate of poverty, reflecting life-cycle patterns of poverty. Households with younger heads are much more likely to be poor than households with older heads (Figure II.11). However, the data do not indicate any association between poverty and the sex of the household head (Figure II.11).⁹

Schooling. There is a great deal of evidence from around the world that human capital – especially in the form of schooling – provides an important means of escaping poverty. Schooling increases an individual’s skills and productivity, allowing him or her to increase earnings and lower the likelihood of poverty. Figure II.12 shows that the schooling of females is even more strongly associated with reduced poverty for the household than the schooling of male members. For instance, the incidence of poverty among households in which the highest-educated adult female has 8-9 years of schooling is 22%; the comparable figure for households where the highest-educated adult male has 8-9 years of schooling is significantly higher (35%). Likewise, the reduction in poverty from having 10 or more years of schooling is much larger when the schooling accrues to females within the household.¹⁰

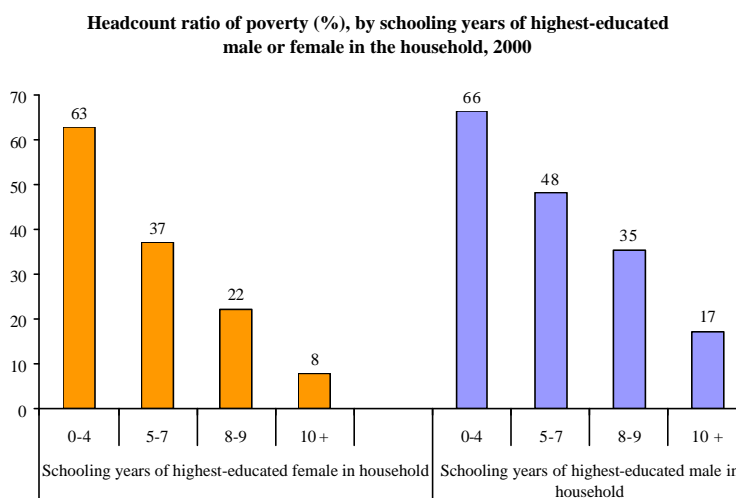


Figure II.12

The Role of Public Interventions

Infrastructure. An inverse association between infrastructure in a community and the incidence of poverty in that community does not imply any causal relationship between the two variables. The association could reflect that better-off communities are able to invest in more and better-quality infrastructure, or it could reflect that infrastructure increases

⁹ However, female headship is associated with higher levels of *extreme* poverty.

¹⁰ Of course, the association between poverty and schooling may not reflect causality, since there is no control for parental background. If better-off parents provide their children with more schooling and also bequeath them more land, an inverse association between the poverty status and schooling of the children would not necessarily reflect the poverty-reducing effects of schooling. The available data do not permit extensive exploration of such possibilities.

the productivity and earnings of individuals and thereby reduces the likelihood of their being poor.

It is nevertheless useful to examine the association between poverty and infrastructure using the HIES data for 2000. Figure II.13 suggests strong positive associations between poverty and three types of infrastructure – paved roads, bus transport, and electricity. For instance, the incidence of poverty in districts having more than 15% of the roads are paved is 46%, as compared to an incidence of 56% if districts where 10% or less of the roads are paved. Likewise, availability of a bus station in a village is associated with a reduction of 8 percentage points in the incidence of poverty in that village. Finally, an electrified village is observed to have a 15% reduced incidence of poverty.

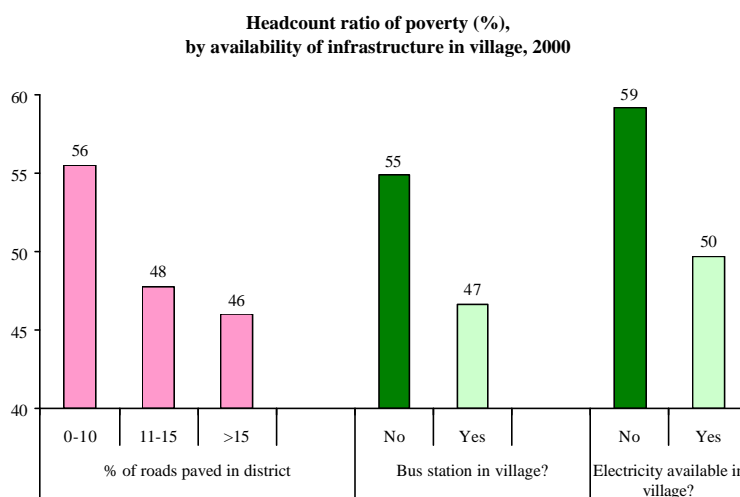


Figure II.13

Government programs. The Government of Bangladesh has had several in-kind food assistance programs going back to the 1970s, many of which benefit the

poor. These include, among others, Food-for-Work (FFW), Test Relief, Food-for-Education, Gratuitous Relief (GR), Vulnerable Group Development (VGD), and the Vulnerable Group Feeding (VGF) program.

Since the community module of the HIES 2000 collected information on whether selected government programs were operating in the village during the past year, it is possible to test the hypothesis that public transfer programs are associated with reduced poverty. The same caveat discussed earlier in the context of infrastructure applies here – viz., an observed association between public transfer programs and poverty does not reflect causality. Indeed, given that these programs are typically well-targeted to the poor in

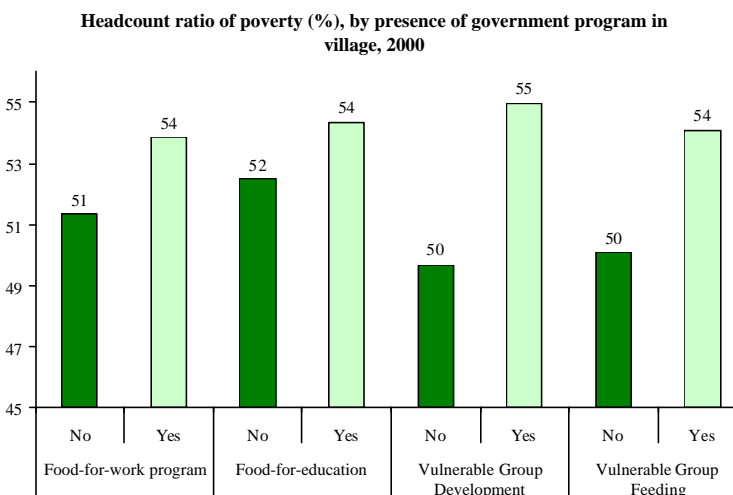


Figure II.14

Bangladesh (World Bank 2003), one would expect them to be associated with higher rates of poverty.

The evidence from HIES 2000 certainly seems to bear out this result (Figure II.14). In most cases, the presence of a government transfer program in a village is associated with a higher incidence of poverty in that village. In most cases, the difference in poverty incidence between villages having the program and not having the program is modest – about 2-5 percentage points.

Role of NGOs. While NGOs have been important actors in development – and particularly in poverty alleviation – in most developing countries, nowhere has their importance been as great as in Bangladesh. NGOs, such as the Bangladesh Rural Advancement Committee (BRAC), PROSHIKA, and the Grameen Bank, are well known throughout the world for their pioneering work in micro-credit, skill development, and employment generation. It is estimated that nearly 80% of the villages in Bangladesh are now covered by some NGO program or project.

One of the most rigorous attempts to estimate the impact of group-based micro credit programs – a very common NGO intervention in the area of poverty alleviation – found significant effects on many household outcomes (Pitt and Khandker 1998).¹¹ In particular, the study observed a significant positive effect of participation in the credit programs on household consumption per capita (and thereby on the risk of poverty). The study also found that participation in the micro-credit programs by females had a much stronger effect on household living standards (as well as on other outcomes, such as children's schooling) than participation by males.

Multivariate Analysis

To examine the likelihood of Bangladesh attaining the poverty MDG, we have estimated a multivariate model of poverty incidence, using household data from the HIES 2000.¹² The multivariate model has the advantage of controlling for several variables that may be simultaneously associated with poverty. The estimation results are reported in Annex Table 1, while only the broad findings of the empirical analysis are discussed here.

The multivariate model confirms many of the bivariate relationships discussed earlier. Even after controlling for other variables, agricultural labor households are observed to have the highest probability of being poor. The amount of land owned per capita is strongly inversely associated with poverty, with a one percent increase in land ownership being associated with a reduction in the probability of being poor by 0.2%. Likewise, larger households and households headed by younger heads are significantly more likely to be poor than smaller households and households headed by older heads, respectively. The schooling of adult males and females has a strong inverse association with the probability

¹¹ The study used a quasi-experimental design and allowed for the fact that certain types of individuals might self-select themselves into the credit programs.

¹² Since the dependent variable in the model is a dichotomous variable (i.e., whether or not a household is poor), the model has been estimated by the maximum-likelihood probit method.

of being poor, with the schooling of females having a slightly (but not significantly) larger association.

All three infrastructure variables – the extent of paved roads, electricity coverage, and availability of bus transport – have significant associations with poverty. However, neither of the two government program interventions included – the VGD and the Food-for-Work program – has any significant correlation with poverty.

The variable that has the strongest association with poverty is the log of mean district consumption expenditure per capita, which is used as a proxy for average living standards in a district. The implied ‘growth elasticity’ of poverty – i.e., the percent reduction in the poverty headcount ratio associated with a one percent increase in mean district consumption expenditure per capita – is slightly more than -1 (viz., -1.14), implying that economic growth has a one-for-one association with poverty reduction.¹³

In addition to mean district consumption expenditure per capita, we include an explanatory variable in the probit equation reflecting income inequality (proxied by the Gini coefficient of per capita consumption expenditure). The empirical results suggest that, controlling for mean consumption, poverty is associated positively and strongly with consumption inequality. The elasticity of poverty with respect to the Gini coefficient is estimated to be 0.7, implying that a one percent increase in the Gini coefficient of consumption inequality would be associated with a 0.7% increase in poverty. These results suggest that worsening consumption (or income) inequality can substantially offset – even reverse – the beneficial effect of economic growth on poverty reduction.

Another variable that is included in the probability-of-poverty model is the average per capita availability of land in a district. The latter variable is included to test whether aggregate natural resource constraints have an additional association with poverty over and above household resource (land) constraints. However, the results do not indicate any such significant association.

Simulations to 2015

Based on the multivariate probit model estimated above, we have undertaken simulations of the poverty headcount ratio in Bangladesh to 2015 under certain assumptions. The nature and magnitude of the interventions are detailed in Table II.1. The scope and magnitude of the assumed interventions are only meant to illustrate the likely reduction in poverty under one possible scenario. It is obviously not possible to predict whether the assumed interventions will indeed take place, and, even if they do, whether they will proceed as the pace assumed in Table II.1.

¹³ Using regional data over three time periods (1991-92, 1995-96 and 2000), the World Bank (2003) estimated the growth elasticity of poverty to be much larger (viz., 2.12). The difference in the two estimates could be accounted for by (i) the use of aggregated regional data in the other study versus our use of household data, and (ii) our control for other socioeconomic variables (such as schooling, land ownership, etc.) versus the lack of control for these other factors in the other study.

Table II.1: Assumptions about various interventions to reduce consumption poverty, 2001 to 2015

Intervention	Starting value in 2000	Assumed change per year	Ending value in 2015
Adult male schooling (years)	4.5	0.3	9.0
Adult female schooling (years)	2.5	0.3	7.0
Mean of district monthly consumption expenditure per capita (Taka)	900	2.7%	1,342
Gini index of consumption inequality	30.0	0.5	37.5
Per capita availability of land (acres)	0.16	-2%	0.12
Availability of bus station (%)	21	1% points	36
Electricity coverage (%)	64	1% points	79

The assumption that mean district monthly consumption expenditure per capita will grow annually at about 2.7% to 2015 needs some elaboration. During the 1990s, per capita consumption expenditure grew by 2.2% per annum, while per capita GDP increased by 3.3% over. Assuming that the same relationship holds in the future, the 2.7% consumption growth we have assumed would be consistent with an annual GDP per capita growth rate of 4%; in other words, we assume that economic growth will be somewhat (but not substantially) higher in the future than it was during the 1990s.

In addition, we assume that consumption inequality will increase and per capita land availability will decline at the same rate at which these variables have changed during the decade of the 1990s. As noted earlier, none of these assumptions are sacrosanct; they are only meant to be illustrative. The projections could be undertaken for any combination of changes in the policy or environmental variables.

Figure II.15 shows the projected changes in the incidence of consumption poverty in Bangladesh when all seven policy and environmental variables proceed as shown in Table II.1. The declining availability of land per capita is associated, understandably so, with rising poverty (from about 50% to 52%). Increasing inequality is further associated with another 8 percentage point increase in poverty (to 60%). However, all the other interventions contribute to reductions in poverty. Both the expansion of male and female schooling are associated with large declines (10-12 percentage points

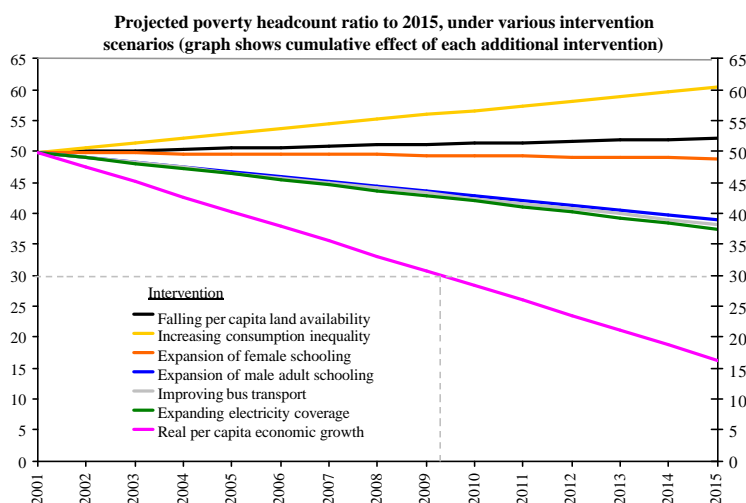


Figure II.15

However, all the other interventions contribute to reductions in poverty. Both the expansion of male and female schooling are associated with large declines (10-12 percentage points

each) in poverty incidence, but the contribution of transport and electricity access are very small (less than one percentage point each over the entire period). Finally, annual per capita GDP growth of 4% is associated with the largest decline in poverty (of about 21 percentage points). Together, the seven policy and environmental variables are associated with a reduction of about 33.5 percentage points in the incidence of poverty – bringing the poverty headcount rate well below the MDG level (16% versus 30%). Indeed, the projections suggest that real per capita economic growth of 4% annually, *without any increase in consumption inequality*, would by itself allow Bangladesh to just meet its MD target. However, if consumption inequality increases at the same rate as it has during the 1990s, this would not be possible.

What these simulations underscore is that attainment of the poverty MDG certainly appears plausible in Bangladesh, but only if the country maintains strong economic growth and continued expansion of male and female schooling, and prevents income and consumption inequality from rising, in the years ahead.

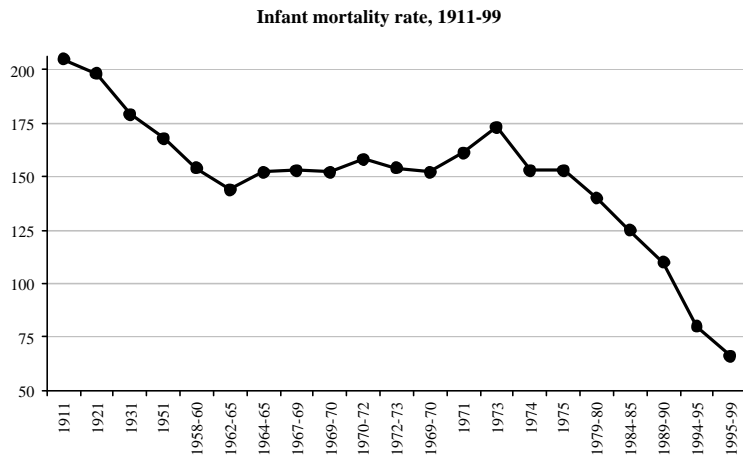
III. INFANT AND UNDER-FIVE MORTALITY

The mortality of children is often seen as the criteria of “success and failure of nations” (Sen 1998). It is an important indicator of well-being in its own right, as recognized by its inclusion among the MDGs. The mortality of children not only represents an enormous waste of human resources, but also a major cause of suffering in the population. The millennium development goal for Bangladesh is to reduce the under-five mortality rate from about 150 in 1990 to 50 by 2015.

Trends

The historical trends in infant mortality, culled from various sources and surveys, are shown in Figure III.1.¹⁴ The IMR appears to have dropped sharply in the early 1900s, but barely dropped from 168 infant deaths per 1,000 live births to 161 deaths during the two decades between 1951 and 1971. In the immediate aftermath of Bangladesh’s independence, the IMR actually increased to 173. But since then the IMR has fallen secularly and rapidly, reaching a level of 125 by 1984-85, 80 in 1994-95, and 66 currently. It is only after 1989 does one see a definitive and a faster trend of decline.

Two data sets provide much of the recent information on infant mortality. One is the vital registration survey (VRS) data of the Bangladesh Bureau of Statistics (BBS) and the other is the Bangladesh Demographic and Health Survey



Source: See Annex Table 7.

Figure III.1

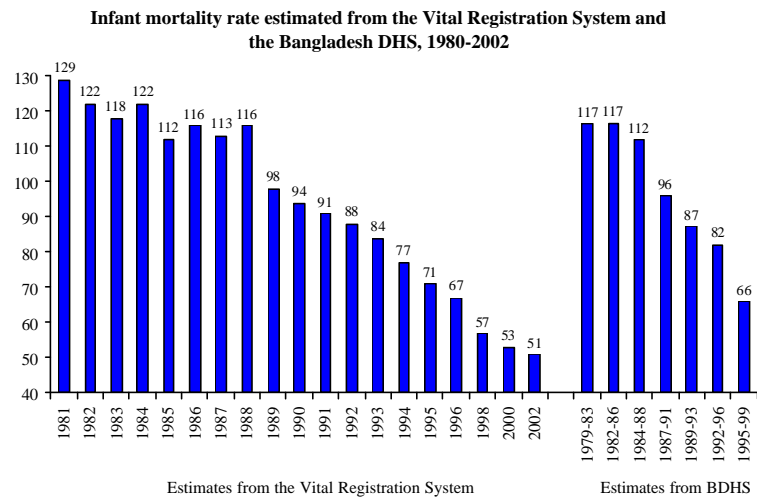


Figure III.2

¹⁴ Note that the time increments in Figure III.1 are not equal.

(BDHS) data. Both suggest dramatic improvements in infant mortality in the 1990s. The VRS data of the BBS represents the longest series on IMR based on a single source. The VRS data show virtually no improvement in infant mortality during 1980-88 (and an increase in 1980-82 (Figure III.2). In 1988, the IMR still stood at 116, but by 1995 it had dropped to 75. The rate fell even faster during the late 1990s and early 2000s – to 57 by 1998, 53 by 2000, and 51 by 2002. While the very low infant mortality rate of 51 estimated by the VRS for 2002 is probably the result of a death registration system that is not complete, the rate of decline in infant mortality in recent years suggested by the BBS data is confirmed by the BDHS data, which also show the IMR halving from its levels in the last decade (Figure III.2).¹⁵

International Comparisons

How does Bangladesh's performance at infant mortality reduction compare to that of other countries in the region? Over the period 1970-2000, infant mortality has fallen by anywhere from 2.6 to 5.6% annually in the countries shown in Figure III.3, with South Korea and Sri Lanka being the stellar performers. Bangladesh has, however, done very well, managing to reduce its infant mortality rate at a rate comparable to that of Thailand and much faster than that of India. Indeed, what is surprising is that the level of infant mortality is now lower in Bangladesh than in India – a country that has two

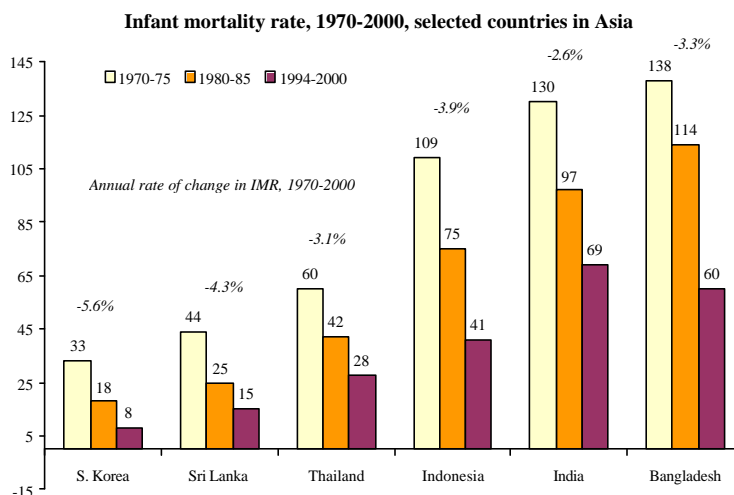


Figure III.3

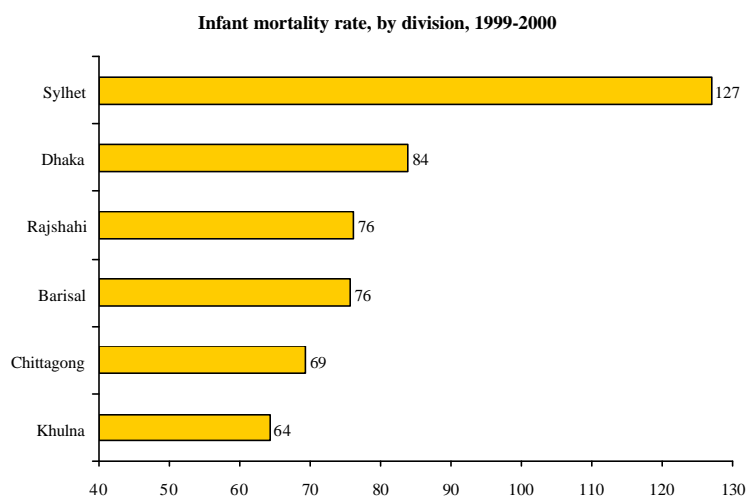


Figure III.4

¹⁵ Note that the BDHS data, which are used in the rest of this chapter, refer to infant mortality during the five years preceding the survey.

times the per capita GDP of Bangladesh.¹⁶

Spatial Patterns

Divisional variations. The BDHS data indicate wide variations in infant mortality across divisions, with the division of Sylhet having an infant mortality rate that is nearly two times as high as that in Khulna (Figure III.4). Indeed, Sylhet has an infant mortality rate that is more than 50% higher than the division having the second-highest rate of infant mortality (Dhaka). There is greater similarity among the other five divisions in terms of their infant mortality rates.

The decline in infant mortality during the 1990s has also varied significantly across divisions (Figure III.5). Since Sylhet was carved out of Chittagong in 1998, changes in infant mortality can only be shown for the five divisions that existed in the early 1990s (when Sylhet formed part of Chittagong). Figure III.5 indicates that the division having the highest level of infant mortality in 1993-94 – Dhaka – experienced the slowest rate of infant mortality decline (14%) over the following six years. In contrast, Khulna,

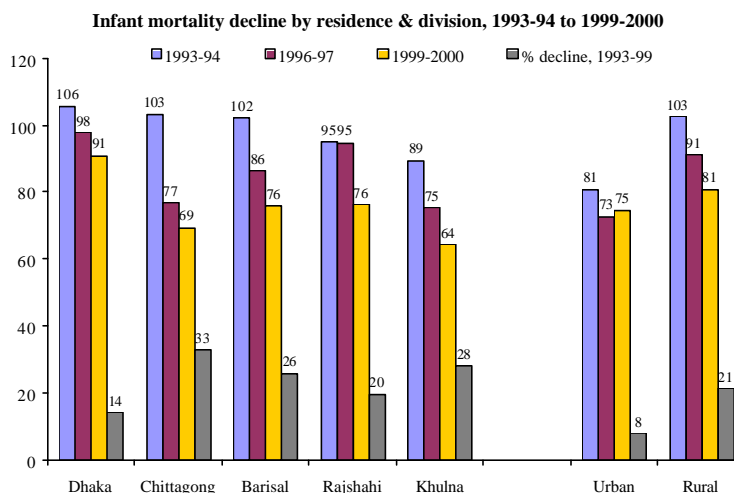
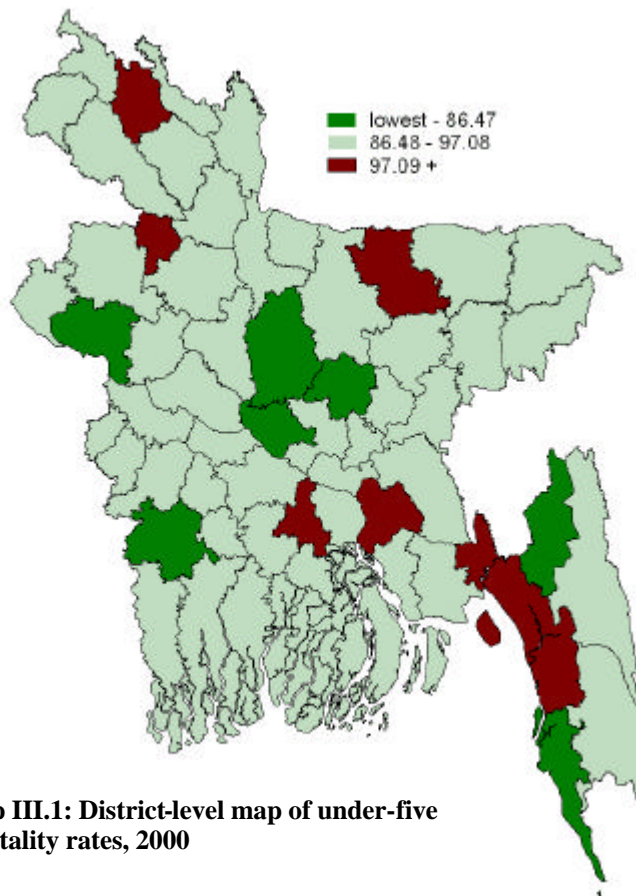


Figure III.5



Map III.1: District-level map of under-five mortality rates, 2000

¹⁶ Dreze (2004) notes this as well: "... Whether one looks at infant mortality, or vaccination rates, or school participation, or child nutrition, or fertility rates [in Bangladesh], the message is similar: living conditions are rapidly improving, not just for a privileged elite but also for the population at large. In India, social progress is slower and less broad-based, despite much faster economic growth. This is one indication, among many others, that India's development strategy is fundamentally distorted and lop-sided."

which enjoyed the lowest level of infant mortality in 1993-94, experienced a rate of infant mortality decline that was two times as much as that experienced by Dhaka. Thus, regional variations in infant mortality appear to have become more pronounced.

However, Figure III.5 shows that there has been a remarkable convergence in infant mortality rates across rural and urban areas, thanks to much more rapid decline in infant mortality in the rural areas. While the infant mortality rate in rural areas was 27% higher than in urban areas in 1993-94, it was only 8% higher in 1999-2000.

District variations. A district-level map of Bangladesh by the under-five mortality rate is shown in Map III.1 below. There are large variations in the under-five mortality rate, with a number of districts having an under-five mortality exceeding 97 deaths per 1,000 live births. These districts have no particular location; they are scattered in the North, Northeast, and South of the country. Some of them are even contiguous to low-mortality districts.

Proximate and Socioeconomic Correlates

Child Malnutrition. After the first month of life, child malnutrition becomes an important contributing factor to infant and child mortality. Malnutrition in Bangladesh often sets in early, often owing to improper feeding practices, such as early termination of exclusive breast-feeding and introduction of (inadequate) supplementary feeding. In addition, even during the exclusive breastfeeding period, infants may be malnourished owing to insufficient quantities of breast milk – in turn the result of poor nutrition and heavy workload of poor women. Malnourished infants are more prone to diarrheal, respiratory and other infections, which, when untreated, can lead to infant death.

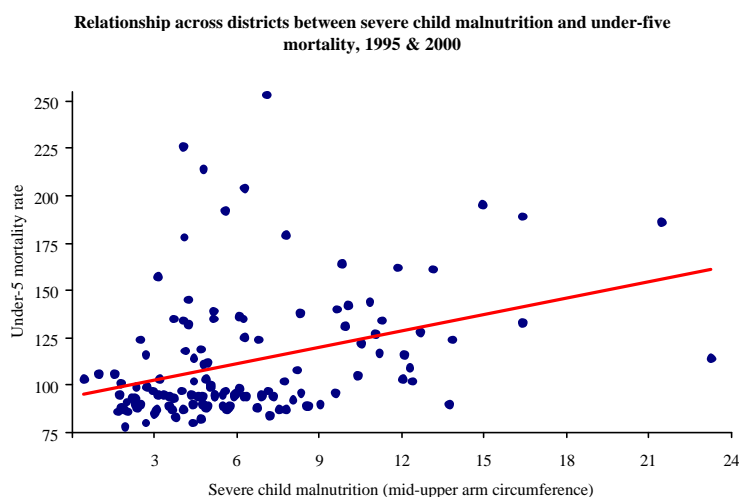


Figure III.6

It is often difficult to establish the correlation between child malnutrition and mortality in the absence of longitudinal data, since anthropometric data from most cross-sectional surveys are available only for children living at the time of the survey. But district-level data on under-five mortality rates and severe malnutrition rates (based on the mid-upper arm circumference measure) for 1995 and 2000 show a positive, albeit not perfect, association between the two rates (Figure III.6). Of course, some districts, such as Cox's Ba-

zar, have unusually high under-5 mortality rates relative to their child malnutrition rates, while other districts, such as Chandpur, have unusually low under-5 mortality relative to their child malnutrition rates.

Immunization. In addition to nutrition, immunization plays an important role in enhancing a child's survival prospects, especially beyond infancy. Indeed, child immunization is an important enough input into child mortality to be considered as a separate MDG (with the goal being universal immunization of one-year olds against measles). The evidence from coverage evaluation surveys suggests that coverage of measles vaccination has increased very slowly since the mid-1990s (Figure III.7).

The DHS 1999-2000 data also indicate large variations in measles coverage. In Khulna, 81% of children aged 12-24 months are vaccinated against measles (Figure III.8). However, the coverage rate is as low as 58% in Sylhet. Likewise, there is a large disparity in measles coverage between the rural and the urban areas.

Previous birth intervals. The timing of successive births is an important risk factor in

Measles immunization coverage (%) among children aged 1 year or less, 1991-2003

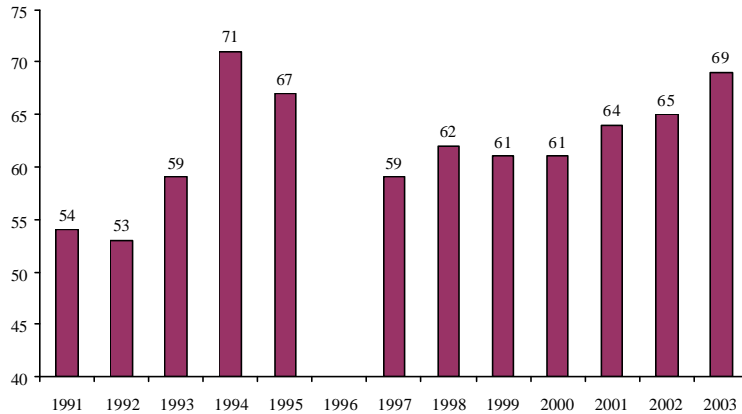


Figure III.7

Measles vaccination coverage among 12-23 month olds, by division and urban/rural residence, 1999

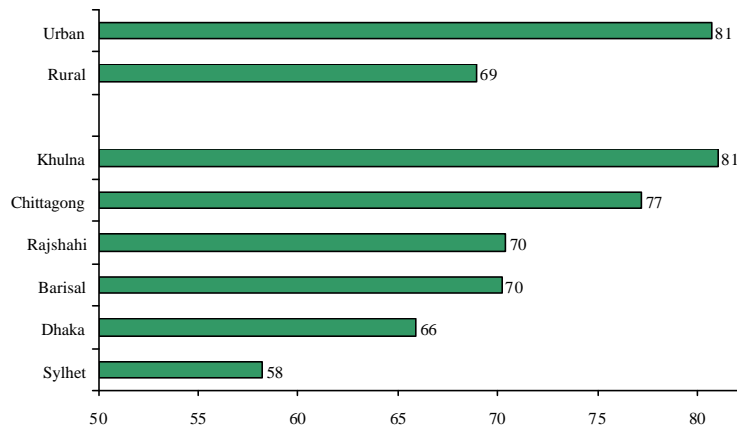


Figure III.8

Infant and under-five mortality rates, by previous birth interval, 1993-94 and 1999-2000

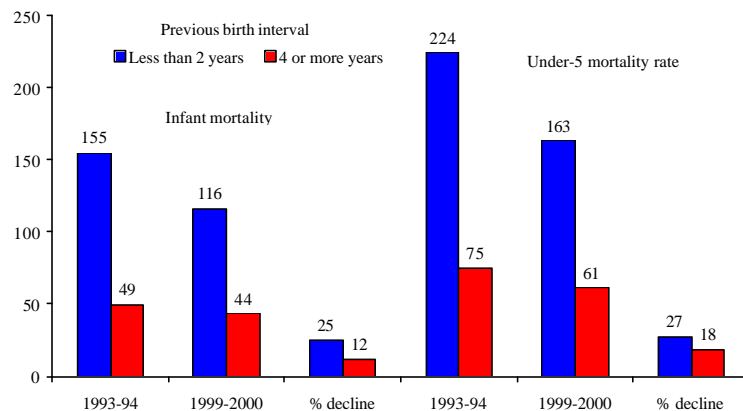


Figure III.9

both infant and under-five mortality. As Figure III.9 shows, the risk of death for an infant or a child declines dramatically when he/she is born four or more years after the previous birth (as compared to being born less than two years after the previous birth). Interestingly, however, high-risk births – those spaced within two years of the previous birth – experienced a larger proportionate decline in mortality risk than low-risk births between 1993-94 and 1999-2000, suggesting that overall infant and under-five mortality decline in Bangladesh occurred independently of longer birth spacing by mothers.

Gender. Much has been written about sex differentials in infant and child mortality in South Asia. South Asia is said to be one of the few regions in the world where female infants and children have a higher risk of mortality rate than males. The Bangladesh DHS data do not show this, at least for infant mortality; indeed, infant mortality rates for observed to be greater for males than for females (Figure III.10). However, the survival advantage enjoyed by female infants appears to have narrowed over time; while female infant mortality was 87% of male infant mortality in 1993-94, it had risen to 94% by 1999-2000.

Figure III.10 also suggests that the survival advantage enjoyed by females is lost and even reversed as they grow beyond infancy. The child mortality rate, which measures the probability of death between the ages of one and five, is actually significantly greater (by about a third) for females than for males. The gender disparity in child mortality rates increased slightly between 1993-94 and 1999-

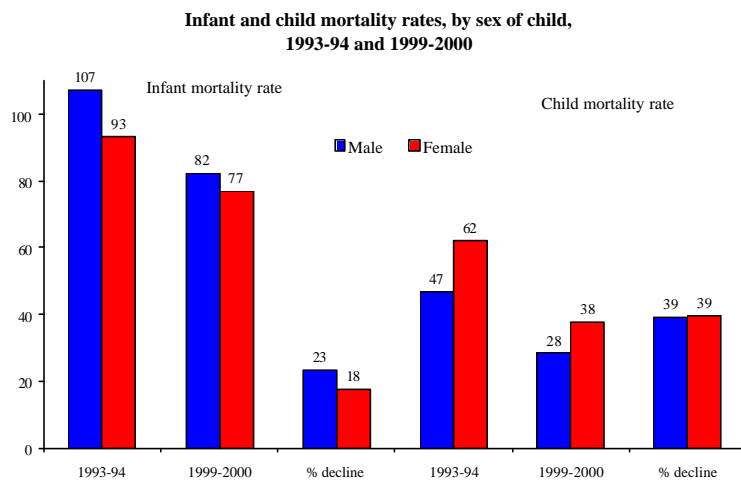


Figure III.10

2000 – from 32% to 36%. Parental neglect toward girls – symptomatic of the generally low social status of women – is an important cause of the gender disparity in child mortality. Girls are less likely to receive adequate food allocations and medical treatment for their illnesses than boys.

A study examining data on nearly 12,000 births during 1973-74 from the Demographic Surveillance System data in the Matlab region of Bangladesh found that the mortality risk for females exceeded that for males around the age of 8 months – typically the age when an infant cannot survive on breast-feeding alone and needs nutritional supplementation (Koenig and D’Souza 1986).

In South Asia, gender interacts with birth order in exerting a powerful influence on the survival probabilities of infants and children. Another study from Matlab for the period 1981-82 observed that girls with surviving older siblings faced higher risks of death than

first-born girls having no older siblings.¹⁷ The probability of dying was higher for girls having older brothers and lower for boys with older sisters. Boys with older male siblings also faced a somewhat higher risk of death than single male children (although not as high a risk as girls with older male siblings). These data clearly suggest that excess female mortality is attributable, in large part, to conscious and selective parental neglect of girls.

A longitudinal study using the Matlab data over the period 1970-95, however, found that child mortality among females has fallen faster than among males.¹⁸ Of course, the Matlab region has benefited from a major MCH-FP project intervention over the years, and the MCH-FP program may have contributed to the reduction in excess female deaths.

Female schooling. As is widely observed in many countries (including Bangladesh), mother's schooling is strongly associated with infant mortality (Figure III.11). What is interesting is that while both infants and under-five children benefit (in terms of reduced risk of mortality) from having their mothers even slightly schooled (e.g., primary incomplete), the proportionate benefit to under-five children is greater than that to infants. This likely occurs because a larger proportion of older children's deaths are preventable due

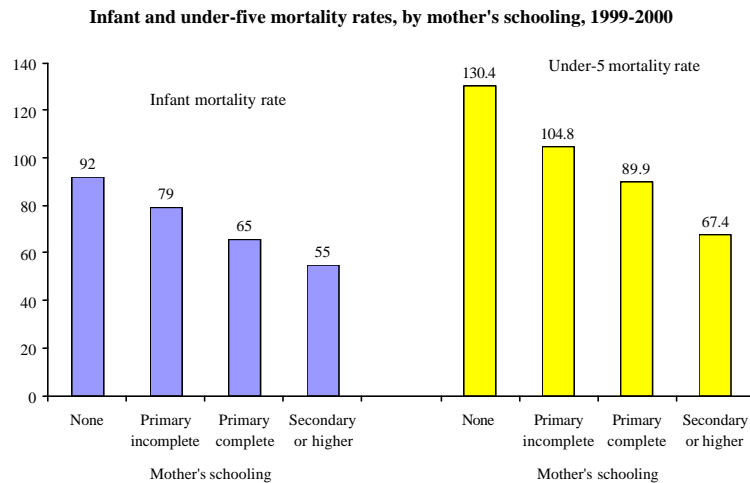


Figure III.11

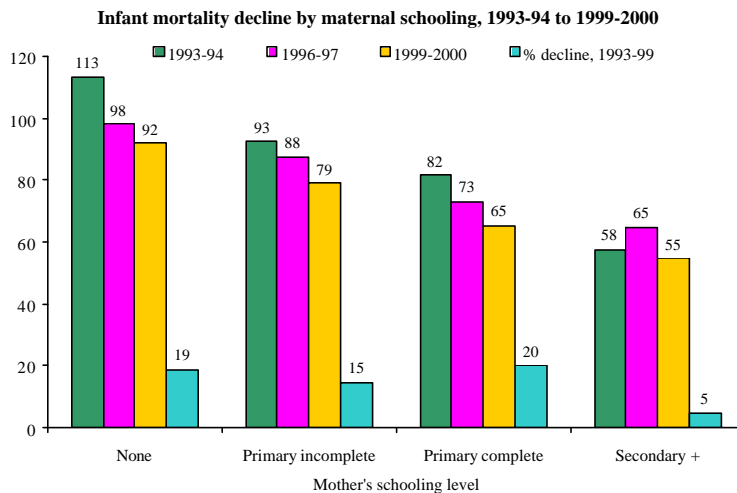


Figure III.12

¹⁷ Muhuri PK, Preston SH. 1991. "Effects of family composition on mortality differentials by sex among children in Matlab, Bangladesh." *Population Development Review* 17(3): 415-34.

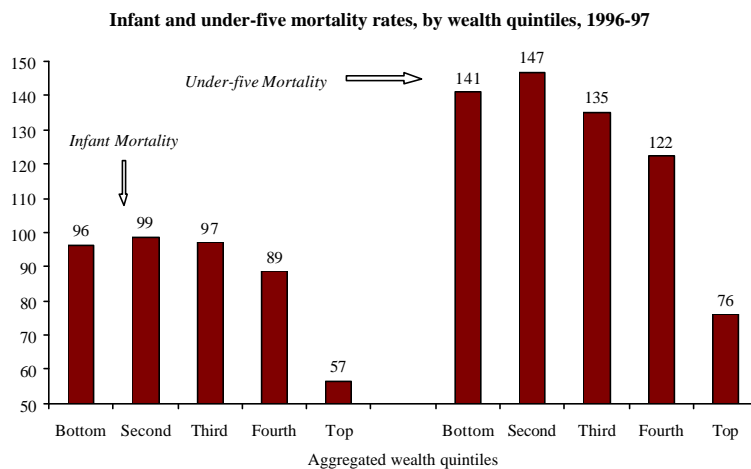
¹⁸ Ashish K. Dutta and Radheshyam Biaragi. "Improvement in Female Survival: A Silent Revolution in Bangladesh." ICDDR, 1999, mimeo.

to interventions such as nutrition and prompt medical attention, which tend to be strongly associated with mother's schooling.

What is also interesting to observe is that women with no schooling experienced almost as much relative decline in the mortality of their infant children between 1993-94 and 1999-2000 in Bangladesh as did women with primary schooling (Figure III.12). Women with secondary or more schooling showed the smallest decline in infant mortality over the 6-year period. This suggests that a large portion of the infant mortality decline in Bangladesh during the 1990s appears to have occurred independently of the expansion in female schooling.

Household wealth. Data from the 1996-97 DHS have been compiled by Wagstaff *et al.* (1999) to examine the association between mortality rates and household wealth status. As Figure III.13 shows, the association is sharply negative, with bottom quintiles having an under-five mortality rate that is nearly two times that of the top quintile. The disparity between the infant mortality rates of the bottom and top quintiles is somewhat lower, but still very large; for instance, the bottom quintile experiences an infant mortality rate that is 70% greater than that experienced by the top quintile. The disparities in mortality across asset groups reflect differences in parental education, levels of child nutrition, and access to health and medical services across the poor and the non-poor.

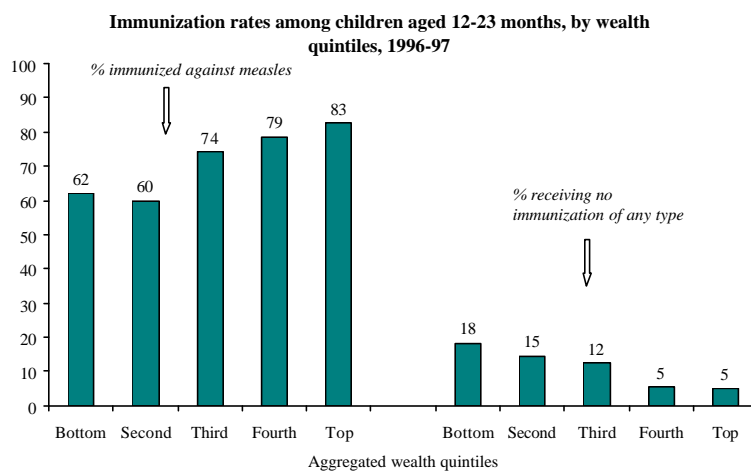
The lower access of the poor to public health measures, such as child immunization, is evident from Figure III.14, which reports the child immunization rates from the DHS 1996-97 data across wealth quintiles.



Source: Compiled by Wagstaff *et al.* (1999) based on DHS 1996-97 data

Figure III.13

for instance, the bottom quintile experiences an infant mortality rate that is 70% greater than that experienced by the top quintile. The disparities in mortality across asset groups reflect differences in parental education, levels of child nutrition, and access to health and medical services across the poor and the non-poor.



Source: Compiled by Wagstaff *et al.* (1999) based on DHS 1996-97 data

Figure III.14

While measles immunization coverage is as high as 83% among the children (aged 12-23 months) belonging to the top wealth quintile, the coverage rate is as low as 62% among the children of the bottom wealth quintile. The percentage of children aged 12-23 months who receive no immunization of any type is about 5% in the top two wealth quintiles; among the bottom quintile, the corresponding figure is 18%.

The Role of Public Interventions

Rural infrastructure. Rural infrastructure can have powerful influences on infant and child mortality outcomes. For instance, access to paved roads allows easier transport to health centers and referral district hospitals, thereby reducing the risk of an infant dying because of neonatal and post-neonatal infections. Access to safe drinking water and sanitation are important environmental hygiene interventions that significantly reduce the exposure of an infant to water- and vector-borne diseases and increase the probability of his or her survival. Likewise, access to electricity can also improve infant survival probabilities either by improving the cold-chain for pharmaceuticals (at the level of the village health center) or by making it easier for households to obtain information on health, hygiene and nutrition via radio or television.

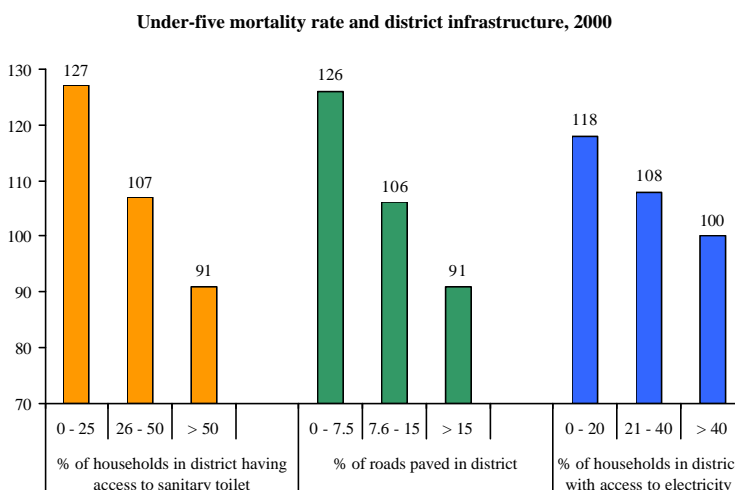


Figure III.15

Data at the district level for the periods 1995 and 2000 show significant associations between under-5 mortality and access to infrastructure (Figure III.15). The under-5 mortality rate is nearly 40% higher in districts having fewer than 25% of households with access to a sanitary toilet than in districts where more than one-half of households have sanitation access. Likewise, the under-5 mortality rate is 38% higher in districts where fewer than 7.5% of roads are paved than in districts where more than 15% of the roads are paved. Among the infrastructural variables, access to electricity appears to have the smallest impact on under-5 mortality, with the under-5 mortality being only 15% lower in districts with more than 40% electricity coverage as compared to districts with less than 20% electricity coverage.

Family planning and MCH programs. The importance of family planning interventions in bringing about infant and child mortality decline cannot be discounted. It is well-known that fertility decline and mortality decline often go hand in hand with each other. Bangladesh has had one of the most successful family planning programs in the developing world. The program has achieved extraordinary results by building an extensive network of health and family welfare clinics throughout the country, training thousands of female

workers to take family planning advice directly to women, and using mass media campaigns to create awareness about family planning in the population. The program has enjoyed strong political commitment from the government, grassroots-level partnership with NGOs, and generous and coordinated assistance from donors. Indeed, Bangladesh's experience has shown that it is possible to bring about fertility and mortality decline in poor countries even in the absence of strong economic growth and improving socioeconomic conditions.

Some of the best evidence of the role of effective family planning and MCH interventions on infant mortality decline in the developing world comes from the Matlab area of Bangladesh, where the Maternal Child Health and Family Planning (MCH-FP) Project has been operating since 1977. This project has provided more accessible and better-quality family planning services to a "treatment" area in comparison to those offered in nearby "control" areas. The more accessible and better-quality family planning services have included more frequent visits from female welfare assistants who provide counseling and deliver contraceptives, as well as closer access to a network of family planning sub-centers operated by the International Center for Diarrheal Diseases Research (ICDDR,

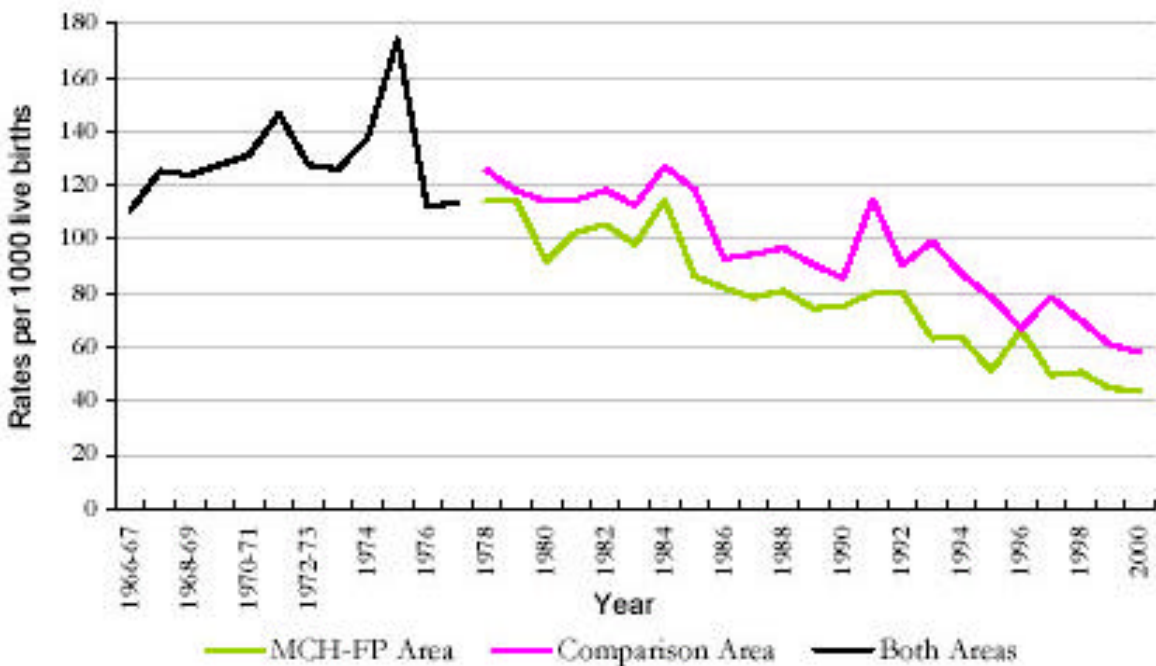


Figure III.16: Infant mortality rates in MCH-FP area and control areas, 1978-2000

Source: Center for Health and Population Research, ICDDR, Bangladesh

B). Figure III.16 suggests that the MCH-FP project has contributed to a decline of 10-30% in infant mortality since its inception.

The Role of Service Delivery. Despite its highly successful family planning program, the quality of service delivery in the overall public health sector in the country remains poor. There is widespread absenteeism of doctors and paramedics at government health centers

and sub-centers; most government health facilities are in disrepair; and the availability of drugs and medical supplies at public health facilities is very limited. For example, when unannounced visits to health clinics were made with the intention of discovering what fraction of medical professionals were present at their assigned post, a nationwide survey found that the average number of vacancies over all types of providers in rural health centers was 26% (Chaudhury and Hammer 2003). Not surprisingly, vacancy rates or unfilled posts were generally higher in the poorer parts of the country. Absentee rates for doctors were observed to be as high as 40% at the larger health clinics, while a shocking 75% of the doctors at smaller, single-doctor sub-health centers were not present at their posts during the unannounced visits. The poor quality of health services reflects many factors at work, including lack of accountability among public health providers and disenchantment with working conditions among health workers. Chaudhury and Hammer (2003) found that proximity of the medical provider's residence to the health facility, access to a road, and rural electrification were among some of the variables strongly associated with the absenteeism of doctors from a clinic.

The NGO sector in Bangladesh has played an important role in the delivery of quality health services. Among some of the important NGOs in the country's health sector are the Voluntary Health Services Society, Bangladesh Rural Advancement Committee (BRAC), Bangladesh Association for Voluntary Sterilization (BAVS), Bangladesh Women's Health Coalition (BWHC), Family Planning Association of Bangladesh, Gonoshasthaya Kendra, Proshika, and Thengamara Mohila Sabuj Sangha (TMSS). These and other NGOs have worked in the areas of water and sanitation, MCH and family planning, child survival, and AIDS/STD prevention, among other things.

Projections to 2015

The Bangladesh DHS data suggest that the decline in infant mortality in Bangladesh between 1979-83 and 1995-99 has averaged an impressive 3.6% annually. The decline during the 1990s has been even more rapid – about 4.7% annually. Figure III.17 suggests that if the rate of infant mortality decline experienced between 1979-83 and 1995-99 continues into the

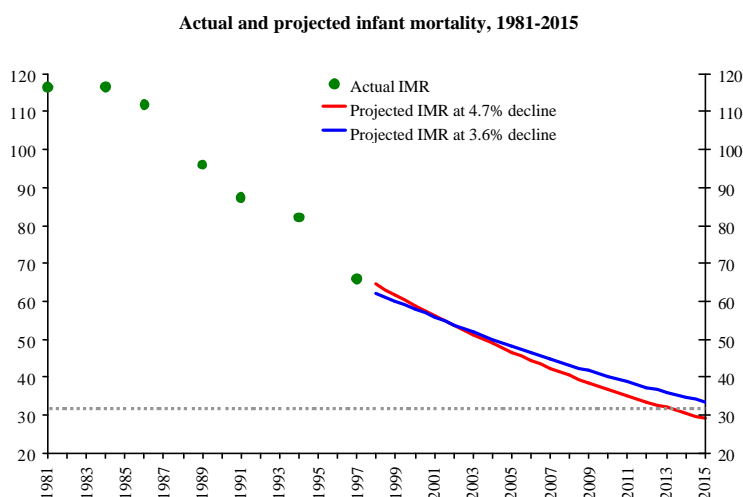


Figure III.17

future, infant mortality rate in Bangladesh could be expected to reach a level of 34

in 2015 – just slightly above the MDG level of 31. If the future rate of decline remains at the (higher 4.7%) rate experienced in the 1990s, the infant mortality rate could decline to

29 by 2015. Thus, Bangladesh could expect to attain the infant mortality MDG – or come very close to attaining it – if it simply continues the trend it has seen in the recent past.

In fact, however, this is unlikely to be the case. The decline in infant mortality experienced by Bangladesh during the past 10-15 years is unprecedented – both in relation to the country’s own earlier experience as well as in relation to the experience of other developing countries. The latter suggests that declines from very high initial levels of infant mortality are driven largely by reductions in the number of post-neonatal deaths (i.e., deaths occurring between the age of one month and twelve months). These deaths are more easily averted by the typical (and relatively inexpensive) child survival interventions, such as child immunizations and oral rehydration therapy. However, as the overall level of infant mortality comes down, further reductions in overall infant mortality can only be obtained via reductions in neonatal mortality. Averting neonatal deaths typically requires more expensive interventions, such as professionally-attended deliveries or deliveries in institutions as well as post-delivery and hospital-based emergency care. Thus, sustained infant mortality reduction becomes increasingly more difficult and expensive.

Bangladesh’s extraordinary success in bringing down the infant mortality rate has meant that neonatal mortality currently accounts for about two-thirds of infant deaths and more than half of the deaths among children under 5 years of age. In fact, the ratio of neonatal mortality to under-five mortality has increased by about 40% over the last decade (*Status of Performance Indicators 2002*). Therefore, future interventions to reduce infant or under-five mortality will need to focus on averting neonatal deaths. Although neonatal mortality reduction typically requires hospital-based care, it is possible to provide a relatively inexpensive package of home-based neonatal services, as shown by a highly-successful field trial in India’s Maharashtra state in 1995-98 (see Box II.1 for a detailed description of the intervention).

Multivariate Analysis

In order to undertake further simulations about the likelihood of Bangladesh meeting the under-five mortality MDG, we have estimated a multivariate model of under-five mortality using unit record data from the Demographic and Health Survey 1999.¹⁹ The multivariate model has the advantage of controlling for several variables that may be simultaneously associated with under-five mortality. The estimation results are reported in Annex Table 2, while only the broad findings of the empirical analysis are discussed here.

After controlling for the other factors associated with under-five mortality, urban areas are actually observed to have significantly higher under-five mortality than rural areas. This suggests that the urban areas enjoy lower rates of infant and under-five mortality than rural areas because of their higher living standards and adult schooling and generally better health services. Once these variables are controlled for, urban residence is actually correlated with higher under-five mortality rates.

¹⁹ Since the dependent variable is dichotomous (viz., whether or not a child dies within 60 months of its birth), the model has been estimated by the maximum-likelihood probit method. As noted earlier, the reference period for calculating under-five mortality is the five years preceding the survey.

The results also confirm that while the risk of mortality is not significantly different across girls and boys, higher birth order girls have a significantly greater likelihood of dying than higher birth order boys. These results are consistent with many earlier studies that indicate a peculiar form of intrahousehold gender discrimination in South Asia against higher birth order daughters.

The results also highlight the extreme vulnerability of multiple (twin) births. Controlling for other factors, such as parental schooling and household living standards, a multiple birth is nearly 20 times more likely to end in death than a single birth.

As in other studies from around the world, maternal schooling – but not father’s schooling – is observed to be significantly and inversely associated with under-five mortality, with each additional year of schooling (of the mother) reducing the under-five mortality rate by about 4 deaths per 1,000 live births. Even after controlling for mother’s schooling, the mother’s age at the time of a child’s birth has a strong inverse association with the risk of that child dying within 5 years of its birth. A delay of each year in bearing a child reduces the under-five mortality rate by about 4 deaths per 1,000 live births.

The standard of living of a household, as proxied by predicted log of monthly consumption expenditure per capita,²⁰ has a strong and significant (inverse) association with under-five mortality, with the elasticity of the under-five mortality rate with respect to household consumption expenditure per capita being estimated at 0.25.

Surprisingly, neither the availability of piped drinking water nor access to toilet facilities is observed to have any significant association with under-five mortality, after controlling for household living standards and parental schooling. While a number of studies in South Asia have failed to find a significant association between the availability of piped drinking water inside the household and infant/child mortality, the lack of significance of the sanitation access variable is surprising. Electricity coverage in the district also does not have a significant association with under-five mortality.

Bangladesh has made tremendous progress in expanding child immunization coverage over the last two decades. The WHO Vaccine Preventable Diseases Monitoring System indicates that Bangladesh went from virtually no measles vaccination coverage in 1980 to 72% coverage by 1998. The empirical results suggest that district-level immunization

²⁰ In the probit model, we have included an explanatory variable – predicted log of household consumption expenditure per capita – to proxy household living standards. The DHS is a rich data set, but it has the limitation that it does not contain information on income or expenditure, both of which are widely used as measures of household welfare. Using data on land ownership, ownership of consumer durables (radio, TV, bicycle, refrigerator, motorcycle, watch or clock, and sewing machine), and the type of materials used for the roof and wall of the household’s dwelling (which are available in both the DHS 1999 and the HIES 2000), we predicted log monthly consumption expenditure per capita for each of the DHS households on the basis of an econometric relationship between *actual* log monthly consumption expenditure and land assets, consumer durables and housing quality variables that was estimated with unit record data from the HIES 2000 data. The distribution of predicted log monthly consumption expenditure per capita in the DHS sample was observed to be very similar to that in the HIES sample.

coverage of measles has a strong (inverse) association with under-five mortality, with each percentage point increase in measles vaccine coverage being associated with a reduction of 0.4 child deaths per 1,000 live births. These estimates imply that universal measles vaccine coverage would be associated with a reduction in under-five mortality of about 16 deaths per 1,000 live births.

Simulations to 2015

Based on the multivariate probit model estimated above, we have undertaken simulations of the under-five mortality rate in Bangladesh to 2015 under certain assumptions. The nature and magnitude of the interventions are detailed in Table III.1. The scope and magnitude of the assumed interventions are only meant to illustrate the likely reduction in under-five mortality under one possible scenario. It is obviously not possible to predict whether the assumed interventions will indeed take place, and, even if they do, whether they will proceed as the pace assumed in Table III.1.

Table III.1: Assumptions about various interventions to reduce under-five mortality, 2001 to 2015

Intervention	Starting value in 2000	Assumed change per year	Ending value in 2015
Adult female schooling (years)	2.5	0.3	7.0
Mother's age at child's birth (years)	23.8	0.2	26.8
Mean of district monthly consumption expenditure per capita (Taka)	900	2.7%	1,342
Measles vaccination coverage in district (%)	63	2.5	100.0

Based on the estimates presented in Annex Table 2, we have projected the likely decline in the under-five mortality rate under the assumption that the policy variables change over time as shown in Table III.1. Figure III.18 shows the projected trajectory of the under-five mortality under this scenario. The under-five mortality is observed to decline substantially – by more than 50% – over this period. The largest decline (of 18 deaths per 1,000 live births) comes about

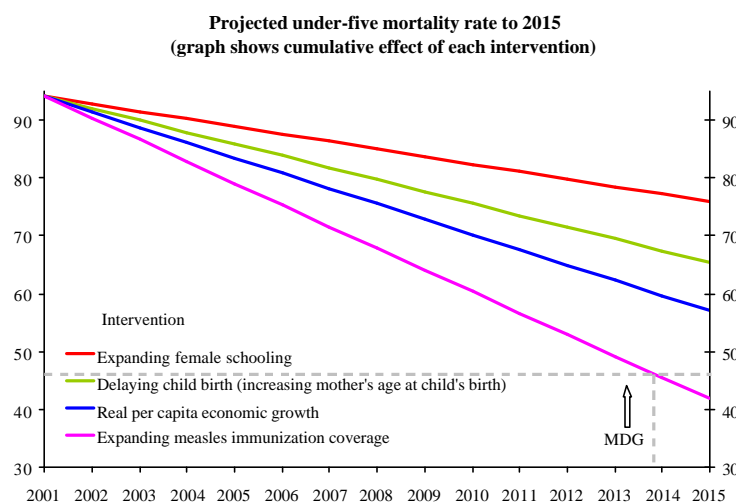


Figure III.18

from the expansion of female schooling, followed by expanded measles vaccination coverage (15 deaths per 1,000 live births). Delayed child bearing, which reflects both a de-

layed age at which the first child is borne as well as better spacing among subsequent children, is also associated with a large reduction (of about 11 deaths per 1,000 live births) in the under-five mortality rate. The smallest association is observed with living standards improvement. The results suggest that real annual GDP per capita growth of 4% (or annual growth of household consumption expenditure per capita of 2.7%) would be associated with a reduction in under-five mortality of 8 deaths per 1,000 live births. Together, the four interventions are associated with a reduction of 52 deaths per 1,000 live births in the under-five mortality rate – bringing that rate below the MDG level (46 deaths per 1,000 live births).

Thus, the simulation confirms the results of the simple trend analysis conducted earlier. It should be possible for Bangladesh to attain the child mortality-related MDG, but only with a package of interventions that includes strong economic growth, expansion of female schooling, family planning programs that motivate women to delay child bearing, and expanded child immunization coverage.

**Box II.1: Home-Based Neonatal Care:
Results from a Field Trial in Rural Maharashtra, India**

Nearly two-thirds of infant deaths in India occur in the first month of birth. Thus, substantial reductions in infant mortality can take place only with a reduction in neonatal mortality. It is believed that the large majority of neonates in India die due to sepsis (typically, septicaemia, meningitis, and pneumonia). While the most efficient way to treat ill neonates is to admit them to hospitals, specialized hospital care is either inaccessible to the rural population or prohibitively expensive.

It was in response to this need that Bang and his colleagues developed a package of home-based neonatal care, including the management of sepsis, and tested it in a three-year field trial from 1995 to 1998 in 39 villages in Gadchiroli district in Maharashtra. Gadchiroli is a 'backward' district in which rice cultivation and forestry are the main sources of income and infrastructure (viz., roads, communications, school facilities, and public health facilities) is poor. The team identified 39 intervention villages, and introduced neonatal care to these villages in a sequential manner from April 1995 to March 1998. In the first year, female village health workers listed pregnant women in the village, collected data via home visits in the third trimester, observed labor and neonates at birth, and visited the home frequently for 28 days after birth to weigh the child and observe neonatal morbidity. Data from the first year were used to plan further interventions. In the second year of the study, the female health workers were trained in and began providing home-based management of neonatal illnesses. The care typically consisted of clinical diagnosis of sepsis and subsequent treatment with an injection of Gentamicin and Co-Trimoxazole syrup. In the third year of the intervention, health education of mothers and grandmothers about the care of pregnant women and neonates was added to the program. By the third year of the intervention, 93% of neonates in the treatment area were receiving home-based care.

The team had selected 47 control villages in an adjacent area of the same district, and had collected baseline data in both treatment and control villages. An evaluation done after the third year of the intervention indicated net reductions of 62%, 46% and 71% in neonatal, infant and perinatal mortality rates in the intervention area as compared to the control area. In absolute terms, the infant mortality rate in the treatment area fell from 75.5 deaths per 1,000 live births in the baseline period (1993-95) to 38.8 in 1997-98, while it merely declined from 77.1 to 74.9 in the control villages over the same period. Case fatality in neonatal sepsis declined from 16.6% before the intervention to 2.8% after treatment by the village health workers. The cost of home-based neonatal care worked out to about US\$5.30 per neonate, of which \$3.80 was the recurrent cost.

The Bang experiment shows that it is possible to halve the infant mortality rate in populations with poor economic and nutritional status and with low female literacy by providing inexpensive health education and home-based neonatal care.

Source: Bang *et al.* (1999).

IV. REDUCING CHILD MALNUTRITION

Reducing child malnutrition is one of the surest ways of reducing income-poverty. A high degree of child malnutrition is one of the most important factors constraining the future productivity of a country. Child malnutrition leads to poor schooling and cognitive outcomes, which shapes occupational choice, which in turn has implications for future productivity as well as intergenerational mobility. Child malnutrition also has a direct adverse impact on labor productivity in adulthood. In addition to pursuing better child nutrition for its impact on future labor productivity and income potential, improved child nutrition is also an important human development goal in and of itself, since malnutrition significantly reduces the quality of life of children. In addition, of course, child malnutrition is an important contributing factor to the high rates of infant mortality in developing countries; by some estimates, as many as half of all the infant deaths in poor countries are directly or indirectly related to child malnutrition.

Trends

Levels. Child malnutrition rates in Bangladesh are very high – among the highest in the world. The two most recent child nutrition surveys – the Child Nutrition Survey 2000 and the Demographic and Health Survey 1999-2000 – indicate that nearly one-half of children below the age of 5 or 6 years are moderately underweight or stunted (Figure IV.1).^{21,22} About 10-18% of children are severely underweight or stunted in the sense of being more than three standard deviations below the relevant NCHS standards. This suggests that children in Bangladesh suffer from short-term, acute food deficits (as reflected in low weight-for-age) as well as from longer-term, chronic under-nutrition (as manifested in high rates of stunting).

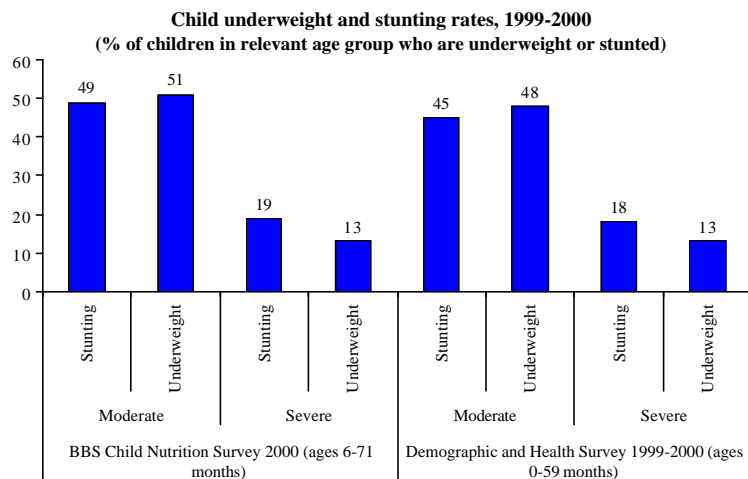


Figure IV.1

²¹ As in the literature, a child is considered underweight when his or her weight-for-age is more than two standard deviations below the NCHS reference weight. A child is stunted when his or her height-for-age is more than two standard deviations below the NCHS reference. Severe underweight and stunting occur when the relevant nutrition indicator is more than three standard deviations below the NCHS reference.

²² Note that not only were the CNS and DHS surveys conducted during slightly different periods, but the age groups of children covered by the two surveys were also somewhat different (see Figure IV.1).

International Comparisons.

The levels of child malnutrition in Bangladesh are among the highest in the world. For instance, during the period 1995-2000, Bangladesh ranked second (after North Korea) in terms of the proportion of underweight children aged 0-5 years and fourth in terms of the proportion of stunted children (after North Korea, Bhutan and Cambodia) (UNDP, HDR 2001). Bangladesh also

had the dubious distinction of having the second-highest percentage of infants with low birth weight (i.e., less than 2,500 gms) in the world (after India) (UNDP 2001).²³ Thus, Bangladesh's child malnutrition problem is more severe than that of most other developing countries, including the countries of sub-Saharan Africa.

But Bangladesh is also among the poorest countries in the world, and child malnutrition rates are typically strongly correlated with household living standards. Is Bangladesh's child malnutrition level in line with what would be expected of a country at its level of per capita income? Figure IV.2, which plots the relationship between child underweight levels and per capita GDP for 16 countries in Asia,²⁴ suggests that the percentage of un-

derweight children in Bangladesh is approximately 16 percentage points higher than would be expected at its level of per capita GDP, given the observed relationship between child underweight rates and per capita GDP across the 16 Asian countries. In other

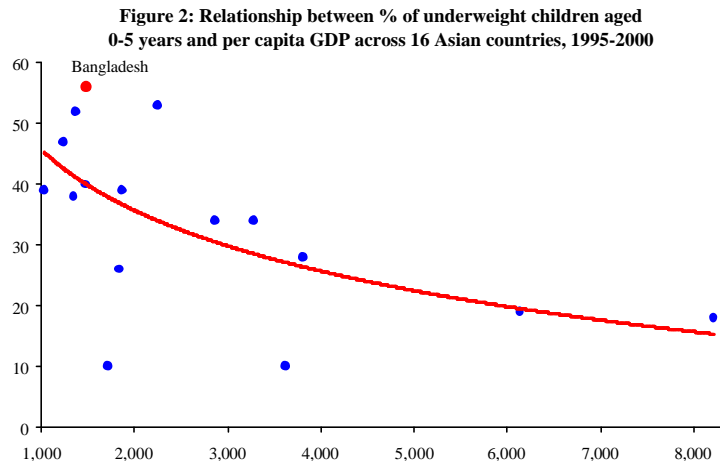


Figure IV.2

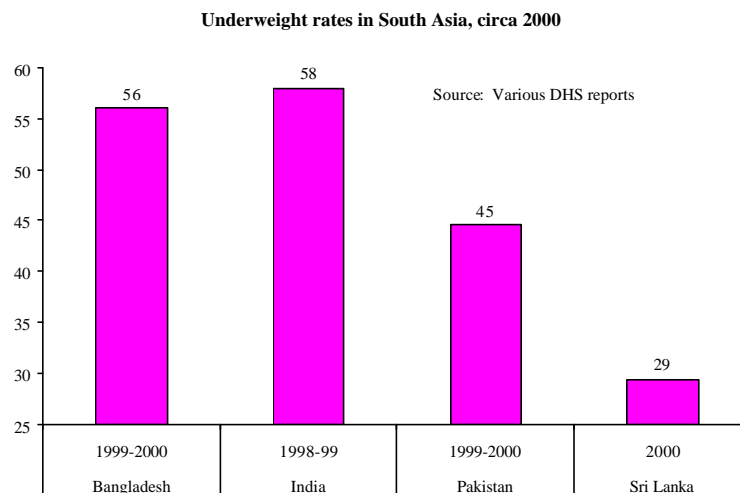


Figure IV.3

²³ Note that the UNDP data are 1995-2000 averages, so the reported figure for Bangladesh in Figure IV.2 is different from that reported in Figure IV.1.

²⁴ These include Myanmar, Nepal, Bhutan, Cambodia, Lao PDR, Bangladesh, Mongolia, Pakistan, Vietnam, India, Indonesia, Sri Lanka, China, Philippines, Thailand and Malaysia (in order of increasing per capita GDP).

words, based on its per capita GDP, Bangladesh would be expected to have a child underweight rate of 40% (similar to that of Lao PDR) – not the 56% it had in 1995-2000.

How does Bangladesh compare to other countries in South Asia? Bangladesh’s overall child underweight rate is comparable to that of India, although it is significantly larger than the underweight rates observed in Pakistan and Sri Lanka (Figure IV.3).

Trends. Bangladesh has made impressive gains in reducing its child underweight rates during the last 15 years. The decline in underweight rates has been especially steep since the early 1990s (Figure IV.6). For instance, between 1992 and 2000, underweight rates dropped from 68% to 51%, implying an annual decline of 3.7%. The decline is confirmed by the Demographic and Health Surveys (DHS) of 1996-97 and 1999-2000 (Figure IV.4).

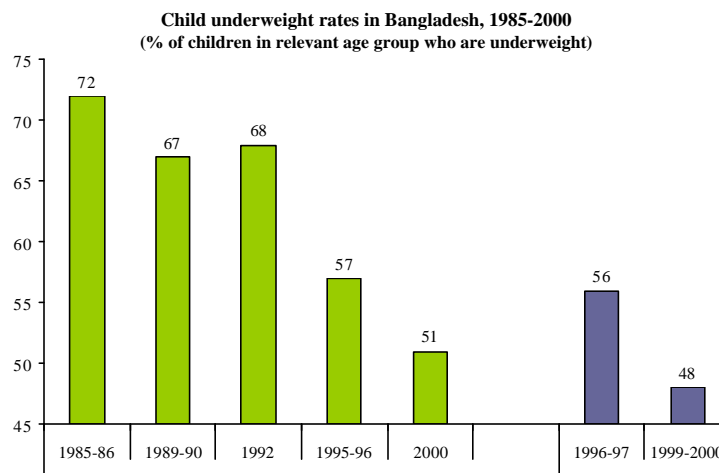


Figure IV.4

Figure IV.5 below shows that the decline in child malnutrition rates during the 1990s occurred in both the rural and urban areas of the country. Indeed, the rate of decline in both indicators of malnutrition was approximately similar in the urban and rural areas of the country (26% versus 24%).

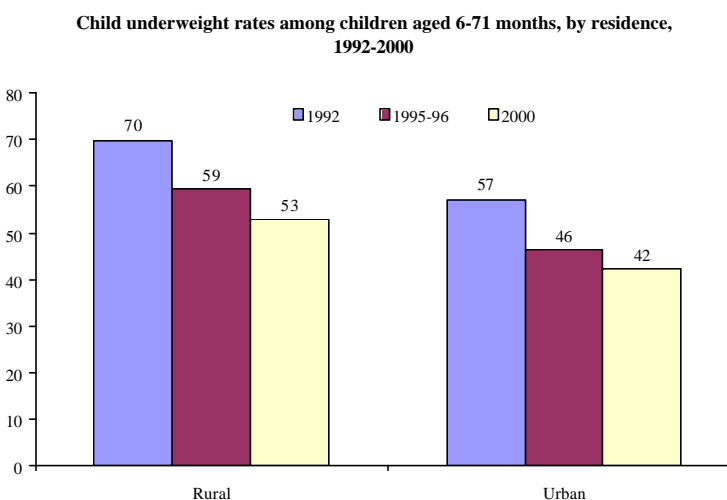


Figure IV.5

How does the decline in child underweight rates in Bangladesh compare to those observed in other countries of the region? Data from India (two rounds of the National Family

Health Surveys) indicate a decline of about 1.9% per year between 1992-93 and 1998-99 (from a rate of 52.7% to 47%). Thus, Bangladesh’s rate of decline of 3.6% per year in child underweight rates is significantly greater than India’s rate of decline. However, the underweight rate in Sri Lanka (based on DHS data), fell from 38% in 1993 to 29% in

2000 – an annual decline of 3.9%. Vietnam, where data on underweight rates are available for roughly comparable periods, the child underweight rate fell from 49% in 1992-93 to 36% in 1998-99 – an annual rate of decline of 5.3% (World Bank 1999)! Thus, while Bangladesh performed better than India, its performance is roughly on par with that of Sri Lanka but pales in comparison to that of Vietnam.

Spatial Patterns

Divisional Variations. The prevalence of child underweight rates by division, as well as changes in the prevalence between 1996-97 and 1999-2000, are shown in Figure IV.6.²⁵ Sylhet, which had the highest prevalence of underweight children in 1996-97 (at 64%), saw the slowest relative decline (11%) in underweight rates between 1996-97 and 1999-2000.

But Chittagong, which also had very high underweight rates in 1996-97 (60%), saw the sharpest relative decline over the three years (24%). Thus, there appears to be no pattern to the decline in child malnutrition across divisions.

Percentage of children under 5 who were underweight, by division, 1996-97 and 1999-2000

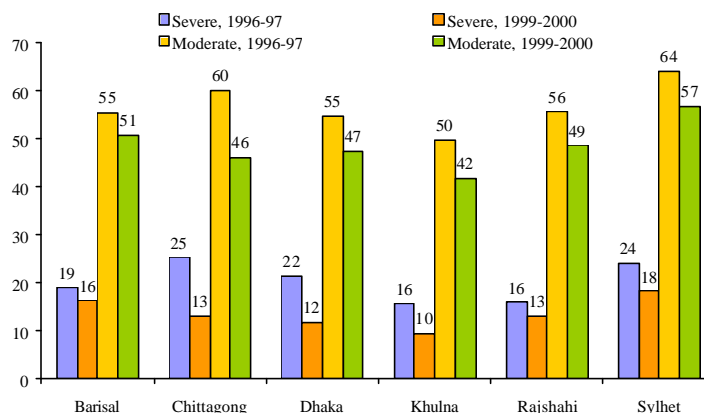
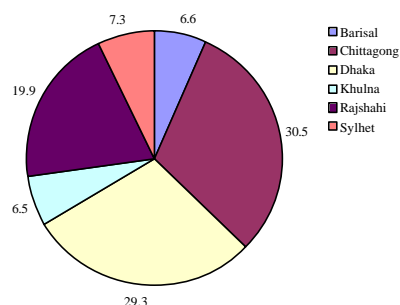


Figure IV.6

The same data are shown in the form of each division's contribution to the total number of (moderately and severely) underweight children in the country in Figure IV.7. These charts suggest show the high degree of concentration in child malnutrition in Bangladesh. In 1999-2000, for instance, two divisions – Chittagong and Dhaka – accounted for more than one-half of all underweight children, while three regions – the above two plus Ra-

Divisional distribution of all underweight children under 5 in Bangladesh, 1996-97



Divisional distribution of all underweight children under 5 in Bangladesh, 1999-2000

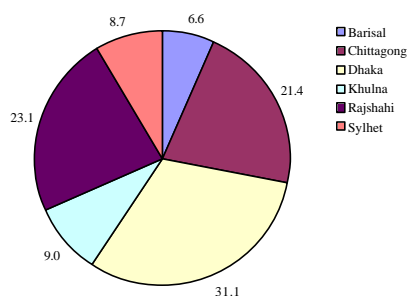


Figure IV.7

²⁵ These data are from the Demographic and Health Surveys of 1996-97 and 1999-2000.

jshahi – accounted for three-quarters of all underweight children. Between 1996-97 and 1999-2000, the largest relative decline in malnutrition occurred in Chittagong, which saw its share of national underweight children fall from 31% to 21%. In contrast, Rajshahi and Khulna accounted for an even larger share of underweight children in the country in 1999-2000 as compared to 1996-97.

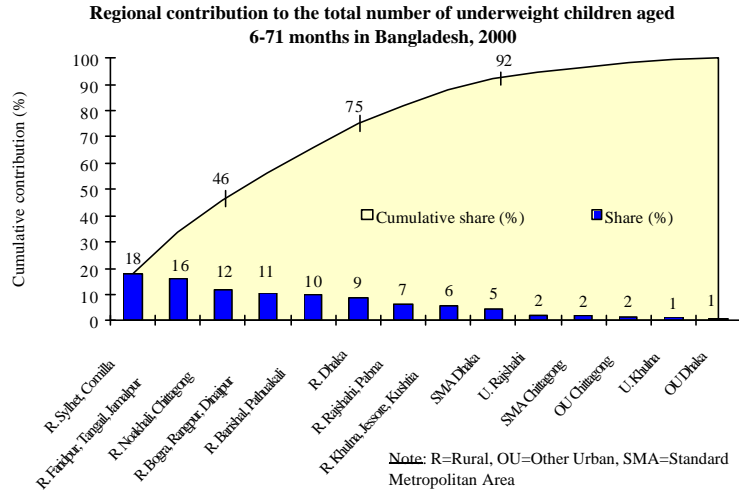
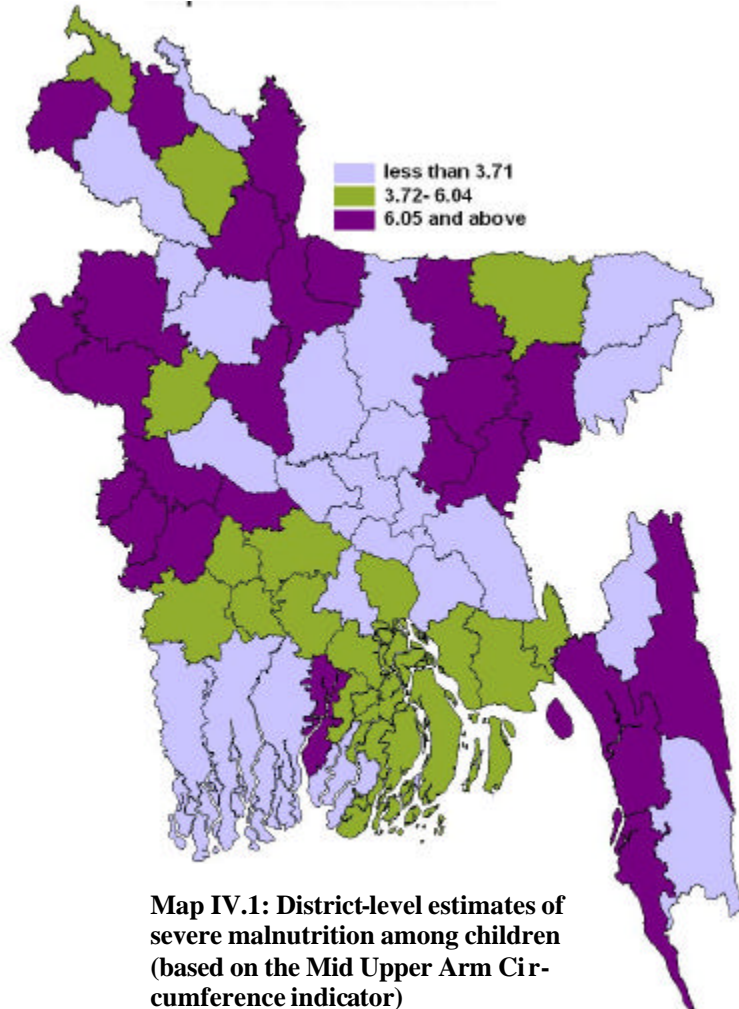


Figure IV.8

Because the more populous regions of Bangladesh also have very high child underweight rates, the number of underweight children is highly concentrated in a few regions in the country. Figure IV.8 shows the extent of this concentration. Three regions (out of 14) – comprising the rural districts of Sylhet, Comilla, Faridpur, Tangail, Jamalpur, Noakhali and Chittagong – account for nearly one-half of all underweight children in the country. Six regions (out of a total of 14) account for three-quarters of all underweight children. The regional concentration of malnutrition means that geographical targeting of nutritional interventions can be highly effective in achieving the largest absolute reduction in child malnutrition in the country.



Map IV.1: District-level estimates of severe malnutrition among children (based on the Mid Upper Arm Circumference indicator)

Inter-district variations. Data on malnutrition below the level of the division are available but only for the mid-upper arm circumference (MUAC) indicator. The MUAC is an alternative measure of severe child malnutrition – but one that has been shown to be highly correlated with the child underweight measure. A district-level map of Bangladesh (Map IV.1) shows large variations in the child malnutrition rate. The rate varies from a low of about 2% – in Tangail – to a high of 14% (in Bhola). About 42% of the districts have a severe child malnutrition rate of 5% or more.

Demographic Patterns

Age Patterns. Malnutrition for a large proportion (about a third) of children begins in the first year of life (Figure IV.9). Reasons for this may be low-birth weights,²⁶ sustained and nurtured by inadequate breast-feeding and complementary feeding practices. But the risk of malnutrition increases sharply in the second year of life (beginning at age 12 months), when most children stop

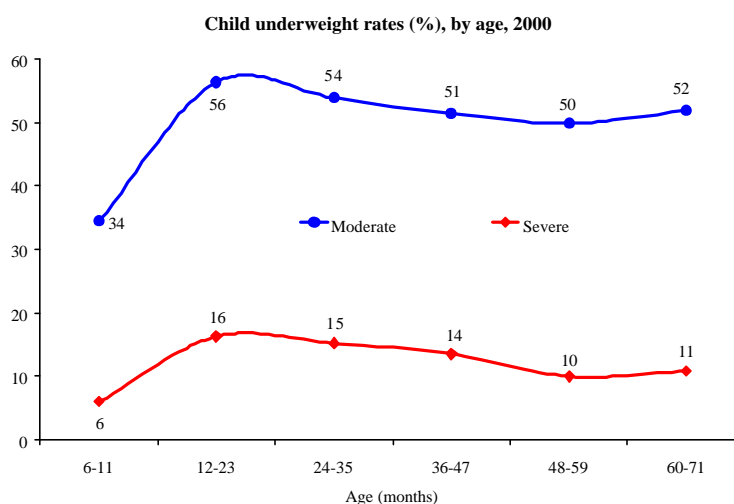


Figure IV.9

breastfeeding and begin relying almost exclusively on solid foods. The insufficiency and inadequacy of weaning diets in Bangladesh increases the risk of malnutrition among infants. Not surprisingly, the probability of dying also increases at this age. Figure IV.9 suggests that child malnutrition rates begin declining modestly after age 2.

Percent of moderately and severely underweight children, by age and sex, 2000

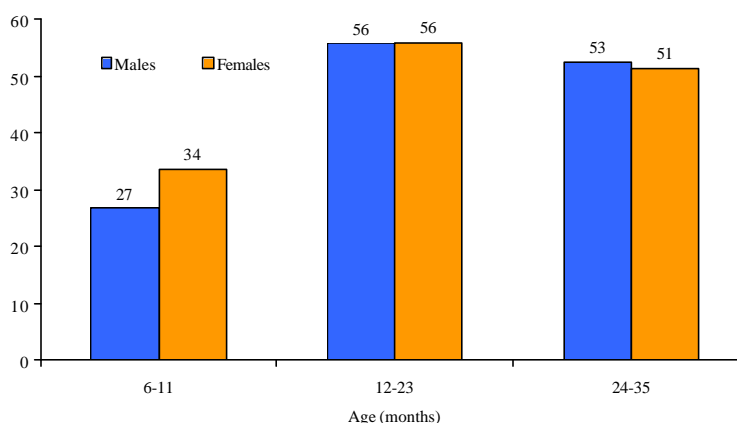


Figure IV.10

Gender Disparities. Gender differences in malnutrition are most pronounced at

²⁶ Other data sources suggest that nearly 30% of infants born in Bangladesh weigh less than 2,500 grams at birth (UNDP 2001).

young ages. Girls aged 6-11 months are significantly more likely than similarly-aged boys to be underweight (Figure IV.10).²⁷ Between ages one and three years, there is virtually no gender difference in underweight rates.

The apparent lack of gender disparity in malnutrition at older ages may be explained by the higher rate of mortality of female relative to male children aged 1-5 years.²⁸ The surviving cohort of female children aged 12-35 months is likely to show (deceptively) lower levels of malnutrition than similarly-aged boys, since the most-severely underweight girls in this age group are the ones most likely to die (and drop out of the sample).

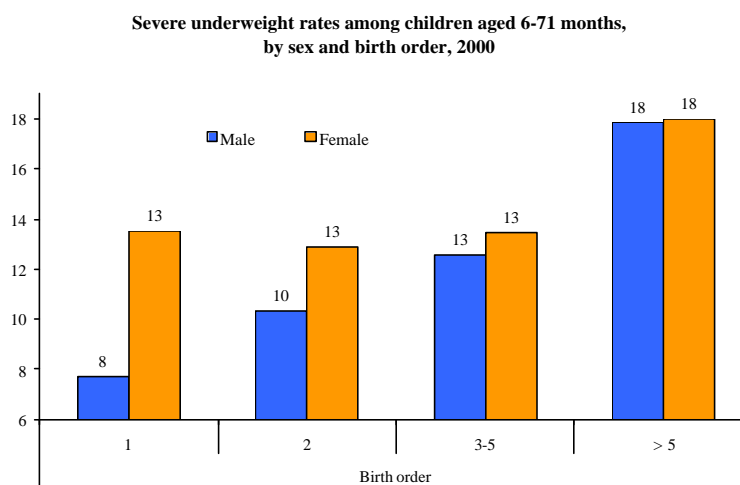


Figure IV.11

There is another dimension in which a child's sex matters to child malnutrition, and that is its interactive association with birth order. As seen in Figure IV.11, first-born females are significantly (75%) more likely to be severely underweight relative to first-born males, reflecting the strong cultural preference in Bangladesh for having a first-born son. The gender disparity in underweight rates progressively diminishes with birth order, and, among children of birth order six or greater, there is no gender difference in rates of severe malnutrition (with, of course, both sexes suffering very high rates of severe malnutrition).

Proximate Causes

Infant Feeding Practices. An important proximate cause of child nutritional status is nutrient intake, which in turn depends on the nature and duration of feeding (including breastfeeding) practices. Feeding practices are especially critical during the first few days and months of an infant's life, since growth is faster and protection against illnesses and infections is most needed during this crucial period. The fact that a large proportion of Bangladeshi mothers wait for several hours or even more than a day after a baby is born to initiate breastfeeding is thus detrimental to the nutritional well-being of the child. The delay in breastfeeding may be related to an incorrect perception that the first breast milk (colostrum) is an inferior food. In fact, colostrum is rich in antibodies and highly beneficial to the new-born infant.

²⁷ Interestingly, however, the gender difference in severe malnutrition for this age group (6-11 months) is reversed. Boys are nearly two times more likely than girls to be severely underweight.

²⁸ Mortality rates are actually higher for male than for female infants in Bangladesh, but the mortality gap reverses after age 1.

The CNS 2000 indicates that only about 18% of children receive mother's milk or colostrum as their first food (upon birth). Nearly two-thirds of children are fed sugar, misri water or honey as their first food, while another 8% receive cow/goat milk or infant formula. About 3% of infants are fed mustard oil as their first food. Premature introduction of foods other than breast milk greatly increases the risk of infection in the small infant, and this sets in motion the process of malnutrition.

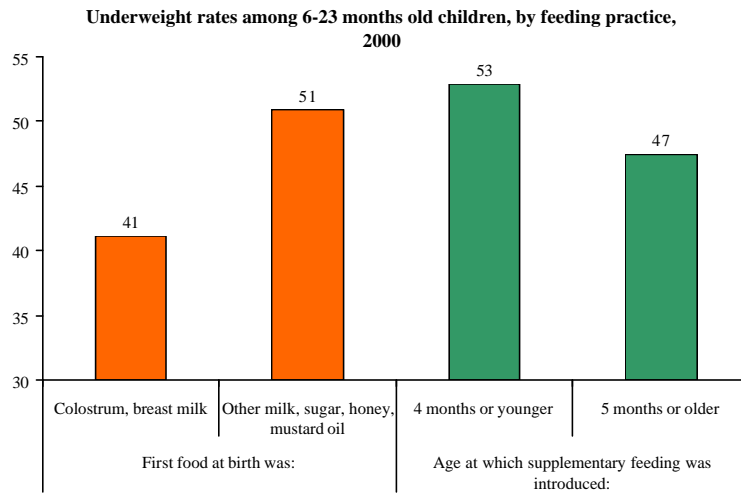


Figure IV.12

Another common feeding practice in Bangladesh that has adverse implications for child malnutrition is the early termination of exclusive breast-feeding and introduction of supplementary feeding. One reason why mothers give up exclusive breastfeeding early is their perception that they are producing insufficient quantities of milk, in part because of their poor nutrition and heavy workload. Premature introduction of supplemental foods puts the infant at greater risk of malnutrition, since weaning diets are often inadequate in Bangladesh, as in other developing countries. Supplementary feeding begins with a thin gruel of rice, often heavily diluted with water and with some vegetables or legumes added as a relish depending on season and availability, but generally in very small quantities. The consequent low energy density of this weaning food leads to a reduced intake of calories and protein, and is an important cause of growth faltering during the weaning period, from six months to two years of age. The CNS 2000 suggests that supplementary feeding is introduced within the first four months of birth for 36% of children and within the first 6 months for 91% of children, which is not in line with the recommendations of WHO and UNICEF that exclusive breastfeeding continue for the first six months of a child's life.

The CNS provides very clear evidence that the provision of foods other than colostrum or breast milk as a first food to the new-born infant, as well as the early introduction of supplementary feeding, significantly increase the risk of subsequent malnutrition in the child. The incidence of underweight rates significantly greater among children whose first food immediately after birth was cow's milk, sugar, honey or mustard oil than among children whose first food was colostrum or breast milk (Figure IV.12). Likewise, underweight rates are significantly lower among children aged 6-23 months who were started on supplementary feeding (in addition to breast-feeding) at ages 5 months or older relative to those whose supplementary feeding within four months of birth (Figure IV.12).

Family Food Intake. As children get older, which could be as early as one year of age in Bangladesh, they begin eating the same foods as adults in the household. Thus, the quantity, quality and distribution of household food intakes are likely to have an important bearing on the nutritional status of toddlers and young children. Figure IV.13 clearly shows that child malnutrition rates

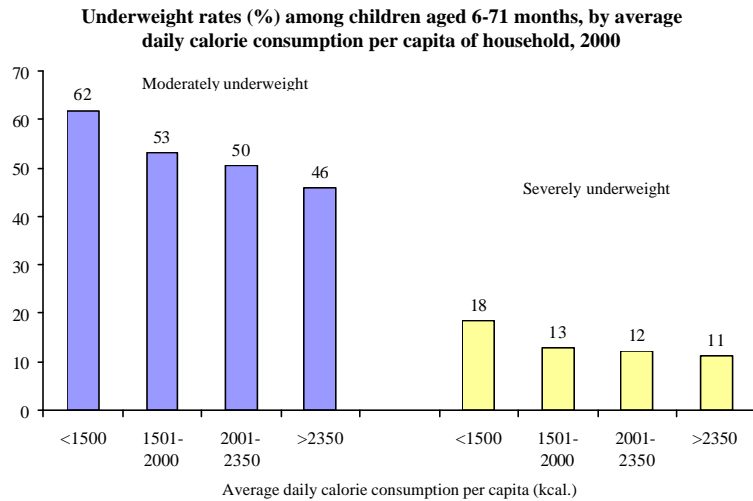


Figure IV.13

increase as household calorie consumption per capita falls. The inverse association of calorie intake and malnutrition is much stronger for severe than for non-severe (moderate and mild) malnutrition rates. For instance, children aged 6-71 months in households with an average daily calorie intake per person of less than 1,500 kcal. are 41% more likely to be stunted and 69% more likely to be severely stunted than children in households with an average daily calorie intake of more than 2,350 kcal.

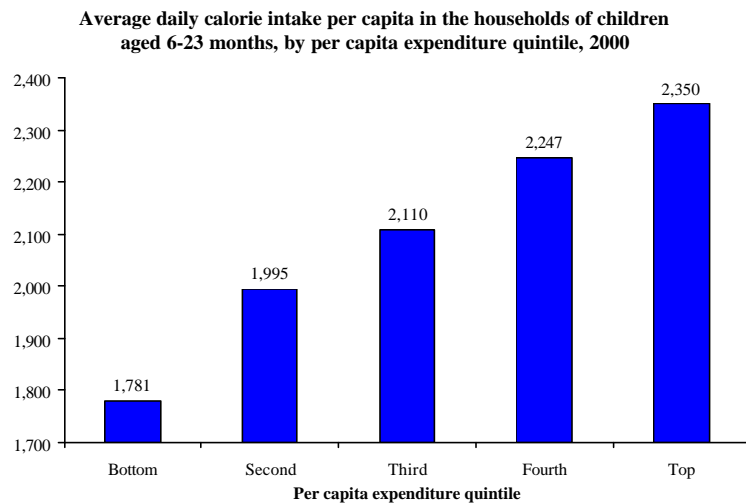
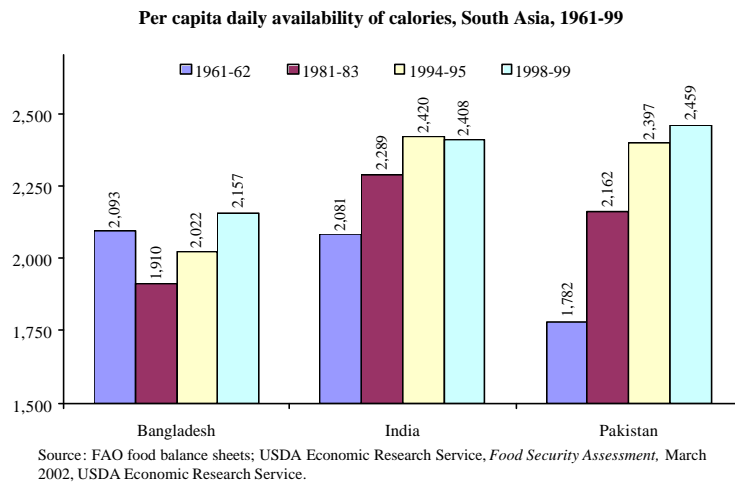


Figure IV.14

Since calories are a normal good, average calorie intake per capita is likely to be related to household living standards. Figure IV.14 shows a strong relationship between the two variables, with individuals in the top consumption quintile consuming nearly a third more calories than those in the bottom quintile. Average daily calorie intakes per person among the bottom two quintiles appear inadequate relative to recommended allowances.

In this connection, it is important to note that Bangladesh has had among the slowest growth of calorie availability in South Asia (Figure IV.15). While daily per capita availability of calories in Pakistan grew from 1,782 in 1961-62 to 2,459 calories in 1998-99 (representing an annual rate of increase of 0.9%), the corresponding growth in Bangladesh over the same period was only about 0.08% per year. India saw its daily per capita

availability of calories go from 2,081 calories to 2,408 calories (an annual increase of about 0.4%). The slow growth of calorie availability, which is an important (although not the only) factor in the continuing high rates of child malnutrition in the country, reflects the lack of strong, sustained agricultural productivity growth in the last 2-3 decades.



Socioeconomic and Policy Correlates

Figure IV.15

Mother's Education. There is a large literature documenting the many benefits of maternal education for child outcomes – infant and child mortality, child nutrition, or child schooling. The CNS data show a sharp association between the prevalence of child malnutrition, especially severe malnutrition, and mother's education (Figure IV.16). For instance, 57% of children (aged 6-23 months) of mothers with no schooling are moderately underweight, as compared to only 27% of children with mothers who have had 8 or more years of schooling. Severe underweight rates are even more sharply associated with mother's schooling.

Water and Sanitation Facilities. Contamination caused by unsafe drinking water and lack of sanitation are important causes of diarrheal and other infections in developing countries. These infections, when they affect a child repeatedly, can cause him or her to become malnourished. The CNS data indicate a strong association between rates of child malnutrition and household sources of drinking water (Figure IV.17). In

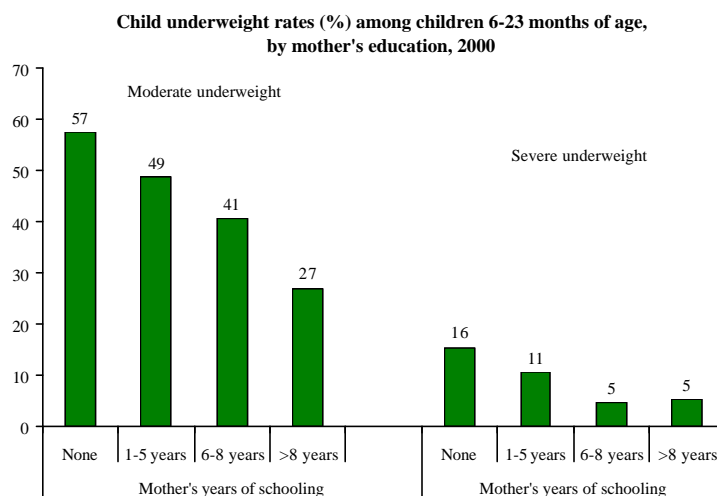


Figure IV.16

general, tap water is observed to be the 'safest' water source (in terms of being associated with the lowest rates of child malnutrition), followed by water from wells and water obtained from ponds and rivers. Indeed, children who obtain their drinking water primarily

from ponds or rivers are nearly 80% more likely to be underweight than children who obtain their drinking water from taps.

For the same reasons discussed above, the type of toilet in a home can also have a bearing on child malnutrition rates. The CNS data suggest that flush or sanitary toilets offer the best protection against child malnutrition, followed by pit latrines (Figure IV.17). As would be expected, the use of open space as a toilet is associated with the highest rates of child malnutrition. Children who use open spaces for their sanitation needs are two times as likely to be underweight as those who use flush toilets.

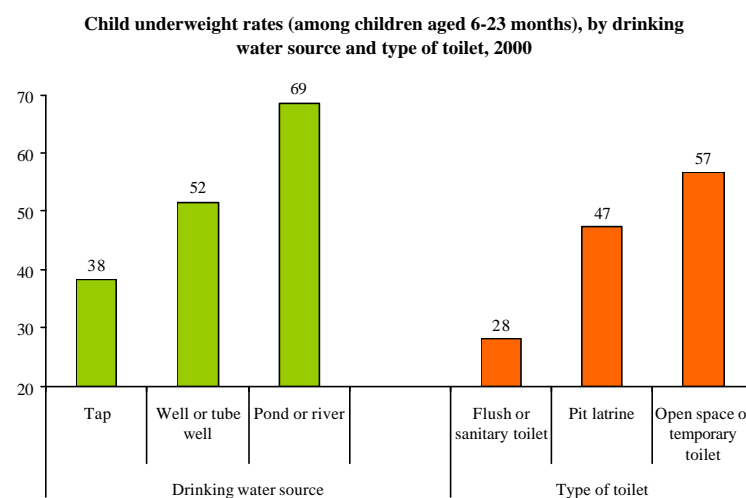


Figure IV.17

Access to Health Facilities. The availability of and access to health facilities is likely to reduce child malnutrition by increasing the utilization of health services, which are an important input into child nutrition and child health. However, if health facilities are located (by governments or NGOs) in those villages having the worst health and nutritional conditions, a (perverse) positive association between child malnutrition and availability of health facilities would be observed.

Data from the CNS suggest that proximity to a *thana* (district) health center does lower child malnutrition (Figure IV.18). Interestingly, however, the largest declines in child malnutrition

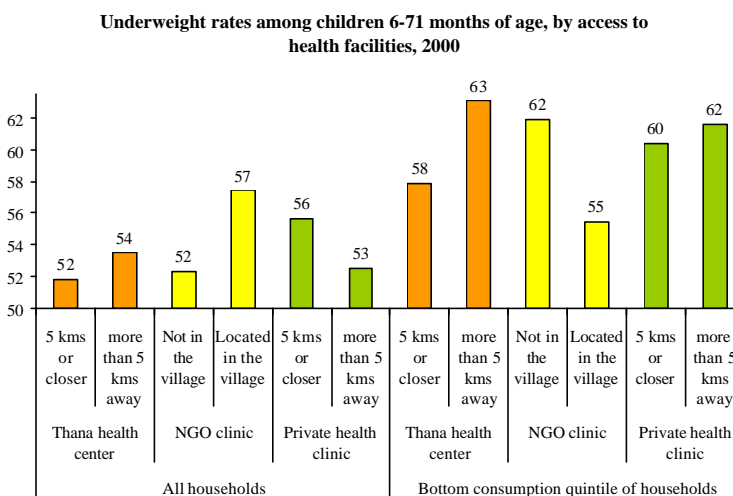


Figure IV.18

from having a *thana* health center within a distance of 5 kilometers are observed for the poorest consumption quintile. For example, a *thana* health center in close proximity to a village is associated with a reduction of the overall incidence of underweight children in that village from 53.5% to 51.9%. But the decline is far greater – from 63.1% to 57.9% – among children belonging to the bottom consumption quintile.

The results with respect to the availability of an NGO health clinic are very similar. Availability an NGO health clinic in a village is associated with a sharp reduction in child underweight rates, but only among the bottom consumption quintile.

However, the results with respect to the proximity of private health clinics are different; close proximity to a private clinic is associated with a negligible decline in child underweight rates among the poorest quintile, suggesting perhaps that the poor do not make as much use of private health clinics as of government and NGO health clinics.

Village Infrastructure. Infrastructure, such as roads and electricity, can also have indirect associations with child malnutrition by improving access to health facilities and by improving conditions of food storage and preparation. The CNS data do not, however, show a strong association between village electrification and prevalence of undernutrition (Figure IV.19).

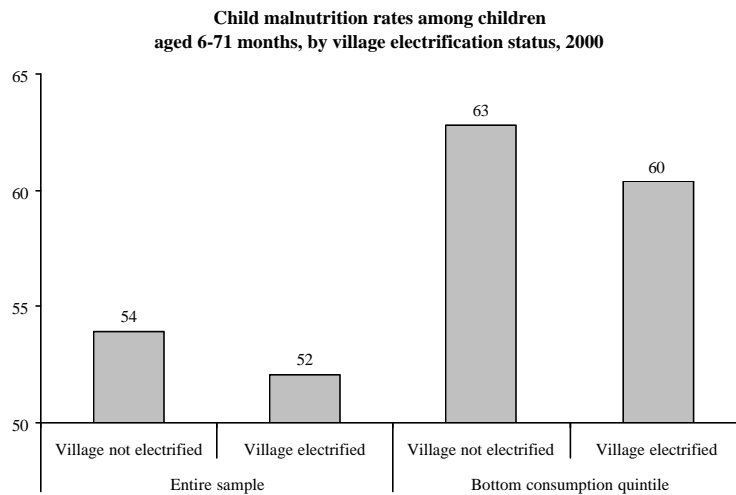


Figure IV.19

Natural Disasters. Households in poor countries, such as Bangladesh, are often inadequately protected against weather- and environment-induced shocks, such as floods, droughts and epidemics, because of the absence of well-functioning credit and insurance markets. These types of shocks can have adverse impacts on household consumption and thereby on child nutritional outcomes. The CNS data suggest that weather shocks – especially floods and cy-

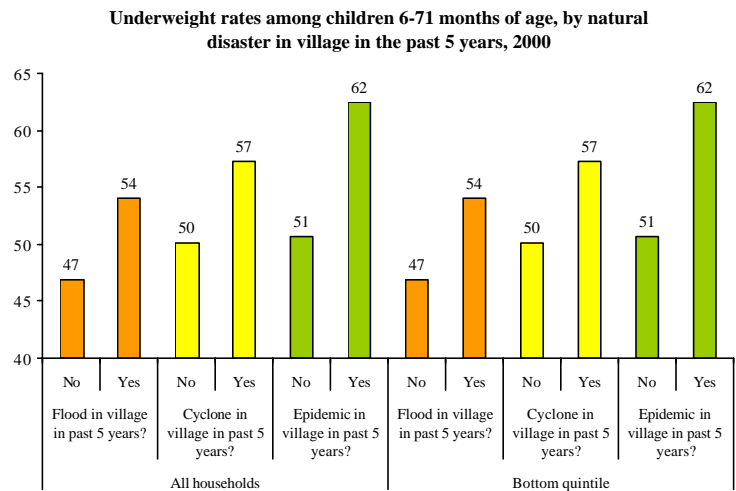


Figure IV.20

clones – can have lasting impacts on child malnutrition (Figure IV.20).²⁹ For instance, rates of underweight children in villages that experienced a flood in the five years preceding the CNS 2000 are 7 percentage points greater than in villages that experienced no flood, with virtually no difference observed between the overall sample and the poorest consumption quintile. The occurrence of a cyclone has an association of similar magnitude, while an epidemic in the village in the preceding five years is even more strongly associated with higher child underweight rates.

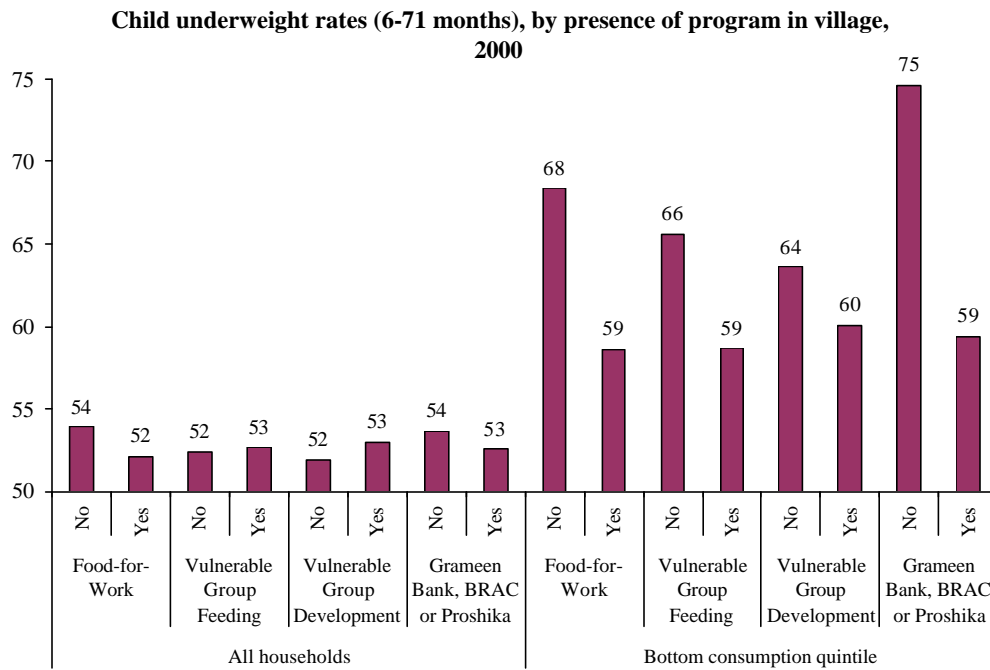


Figure IV.21

Public Nutrition Programs. Depending upon their geographical reach and programmatic effectiveness, government in-kind (food) transfer programs are likely to influence child nutritional levels. The Government of Bangladesh has had several nutritional intervention programs going back to the 1970s. These include, among others, Food-for-Work (FFW), Test Relief, Food-for-Education, Gratuitous Relief (GR), and Vulnerable Group Development (VGD). In addition, in response to the devastating floods of 1998, the Government started the Vulnerable Group Feeding (VGF) program, which provides some four million vulnerable households in the country with 16 kg of wheat and rice per household per month.

Since the community module of the HIES 2000 collected information on whether selected government programs were operating in the village during the past year, it is possible to test the hypothesis that public transfer programs are associated with reduced

²⁹ Although seasonal flooding is nothing new to Bangladesh (owing to the fact that its three major rivers drain a vast basin twelve times their own area), the country suffered its worst floods in living memory in 1998. The 1998 floods affected some 30 million people and caused over 1,000 deaths. In addition to severely damaging public and private infrastructure and assets, they resulted in extensive loss of rice crop.

prevalence of child malnutrition. However, an observed association between nutritional interventions and nutritional outcomes could be spurious, especially if government nutritional interventions are targeted to villages with severe child malnutrition rates.

The CNS 2000 data shown in Figure IV.21 indicate that, while public food transfer programs, such as Food-for-Work, VGF and VGD, are weakly associated with overall prevalence rates of child malnutrition, they appear to have large (inverse) associations with child malnutrition rates among the poorest quintile of children. For instance, the Food-for-Work program is associated with a reduction of 9 percentage points in underweight rates among the bottom quintile of children aged 6-71 months old. Likewise, underweight rates among children in the bottom quintile are 7 percentage points lower in villages having a VGF program than in those not having a VGF program.

During the 1990s, there has been a gradual shift in emphasis within the targeted food assistance programs operated by the Government of Bangladesh from purely relief to a more explicit development orientation. Given the finding that relief programs, such as the FFW and VGF, have a strong association with child nutritional status among the poor, and given the propensity for natural disasters in Bangladesh, it would be clearly important for the government to retain some food relief programs, such as the VGF and GR, that could be rapidly scaled up in times of need to provide relief and short-term risk-coping.

The CNS data show very large associations between the presence of an NGO program in a village and child malnutrition rates among the poorest quintile of children in that village. For instance, the percentage of underweight children is 16 percentage points lower in villages having a Grameen Bank, BRAC or Proshika program than in villages not having one. BRAC and the Grameen Bank are the two largest NGOs in Bangladesh.³⁰ Both operate micro-credit schemes that attract some of the poorest households as their members. In addition to its micro-credit activities, BRAC operates community-based agricultural, health, education, and water and sanitation projects. Thus, the NGO programs can be viewed as comprehensive income-generating and community development interventions.

Projections to 2015

The Bangladesh CNS data suggest that child underweight rates in Bangladesh have declined at an annual rate of 2.4% between 1985 and 2000. The decline during the 1990s has been even more rapid – about 3.5% annually. Figure IV.22 suggests that if the rate of decline of child malnutrition experienced between 1985 and 2000 continues into the future, the child underweight rate in Bangladesh could be expected to reach a level of 36 in 2015 – just slightly above the MDG level of 34. If the future rate of decline remains at the (higher 4.5%) rate experienced in the 1990s, the child underweight rate could decline to 30 by 2015. Thus, Bangladesh could expect to attain the child underweight MDG – or come very close to attaining it – if it simply continues the trend it has seen in the recent past.

³⁰ Indeed, BRAC is often described as the largest NGO in the world.

However, this is a simplistic projection that does not recognize the underlying factors that determine child malnutrition. A projection based on the underlying factors is attempted below.

Multivariate Analysis

To examine the likelihood of Bangladesh attaining the child underweight MD goal, we have estimated a multivariate model of child underweight rates, using unit record data from the CNS 2000.³¹ The multivariate model has the advantage of controlling for several variables that may be simultaneously associated with child malnutrition. The estimation results are reported in Annex Table 3, while only the broad findings of the empirical analysis are discussed here.

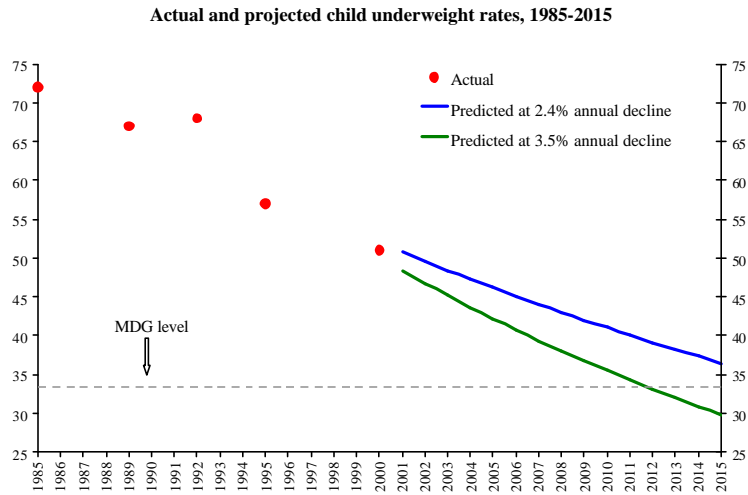


Figure IV.22

The multivariate model confirms many of the bivariate relationships discussed earlier. After controlling for other variables, neither age nor gender is a significant correlate of malnutrition. However, birth order is, with higher birth-order children being significantly more likely to be underweight than lower birth-order children.

Maternal schooling has a strong association with underweight rates, with each additional year of schooling of the mother being associated with a decline of about 2 percentage points in the child underweight rate. The log of monthly consumption expenditure per capita (proxying for a household's living standards) also has a strong association, with a one percent increase in per capita consumption expenditure being associated with a 0.2% decline in underweight rates. However, consumption inequality, as measured by the Gini index of per capita consumption expenditure, has no significant association with child malnutrition.

Infrastructure generally has strong inverse associations with child malnutrition. Children in households having a flush toilet are, on average, 15% less likely to be underweight than children in households not having access to a flush toilet. As was observed in the bivariate results discussed earlier, village electrification has no significant association with underweight rates. However, proximity to a bus station appears to have a significant association, indicating the importance of transport and road access to the probability of a child being underweight.

³¹ Since the dependent variable in the model is a dichotomous variable (i.e., whether or not a child is underweight), the model has been estimated by the maximum-likelihood probit method.

The results also indicate that natural disasters – in particular, floods – have a significant inverse association with child nutritional status. Children residing in villages that experienced a flood in the 5 years preceding the CNS 2000 were 7% more likely to be underweight than children in villages that did not experience a flood.

Among the various government nutritional programs, the Food-for-Work program appears to have a significant inverse association with child underweight rates. Controlling for other variables, children in villages having a Food-for-Work program are 5% less likely to be underweight than children in villages not having such a program³²

Finally, the results indicate that, even after controlling for household living standards, the scarcity of land in a community (as proxied by mean per capita land ownership in a child’s district of residence) is significantly and inversely associated with child underweight rates. A one percent increase in per capita land availability in district is associated with a reduction of about 0.1% in child underweight rates.

Simulations to 2015

Based on the multivariate probit model estimated above, we have undertaken simulations of the child underweight rate in Bangladesh from 2001 to 2015 under certain assumptions. The nature and magnitude of the interventions are detailed in Table IV.1. As noted previously, the scope and magnitude of the assumed interventions are only meant to illustrate the likely reduction in child malnutrition under one possible scenario. It is obviously not possible to predict whether the assumed interventions will indeed take place, and, even if they do, whether they will proceed as the pace assumed in Table IV.1.

Table IV.1: Assumptions about various interventions to reduce the child underweight rate, 2000 to 2015

Intervention	Starting value in 2000	Assumed change per year	Ending value in 2015
Adult female schooling (years)	2.5	0.3	7.0
Food-for-work program coverage (%)	68	1% points	83
Monthly consumption expenditure per capita (Taka)	900	2.7%	1,342
Flush toilet coverage (%)	9	0.5% point	17
Distance to nearest bus station (kms.)	5.4	0.15	3.15
Mean of district land availability per capita (acres)	0.16	-2%	0.12
Probability of village experiencing a flood in 5-year period	0.80	-0.1	-0.65

³² Of course, this result might reflect that the Food-for-Work program is located in better-off communities that happen to have lower child malnutrition rates. However, such a possibility appears unlikely, given the design of the program.

As in the previous chapter, we assume that mean district monthly consumption expenditure per capita will grow annually at about 2.7% to 2015, which would be consistent with an annual per capita GDP growth rate of 4%, given the historical relationship between GDP and consumption growth in Bangladesh over the 1990s. In addition, we assume that per capita land availability will continue to decrease at the rate at which it has declined during the 1990s. Finally, we assume that flood prevention and management measures, such as construction of storage reservoirs in the upper catchments of the Ganges, the Brahmaputra and the Megna Rivers (in cooperation with other countries sharing the basins of these rivers), drainage improvements, and use of better embankment materials, will reduce the likelihood of floods. As noted earlier, none of these assumptions are sacrosanct; they are only meant to be illustrative. The projections could be undertaken for any combination of changes in the policy or environmental variables.

Figure IV.23 shows the projected path of the child underweight rate in Bangladesh to 2015 with all of the seven policy and environmental changes shown in Table IV.1 occurring. As would be expected, the declining availability of land per capita is associated with rising underweight rates (from about 51% to 53.5%). However, all the other interventions contribute to reductions in poverty. The largest decline in child underweight rates (about 8 percentage points) comes about with the expansion of female schooling, with economic growth also contributing to an appreciable decline (of 3½ percentage points). The other interventions – flood control and management measures, improved bus transport, sanitation access, and improved coverage of the Food-for-Work program – are all associated with smaller declines (of about one percentage point each) in child underweight rates to 2015. Together, the seven interventions are associated with a reduction of about 12 percentage points in the child underweight rate – bringing the child underweight rate down from 51% to 39% – about 5 percentage points above the MDG level (34%).

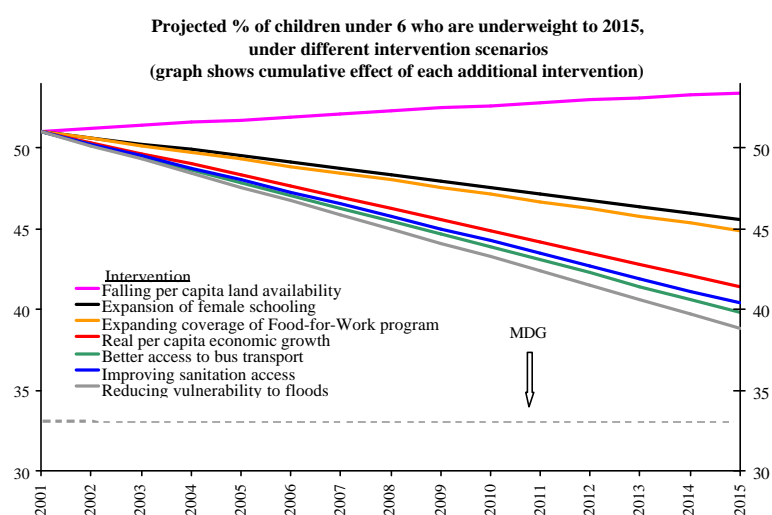


Figure IV.23

Figure IV.23 shows the projected path of the child underweight rate in Bangladesh to 2015 with all of the seven policy and environmental changes shown in Table IV.1 occurring. As would be expected, the declining availability of land per capita is associated with rising underweight rates (from about 51% to 53.5%). However, all the other interventions contribute to reductions in poverty. The largest decline in child underweight rates (about 8 percentage points) comes about with the expansion of female schooling, with economic growth also contributing to an appreciable decline (of 3½ percentage points). The other interventions – flood control and management measures, improved bus transport, sanitation access, and improved coverage of the Food-for-Work program – are all associated with smaller declines (of about one percentage point each) in child underweight rates to 2015. Together, the seven interventions are associated with a reduction of about 12 percentage points in the child underweight rate – bringing the child underweight rate down from 51% to 39% – about 5 percentage points above the MDG level (34%).

These results suggest that even though attainment of the child nutrition MDG will be challenging in Bangladesh, it should be possible to bring child underweight rates down sharply (and relatively close to the MD target) with a package of interventions that includes economic growth, flood control and management, expansion of female schooling, improved physical infrastructure (transport and sanitation access), and greater coverage by food assistance programs, such as Food-for-Work.

V. PRIMARY SCHOOLING

Universal primary enrollment is one of the main education-related MDGs. The millennium development goal is to ensure that, by 2015, all children are in school, the net primary enrollment ratio is 100%, and that all the pupils entering grade 1 are retained until grade 5 (typically the last year of primary school).

The numerous benefits of schooling are well-known and have been widely discussed in the literature on economic development. Schooling is one of the most powerful instruments for reducing poverty, unemployment and inequality; improving health and nutrition; and promoting sustained, human development-led growth. It is also self-perpetuating across generations, with educated parents much more likely to provide schooling to their children. Both the pecuniary and non-pecuniary returns from schooling have been well-documented in the literature for several countries, including Bangladesh.

Overall Trends

Enrollment Rates. Bangladesh has achieved rapid progress in schooling during the last two decades. The gross primary enrollment rate, which was only 61% in 1980, increased to 72% by 1990 and to 96% by 2000.

However, as in other developing countries, gross enrollment rates tend to be greater than net primary enrollment rates because of the late entry of children (i.e., beyond age 6) into primary school and the resulting enrollment of overage children (i.e., those above age 10) at the primary level. In the case of Bangladesh, the net primary enrollment rate from administrative data is estimated to be about 86% in 2000.

Household surveys present yet another set of estimates. For example, data from the HIES 2000 indicate a net primary enrollment rate of only 65.4% in 2000.³³ There are many reasons for the discrepancy between household survey-based and school administrative records-based enrollment rates. First, household surveys typically obtain information on whether a child is *attending* school at the time of the survey, while administrative data refer to students enrolled in the registers of the school at the beginning of the school year. The latter may be greater than the former if students enroll in school at the start of the school year but then do not attend it during the remainder of the year. Second, gross enrollment rates from administrative records are very sensitive to incorrect estimates of the population of school-aged children. Third and finally, there are incentives for school administrators and district officials to overstate the number of enrolled students, since many types of government education expenditure allocations to districts and schools are often based on the number of enrolled students.

³³ Data from UNICEF's Multiple Indicator Cluster Survey (MICS) indicate a much higher net primary enrollment rate – 79.8% for 2000.

Figure V.1 shows the percentage of children of different ages that were attending school, and those that were attending primary school in particular, in 2000, based on the HIES.³⁴ School enrollment rates are observed to increase from 29% at age 5 to 55% at age 6 and then peak at 86% at age 9. Thereafter, enrollment falls gradually until age 14, and sharply beyond that age. For the age group 6-10 years, the school enrollment rate is 75.2% – significantly larger than the 65.4% net primary enrollment rate. The difference arises largely because a number of children aged 6-10 years attend pre-primary school. The HIES data indicate that one-third of enrolled students aged 6 and 16% of students aged 7 do not, in fact, attend *primary* school. This suggests an age at entry into primary school of closer to 7 or 8

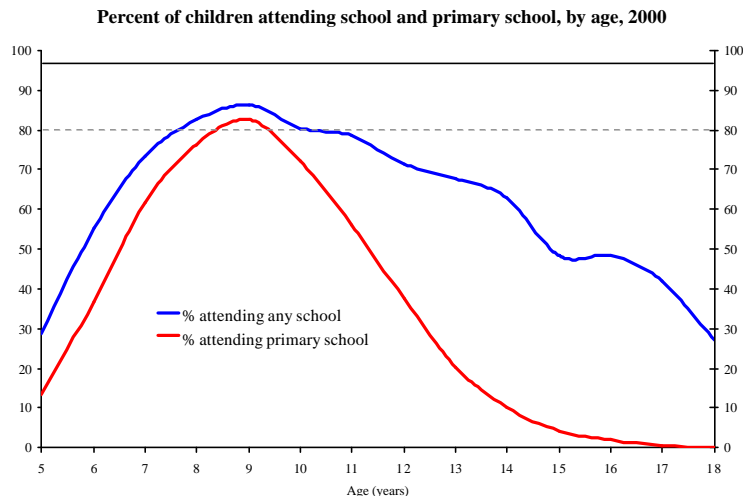


Figure V.1

years instead of the 6 that is officially expected. On the other hand, nearly half of all enrolled students aged 12 and 30% of students aged 13 report attending primary school. This overage enrollment results in high rates of gross (relative to net) primary enrollment.

Primary Completion. Universal primary enrollment is only one of the education-related millennium development goals. Another goal is retention of students – viz., to ensure that the entire cohort of children who begins grade 1 remains in school until grade 5. School completion is an indicator – albeit imperfect – of the quality of schooling. It is possible that in the rush to expand access to schooling, policy makers might compromise the quality of schooling. The compromise in quality would likely show up in lower rates of student retention and primary school completion.

Calculating the true primary completion rate requires longitudinal data on children, but in the absence of such data, one can use household survey data on children’s ever-schooled, currently-in-school, and current grade status. The HIES 2000 data reports whether a child ever went to school, whether he/she was currently attending school at the time of the survey, the grade currently attending, and the grade last completed.

The above information can be used to calculate the primary completion rate for children aged 12 years. Obviously, 12-year olds who never attended school are excluded from the calculation of the primary completion rate. A child is considered to have completed primary school if he/she reported having completed class 5 at the time of the survey and if

³⁴ In what follows, we use the term ‘enrollment’ for rates estimated from both administrative and survey data, since the term ‘attendance rate’ refers to the percentage of school days that a student attended school. Data on such rates are rarely available from most multi-purpose household surveys.

he/she was *not* reported as never having attended school. In 2000, the primary completion rate thus calculated was 66.3%. A similar calculation for India for approximately the same year (1999-2000) yields a primary completion rate of 61.4% (World Bank 2004).^{35,36}

Spatial Patterns

There are large variations in the net primary enrollment rate across regions (Figure V.2). The rural areas of Faridpur, Tangail and Jamalpur, for instance, have net primary enrollment rates of only 48%. On the other hand, the rural areas of Khulna, Jessore and Kushtia have net primary enrollment rates of 74%.

Likewise, there are large variations in the primary completion rate across areas (Figure V.3). At 84%, Other Urban Dhaka (i.e., urban areas outside the Standard Metropolitan Area of the city) has the highest primary completion rate, followed by rural Dhaka, urban Khulna, and rural Sylhet and Comilla. The rural areas of Noakhali and Chittagong rank at the bottom, with primary completion rates of 52%.

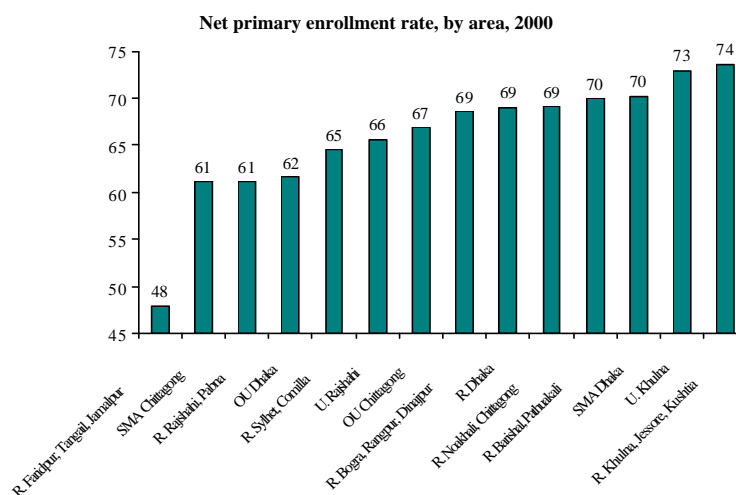


Figure V.2

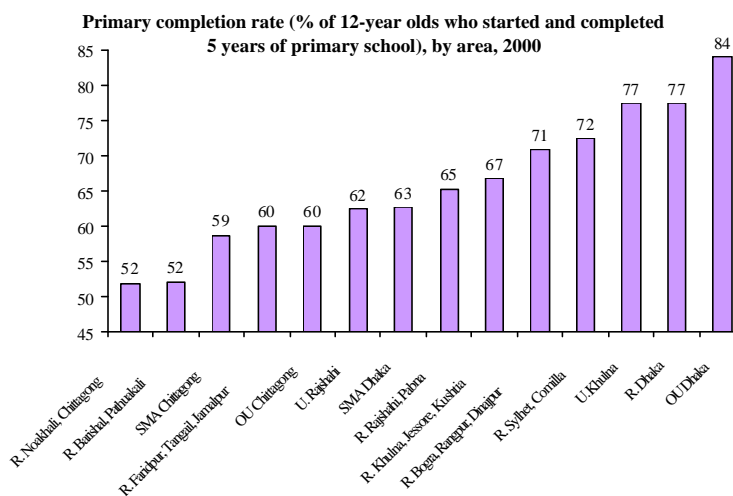


Figure V.3

³⁵ Increasing the potential pool of children from age 12 to those aged 12-13 years does not make an overly large difference to the estimated primary completion rate. In 2000, the estimated primary completion rate goes up from 66.3% to 71.6% when the age group 12-13 years is considered.

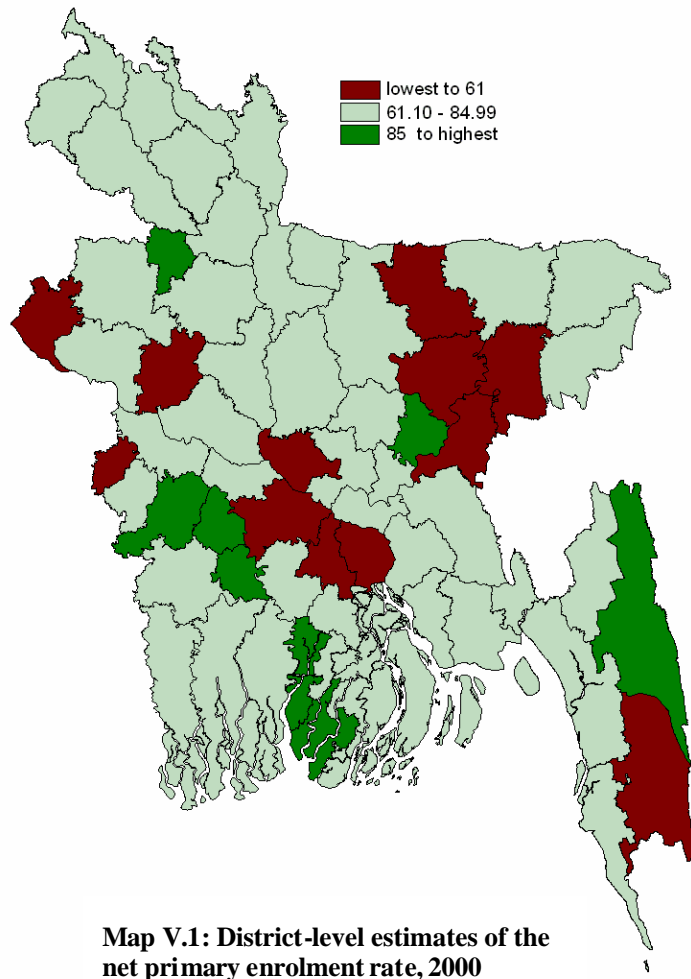
³⁶ Another, more widely-used method of calculating the primary completion rate is to compare the size of the first grade cohort in a given year with that of the sixth grade cohort five years later.

Inter-district variations in the net primary enrollment rates are even larger (Map V.1).³⁷ The low enrollment districts are found in the eastern, western and southern parts of the country.

Geographic Concentration of Out-of-School Children

It is useful to know the absolute population of out-of-school children, since this group would need to be targeted by schooling interventions.

The HIES 2000 indicates that nearly 4.7 million children aged 6-10 years (out of a total population of 18.8 million in that age group) do not attend school in Bangladesh. Figure V.4, which breaks down this number by area, suggests a high degree of regional concentration of this variable. The rural areas of Faridpur, Tangail and Jamalpur account for nearly one-fifth of all out-of-school children aged 6-10 in the country. Three regions (out of a total of 14) together account for nearly one-half – and six regions account for three-quarters – of all out-of-school children nationally.



Map V.1: District-level estimates of the net primary enrolment rate, 2000

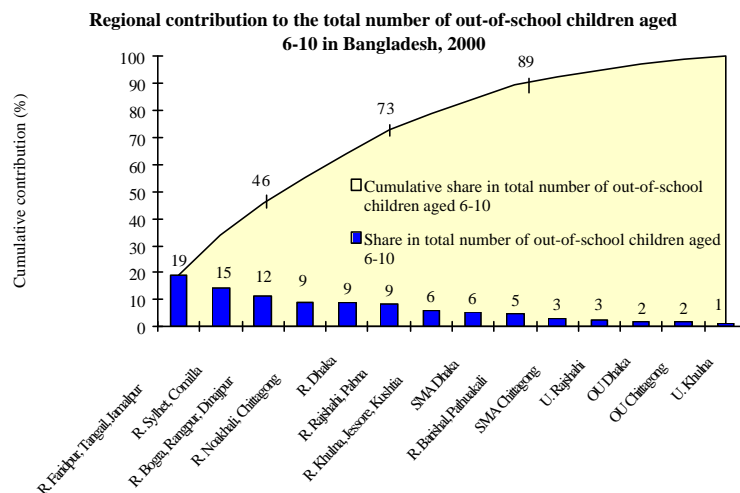


Figure V.4

³⁷ The district-level estimates are from administrative sources. Hence, they are not strictly comparable to the area estimates in Figure V.2, which are calculated from the HIES 2000.

Socioeconomic Variations

Living standards. There is a very clear pattern of net primary enrollment and completion rates increasing sharply with household living standards (as measured by household consumption expenditure per capita) (Figure V.5). The bottom consumption quintile has a net primary enrollment rate of only 54%, while the top quintile has a rate of 78%.

Similarly, the bottom quintile has a primary completion rate of 55%, as against a primary completion rate of 77% in the top quintile. The strong positive association between the net primary enrollment rate and household living standards suggests that low household income constrains primary schooling opportunities for the poor, probably because the poor face a high opportunity cost of sending young children to school.³⁸

Figure V.6 shows that, of the 4.67 million out-of-school children aged 6-10, nearly two-thirds (about 3 million) belong to the bottom two consumption quintiles. Thus, the problem of children not attending school is largely a problem of the poor.

Parental schooling. Schooling tends to transmit itself across generations, with schooled parents being much more likely to send their children to school and to keep them in school for the duration of the primary course. Figure V.7 suggests that this is true for Bangladesh as well, but what is interesting is that there is a threshold effect in the association between adult female schooling on the one hand and net primary school enroll-

Net primary enrollment rate and the primary completion rate, by per capita expenditure quintile, 2000

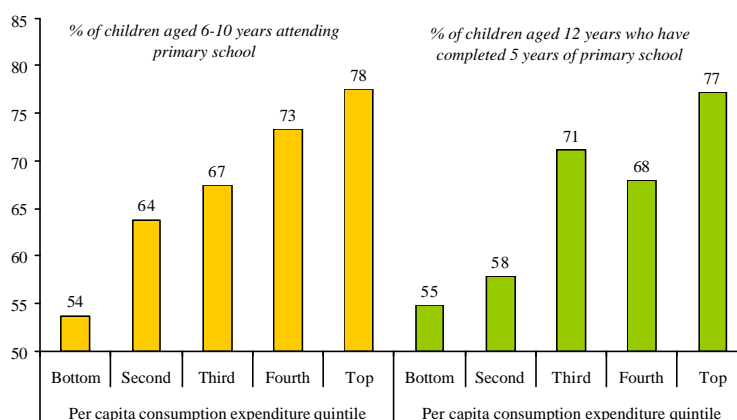


Figure V.5

Distribution of out-of-school children aged 6-10, by per capita consumption expenditure quintile, 2000

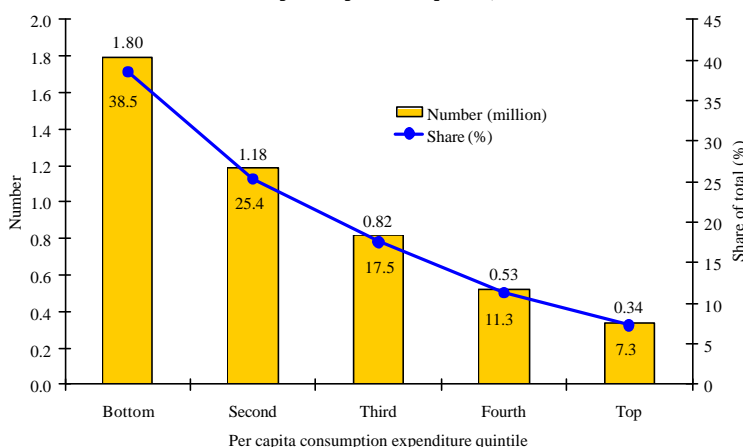


Figure V.6

³⁸ As in other developing countries, the direct costs of attending primary school are typically quite low in Bangladesh.

ment and primary completion rates and adult female schooling on the other.³⁹ The data suggest that the major difference in primary school enrollment and completion rates occurs between households in which the highest-educated adult female has no schooling at all and those in which the highest-educated female has some schooling. The number of years of schooling of the adult female, conditional on her having some schooling, does not appear to make much of a difference to the net primary attendance and completion rates of children in her household.

Net primary enrollment rate and the primary completion rate, by schooling years of highest-educated adult female in household, 2000

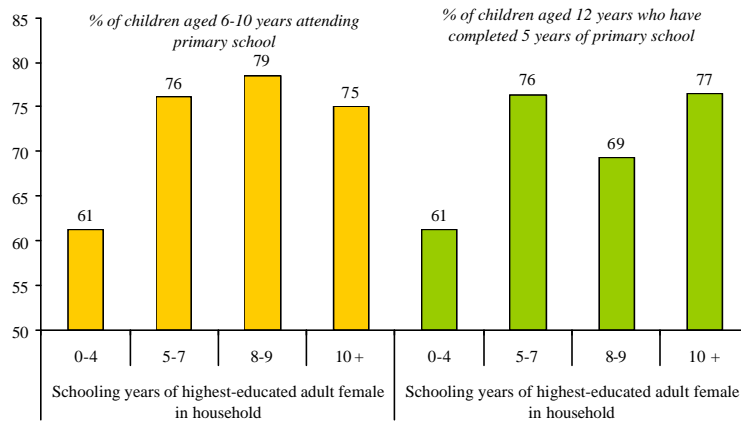


Figure V.7

Occupation. There are also sharp differences in primary school enrollment and completion rates across occupational groups (Figure V.8). Some of these mirror the differences observed across economic groups. For instance, the children of agricultural and casual laborers, who constitute the poorest occupational group in Bangladesh, have very low rates of primary school enrollment and completion among. The children of small farmers (i.e., those operating less than an acre of land) and self-employed entrepreneurs are next, while the children of large farmers, salaried employees, and other occupational groups have roughly comparable (and higher) rates of primary school enrollment and completion.

Net primary enrollment rate and the primary completion rate, by occupation of household, 2000

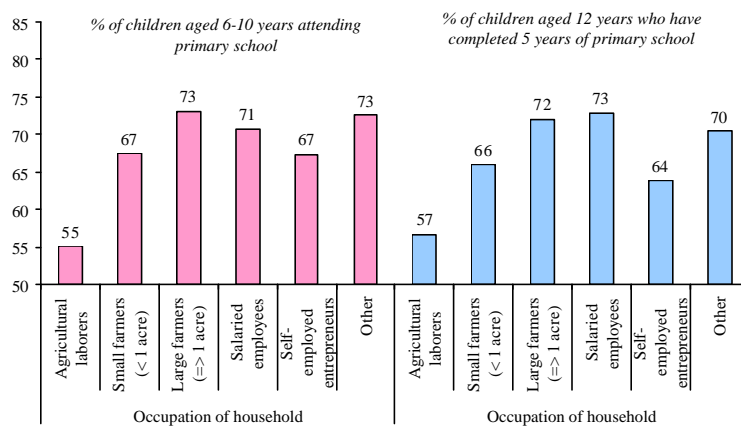


Figure V.8

³⁹ The HIES data do not permit identification of the mother of each child in the sample (unless the sample is restricted to biological children of the household head). We have therefore used the schooling years of the highest-educated adult female in a household as a proxy for maternal schooling.

The facts that casual laborers constitute a large share of Bangladesh's population (about 28%) and that their children have the lowest rates of primary school enrollment result in a very high concentration of out-of-school children in the country in this occupational group. Figure V.9 indicates that fully 45% of all out-of-school children belong to the agricultural labor profession. Another 17% belong to self-employed households, which implies

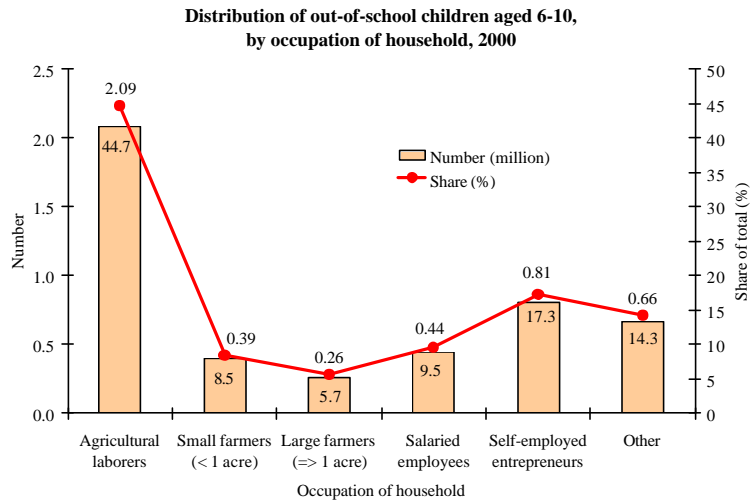


Figure V.9

that nearly two-thirds of all out-of-school children in the country are either children of agricultural laborers and self-employed entrepreneurs. These findings have obvious implications for efforts at targeting school interventions to selected groups of children.

The Role of Public Interventions

Infrastructure. The HIES data suggest that access to infrastructure is associated with generally higher primary school enrollment and completion rates. Villages having electricity coverage and a bus station tend to have higher net primary enrollment rates, but tap water and sealed toilet coverage do not appear to have any significant association with net primary enrollment. On

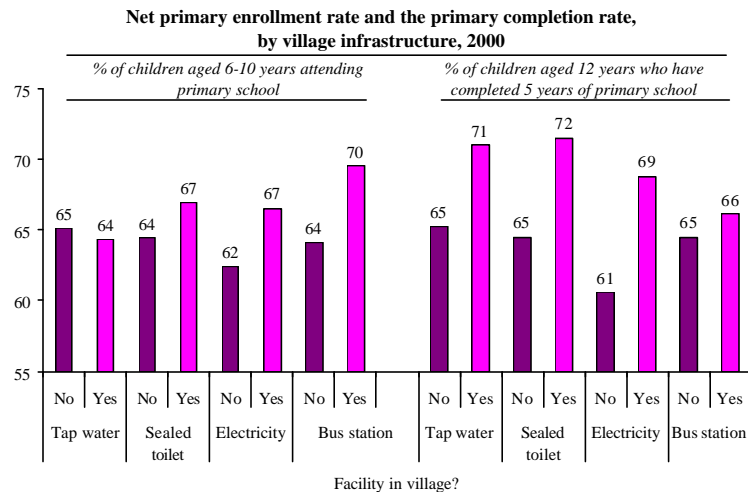


Figure V.10

the other hand, the availability of tap water, sealed toilets, and electricity – but not access to a bus station – are strongly positively associated with higher primary completion rates (Figure V.10).

Government programs. The Government of Bangladesh has, for a number of years, operated several income assistance programs, one of which directly links its benefits to the school attendance of primary school-aged children (viz., the Food-for-Education pro-

gram).⁴⁰ An important question is the extent to which these programs influence primary school attendance and completion rates of children. Figure V.11 suggests that some of these programs, especially the Food-for-Education, Vulnerable Group Feeding and Vulnerable Group Development programs are associated with higher net primary enrollment rates. But there does not appear to be any association of these programs with primary completion rates. Indeed, rather surprisingly and counter-intuitively, one of these programs – Food-for-Education – is associated with sharply lower school completion rates.

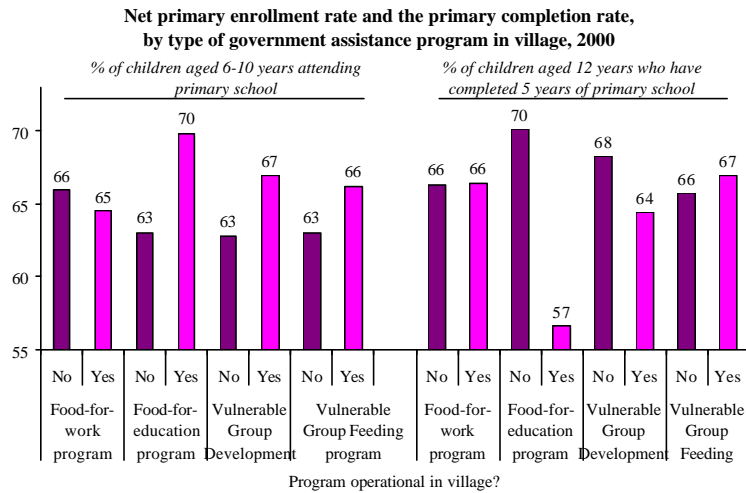


Figure V.11

Governance. Poor governance is pervasive in the educational sector of Bangladesh. Membership of school management committees is rife with politics, and teacher recruitment is often subject to personal influence. As in the public health sector, teacher absenteeism is rampant, with teachers placing much greater emphasis on private tutoring than on teaching at schools. There have been numerous textbook production and procurement scandals over the years, with books that are supposed to be distributed for free showing up for sale in markets (World Bank 2003). Corruption in procurement has also resulted in poor quality of school construction. These types of governance problems contribute to the poor quality of education in Bangladesh, and undermine the tremendous gains made in expanding access.

Reducing teacher absenteeism and making schools accountable to students and the community is no simple task. As the *World Development Report 2004* points out, it requires broad-ranging institutional reform, incorporating, among other things, empowerment of citizens and communities who can hold the state accountable for performance, devolution of administrative and financial powers to communities, greater autonomy to schools, involvement of parents in school management, and ensuring the motivation of front-line workers.

Role of NGOs. As in other sectors, NGOs have played an important role in promoting basic education in Bangladesh. In 1990, mainstream NGOs working in the education sec-

⁴⁰ One study found that the Food-for-Education program, which was launched in 1993 to increase primary school enrollment and completion among children from very poor and landless families, did raise enrollment and completion rates, but that it suffered from high levels of leakage (costing 1.6 taka to transfer one taka in benefits) and was poorly targeted (with 50% of the beneficiaries coming from households above the food poverty line) (World Bank 1998). The program was discontinued in June 2002, but has been replaced by another program called the Primary Stipend Education Program.

tor formed a coalition called the “Campaign for Popular Education or CAMPE.” The goal of CAMPE was to eradicate illiteracy via mass formal and informal literacy programs. At the present time, more than 400 NGOs are engaged in non-formal education programs in the country. Some of these NGOs have established innovative projects to promote basic education and literacy. For instance, the BRAC Non-Formal Primary Education Program caters to older children who never attended formal school and takes them from grade 1 to 3. This program is by far the largest single non-government primary education program in the country, with more than 30,000 schools and about a million pupils. More than 90% of the children who start in BRAC schools graduate, and a large proportion of the program graduates are admitted into grade 4 or higher of the government school system (Sharafuddin 1998).

Multivariate Analysis

To examine the likelihood of Bangladesh attaining the child education-related MDGs, we have estimated multivariate models of net primary school enrollment and completion, using unit record data from the HIES 2000.⁴¹ The multivariate models have the advantage of controlling for several variables that may be simultaneously associated with primary school enrollment and completion. The estimation results are reported in Annex Tables 4 and 5, while only the broad findings of the empirical analysis are discussed here.

Net primary school enrollment. The multivariate model confirms many of the bivariate relationships discussed earlier. Older children are observed to have a higher probability of primary school enrollment (as compared to children aged 6 years), with primary school enrollment peaking at age 9. Interestingly, after controlling for age and other factors, girls are significantly more likely than boys to be enrolled in primary school, although the difference (about 3.6 percentage points) is modest.

Household living standards, as measured by the log of monthly consumption expenditure per capita, have a strong positive association with primary school enrollment, with a one-percent increase in per capita consumption expenditure being associated with a 0.23% increase in the net primary school enrollment rate.

Interestingly, however, while the likelihood of primary school enrollment is significantly and positively associated with adult female schooling in the household, it has a stronger association with adult male schooling. Each additional year of schooling of the highest-educated adult male in the household is associated with a 1.4 percentage point increase in the net primary enrollment rate, but the corresponding increase associated with the schooling of the highest-educated adult female in the household is only half as much (0.7 percentage points).⁴² This result is counter-intuitive and flies in the face of evidence from around the world indicating stronger associations between mother’s and children’s

⁴¹ Since the dependent variable in the model is a dichotomous variable (i.e., whether or not a child of a given age is attending primary school or has completed primary school), the models have been estimated by the maximum-likelihood probit method.

⁴² The results do not, however, show a statistically significant (at the 5% level or below) difference between the point estimates of adult male and adult female schooling.

schooling than between father's and children's schooling. The result might reflect the fact that the highest-educated adult female in the household may not necessarily be a child's mother, nor might the highest-educated adult male be a child's father. At any rate, since it is merely net primary school enrollment that is being analyzed here, there is nothing in the results to suggest that adult female schooling in a household is less important than adult male schooling to regular school attendance and improved learning outcomes among children.

Infrastructure generally has mixed associations with primary school enrollment rates. Paved roads in a district are strongly associated with primary school enrollment, with a one point increase in the percentage of roads in a district that are paved being associated with a 0.4 percentage point increase in the net primary school enrollment rate. Similarly, distance to a bus station is associated negatively with primary school enrollment, reflecting the importance of transport and road access to schooling decisions. The results suggest that every one-kilometer reduction in the distance of a village from the nearest bus station is associated with an increase in the net primary enrollment rate of about 0.6 percentage points. However, electricity coverage does not appear to be a significant correlate of primary school enrollment.

Among the various government programs, the Food-for-Education program appears to have a very significant and large association with primary school enrollment. Controlling for other variables, the net primary enrollment rate in villages having a Food-for-Education program is 8.5 percentage points higher than the corresponding rate in villages not having a Food-for-Education program. The Vulnerable Group Development (VGD) program is also observed to have a very strong positive association with net primary school enrollment; VGD villages on average have a net primary enrollment rate that is 6 percentage points greater than non-VGD villages.⁴³

An interesting question is the extent to which access to schools and the quality of schools in a community are associated with net primary school enrollment rates. The distance (as measured in minutes of walking) to the nearest primary school in a village – an indicator of school access – has no significant association with primary school enrollment. The lack of significance of access is surprising, but perhaps reflects the fact that 85% of villages in Bangladesh have a primary school located in the village. On the other hand, lowering the pupil-teacher ratio at the primary level in a district – an indicator of increased schooling quality – is significantly associated with higher rates of school enrollment. The absolute size of the association is small, however; the results suggest that, controlling for other factors, a one-percent reduction in the pupil-teacher ratio in a district is associated with an increase of only 0.1% in the net primary enrollment rate. These results thus indicate that primary school enrollment in Bangladesh is currently not constrained by the availability of primary schools,⁴⁴ but that enrollment would likely benefit (modestly) from school quality improvements in the form of a reduction of the pupil teacher ratio.

⁴³ Of course, these results might reflect that the Food-for-Education and VGD programs are (unintentionally) targeted to better-off communities that happen to have higher net primary enrollment rates.

⁴⁴ Naturally, given the linear prediction, this result would hold only up to some limit.

The results also suggest that the number of female teachers in the village school is not significantly associated with net primary school enrollment rates. This result is surprising, as there is a great deal of anecdotal evidence from Bangladesh and other countries indicating that parents are less reluctant to send their children, especially daughters, to school when the school teacher is female. However, it may be the case that having female teachers in school is especially important to improving regular school attendance and learning among children, especially girls – effects that this analysis is unable to capture.

Primary completion. The results of the multivariate analysis of primary completion are disappointing, since few explanatory variables are significantly associated with primary completion. The only variables that are significant are log of per capita consumption expenditure, adult male schooling, and the presence of the Food-for-Education program in the village. Of these, the last variable has a perverse (negative) association, suggesting that the Food-for-Education program is associated with lower rates of primary completion. Such a result makes little sense, especially given the earlier finding that the Food-for-Education program is strongly associated with higher rates of primary school enrollment. Likewise, the significance of adult male schooling, but lack of significance of adult female schooling, is troubling, given the large body of evidence indicating stronger associations of mother’s (relative to father’s) schooling with children’s primary school enrollment and completion. Interestingly, this result is consistent with the earlier finding that net primary enrollment rates have a stronger association with adult male schooling in a household than with adult female schooling. However, it is not clear how much credence one can place in these unusual and counter-intuitive findings.

The empirical results suggest that a one percent increase in consumption expenditure per capita is associated with a 0.25% increase in primary completion rates. The observed association of primary completion with adult male schooling is also strong, with a one-year increase in the schooling of the highest-educated male in the household being associated with an increase of 2.5 percentage points in the primary completion rate. None of the other variables, including adult female schooling, is significantly associated with primary completion.

Simulations to 2015

Based on the multivariate probit models estimated above, we have undertaken simulations of the primary school enrollment and completion rates in Bangladesh from 2001 to 2015 under

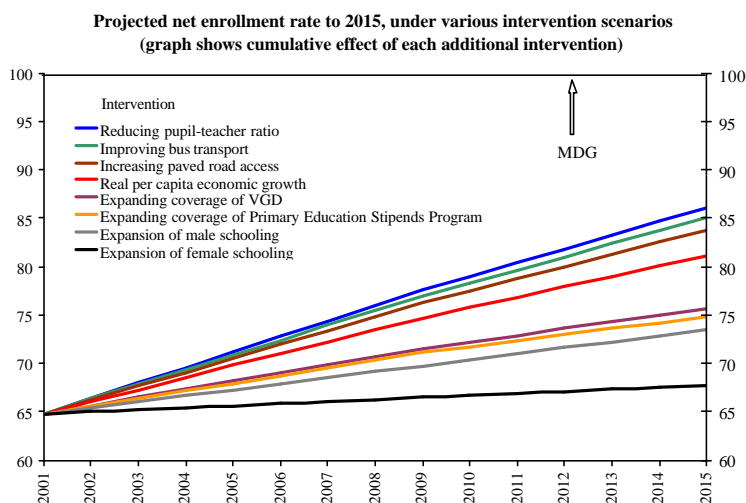


Figure V.12

certain assumptions. The nature and magnitude of the interventions are detailed in Table V.1. As noted previously, the scope and magnitude of the assumed interventions are only meant to illustrate the likely reduction in child malnutrition under one possible scenario. It is obviously not possible to predict whether the assumed interventions will indeed take place, and, even if they do, whether they will proceed as the pace assumed in Table V.1.

Figure V.12 shows the projected changes in the primary school enrollment rate in Bangladesh when the eight interventions shown in Table V.1 are pursued simultaneously. It is obvious that, while each of the interventions contributes to the increase in primary school enrollment, the ones that are associated with the largest increases in primary school are expansion of male and female schooling, increases in household consumption expenditure per capita, and paving of rural roads. Together, the eight interventions considered are associated with an increase of about 21 percentage points in the net primary enrollment rate – bringing that rate to 86% or well below the 100% MDG rate.

Table V.1: Assumptions about various interventions to increase primary school enrollment and completion rates, 2000 to 2015

Intervention	Starting value in 2000	Assumed change per year	Ending value in 2015
Adult male schooling	4.5	0.3	9.0
Adult female schooling (years)	2.5	0.3	7.0
Primary Education Stipends Program (successor to Food-for-Education program) coverage (%)	22	2% points to a maximum of 40	40
VGD program coverage (%)	56	1% points	71
Monthly consumption expenditure per capita (Taka)	900	2.7%	1,342
% of roads in district that are paved	13	0.5% point	20
Distance to nearest bus station (kms.)	5.4	0.15	3.2
Pupil teacher ratio in village primary school	78	-1% point	63

Figure V.13 shows the projected changes in the primary completion rate when the only three interventions that are significantly associated with primary completion are pursued simultaneously. Given the (perverse) inverse association between primary completion and the Food-for-Education (or its successor, the Primary Education Stipends Program), an expansion in the coverage of that

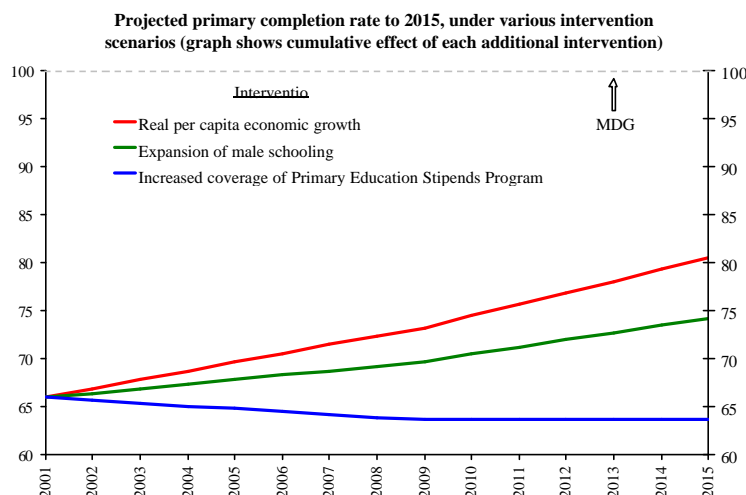


Figure V.13

program is projected to reduce primary completion rates by about 2 percentage points. Expansion of adult male schooling is associated with an increase of 11 percentage points in the primary completion rate, while annual per capita GDP growth of 4% is associated with an increase of 9 percentage points. Thus, the primary completion rate is projected to increase from its base level of 66% to 80% by 2015.

What these simulations suggest is that there is a great deal of scope for raising both the primary school enrollment and the primary completion rate in Bangladesh over the next 12 years with a package of interventions that include economic growth, expansion of adult male and female schooling, improved physical infrastructure (mainly roads and transport), and greater coverage by food assistance programs, such as the Primary Education Stipends Program. However, the achievements are still likely to fall short of the levels called for by the education MDGs.

VI. GENDER DISPARITY IN SCHOOLING

One of the Millennium Development Goals is to reduce gender disparities in schooling, such that the ratio of girls to boys enrolled at all schooling levels – primary and secondary – is 100%. This report focuses on the gender disparity situation in Bangladesh and explores how far Bangladesh is from attaining that MDG.

Trends

Levels and Trends. School-based administrative data suggest that Bangladesh has made impressive gains in reducing gender disparities in primary and secondary schooling. Data from the Directorate of Primary Education show that the ratio of females to males in primary schools has steadily increased from about 83% in 1991 to 96% in 2000 (Figure VI.1). At the

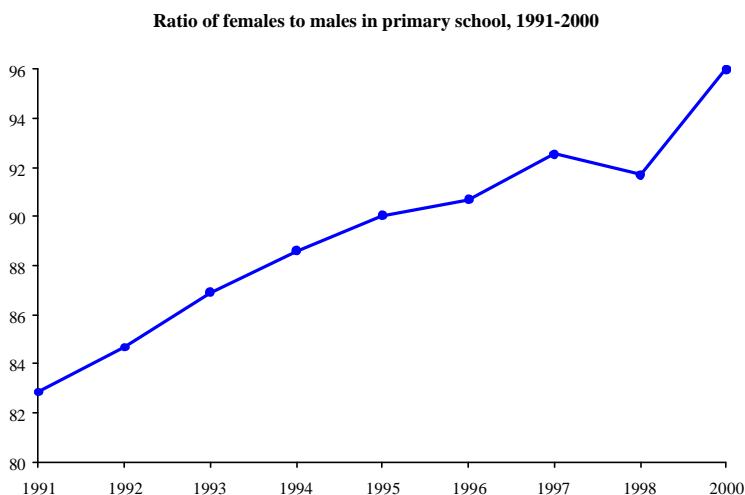


Figure VI.1

secondary level, thanks largely to the Bangladesh

Female Secondary Stipend program, there are already more girls enrolled than boys. In 2000, Ministry of Education statistics indicate that, of the 7.65 million children enrolled in junior secondary and secondary schools, 4 million were females, which would imply a ratio of females to males in secondary schools of 112%.

Regional Variations. There are large spatial variations in the extent of gender disparity in schooling (Figure VI.2). Data from the HIES 2000 indicate that, while the ratio of females to males in primary and secondary schools in the entire country is 97%, it varies from a low of 86% in SMA Dhaka to a high of 117% in Other Urban Dhaka. Six regions, out of a total of 14, have a female majority in primary and secondary

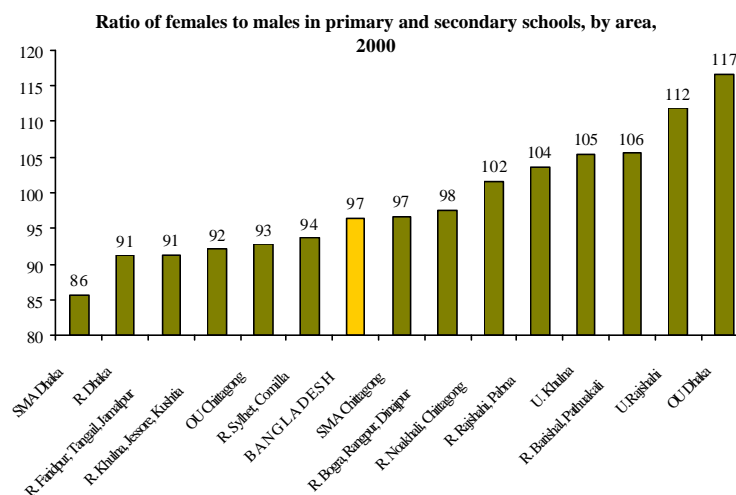


Figure VI.2

schools. These include the rural areas of Noakhali, Chittagong, Rajshahi, Pabna, Barisal and Pathuakali and the urban areas of Khulna, Rajshahi and Dhaka.

Gender Patterns by Age

Figure VI.3 shows the pattern of male and female school attendance by age. Until age 9, approximately the same proportion of males and females attend school. However, beyond age 9, the percent of females attending schools is consistently higher than the percent of males attending school, and this trend continues until age 18.

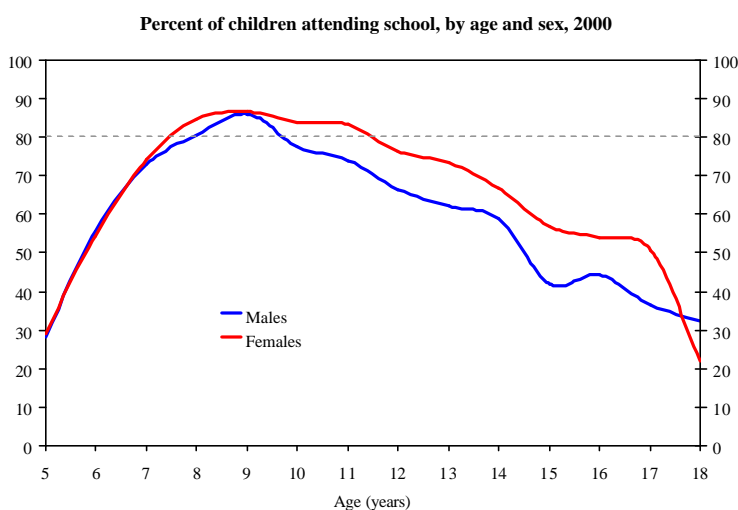


Figure VI.3

These results are nothing short of astonishing, since they are so different from the pattern found in the other countries of South Asia as well as in other countries at Bangladesh's level of per capita GDP. Figures VI.4 and VI.5 contrast the pattern of sex-specific schooling attendance in Bangladesh against that found in India (using data from the 55th round of the National Sample Survey conducted in 1999-2000). Between ages

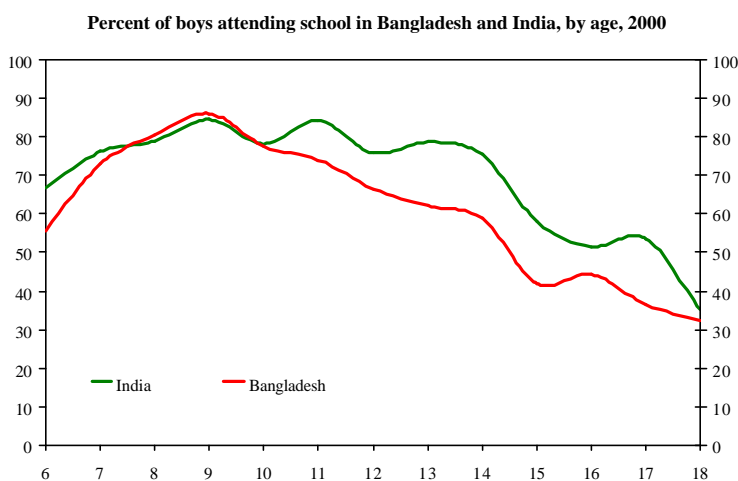


Figure VI.4

10 and 18, age-specific school attendance rates for boys are higher in India than in Bangladesh (Figure VI.4). However, the pattern is completely reversed for girls (Figure VI.5). At virtually every age, Bangladeshi girls have higher rates of school attendance than Indian girls.

Female Secondary School Stipend Program

What is responsible for these unusual results in Bangladesh? The uncommonly large enrollment of girls in secondary school is largely the result of a government initiative – the Female Secondary School Stipend (FSSS) program – launched in 1994. Under the FSSS, the government provides a cash incentive or stipend to households to cover a large portion of direct

school expenses incurred by girls in grades 6-10.⁴⁵ The stipend is paid directly to an account specially set up for each girl in a nearby commercial bank. The recipient girls are expected to pay miscellaneous school fees (but not tuition fees) out of their stipend. The FSSS program also provides tuition assistance, though this part of the financial assistance is paid to the school where the girl is enrolled, rather than to the girl directly. The coverage of other costs rises with grade because extra incentives are needed in the upper grades to reduce high dropout rates. The program simultaneously has attempted to raise the number of teachers – especially female teachers – in secondary school; provide occupational skills training to girls who are about to graduate; make schools more attractive to provide a healthier and safer setting for girls; and strengthened government institutions for secondary education.

The program appears to have been hugely successful in its twin objectives of increasing the number of girl students entering secondary school as well as keeping them in school until graduation. Clearly, with this program, Bang-

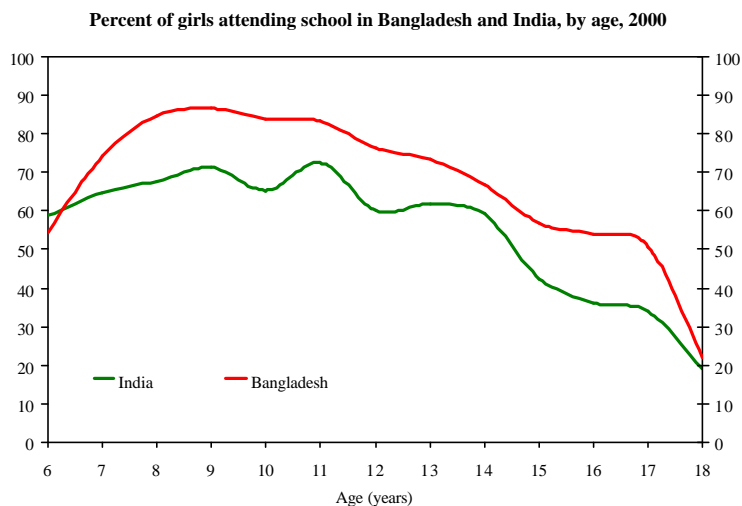


Figure VI.5

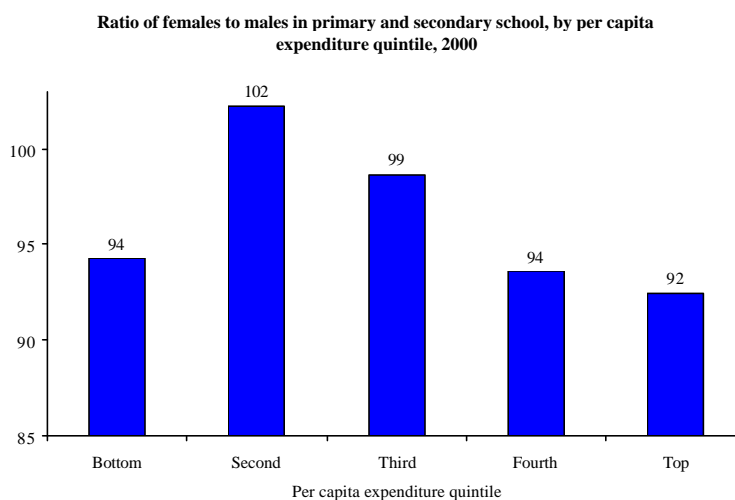


Figure VI.6

⁴⁵ Unlike primary schools, which are free, secondary schools require payment of tuition fees in Bangladesh. In addition, households have to incur all other costs, such as transportation, books, uniforms, school supplies, and examination fees.

ladesh has become a pioneer in South Asia in increasing female secondary enrollments and in narrowing gender disparities at the secondary level.

Socioeconomic Variations

Living standards. There is no clear association between gender disparity in schooling and household living standards (Figure VI.6). The ratio of females to males in primary and secondary is highest for the second consumption quintile, followed by the third quintile. The other three quintiles have approximately similar ratios of females to males in primary and secondary school.

Mother's schooling. There is likewise little relationship between gender disparity in schooling and adult female schooling in a household (Figure VI.7). Households where the highest-educated female has 8-9 years of schooling are observed to have the smallest ratio of females to males in primary and secondary school.

Occupation and sex of household head. There are some unusual patterns of gender disparity across occupational groups (Figure VI.8). The gender disparity in schooling is greatest among large farmers (i.e., those operating one or more acre of land) and smallest among small farmers (those operating less than one acre). Agricultural laborer households also have relatively low gender disparity.

Interestingly, gender disparity varies significantly by the sex of the household head (Figure VI.8). In

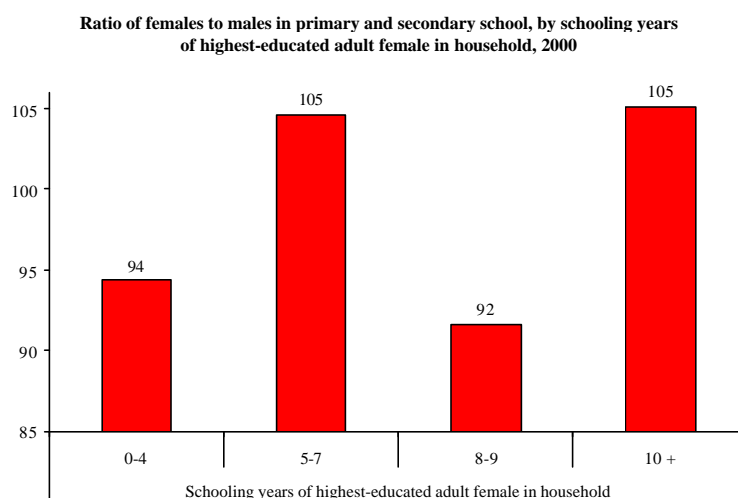


Figure VI.7

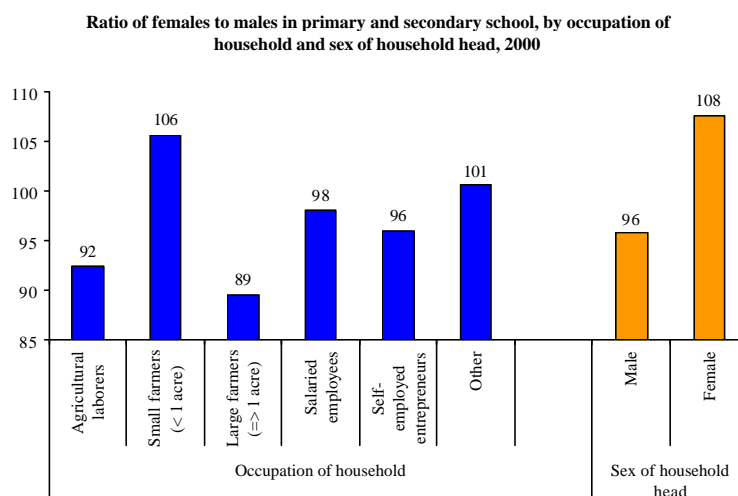


Figure VI.8

households where the head is male, the ratio of females to males in primary and second-

dary is 96%, but in households where the head is female, the corresponding ratio is as high as 108. This suggests that female-headed households are more likely than male-headed households to encourage girls to attend and stay in school.

The Role of Public Interventions

Infrastructure. The HIES 2000 data suggest that access to infrastructure is generally associated with higher ratios of females to males in primary and secondary school (Figure VI.9). In particular, access to tap water, electricity, and a bus station are all associated with significantly lower gender disparity in schooling. The availability of tap water probably relieves girls in the household from time-consuming water-collection chores, which in turn makes time for them to attend school. Likewise, a bus station in the village provides easier (and safer) access to secondary schools that are typically located outside most villages. Since parents are more likely to not send girls to far-away schools owing to safety concerns, the availability of bus transport helps girls proportionately more than it does boys.

School quality. Does school quality in the form of lower pupil-teacher ratios influence gender disparity? The HIES 2000 data certainly suggest so (Figure VI.10). The ratio of females to males in primary and secondary schools is significantly greater in villages where the primary school has a pupil-teacher ratio of less than 50 than in villages where the ratio exceeds 50 (107% versus 94%). This suggests that parents are less likely to send their daughters (relative to their sons) to ‘overcrowded’ schools that have a large number of students relative to teachers. The reasons for this might be concern for their daughters’ security or the perception that their daughters might not benefit much in such environ-

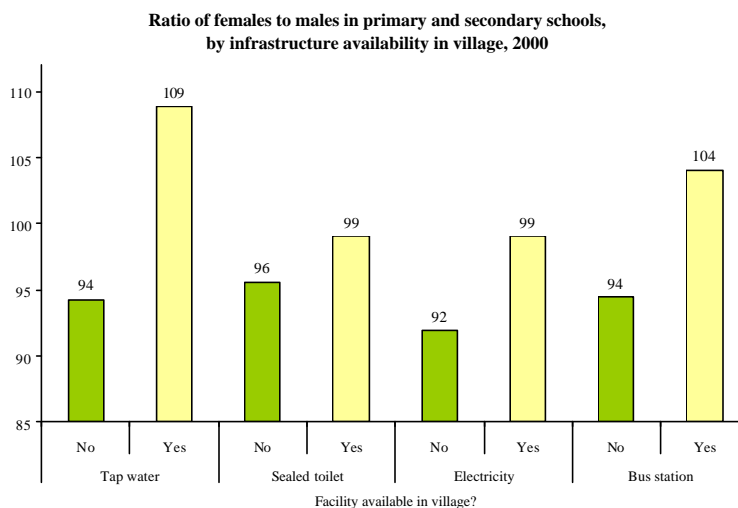


Figure VI.9

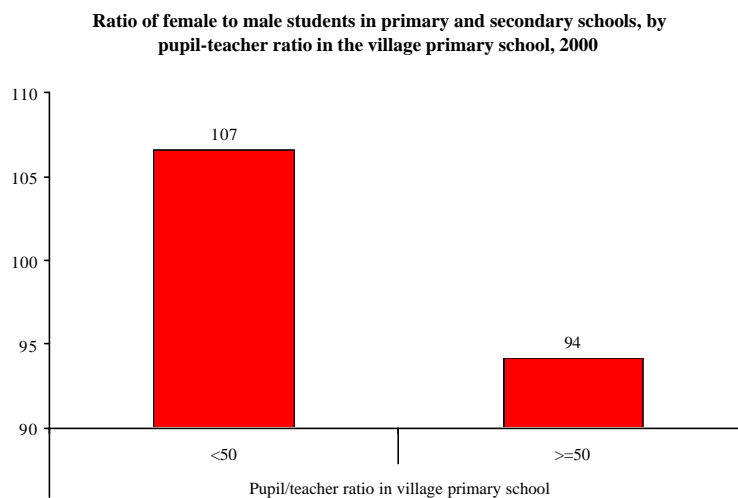


Figure VI.10

ments.

Government programs. The two government programs that have the largest association with reduced gender disparity in schooling are the Food-for-Work program and the Vulnerable Group Development program (Figure VI.11). Since neither of these programs explicitly target girls' schooling, it is not clear why these programs are associated with significantly higher ratios of females to males in primary and secondary school. Again, it is probably the case that availability of these programs releases girls from having to perform time-consuming chores in the household, and this is what results in their higher rates of school attendance.

Multivariate Analysis

Bangladesh has already achieved the MDG related to gender disparity in schooling opportunities, as the ratio of females to males in primary and secondary schools was 97% in 2000. There is, therefore, no point in undertaking simulations of this ratio through 2015. Nevertheless, as it might still be useful to know which variables influence male and female school attendance differentially, we have estimated a multivariate model of school enrollment at the primary and secondary levels separately for boys and girls aged 6-18 years, using unit record data from the HIES 2000.⁴⁶ The multivariate model has the advantage of controlling for several variables that may be simultaneously associated with school enrollment of 6-18 year olds. The estimation results are reported in Annex Tables 6, while only the broad findings of the empirical analysis are discussed here.

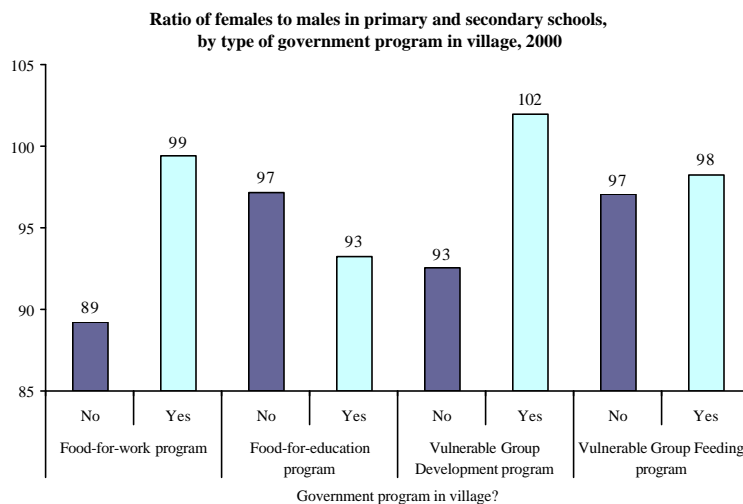


Figure VI.11

The multivariate model confirms that even after controlling for other variables, girls have a significantly higher probability of attending school, and a lower likelihood of dropping out, than boys past the age of 10 (and until the age of 17).

Household living standards, as measured by the log of monthly consumption expenditure per capita, have a stronger positive association with the school enrollment of boys than of

Household living standards, as measured by the log of monthly consumption expenditure per capita, have a stronger positive association with the school enrollment of boys than of

⁴⁶ Since the dependent variable in the model is a dichotomous variable (i.e., whether or not a child aged 6-18 years is attending primary or secondary school), the model has been estimated by the maximum-likelihood probit method.

girls, although the difference is not significant.⁴⁷ However, greater inequality in consumption in a district is associated with reduced enrollment of girls, but the association is not significant for boys.

Interestingly, adult male schooling in the household has a stronger positive association with boys' than girls' enrollment, while adult female schooling has exactly the opposite associations. This suggests that better-educated fathers (or other adult males in the household) favor boys (in terms of offering them more schooling opportunities), while better-educated mothers (or other adult females in the household) favor girls.

Among the infrastructure variables, proximity to a bus station has a stronger association with girls' than with boys' enrollment, implying that improved transport would be associated with a narrowing of gender disparities in schooling.

Two school-related variables also have differential associations with male and female enrollment. The availability of a secondary school in a village has a strong positive association with female – but not male – school enrollment. This finding reinforces the earlier finding relating to bus transport – viz., when the distance and difficulty of reaching a school is reduced (either by having better roads or transport or having a secondary school in the village), the enrollment of girls increases much more than that of boys.

The second school-related variable relates to the quality of schools. Higher pupil-teacher ratios in the village primary school are observed to have a stronger inverse association with the enrollment of girls than with the enrollment of boys. This result could indicate that parents are less willing to send their daughters (relative to their sons) to low-quality schools, or it could reflect that parents are concerned for their daughters' security when there are fewer teachers to supervise a large number of students.

⁴⁷ Interestingly, a similar exercise for India produced the same result (World Bank 2004), suggesting that economic growth might actually widen gender disparities in schooling.

CONCLUSIONS

Of the five MDGs analyzed here, Bangladesh has already attained (or nearly attained) the goal relating to elimination of gender disparity in schooling opportunities. Bangladesh is the only country in South Asia other than Sri Lanka to have achieved parity in male and female enrollments not just at the primary level but also at the secondary level. This is an impressive achievement for a country that is one of the poorest countries in the world, with a per capita gross national income of only US\$1,770 (in PPP terms) in 2002. The analysis in this report suggests that attainment of two other MDGs – in particular, the reduction of consumption-poverty and under-five mortality – is also feasible with a combination of interventions, including sector-specific interventions (such as expanding immunization coverage and reducing pupil-teacher ratios), economic growth, improved coverage of infrastructure, and social safety-net programs (such as the District Education Stipends Program and the Vulnerable Group Development programs). However, it will be challenging for Bangladesh to attain the child malnutrition-related MDG as well as the education MDGs relating to universal net primary enrollment and primary completion. In the case of child malnutrition, the projections suggest that Bangladesh could come very close to – within 5 percentage points of – the MD goal of having no more than 34% of its children underweight. However, it will be very challenging for the country to attain rates of net primary enrollment and primary completion exceeding 83-86% by 2015.

These achievements represent extraordinary progress for a country that, until recently, was frequently derided as an “international basket case.” Indeed, a recent article by Dreze (2004) suggests that Bangladesh is now ahead of India on most social indicators. Bangladesh has lower infant and maternal mortality rates, higher child immunization rates, better access to ‘improved’ water sources and sanitation, and higher primary enrolment rates than India. As noted earlier, Bangladesh has eliminated the gender gap not only in primary education but also in secondary education, while India still has a significant gender gap at both levels. Dreze admits that “Bangladesh is no paradise of human development,... but social indicators are improving quite rapidly not just for a privileged elite but also for the population at large.” On the other hand, Dreze contends that “... in India, social progress is slower and less broad-based, despite much faster economic growth. This is one indication, among many others, that India’s development strategy is fundamentally distorted and lop-sided.”

What accounts for the extraordinary progress in improving social indicators in Bangladesh (relative to the progress made by India)? Dreze provides one possible answer. According to him, Bangladesh’s better performance may have to do with the fact that public expenditure on health as a proportion of GDP is almost twice as high in Bangladesh (1.5%) as in India (0.9%). This was not always so. In 1990, Bangladesh spent only 0.7% of its GDP on health – less than what India spent (0.9%) (UNDP 2004). Thus, Bangladesh saw public spending on health increase very sharply during the 1990s, while India experienced stagnation in public spending on health (in relation to GDP growth).

While Dreze does not note differences between the two countries in terms of their public spending on education, it is instructive to look at public educational expenditures in

Bangladesh and India as well. In 1999-2001, India's public spending on education was 4.1% of its GDP – considerably greater than public spending on education in Bangladesh, which was only 2.3% of GDP (UNDP 2004). However, as in the case of health, public expenditure on education in Bangladesh increased from 1.5% of GDP in 1990 to 2.3% of GDP in 1999-2001 – an increase of more than 50%. In contrast, public spending on education as a share of GDP increased by merely 5% over the same period in India – from 3.9% to 4.1% of GDP. Additionally, there is an important difference between Bangladesh and India in the composition of public spending on education. While Bangladesh spends 45.1% of its total public expenditure on education at the pre-primary and primary level, the relevant figure for India is 38.4%. At the other extreme, India spends 20.3% of its total public spending on education at the tertiary level, in contrast to Bangladesh's 11.1% (UNDP 2004). Thus, the rapid growth of public spending on education and health in Bangladesh, combined with its better balance of educational spending across the primary and tertiary sectors (relative to India), are likely to be important factors in explaining the significant progress the country has made in its social indicators during the 1990s.

Another factor that is likely to be important in explaining Bangladesh's relative success in attaining positive social outcomes is the work of its NGOs. Bangladesh may well be the world's leader in using NGOs as vehicles of development. NGOs are involved in virtually every activity in the country – relief and rehabilitation, poverty alleviation, health, education, social protection, and environmental protection, to name a few. A villager in Bangladesh can send his or her child to an NGO school, have family planning and basic health services delivered by an NGO health worker, obtain micro-credit financing from a choice of several NGO banks, sell milk and other dairy products to an NGO dairy cooperative, and make a telephone call on an NGO telephone! Secondary education in Bangladesh is almost entirely provided by the non-government sector – viz., the NGOs, for-profit schools, and religious schools (*madrasas*). Likewise, many of the family planning programs of the 1970s and 1980s, which set the stage for the subsequent decline in child mortality, were primarily delivered through NGOs. And several studies suggest that micro-credit programs, which were pioneered by one of the best-known NGOs in the world – the Grameen Bank, have had a significant effect on reducing poverty, especially among females.

NGOs in Bangladesh differ from NGOs in other developing countries in an important way: "...Several of these organizations have become very large, very professional, and they have become a model for others. Bangladesh, one of the poorest countries in the world and the last place you would have expected this to happen, has really become a leader in showing what the voluntary sector can do" (Smillie 1998).

Yet another factor in explaining Bangladesh's success, especially its ability to eliminate gender disparity in enrollment even at the secondary level, is the use of targeted public interventions, such as the Female Secondary School Stipend Program (FSSS). The FSSS program is essentially a Conditional Cash Transfer (CCT) or a demand-side intervention for rural girls (the majority of whom are poor) to attend secondary school. By all indications, the FSSS program has been hugely successful in increasing female secondary

school enrollments, especially since secondary schooling in Bangladesh is not free and parents are often unwilling to invest in the secondary schooling of their daughters.

However, Bangladesh's progress on the MD indicators during the 1990s does not mean that there are no problems going forward. Indeed, there are several areas of concern highlighted in this report. First, there are very large regional disparities in virtually all of the MD indicators in Bangladesh. Districts such as Noakhali, Pathuakali, Chittagong, Rajshahi, and Sylhet have generally not performed well on several of the MD indicators. Even if Bangladesh as a whole attains some of the MDGs, there will be several areas of the country that will remain distantly behind. The analysis in this report suggests that many of the MD indicators are geographically concentrated in a few regions. This in turn means that targeting interventions, central government resources, and economic growth opportunities to the lagging divisions and districts will speed up attainment of the MDGs.

Second, the problem of governance – in particular, poor service delivery – is widespread in the social sectors in Bangladesh. Doctors, health workers and teachers are typically absent from their assigned posts at government health centers and schools. Membership of school management committees is highly politicized, and teacher recruitment is often subject to personal influence. Procurement of textbooks and essential drugs is rife with corruption. The quality of health and education services offered at most government health facilities is generally very poor. Yet the evidence presented in this report indicates the tremendous importance of service delivery in influencing MD outcomes. Infant and under-five mortality rates have fallen most in areas where effective family planning and MCH/FP programs are delivered to rural women with low schooling; female school enrollments have increased thanks to a well-designed and well-delivered secondary stipend program that reaches its intended beneficiaries; and public transfer programs that deliver food supplies to the vulnerable in rural areas, such as Food-for-Work, Vulnerable Group Feeding and Vulnerable Group Development, are associated with large reductions in child malnutrition among the poorest children. This suggests that better governance, and improved delivery of social services in particular, would be very important to attaining the MDGs.

Better delivery of public services – whether in health, schooling, nutrition, or infrastructure – is a complex and difficult task that entails creation of the right institutions and incentives, including devolving responsibility for service delivery to local governments and communities, contracting out certain types of service delivery to the non-government sector, empowering consumers to demand better services from government health facilities, introducing competition among public providers, and ensuring the motivation of front-line workers (World Bank 2003).

There are some other findings in this report that are useful to reiterate. The report notes there is evidence of significant synergies among the different MDGs. For instance, a reduction in the proportion of underweight children is strongly associated with a reduction of child mortality. Although maternal mortality is an MD indicator that has not been analyzed in this report, it is clear that interventions that reduce maternal mortality, such as tetanus immunization, expansion of antenatal care coverage, and an increase in the ratio

of professionally-attended deliveries, will also bring about large reductions in infant (especially neonatal) mortality. Likewise, reducing child malnutrition is likely to result in both schooling quantity and quality, as better nourished children are more likely to attend school and perform better in school. Thus there are synergies amongst the MDGs that will help in their attainment, which implies that proceeding with simultaneous action on all these measures will have the greatest impact on attainment of the MDGs.

At the same, it needs to be realized that the different MDGs are not necessarily internally consistent. For instance, simultaneous attainment of the poverty and child malnutrition MDGs by Bangladesh would result in 30% of the population being poor but 34% of the children being underweight. The contrast is even greater when the results of the simulations undertaken in this report are considered. We find that, under plausible scenarios, Bangladesh could bring down its poverty headcount rate to 16% by 2015, but it would still have many as 39% of its children underweight. Thus, a large number of children who are classified as non-poor would in fact be underweight. This inconsistency indicates a problem in the manner in which poverty and/or underweight thresholds are established.

The simulations carried out in this report also suggest that economic growth that brings about an improvement in household living standards is strongly associated with virtually every MD indicator. For example, real per capita GDP growth of 4% per annum in Bangladesh could alone bring down the under-five mortality rate by about 8 deaths per 1,000 live births and the incidence of poverty by 21 percentage points between now and 2015. In addition, this growth could bring about an increase in the net primary enrollment rate of 5 percentage points by 2015. In other words, rapid economic growth could make significant contributions to an improvement in all the MD indicators between now and 2015.

Finally, the importance of systematically monitoring MD outcomes at disaggregated levels and evaluating the impact of public programs cannot be overemphasized. There is a paucity of reliable, time-series data on most MD indicators at the district and *upazila* (sub-district) levels. The lack of such data makes it virtually impossible to monitor progress toward attainment of the MDGs at lower levels of administration. In addition, with the exception of a few food assistance and micro-credit programs, most public interventions in Bangladesh have not been subjected to rigorous, independent evaluation. In order to choose the right set of interventions with which to attain the MDGs, it is critical to know which programs have been successful in improving MD indicators and which have not.

ANNEX TABLES

Annex Table 1: Maximum likelihood probit estimates of the probability of a household being poor, 2000

<i>Independent variable</i>	<i>Parameter</i>	<i>Asymp. z-ratio</i>
Owned acres of land	-0.5792	-10.96
Whether agricultural labor household?*	0.2381	11.24
Whether salaried employee household?*	0.1001	3.58
Whether small farm (<1 acre) household?*	0.0805	2.83
Whether large farm (1 or more acres) household?*	0.0647	1.84
Age of household head (years)	-0.0018	-2.70
Whether household head female?*	0.0036	0.10
Schooling years of highest-educated adult male	-0.0237	-9.64
Schooling years of highest-educated adult female	-0.0273	-8.95
Log of mean district consumption expenditure per capita	-0.5671	-13.53
Household size	0.0423	12.08
Whether village has electricity?*	-0.0518	-2.86
Whether village has Food-for-Work program?*	0.0223	1.23
Whether village has Vulnerable Group Development program?*	0.0099	0.57
% of roads in district that are paved	-0.0002	-0.10
Whether village has bus station?*	-0.0518	-2.48
Gini index of consumption inequality in district	0.0119	5.92
Per capita land availability in district	0.2264	1.47
Number of observations	4,700	
Chi-squared test	1,620	
Log likelihood ratio	-2,440	
Pseudo R-squared	0.249	

Notes: Estimation employs unit record data from the 2000 HIES, merged with relevant district- and village-level data. Standard errors are corrected for heteroscedasticity using the Huber-white method. All coefficients are expressed as marginal effects (i.e., the change in probability of being poor with a one-unit change in the right-side variable.) An “*” implies the variable is dichotomous. Figures in bold indicate statistical significance of the marginal effect at the 10% or lower level.

Annex Table 2: Maximum likelihood probit estimates of the probability of a child dying before the age of 60 months, 2000

<i>Independent variable</i>	<i>Parameter</i>	<i>Asympt. z-ratio</i>
Whether urban resident?*	0.0279	2.44
Birth order	0.0009	0.34
Whether child female?*	-0.0154	-1.60
Whether child female* x Birth order	0.0044	1.65
Predicted log of monthly consumption expenditure per capita	-0.0224	-2.03
Gini index of inequality of predicted household consumption expenditure per capita	-0.0003	-0.51
Per capita availability of land (acres) in district	0.0201	0.84
Whether piped water available to household?*	0.0059	0.38
Whether household has no access to toilet?*	-0.0020	-0.28
Mother's schooling years	-0.0043	-3.55
Father's schooling years	-0.0007	-0.72
Whether child was multiple birth?*	0.4024	13.96
Mother's age at child's birth	-0.0038	-4.96
Whether household head is female?*	0.0062	0.51
% of children in district who have been vaccinated for measles	-0.0004	-2.92
% of pregnant women in district who had professional prenatal care pregnancy	-0.0001	-0.46
% of households in district with electricity connection	-0.0001	-0.75
Number of observations	10,761	
Log likelihood ratio	-3,280	
Chi-squared test	308.91	
Pseudo R-squared	0.045	
Log likelihood ratio	0.045	

Notes: Estimation employs unit record data from the 1999 DHS. Standard errors are corrected for heteroscedasticity using the Huber-white method. All coefficients are expressed as marginal effects (i.e., the change in probability of a child dying with a one-unit change in the right-side variable.) An "*" implies the variable is dichotomous. Figures in bold indicate statistical significance of the marginal effect at the 10% or lower level.

Annex Table 3: Maximum likelihood probit estimates of the probability of a child being underweight, 2000

<i>Independent variable</i>	<i>Parameter</i>	<i>Asympt. z-ratio</i>
Age (months)	0.0037	1.51
Age squared	-0.0001	-1.63
Log per capita consumption expenditure	-0.0933	-4.09
Mother's schooling years	-0.0187	-5.27
Whether child female?*	-0.0348	-0.96
Birth order	-0.0129	-1.94
Whether child female?* x Birth order	0.0067	0.70
Whether village has Food-for-Work program?*	-0.0480	-2.20
Whether village is electrified?*	0.0132	0.60
Distance (kms.) from nearest bus stop	0.0027	1.87
Whether village experienced flood in last 5 years?*	0.0707	2.65
Whether household has flush toilet?*	-0.1477	-3.12
Gini index of inequality of household consumption expenditure per capita	-0.0030	-0.97
Per capita availability of land (acres) in district	-0.6356	-2.29
Number of observations	2,625	
Chi-squared test	123.42	
Pseudo R-squared	0.034	
Log likelihood ratio	-1,753	

Notes: Estimation employs unit record data from the 2000 CNS, merged with household data from the 2000 HIES and with relevant village-level data. Standard errors are corrected for heteroscedasticity using the Huber-white method. All coefficients are expressed as marginal effects (i.e., the change in probability of a child being underweight with a one-unit change in the right-side variable.) An “*” implies the variable is dichotomous. Figures in bold indicate statistically significance of the marginal effect at the 10% or lower level.

Annex Table 4: Maximum likelihood probit estimates of the probability of a child aged 6-10 years attending primary school, 2000

<i>Independent variable</i>	<i>Parameter</i>	<i>Asymp. z-ratio</i>
Whether child aged ...		
7 years?*	0.2341	9.70
8 years?*	0.3383	14.76
9 years?*	0.3654	15.84
10 years?*	0.3225	14.11
Whether child female?*	0.0358	1.98
Log monthly household consumption expenditure per capita	0.1484	6.27
Whether household head female?*	-0.0196	-0.51
Schooling years of highest-educated adult male	0.0136	4.71
Schooling years of highest-educated adult female	0.0070	1.73
% of roads in district that are paved	0.0038	1.89
Whether village has electricity?*	0.0114	0.55
Whether village has Food-for-Education program?*	0.0853	4.04
Whether village has Food-for-Work program?*	-0.0024	-0.11
Whether village has Vulnerable Group Development program?*	0.0564	3.00
Distance (kms.) from nearest bus stop	-0.0062	-3.69
Time (hours) to reach nearest primary school in village	0.0721	1.12
Pupil teacher ratio in village primary school	-0.0007	-2.72
Number of female teachers in village primary school	-0.0028	-0.42
Gini index of inequality of household consumption expenditure per capita	-0.0026	-1.27
Per capita availability of land (acres) in district	-0.1783	-1.11
Number of observations	3083	
Chi-squared test	586.93	
Log likelihood ratio	-1706	
Pseudo R-squared	0.1467	

Notes: Estimation employs unit record data from the 2000 HIES, merged with relevant district- and village-level data. Standard errors are corrected for heteroscedasticity using the Huber-white method. All coefficients are expressed as marginal effects (i.e., the change in probability of a child aged 6-10 years attending primary school with a one-unit change in the right-side variable.) An “*” implies the variable is dichotomous. Figures in bold indicate statistical significance of the marginal effect at the 10% or lower level.

Annex Table 5: Maximum likelihood probit estimates of the probability of a child aged 12 years having completed primary school (Class 5), 2000

<i>Independent variable</i>	<i>Parameter</i>	<i>Asymp. z-ratio</i>
Whether child female?*	0.0067	0.14
Log monthly household consumption expenditure per capita	0.1676	2.50
Gini index of inequality of household consumption expenditure per capita	0.0012	0.20
Per capita availability of land (acres) in district	0.2935	0.62
Whether household head female?*	0.0151	0.14
Schooling years of highest-educated adult male	0.0253	3.85
Schooling years of highest-educated adult female	-0.0017	-0.20
% of roads in district that are paved	0.0024	0.50
Whether village has electricity?*	0.0756	1.29
Whether village has Food-for-Education program?*	-0.1454	-2.45
Whether village has Food-for-Work program?*	-0.0173	-0.31
Whether village has Vulnerable Group Development program?*	-0.0739	-1.44
Distance (kms.) from nearest bus stop	0.0011	0.22
Time (hours) to reach nearest primary school in village	-0.0520	-0.31
Pupil teacher ratio in village primary school	0.0001	0.14
% of female teachers in village primary school	-0.0111	-0.65
Number of observations	410.0000	
Chi-squared test	-237.8900	
Log likelihood ratio	50.5800	
Pseudo R-squared	0.0961	

Notes: Estimation employs unit record data from the 2000 HIES, merged with relevant district- and village-level data. Standard errors are corrected for heteroscedasticity using the Huber-white method. All coefficients are expressed as marginal effects (i.e., the change in probability of a child aged 12 years having completed primary (class 5) with a one-unit change in the right-side variable.) An “*” implies the variable is dichotomous. Figures in bold indicate statistical significance of the marginal effect at the 10% or lower level.

Annex Table 6: Maximum likelihood probit estimates of the probability of a female or male child aged 6-18 years attending school, 2000

<i>Independent variable</i>	<i>Females</i>		<i>Males</i>	
	<i>Parameter</i>	<i>Asymp. z-ratio</i>	<i>Parameter</i>	<i>Asymp. z-ratio</i>
Whether aged 7 years?*	0.1988	6.31	0.1572	4.16
Whether aged 8 years?*	0.2726	9.22	0.2700	7.31
Whether aged 9 years?*	0.2740	8.60	0.2785	7.10
Whether aged 10 years?*	0.2701	9.23	0.2206	6.20
Whether aged 11 years?*	0.2695	8.13	0.1957	4.52
Whether aged 12 years?*	0.2021	6.43	0.0714	1.85
Whether aged 13 years?*	0.1706	4.54	0.0258	0.56
Whether aged 14 years?*	0.1056	2.80	-0.0559	-1.24
Whether aged 15 years?*	-0.0005	-0.01	-0.2529	-5.62
Whether aged 16 years?*	-0.0751	-1.48	-0.2085	-4.68
Whether aged 17 years?*	-0.0178	-0.28	-0.3775	-6.95
Whether aged 18 years?*	-0.5020	-10.57	-0.3698	-8.27
Log monthly consumption expenditure per capita	0.1680	7.23	0.1943	8.30
Gini index of inequality of household consumption expenditure per capita	-0.0036	-1.69	0.0033	1.62
Per capita availability of land (acres) in district	0.0336	0.20	0.1415	0.86
Whether household head female?*	0.0051	0.14	0.0502	1.30
Schooling years of highest-educated adult male in household	0.0137	4.89	0.0200	7.67
Schooling years of highest-educated adult female in household	0.0193	4.97	0.0136	3.81
% of roads paved in district	0.0027	1.36	0.0026	1.35
Whether village electrified?*	0.0074	0.36	-0.0036	-0.17
Whether Food-for-Education program operates in village?*	0.0632	2.99	0.0725	3.45
Whether Food-for-Work program operates in village?*	-0.0056	-0.27	0.0159	0.79
Whether Vulnerable Group Development program operates in village?*	0.0154	0.81	0.0079	0.42
Distance to nearest bus station (kms)	-0.0066	-3.72	-0.0043	-2.42
Pupil teacher ratio in village primary school	-0.0010	-3.77	-0.0005	-1.89
Percentage of female teachers in village primary school	-0.0050	-0.75	-0.0056	-0.82
Whether secondary school available in village?*	0.0499	2.52	0.0154	0.78
Number of observations	3,038		3,415	
Chi-squared test	923.54		832.15	
Pseudo R-squared	0.2411		0.1814	
Log likelihood ratio	-1,454		-1,877	

Notes: Estimation employs unit record data from the 2000 HIES, merged with relevant district- and village-level data. Standard errors are corrected for heteroscedasticity using the Huber-white method. All coefficients are expressed as marginal effects (i.e., the change in probability of a child aged 6-18 years attending school with a one-unit change in the right-side variable.) An “*” implies the variable is dichotomous. Figures in bold indicate statistically significance of the marginal effect at the 10% or lower level.

Annex Table 7

Historical Trends in Infant Mortality Rate for Bangladesh From Various Sources

Source/Year	Infant mortality rate	Source/Year	IMR
Davis ^a		Kabir ^g	
1911	205	1974	153
1921	198	BRSFM ^h	
1931	179	1975	153
Census ^b		BFS (1975)	153
1951	168	CPS ⁱ	
PGE ^c		1979	145
1962-65	144	1983	143
Begum ^d		1985	144
1958-60	154	1989	124
1964-65	152	1991	121
1967-69	153	BFS ^k (1985)	121
Mitra ^e		Planning Commission ^l	
1969-70	152	1979-80	140
1970-72	158	1984-85	125
1972-73	154	1989-90	110
Impact Survey ^f		1994-95	80
1969-70	152		
Begum ^d			
1971	161		
1973	173		

a = Davis, 1951; b = Statistical pocketbook of Bangladesh, 1978; c = Farooqui & Farooq, 1971; d = Begum S, 1983; e = Mitra, 1999; f = TREC (undated); g = Kabir, 1977; h = GOB/ODA, 1977; i = Bangladesh Fertility Survey, 1975; j = Contraceptive Prevalence Survey Reports; k = Bangladesh Fertility Survey, 1985; l = Plan Documents

Source: Compiled by Begum (2001)

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