Cost-Benefit Analysis of Food for Education in Bangladesh

Quentin T. Wodon[1]

April 27, 1998

Preliminary, not to be quoted

Abstract

Food for Education (FFE) provides monthly rations of grain to poor kids attending primary school in rural Bangladesh. The program is massive. In 1998, it accounts for a large share of the primary education budget and serves more than 2 million kids. Concerns have been raised about its value. To assess this value, the gains from education and their trend over time are estimated using five surveys spanning the years 1983 to 1996. When combining these gains with estimates of the impact of FFE on school attendance and the program's cost, FFE is found to be cost effective. However, the program could be improved through better targeting of the (very) poor and/or through more efficient primary schools.

Key words: Asia, Bangladesh, gains from education, Food for Education, cost-benefit analysis

JEL classification: I21, H52, D61

Word Count: 9,842

Correspondence: Quentin T. Wodon, 1325 18th Street, NW, # 509, Washington, DC 20036, USA.
E-mail: quentin.wodon@fundp.ac.be

[1] Associate Professor of Economics, University of Namur, Belgium. This research was completed as a background paper for the poverty assessment of Bangladesh at The World Bank. The research was made possible through a long term collaborative effort between the Bangladesh Bureau of Statistics and the Country Operations Divisions of the World Bank's South Asia Country Department 1. I am especially grateful to Martin Ravallion and Shekhar Shah for discussions on this topic. These are the views of the author, and need not reflect those of the World Bank, its Executive Directors, or the countries they represent. The paper is not to be quoted without permission.

1 Introduction

Education has repeatedly been found to enhance standards of living. Psacharopoulos (1994) compiled rates of gains from education obtained by estimating earnings equations with household surveys. The gains from education tend to be positive and significant, higher in developing than in developed countries, and higher for basic primary and secondary education than for more advanced levels. Although the gains may be higher in urban areas where wage employment for better educated individuals is more abundant, the gains are also significant in rural areas where many workers tend to be self-employed. Jamison and Lau (1982) found a positive impact of education on the productivity of farmers with detailed analyses for Korea, Malaysia, and Thailand. Although less evidence is available for the rural non-farm sector, results by Vijverberg in Ghana (1995) and Lyne (1988) in South Africa indicate that the gains from education are high there as well. Using aggregate production functions, Lau et al. (1990) found that one additional year of schooling for the adult population in Latin America and East Asia may increase GDP by two to three percent. The list could go on (see Schultz, 1988).

Given the high gains from education encountered in many countries, it should be no surprise that programs designed to increase enrollment rates abound. What is surprising is that these programs are seldom evaluated. Subbarao et al. (1997) report that out of 97 programs surveyed in Latin America, including many school feeding programs, only ten had been evaluated, and three correctly so. Most evaluations focus on outreach, few assess program impacts, and even fewer combine these impact assessments with information on the gains from education so as to estimate cost effectiveness (Miller Del Rosso and Marek, 1996). This lack of evaluation is all the more damaging as the funds invested in some programs are large. In Bangladesh, Food for Education (FFE) provides rations of grain to poor kids attending primary school in rural areas. The program accounts for 43 percent of the 1998 primary education budget and serves 2.2 million kids.

Concerns have been raised about the value of FFE. A World Bank (1997:20) public expenditure review states that “the continuation of the program should be reexamined in the context of the sectoral

problems, priorities, and resource needs... FFE [is] a poverty alleviation program, which is clearly not the most effective means of promoting the priority needs and objective of the [primary education] subsector." This paper evaluates the cost effectiveness of FFE. Does it raise attendance of poor kids in primary school? Is the cost of the program justified in terms of future expected gains in standards of living? To answer these questions, the gains from education and their trend over time are first estimated using five surveys spanning the years 1983 to 1996 (section 2). The gains are then combined with estimates of the impact of Food for Education on school attendance so as to assess cost effectiveness (section 3).

2 Measuring the gains from education

2.1 Naive estimates

Studying the impact of education on standards of living in Bangladesh is worth doing. With almost half its population unable to meet basic needs (Wodon, 1997a), the country is among the poorest in the world. Eighty percent of Bangladesh's population lives in rural areas. According to the 1991 census, individuals having passed at least the secondary school certificate (S.S.C.) or the higher secondary certificate (H.S.C.) represented only 10 percent of the rural population. Adult literacy rates in rural areas among the population aged 15 and over is only 38.7 percent for males and 21.5 percent for females according to the latest 1991 census (Bangladesh Bureau of Statistics, 1995: 133, Table 8.9). School attendance for children has increased dramatically, almost doubling in percentage terms from the 1981 to the 1991 census. Yet, as of 1991, only 40.6 percent of male and 37.7 percent of female children aged 5 to 9 attended school (these figures are however underestimated because they do not take into account attendance in some non-governmental schools). Rural enrollment rates trail urban rates by 10 points. There is ample room for educational improvement and for well designed programs to raise attendance.

In Bangladesh, the structure of the education system is such that classes 1 to 5 constitute the primary level, and classes 6 to 9 the secondary level. We use in this paper five rounds of the nationally representative Household Expenditure Survey (HES) for the years 1983-84, 1985-86, 1988-89, 1991-92,

and 1995-96. In the HES, we can identify the illiterate (no schooling), those who have some primary education (below class 5; in the 1988-89 HES, the two first groups are lumped together), those who have completed primary education (class 5), those who have some secondary education (classes 6 to 9), and those who have completed secondary education and may even have gone further. The proportion of households by education level in the HES are given in Table 1 separately for heads and spouses, and for urban and rural areas. In rural areas, sixty percent of the heads and three fourths of the spouses have no schooling at all and were illiterate in 1995-96. These rates have not decreased much as compared to 1983-84, simply because the younger and better educated generations have not yet come of age.

Some care must be taken in assessing the impact of education on standards of living. Naive estimates of the gains from education based on observed differences between educational groups can be misleading. Table 2 presents data on the mean per capita consumption level of households by education levels of the household head and spouse (we justify using consumption rather than earnings for measuring the gains in the next section). These consumption levels are normalized by regional poverty lines in order to take into account differences in the cost of living between geographical areas (see Wodon, 1997a for details). A value of 1 indicates that on average, households are at the level of their area poverty line. In 1983-84, urban households with illiterate heads had a consumption equal to 1.265 the poverty line, as compared to 2.162 for heads having completed secondary school. Apparently, the gain (in terms of increasing per capita consumption) of completing secondary education versus having no schooling at all was thus 70.96 percent. By 1995-96, this gain apparently increased to 156.8 percent. In rural areas, the gains are lower, but still high at 83.49 percent in 1995-96 for heads having completed secondary school. The gains from the education of spouses were similar to those obtained for heads.

The above results are misleading: the gains are grossly overestimated because these statistical comparisons do not take into account the impact of other household characteristics on standards of living. Land ownership for example is positively correlated with education, so that the gains from education obtained with such statistical comparisons include part of the gains from land ownership. The potential

bias of simple statistical comparisons is well known, but it is still common to encounter cost-benefit analyses using such comparisons as a base for analysis. We need better estimates of the gains here.

2.2 Econometric estimates: Methodological issues

To estimate the gains from (or returns to) education correctly, most empirical analyzes have been based on wage earnings. Two main methods have been used (Psacharopoulos, 1994). The elaborate method consists in finding for various age-earnings profiles the discount rate at which the benefits (stream of earnings gain) from investing in education equal the cost (foregone earnings and direct schooling costs) of acquiring this education. The simpler method consists in estimating a semi-logarithmic Mincerian earnings function where log earnings depends on years of education and a number of other variables such as years of experience. Denoting earnings by Y_i, years of schooling by S_i, and work experience by W_i, the Mincerian equation is of the form:

$$\text{Log}Y_i = \alpha + \beta S_i + \gamma W_i + \delta W_i^2 + \varepsilon_i \qquad (1)$$

In an equilibrium investment setting, the estimate of β in (1) can be interpreted as the private return from education. Yet, there are potential pitfalls in using this specification when one wishes to capture the impact of education in developing countries. We discuss three here.

Consider first the dependent variable. If a representative sample of the population as a whole is used, earnings and other income data are likely to be inadequately measured, if only because most adult household members are not wage earners. For measuring gains, it is better to construct a consumption aggregate and to consider total real consumption as a proxy for income. In the HES surveys, detailed information is provided on the consumption of households. To construct the consumption aggregates, we netted out non recurrent expenses for ceremonial activities (marriage, death). Nominal consumption

aggregates were then deflated by regional poverty lines (see Wodon, 1997a for details on their estimation). In other words, if C denotes per capita consumption and Z is the regional poverty line, Y=C/Z.

Second, a decision has to be made regarding the education variables to be used. Equation (1) implies increasing gains from education, since $\partial Y_i / \partial S_i = \beta Y_i$, which is increasing in Y. To relax this assumption, a quadratic term for years of schooling can be added. Alternatively, the education level can be represented by a string of education dummies capturing the educational attainment of the individual rather than years of schooling. This later specification is required in the absence of data on the duration of enrollment. But more importantly, it has the advantage of capturing the benefits of each additional level of schooling. Of course, strictly speaking, the estimates of the coefficients of the educational dummies do not represent returns, but only marginal consumption effects. And they do not take into account the cost of education, be it direct through school fees or indirect through foregone income.

Third, the other variables to be used as regressors must be chosen with care. In developing countries, variables such as demographics, religion, land owned may all affect consumption. Because these variables may be reasonably considered as exogenous with respect to education, they should be included as regressors to avoid omitted variable bias[2]. Other variables such as occupation which also affect income and consumption are likely to be endogenous with respect to education. If the full gains from education are to be captured, occupation variables should be excluded since including occupation would induce a downward bias in the estimates of the gains. But in a country like Bangladesh, occupational mobility is limited (which is why micro-credit programs are so important to compensate for rural finance market failures), so that to some extent, occupation could be considered as exogenous. We will estimate two sets of gains from education here, with and without occupation dummies as regressors.

[2] If land is inherited, which is often the case, it can be considered as exogenous with respect to education. Demographic variables such as the number of babies and children are more problematic. They will be considered exogenous here, even it could be argued that a better education reduces fertility rates.

Given the above comments[3], to take into account the possibility that the gains from education (and other variables) may differ in rural and urban areas, we estimated the model:

$$\text{Urban sector:} \quad \text{Log}Y_{Ui} = \alpha + \beta_U\mathbf{'E_i} + \gamma_U\mathbf{'X_i} + \varepsilon_{Ui} \qquad (2.1)$$

$$\text{Rural sector:} \quad \text{Log}Y_{Ri} = \alpha + \beta_R\mathbf{'E_i} + \gamma_R\mathbf{'X_i} + \varepsilon_{Ri} \qquad (2.2)$$

In equations (2.1) and (2.2), $\mathbf{E_i}$ is a 8x1 vector of dummy variables with four dummies for the education of the household head, and four additional dummies for the education of the spouse. These dummies correspond to the levels described in Table 1. In 1988-89 however, the data does not enable us to separate the first two groups, so that for this year, the excluded dummy in the urban and rural regressions represents the heads and spouses with education level below class 5.

The other regressors $\mathbf{X_i}$ in (2.1) and (2.2) consist of the following: (a) geographic location (along 17 districts); (b) numbers of babies, children, and adults (plus their squared values); (c) household structure (female head; head without a spouse and single, head without a spouse and married, head without a spouse and divorced or widowed); (d) age of the household head and its square; e) occupation (along twelve categories: five agricultural, seven non-agricultural, and one for non working heads), and for the years 1988-89 and beyond (f) religion and (g) the household's land owned (religion and land information is not available for 1983-84 and 1985-86).

2.3 Econometric estimates: Results

The regressions (2.1) and (2.2) were estimated with and without occupation dummies. This represents a total of twenty regressions (urban and rural, five years, and two specifications). For lack of space, only the estimated coefficients of the eight education dummies for the head and the spouse are shown in Table 3 (the standard errors use the Huber-White correction).

[3] Additionally, unobserved variables such as ability may be positively correlated with education, thereby probably

A better education for the head or the spouse clearly enhances standards of living. Although the gains are lower than what naive estimates would lead us to believe, and lower in rural than in urban areas, there are still large and statistically significant. In 1995-96 in rural areas, controlling for occupation, a household with a head having completed primary school had an expected per capita consumption 7.27 percent higher than if the head were illiterate (the corresponding value for the spouse is 9.21 percent). The gains are higher if occupation is considered as endogenous. And they are significant even if the head or the spouse has not completed primary school. It does require some faith to base cost-benefit analyses of education programs which will generate benefits fifteen to twenty years from now on the current state of the gains from education. But in Bangladesh, as shown in Table 3, these gains have been stable over the last fifteen years[4]. This provides some comfort for the analysis to follow in section 3.

How useful are these results for policy? A complete model for public education investment decisions should take into account not only the private gains from education given in Table 3, but also the external gains to society as well as alternative investment opportunities. Social gains from education could be estimated by adding the public subsidies to the private costs of acquiring education, and adding the higher taxes paid on earnings by better educated workers and any positive externalities to the private benefits of education. Typically, social gains are lower than private gains. Yet even if social gains could be measured accurately, additional information would still be needed to inform public policy. For example, the observed lack of education in Bangladesh may be due to schools turning away students due to capacity constraint. In this case, building additional schools would make sense. But a lack of education or skills may also result from an education of poor quality. Rather than increasing the quantity of education provided by the state, an alternative strategy could consist in providing textbooks and training teachers.

(but not necessarily) yielding upward bias in the estimates of the marginal consumption gains.

[4] On the other hand, unemployment rates have been increasing over time among better educated individuals (young for the most part), which may be a sign of weakening gains from education. According to the 1995-96 Labour Force Survey of the Bangladesh Bureau of Statistics, 0.7 percent of those with no schooling were unemployed that year, as compared to 15.0 percent of those having completed secondary education. Yet, part of the difference in unemployment rates may be due to higher reservation wages among the better educated who can afford to take more time to look for a well paying job because they come from better-off families from which they receive support.

Public dollars would then be spent more wisely on improving the quality of schools than on increasing enrollment figures. None of these issues will be discussed below. Still, the private gains from education provide a valuable information for assessing the value of the Food for Education program.

3 Cost-effectiveness of Food for Education

3.1 Program description

Many poor families do not send their children to school in Bangladesh because they cannot afford the costs of doing so and/or because they need their children to work at home and outside the home. Food for Education (FFE) was launched in July 1993 to remedy this situation. The program is administered by the Primary and Mass Education Division and the Directorate of Primary Education. Participating kids receive monthly rations of rice or wheat (15 kg for one kid, 20 kg for two kids or more) if they attend primary school for at least 85 percent of the classes. The objectives are to increase enrollment and attendance rates, and to limit drop-outs.

Participation in FFE results from a two-steps selection procedure. First, economically backward unions (or villages) are selected. Within these unions, FFE is granted to almost all schools, whether they are governmentally run or not. Second, within schools, kids are targeted by land ownership (landless or near landless households), their parents' occupation (day laborers and low pay artisans), and their family structure (female heads). Households benefiting from FFE cannot also be recipients of the Vulnerable Group Development and Rural Maintenance Programs, two other government sponsored programs distributing food to the disadvantaged.

FFE has grown at an impressive rate since its inception (Table 4). In 1994, the program was implemented in 460 rural thanas. Three years later, it had tripled in size. In 1995-96, about 13 percent of all primary school children (2.2 million kids) participated. The project is expected to cost 3.4 billion Taka in 1998 ($ 75.6 million at 45 Taka per U.S. dollar), accounting for 43 percent of the primary education budget in Bangladesh's Annual Development Plan.

3.2 Past evaluations of FFE

To our knowledge, three evaluations of FFE have been conducted so far. First, from April 6 through May 9, 1994, IFPRI (International Food Policy Research Institute) conducted an early assessment survey of 104 FFE and 97 non-FFE schools located in 20 unions, with 2 unions selected in each of 10 thanas spread over the country (Ahmed and Billah, 1994). Next, from March 13 to April 12, 1997, BIDS (Bangladesh Institute for Development Studies) surveyed 153 FFE and 124 non-FFE schools (BIDS, 1997). Third, using the 1995-96 Household Expenditure Survey which includes an education module, Ravallion and Wodon (1998) estimated the increase in attendance brought about by FFE. The first two studies use simple statistical methods and are discussed here. The third study uses econometric modeling and will be discussed below (section 3.3).

The IFPRI and BIDS surveys are similar and their results are summarized in Table 5. Consider first enrollment. According to the IFPRI study, FFE was successful in its first year of existence in increasing school enrollment. This judgment is based on the fact that the growth rate of enrollment in FFE schools was larger after the introduction of FFE (+28%) than before (+8%), while enrollment growth decreased in non-FFE schools by two percentage points. Because the drop in enrollment in non-FFE schools was not statistically significant, IFPRI argues that the growth of FFE schools was not achieved simply through transfers of students from non-FFE schools. (We will discuss the evaluation of enrollment rates in the BIDS study below.)

Consider next attendance and drop-out rates. In the IFPRI survey, attendance increased from 63.0 to 77.6 percent in FFE schools, while there was no statistically significant change for non-FFE schools. Attendance was also higher in FFE schools than in non-FFE schools (with no significant difference between boys and girls). Moreover, drop-out rates declined more in FFE than in non-FFE schools, and were significantly lower in FFE schools after the introduction of the program. In the BIDS survey, attendance was also higher in FFE than in non-FFE school, but drop-out rates were similar. No comparison is

provided in the BIDS survey with attendance and drop-out rates for the year before the introduction of the FFE program.

Finally, both IFPRI and BIDS present results from surveys of households with children in FFE and non-FFE schools (the previous results were obtained with school data). BIDS finds no impact of the program on child labor[5]. Moreover, the food grain rations of FFE children had no significant impact on their nutritional development as measured by anthropometric tests. This later result should not be too surprising given that a rice ration of kg per month is worth about 180 Taka (the value of a wheat ration is lower), which represents less than eight percent of what a family of six must spend on food to meet its nutritional requirement[6]. It could also be that many households receive less than the official ration as administrators try to split the available rations among a larger number of households, that adults use the rations for their own benefit, or that they spend more on non-food consumption either by reselling the grain or not buying as much of it as before if they are net purchasers. Nevertheless, the targeting of poor children within schools appeared to be good in both surveys, even though BIDS mentions leakage, especially when members sitting on the School Management Committees have their favorite families.

3.3 Controlling for the endogeneity of program placement

Evaluations of school-based food distribution programs are typically been based on before and after comparisons of mean outcomes among a treatment group (beneficiary schools) and a control group (non-beneficiary schools). In Peru for example, Jacoby, Cueto and Politt (1996) compared program and

---

[5] According to BIDS (1997: 27, table 2.7), a child enrolled in a FFE school in grade II is involved in 3.49 hours of productive work on average per day (1.88 hour of domestic work and 1.61 hour of work outside the home). And a FFE school pupil in grade V works for 4.04 hours (2.32 domestic and 1.72 hours outside). The figures are virtually identical for children enrolled in non-FFE schools. No measures are provided separately for FFE children and non-FFE children in FFE schools.

[6] Meeting an energy intake of 2,112 kcal per day and person cost a family of six a total of Tk 2,280 per month in rural Bangladesh in 1995-96 (Wodon, 1997). By comparison, the value of a 15 kg rice ration is 180 Tk given an average price of rice in rural areas of 12 Tk per kg. Of course, the value the ration may be greater for poorer household who fall short of their nutritional intake by a large amount.

non-program schools to monitor the impact of school breakfast. Before the program, there was no significant difference between the two groups, while after the program, the treatment group had significantly better energy, protein, and iron intake. Attendance increased in the treatment group and decreased in the control group, so that the difference was significant, and the program was considered successful. As we have seen, similar methods were used by IFPRI and BIDS to evaluate Bangladesh's FFE program. Yet, there are dangers in using these methods.

Treatment and control group methods are fine if schools have been randomly assigned to the treatment and control groups and if the characteristics of the children in both groups are similar (if not, one can sometimes control for the difference in these characteristics). But the method can be deceptive if program participation is not random. For example, sample selection appears to be at work in the results for Sri Lanka in Miller and Drake (1983), who found that schools with no feeding programs had higher attendance than schools with the programs. But (as the authors note) the schools which were granted the program may have been targeted precisely because of low attendance rates[7]. A related problem may be at work in Bangladesh. While IFPRI found a statistically significant positive enrollment gain for girls (+31 percent) and boys (+27%) with FFE, if one interprets the results of the BIDS survey literally, FFE had a negative impact on enrollment since the introduction of FFE appears to have reduced the enrollment growth of FFE schools (Table 5)! This highlights the limits of before and after comparisons without suitable controls. If FFE schools were better than non-FFE schools before the start of the program, this could explain their high growth rate before FFE in the BIDS survey.

Although the evidence of the IFPRI and (to a letter extent) the BIDS surveys is encouraging, doubts therefore remain as to the impact of the program. Given the likely endogeneity of program

[7] As another example of lack of control for endogeneity of program placement, consider Babu and Hallam (1989) who evaluate the school feeding program of Tamil Nadu in South India, a locally organized program that consumes more than ten percent of the state's budget and whereby free meals are provided to children aged 2 to 15 living in households with income below the poverty line. Babu and Halam measure program impact through an OLS regression of school attendance on family income, the adult literacy rate and children in the nutrition program times their energy intake, without recognizing that child participation is likely to be endogenous.

placement not only at the school level, but also at the household level, does FFE really raise enrollment and attendance as the IFPRI and BIDS studies suggest? Using data from the nationally representative 1995-96 Household Expenditure Survey and an appropriate econometric model, Ravallion and Wodon (1998) showed that FFE does raise enrollment and attendance. They used three stages least square to estimate an outcome equation at the household level where a combined measure of enrollment and attendance was a function of household characteristics, village characteristics, and FFE program participation, together with a program participation equation where household participation was itself a function of household characteristics, village characteristics, and participation at the village level. The fact that some villages participate in the program while others do not, and the fact that FFE allocation is decided at the village level, provided a valid instrumental variable to control for the endogeneity of program placement. In other words, village participation affects household participation, but not outcome conditional on household participation. The results of the estimation were that for participating households, receiving 100 kg of grain per year increased enrollment and attendance for primary school aged children in the household by 21.1 percent (this result was statistically significant at the 5 percent level). Interestingly, the program also appeared relatively well targeted at the household level, with landless and near landless households benefiting significantly more than others from FFE.

3.4 Private gains and the cost effectiveness of FFE

The gains from education computed in section 2 and the impact of FFE on attendance as estimated by Ravallion and Wodon (1998) can be used to assess the cost effectiveness of FFE. The objective is to compute the discount rate such that the stream of costs of getting one more kid completing primary school thanks to FFE is equal to the stream of benefits enjoyed by the kid when he reaches adulthood and by its family. Denoting yearly costs at time t by C_t, yearly net benefits of primary schooling by B_t, the discount rate by r, the number of years necessary to complete primary school by N, the delay between completing

primary school and (full) earning capacity by D, and the length of the period with earnings potential by L, break even occurs when:

$$\sum_{t=0}^{N} \frac{-C_t}{(1+r)^t} + \sum_{t=N+D}^{N+D+L} \frac{B_t}{(1+r)^t} = 0 \qquad (3)$$

What is the yearly cost in U.S. dollars of enabling one more child to complete primary school? We know that all other things being equal, 100 kg of grain raises attendance among primary school aged kids in the household by 21.1 percent. On average, the potentially beneficiary households have 2.1 children in age of going to primary school. This includes kids aged 5 to 9, but also older kids up to 16 who have not yet completed primary school (many of these older kids still attend school)[8]. Then, 226 kg of grain [i.e. 100/(0.211*2.1)] are needed to have "one additional hundred percent of a kid" in school full time for one year. This "one additional hundred percent of a kid" is a summation of smaller increases in attendance for several kids (on average the increase is 21.1 percent per kid). This may not be equivalent to getting in school one more kid who was not previously enrolled. For lack of a better measure, we will use 226 kg as the grain needed to get one more kid full time in school in our cost-benefit analysis. In so doing, we are implicitly assuming a linearity in the gains from education as a function of the percentage of class days attended. While this assumption may not be warranted, it is difficult on a priori grounds to know whether it leads to underestimating or overestimating the cost-effectiveness of FFE (this depends on the marginal returns for the kids of additional classes attended). Yet, we could well be on the conservative side in our cost estimate because even the FFE program does not require full attendance: to benefit, eligible kids must attend only 85 percent of the classes, which is likely to be enough to graduate.

The case for valuing private returns to education in the cost-benefit analysis of a public education program rests on equity considerations: FFE can be considered as one tool among others to fight the

[8] There are 3625 households with kids in age of going to primary school in the 1995-96 HES. These have 2045 boys and 2026 girls aged 5 to 9, plus 1935 boys and 1630 girls aged 10 to 16 not having completed primary school.

recurring problem of poverty in Bangladesh. But then, if parts of the benefits from FFE are reaped by non-poor households, this represents a leakage which should be taken into account in the cost-benefit analysis. Table 6 indicates that FFE is not very well targeted. Out of 3625 rural households with primary school aged kids, 357 (9.85 percent) benefited from FFE according to the 1995-96 HES. Of these, respectively 243 (6.70 percent of all households) and 170 (4.69 percent of all households) had a per capita consumption level below respectively upper and lower poverty lines identifying the poor and the very poor (see Wodon, 1997a for details on these poverty lines). In other words, if one were to consider the upper poverty lines as the cut-off point for granting FFE, the current leakage would amount to 31.93 percent, which would then require 332 kg of grain for getting the equivalent of one more poor kid in school full time. Using the lower poverty lines, leakage would be as high as 52.38 percent, requiring 475 kg of grain for getting the equivalent of one more very poor kid in school full time. To put it differently, perfect targeting of FFE to the poor would increase coverage from its 10.99 to 16.14 percent of the poor. Perfect targeting to the very poor would raise coverage from 10.79 to 22.65 percent of the very poor.

The price per ton of wheat in 1994 for the Bangladesh authorities was $129 under the U.S. Export Enhancement program. Administrative and delivery costs were evaluated by Ahmed and Billah (1994) at $62 per ton. The total cost per ton was thus $191 in 1994 dollars, rounded up to $200 in 1996 to take two years of inflation into account. Hence, the cost of having one more poor kid completing one year of primary school is $66.4 (332 kg). For getting the equivalent of one more very poor kid in school, the cost is $95 (475 kg). Because we have taken leakage into account, these costs are somewhat higher than those computed by Summers (1994) for other programs in India ($32 per kid) and Kenya ($58).

What are the yearly benefits? Not taking into account the immediate in kind benefit of the free grain enjoyed by participating households (which may be considered as a compensation for the potential loss in working hours at home and outside of the home for the kids going to school; see however the discussion below in section 3.5), the private benefits are the streams of additional per capita consumption enjoyed by the kids and their own family when they reach adulthood. Given the objective of reaching the

poor (below the upper poverty lines) or the very poor (below the lower poverty lines) with FFE, we will use as the base line the consumption of a very poor rural family at 438 Tk per person per month in 1995-96, and that of a poor rural family at 583 Tk per person per month. Using an exchange rate of 45 Tk for one US dollar, this translates for a family of five into an average household consumption of $584 for the very poor and $777 for the poor. Assuming that the gains from education remain stable in the future, as they have been over the last fifteen years, the estimates in Table 3 indicate that the head or the spouse completing primary school brings in an additional 7.27 (head) or 9.21 (spouse) percent of consumption when controlling for occupation, or 10.07 (head) and 9.50 (spouse) percent with endogenous occupation. Using nine percent as our estimate, this brings in $52.6 per year in additional household consumption for the poor and $69.9 for the very poor.

According to official data, kids complete the five years of primary school in 8.7 years. The value of N in (3) is set accordingly at 8 (for nine years of FFE intervention). We assume a delay D of 6 years before the kid has full earning capacity (the kid is then twenty years old if she started at school at 5), and a period L of 38 years during which the former kid enjoys the benefits brought about is earnings capacity (life expectancy at birth is 58 in Bangladesh and similar for men and women; 38 years for the stream of benefits is conservative since kids having survived up to primary school have higher life expectancy).

Given this, the discount rate for break even is 3.16 percent for the very poor, and 5.84 percent for the poor (Table 7). If the government values the private gains from education for the very poor (resp. the poor) at their actual value for households, any interest rate below 3.16 percent (resp. 5.84 percent) would make it profitable to invest in primary education through FFE. Bangladesh is able to borrow from international institutions (e.g. the World Bank's International Agency for Development and the Asian Development Bank) at highly concessional rates, so that the real interest rate for the country's public debt has been estimated at -1.5 percent. Investments in education through FFE are thus cost-effective.

3.5 Improving the cost effectiveness of FFE

How could the cost-effectiveness of FFE be further improved? Two strategies stand out. First, the efficiency of the educational system itself could be improved by reducing the number of years necessary for completing primary school. In principle, completing primary school should take 5 years, while it currently takes almost 9 years on average. If repeats were decreased by two thirds, so that it would take 6 years to complete primary school on average, the discount rates for break even for the poor and the very poor would be respectively 4.01 and 6.72 percent because the costs would be less (Table 7).

A second strategy would consist in better targeting the program. If leakage were to be reduced by two thirds, to 17 percent for the very poor and 10 percent for the poor, 272 and 251 kg of grain would be needed per additional kid attending full time, for a cost of $ 54.4 and $50.2 per year. The discount rates for break even would then be 5.47 and 7.13 percent. Arguably, improving the targeting of FFE should be easier than improving the primary school system as a whole, which is interesting since the gains from better targeting are larger than from better efficiency from the (narrow) point of view of the cost effectiveness of FFE[9]. If performance were to be increased in both the efficiency of the primary school system and the targeting of FFE, the gains would be still larger with discount rates at 6.34 and 8.01 percent for the very poor and the poor.

How could better targeting of FFE be achieved? One possibility would be to better use household characteristics as indicators of poverty. In Bangladesh, land ownership is a good targeting indicator for at least three reasons. First, land ownership is strongly correlated with poverty, which makes it less likely to select a non-poor household or to reject a poor household (Wodon, 1997b). Second, the administrative cost of selecting participant households tend to be low when using land ownership because it is relatively easy to identify the landless or near landless (in villages, this tends to be common knowledge). Third, the risk of negative incentives in targeting through land ownership is small because land ownership in rural

[9] But from a broader point of view, all (including poor) children would benefit from better school efficiency, while only a portion of all poor children would benefit from better targeting of FFE (those receiving the program).

Bangladesh is more the result of inheritance than choice (land markets are rather thin). There is evidence of some targeting of FFE by land ownership, which is good, but this remains still far from perfect.

Another way to improve targeting would be to better target FFE at the village level. As mentioned earlier, FFE is supposed to be targeted to poor villages first, and then to poor households within poor villages. Define poor villages (relatively speaking) as those with mean per capita consumption below the median per capita consumption for all villages. Exactly half the villages are then considered as poor, the other half being nonpoor (this definition is a matter of convenience; another definition would not affect the discussion to follow). With this definition, according to the data in the 1995-96 HES, it turns out that nonpoor villages are as likely as poor villages to benefit from FFE, indicating a complete lack of village targeting. What would be the potential benefit in terms of targeting poor or very poor households of focusing FFE on poor villages only? It turns out that the share of nonpoor households, as identified by the upper poverty lines, receiving the program could be decreased by up to one half (from one third to one sixth of all beneficiary households) if only poor villages were to benefit from the program (because poor villages have a higher proportion of poor households). The gains in targeting are similar for the very poor. Reaping these gains would require finding ways to identify poor villages as is done with landlessness at the household level. While this may not be easy, further research on identifying poor villages is warranted. More generally, further analysis is needed to better understand the dynamics of NGO and government program placement at the village level.

3.6. Alternative measure of private gains and external benefits

When originally implemented in 1993, FFE benefited from food resources made available by the United States Agency for International Development (PL 480 program), so that the program did not weight on the budget of the Government of Bangladesh (GOB). After that, FFE was funded by the GOB, and domestically produced rice was distributed instead of wheat. Because FFE is now paid for by GOB, and not by foreign aid, it could be argued that using the concessional interest rate on foreign aid as a benchmark

for the cost benefit analysis is misleading. A much more strict benchmark could be the interest rate of up to 13 percent paid by GOB to finance parts of its budget deficit. In this case, the above discount rates of 3.16 and 5.84 percent would not make FFE cost effective.

However, in the above computations, we did not take into account the value of the grain given to the participating households. If the food transfer is included in the benefits, the net cost of the program is reduced by more than two thirds since it then consists only in administration, transport and distribution costs. In this case, the costs per year to get one more kid in school amount to $ 30.84 for the very poor and $ 21.55 for the poor, and the discount rates are 8.11 percent for the very poor and 11.50 percent for the poor. This is still below the 13 percent benchmark, yet it would very probably pass the benchmark if the external benefits (for society) of the program were taken into account. We won't try to estimate these gains here, but figures from Summers (1994) for India and Kenya are worth mentioning. Providing one year of additional schooling for 1,000 women was found to cost $32,000 in India and $58,000 in Kenya in 1991 dollars[10]. The benefits included a decrease in child mortality of 7.5 percent; a decrease in fertility of 7.5 percent; and the aversion of two deaths among the women. Achieving these benefits through other means would have cost $109,300 in India and $136,600 in Kenya. Even after discounting for the time lag in the benefits as we did above in this paper for FFE (15 years at a 5 percent discount rate per year), the net external benefits were positive and large. They probably are positive as well for FFE in Bangladesh, so that using social (i.e. private plus external) benefits would probably make FFE cost effective[11].

3.7 Alternative means to raise attendance

[10] These costs are from Lockheed and Verspoor (1990), quoted by Summers (1994).

[11] On the other hand, our computations did not take into account the opportunity cost of the time spent by teachers in distributing the food, as well as the opportunity cost (loss of child labor) for partents to send their kids to school.

Another way to look at the cost effectiveness of FFE is to compare the program with alternative means to raise attendance. Horton (1992) found that the cost of providing 1,000 calories per day and per student through school lunch programs in a number of developing countries varied between $19.25 and $208.59 per year (1989 dollars). The mean program cost was $88.74. This cost should not be compared with the cost of generating additional school years through FFE, but to the purchase cost of grain plus the administrative and social costs, which amount to $191 per ton of wheat in Bangladesh. Knowing that one gram of wheat provides 3.44 kcal, and that there are 235 school days in Bangladesh, the cost of providing 1,000 kcal per day and per student for one year is $13.7 (68.3 kg of wheat are needed not including leakage). The cost of FFE is thus low, but of course giving grain away once a month is not equivalent to providing a hot and balanced meal in the school every day. School lunches may raise attendance more than grain distribution. School lunches may also improve learning abilities. If lunches are provided early, the children get a head start for the day, which need not be true with food distribution programs.

Other strategies can be implemented at the village level to raise child attendance. Using a multipurpose survey conducted in Bangladesh in 1991-92 (before the start of FFE), Khandker (1996) found that reducing the cost of schooling (books, uniforms, school supplies) by 50 percent increased attendance for boys and girls by only 6 and 3 percent respectively. Investing in better infrastructure had lower gains in terms of attendance. Other alternatives such as increasing the number of female teachers (a World Bank loan was granted to Bangladesh for this purpose) or setting new schools could yield better results, but this would have to be proven. So far, FFE seems to be valuable despite its high leakage.

3.8. Comparing FFE to other food safety nets in Bangladesh

Does all this mean that FFE should be supported? Not necessarily. It all depends on how one defines the program's goal, and on the performance of alternative programs. Bangladesh has had a long tradition of food-grain distribution programs before it implemented FFE in 1993. Should the country invest more in FFE and less in other programs, such as Vulnerable Group Development which provides food and

training to disadvantaged women, Food for Work which gives wheat to men in exchange of work in rural infrastructure projects, or the Rural Maintenance Program which gives cash wages to women working in rural infrastructure? The costs of the various food safety nets programs appear to be of a similar order of magnitude. Ahmed and Billah (1994; see also Subbarao et al., 1997) estimate that taking into account administrative costs and leakage to the non-poor, the cost of transferring a $1 in benefit to the poor was $1.32 for Rural Maintenance Program, $1.56 for Vulnerable Group Development, and $2.20 for Food for Work (under World Food Program management) and $ 1.59 for Food for Education (our cost is higher due to higher leakage observed in the 1995-96 HES than in Ahmed and Billah's assumptions) Although there are some differences in these costs, they remain limited.

While their costs are of a similar order of magnitude, the benefits of the programs are different and thereby difficult to compare. Food for Work and Rural Maintenance Programs provide immediate relief to the poor through wages in cash or in-kind and help build and maintain rural infrastructure which is important for rural development. Vulnerable Group Development was originally a pure transfer program, but it now includes an investment component. While women still receive wheat rations, they also benefit from skills, literacy and numeracy training, credit programs, and health and nutrition education provided by NGOs working in partnership with the government. Of all programs, FFE may be one of the most forward looking. By raising primary school attendance, the program holds the promise of high gains, not only for the kids themselves through enhanced future labor force participation and earnings, but also for society as a whole. The decision to support FFE rests in the end on the validity of our estimates of the gains from completing primary school in Bangladesh.

5. Conclusion

Food for Education is a massive program in Bangladesh. It provides monthly rations of grain to more than 2 million kids in order to boost attendance in primary schools in rural areas, and it accounts for 43 percent of the primary education budget in fiscal year 1998. While the program is not very well

targeted at the household level, it does raise school attendance by an estimated 21.1 percent by household for 100 kg of rice. Concerns have been raised about the cost effectiveness of FFE. To assess the value of the program, gains from education must be estimated. This was done in this paper using five surveys spanning the years 1983 to 1996. In rural areas, completing primary school increases expected per capita consumption by 9 percent. This impact has been relatively stable over time, so that it can be expected to remain stable in the future. Given this estimate of the gains from primary education, it was shown that the discount rate for break even of FFE using private gains and public costs was between 3.16 and 5.84 percent depending on which measure of leakage is used. Given Bangladesh's concessional borrowing at negative real interest rates, FFE therefore appears to be cost effective. FFE was also compared with other food safety nets programs in Bangladesh, and with other means of raising attendance in primary schools. Again, in both cases, the program appeared cost effective. Still, the cost-effectiveness of the program could be improved, either by improving the efficiency of the primary school system so that it takes fewer years for kids to graduate, by improving the targeting performance of the program to reach the poor and very poor, or by doing both in which case the discount rate would be between and percent.

References

Ahmed, A. U., and K. Billah, 1994, Food for Education in Bangladesh: An Early Assessment, Mimeograph, International Food Policy Research Institute, Washington, D.C. and Dhaka.

Babu, S. C., and J. A. Hallam, 1989, Socio-Economic Impacts of School Feeding Programmes: Empirical Evidence from a South Indian Village, Food Policy, Vol. 14: 58-66.

Bangladesh Bureau of Statistics, 1995, Bangladesh Population Census 1991: Volume 1, Analytical Report, Bangladesh Bureau of Statistics, Dhaka.

Bangladesh Institute of Development Studies, 1997, An Evaluation of the Food for Education Program: Enhancing Accessibility to and Retention in Primary Education for the Rural Poor in Bangladesh, Mimeograph, Dhaka.

Horton, S., 1992, Unit Costs, Cost-Effectiveness and Financing of Nutrition Interventions, Policy Research Working Paper No. 852, World Bank, Washington, D.C.

Jacoby, E., S. Cueto and E. Politt, 1996, Benefits of a School Breakfast Programme Among Andean Children in Huaraz, Peru, Food and Nutrition Bulletin, Vol. 17, 1: 54-63.

Jamison, D.T., and L. Lau, 1982, Farmer Education and Farm Efficiency, Johns Hopkins University Press, Baltimore.

Jamison, D. T., and J. Leslie, 1990, Health and Nutrition Considerations in Education Planning. 2. The Cost and Effectiveness of School-Based Interventions, Food and Nutrition Bulletin, Vol. 12, No. 3: 204-214.

Khandker, S. R., 1996, Education Achievements and School Efficiency in Rural Bangladesh, World Bank Discussion paper No. 319, World bank, Washington, D.C.

Lau, L., D. Jamison, and F. Louat, 1990, Education and productivity in developing countries: An aggregate production function approach, The World Bank: Washington, DC. Mimeo.

Lockheed, M. E. and A. M. Verspoor, 1990, Improving Primary Education in developing Countries: A Review of Policy Options, Oxford University Press, New York.

Lyne, M. C., 1988, Off-farm Wage Gains from Education: A Study in Kwa Zulu, Development Southern Africa, 5: 459-64.

Miller, R., and W. D. Drake, 1983, School Feeding: Effects on Enrollment, Attendance, and Drop-Out in Sri Lanka, Report submitted to the United States Agency For International Development under contract number PDC-0212-I-09-1010-00, Washington, D.C.

Miller Del Rosso, J., and T. Marek, 1996, Class Action: Improving School Performance in the Developing World through Better Health and Nutrition, Directions for Development, World Bank, Washington, D.C.

Psacharopoulos, G., 1994, Gains from Investment in Education: A Global Update, World Development, 22: 1325-1343.

Ravallion, M., and Q. Wodon, 1998, Evaluating a Targeted Social Programs When Placement is Decentralized, Mimeo, World Bank, Washington, DC.

Schultz, T. P., 1988, Education Investments and Gains, in H. B. Chenery and T. N. Srinivsan, Editors, Handbook of Development Economics, Vol. 1, Elsevier, Amsterdam.

Subbarao K., A. Bonnerjee, J. Braithwaite, S. Carvalho, K. Ezemenari, C. Graham, and A. Thompson, 1997, Safety Net Programs and Poverty Reduction: Lessons from Cross-Country Experience, Directions for Development, World Bank, Washington, D.C.

Summers, L. H., 1994, Investing in All the People: Educating Women in Developing Countries, Economic Development Institute Seminar Paper No. 45, World bank, Washington, D.C.

Vijverberg, W. P. M., 1995, Gains from schooling in non-farm self-employment: an econometric case study of Ghana, World Development, 23: 1215-27.

Wodon Q., 1997a, Food Energy Intake and Cost of Basic Needs: Measuring Poverty in Bangladesh, Journal of Development Studies, 34: 66-101.

Wodon Q., 1997b, Targeting the Poor Using ROC Curves, World Development, 25: 2083-2092.

World Bank, 1997, Making the Best Use of Public Resources: Bangladesh Public Expenditure Review 1997 Update, World Bank, Washington, D.C.

Table 1: Shares of education groups in Household Expenditure Surveys

	83-84		85-86		88-89		91-92		95-96	
	Urban	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**
Education of head										
Illiterate/no schooling	0,31	0,52	0,29	0,53	0,29	0,56	0,27	0,53	0,34	0,60
Some primary school	0,15	0,20	0,11	0,17	-	-	0,16	0,20	0,13	0,14
Primary school completed	0,08	0,08	0,12	0,09	0,24	0,26	0,10	0,10	0,08	0,07
Some secondary school	0,17	0,12	0,18	0,12	0,16	0,11	0,15	0,10	0,17	0,12
Secondary school completed	0,29	0,07	0,30	0,08	0,31	0,08	0,32	0,07	0,29	0,07
Education of spouse										
Illiterate/no schooling	0,53	0,76	0,51	0,76	0,54	0,78	0,48	0,75	0,52	0,77
Some primary school	0,13	0,13	0,12	0,11	-	-	0,13	0,12	0,11	0,09
Primary school completed	0,10	0,06	0,12	0,07	0,19	0,16	0,10	0,07	0,10	0,07
Some secondary school	0,14	0,04	0,14	0,05	0,15	0,05	0,15	0,05	0,16	0,06
Secondary school completed	0,11	0,01	0,10	0,01	0,12	0,01	0,14	0,01	0,12	0,01

Source: Author's estimates. For the year 1988-89, the first two categories cannot be separated in the data.

Table 2: Naive estimates of gains from education (without regressions)

	83-84		85-86		88-89		91-92		95-96	
	Mean	**Gain**	**Mean**	**Gain**	**Mean**	**Gain**	**Mean**	**Gain**	**Mean**	**Gain**
Mean consumption and differences by education										
EDUCATION OF HEAD										
Urban sector										
Illiterate	1,265	-	1,295	-	1,357	-	1,171	-	1,384	-
Some primary school	1,38	9,10	1,525	17,80	-	-	1,461	24,69	1,686	21,83
Primary school completed	1,682	33,00	1,665	28,64	1,525	12,44	1,52	29,74	1,832	32,40
Some secondary school	1,726	36,44	1,999	54,46	1,736	27,95	1,74	48,52	2,005	44,91
Secondary school completed	2,162	70,96	2,691	107,9	2,406	77,39	2,527	115,7	3,553	156,8
Rural sector										
Illiterate	1,091	-	1,159	-	1,281	-	1,044	-	1,138	-
Some primary school	1,285	17,82	1,324	14,26	-	-	1,214	16,25	1,31	15,04
Primary school completed	1,43	31,07	1,425	22,96	1,581	23,40	1,309	25,36	1,442	26,68
Some secondary school	1,382	26,69	1,538	32,75	1,68	31,18	1,462	39,98	1,694	48,80
Secondary school completed	1,764	61,67	1,93	66,57	2,123	65,76	1,702	62,95	2,089	83,49
EDUCATION OF SPOUSE										
Urban sector										
Illiterate	1,208	-	1,306	-	1,625	-	1,45	-	1,705	-
Some primary school	1,463	21,11	1,702	30,35	-	-	1,449	-0,10	1,718	0,72
Primary school completed	1,633	35,17	1,917	46,81	1,584	-2,48	1,707	17,71	2,064	21,03
Some secondary school	1,869	54,64	2,34	79,20	2,114	30,13	2,047	41,12	2,688	57,62
Secondary school completed	2,543	110,4	3,063	134,6	3,097	90,65	2,966	104,5	4,2	146,3
Rural sector										
Illiterate	1,118	-	1,199	-	1,174	-	1,131	-	1,227	-
Some primary school	1,362	21,76	1,329	10,85	-	-	1,216	7,57	1,303	6,22
Primary school completed	1,322	18,26	1,559	30,03	1,415	20,53	1,439	27,27	1,533	24,97
Some secondary school	1,706	52,54	1,784	48,77	1,689	43,88	1,57	38,89	1,972	60,72
Secondary school completed	1,961	75,36	2,211	84,36	1,936	64,90	2,049	81,25	2,551	107,9

Source: Author's estimates. For the year 1988-89, the first two categories cannot be separated in the data.
Note: A welfare ratio of 1 indicates per capita consumption at the level of the poverty ine.

Table 3: Econometric estimates of gains from education

	83-84		85-86		88-89		91-92		95-96	
	Coeff.	St. Er.	Coeff.	St. Er.	Coeff.	St. Er.	Coeff.	St. Er.	Coeff.	St. Er.
URBAN AREAS										
Estimates controlling for occupation										
Education of head										
Some primary school	2,51	3,07	9,40 *	3,25	-	-	14,96 *	2,66	13,46 *	2,58
Primary school completed	20,03 *	4,03	17,78 *	3,42	9,00 *	2,58	13,93 *	2,99	18,84 *	3,00
Some secondary school	18,75 *	3,55	25,79 *	3,26	15,71 *	3,25	24,65 *	3,04	23,68 *	2,69
Secondary school completed	25,90 *	4,16	38,00 *	4,03	34,82 *	3,98	37,15 *	3,78	47,87 *	4,26
Education of spouse										
Some primary school	8,10 *	3,12	11,17 *	3,20	-	-	4,20	2,59	3,13	2,94
Primary school completed	13,07 *	3,72	12,87 *	3,58	2,09	2,65	8,38 *	3,42	8,11 *	2,98
Some secondary school	20,35 *	4,03	23,34 *	3,69	15,14 *	3,51	15,01 *	3,45	16,39 *	3,19
Secondary school completed	43,32 *	4,91	43,43 *	4,36	39,84 *	4,49	38,13 *	4,36	41,82 *	4,47
Estimates with endogenous occupation										
Education of head										
Some primary school	7,07 *	3,18	13,73 *	3,16	-	-	17,25 *	2,73	16,09 *	2,62
Primary school completed	25,78 *	3,99	22,76 *	3,35	-1,70	2,57	17,68 *	3,01	21,38 *	3,15
Some secondary school	25,58 *	3,56	30,83 *	3,14	1,55	3,09	28,55 *	3,02	27,02 *	2,73
Secondary school completed	30,22 *	4,00	42,41 *	3,54	10,37 *	3,16	42,07 *	3,64	52,38 *	4,11
Education of spouse										
Some primary school	8,08 *	3,28	11,49 *	3,28	-	-	5,03	2,64	3,47	3,05
Primary school completed	14,92 *	3,79	14,49 *	3,59	8,52 *	2,69	9,92 *	3,51	9,36 *	3,02
Some secondary school	22,01 *	4,19	25,20 *	3,76	29,91 *	3,24	16,98 *	3,54	18,09 *	3,30
Secondary school completed	45,17 *	4,92	45,22 *	4,36	61,63 *	3,74	39,84 *	4,46	43,78 *	4,61
RURAL AREAS										
Estimates controlling for occupation										
Education of head										
Some primary school	11,79 *	2,25	10,91 *	2,08	-	-	6,23 *	1,47	6,19 *	1,59
Primary school completed	15,22 *	3,27	12,91 *	3,00	9,01 *	1,51	8,00 *	1,91	7,27 *	2,21
Some secondary school	17,05 *	2,97	16,12 *	2,95	18,65 *	2,41	10,39 *	2,23	12,65 *	2,09
Secondary school completed	32,65 *	4,06	30,16 *	4,75	21,01 *	3,68	16,01 *	3,04	17,35 *	2,85
Education of spouse										
Some primary school	4,93	2,58	0,06	2,54	-	-	5,04 *	1,70	4,32 *	1,86
Primary school completed	-0,78	4,09	7,21	4,08	3,54	1,98	11,92 *	2,51	9,21 *	2,33
Some secondary school	11,44 *	4,48	15,17 *	5,19	9,41 *	3,78	16,94 *	2,99	22,16 *	2,99
Secondary school completed	28,98 *	10,72	40,66 *	12,38	19,45 *	9,67	25,11 *	7,91	39,41 *	6,75
Estimates with endogenous occupation										
Education of head										
Some primary school	17,06 *	2,35	15,99 *	2,16	-	-	8,13 *	1,50	8,15 *	1,64
Primary school completed	22,06 *	3,37	17,69 *	3,15	8,83 *	1,53	9,75 *	1,97	10,07 *	2,27
Some secondary school	24,44 *	2,99	23,50 *	2,99	17,99 *	2,39	13,21 *	2,29	16,11 *	2,15
Secondary school completed	40,17 *	3,96	38,47 *	4,90	15,26 *	3,66	21,20 *	2,80	21,77 *	2,82
Education of spouse										
Some primary school	5,47 *	2,71	2,01	2,67	-	-	6,13 *	1,73	4,96 *	1,83
Primary school completed	-0,78	4,12	7,59	4,07	7,62 *	2,01	13,89 *	2,54	9,50 *	2,35
Some secondary school	12,98 *	4,69	15,85 *	5,17	18,68 *	3,87	18,95 *	3,11	23,35 *	3,01
Secondary school completed	27,51 *	11,59	39,50 *	11,95	28,51 *	10,10	27,18 *	8,08	40,37 *	6,77

Source: Author's estimation. * indicates significance at 5% level. No schooling is the excluded dummy.
Other variables included in the regressions are: geographic dummies, demographic variables, land ownership and for the years 1988-89, religion and occupation. See text for details. Most R2 in the 0.50 range or higher.

Table 4: Bangladesh's Food For Education Program, 1993-94 to 1995-96

	Unions covered	Schools covered	Enrollment	Number of participants	
				Children	Families
1993-94	460	4,914	1,504,437	706,519	549,881
	(10.44 %)	(7.30 %)	(16.73 %)		
1994-95	1000	12,182	3,619.243	1,628,659	1,416,932
	(22.70 %)	(18.10 %)	(19.06 %)		
1995-96	1243	16,159	4,960,813	2,239,805	1,962,496
	(28.21 %)	(24.01 %)	(26.71 %)		

Source: Project Implementation Unit, FFEP, Dhaka, May 2, 1997, quoted by BIDS (1997: 12).
Note: Percentage of all unions, schools, and students in parentheses in first three columns.

Table 5: IFPRI and BIDS evaluations of FFE Using "Before-After" Comparisons

	Enrollment (% increase over previous years)			Attendance (% of school days)		Drop-outs and repeaters (% of students)	
	IFPRI (1994)	BIDS (1997)		IFPRI (1994)	BIDS (1997)	IFPRI (1994)	BIDS (1997)
FFE Schools		Phase 1	Phase 2				
Before (1)	8	30	19	63	NA	19	NA
After (2)	28	14	13	78	78	11	7
Non-FFE schools							
Before (3)	9	5	3	62	NA	17	NA
After (4)	7	6	-1	61	64	15	9
Difference							
[(2)-(1)]-[(4)-(3)]	21	-15	-2	16	NA	6	NA

Source: Ahmed and Billah (1994) and BIDS (1997).
Note: For BIDS enrollment rates, Phase 1 refers to unions with FFE starting in 1993-94, and Phase 2 refers to unions with FFE starting in 1994-95. Although BIDS provides attendance and drop-outs rates for FFE and non-FFE schools in the survey year, it does not provide similar figures for the year preceding program implementation. This explains the N.A. (non-availability) entries in columns 5 and 7.

Table 6: Targeting performance of FFE

	Poor or very poor household?				Total
	Lower poverty lines (very poor)		Upper poverty lines (poor)		
FFE beneficiary household?	No	Yes	No	Yes	
No Number of HH	**1862**	**1406**	**1299**	**1969**	**3268**
% of all non-FFE HH (1862/3268)	56.98	43.02	39.75	60.25	-
% of non-FFE poor/nonpoor HH (862/2049)	90.87	89.21	91.93	89.01	-
% of all HH (1862/3625)	51.37	38.79	35.83	54.32	90.15
Yes Number of HH	**187**	**170**	**114**	**243**	**357**
% of all FFE HH (187/357)	52.38	47.62	31.93	68.07	-
% of FFE poor/nonpoor HH (187/2049)	9.13	10.79	8.07	10.99	-
% of all HH (187/3625)	5.16	4.69	3.14	6.7	9.85
Total Number of HH	**2049**	**1576**	**1413**	**2212**	**3625**
% of all HH (2049/3625)	56.52	43.48	38.98	61.02	-

Source: Author's computation from 1995-96 HES.
Note: the percentages of poor versus nonpoor HH do not represent headcount indices of poverty because these have not been weighted. Actual poverty rates in Bnagladesh are slightly lower than could be inferred from the Table.

Table 7: Cost-benefit analysis of FFE (not including the in kind benefits from the grain itself)

	Current estimates		Better schools (2/3 reduction in repeats)		Better targeting (2/3 reduction in leakage)		Both improvements	
	Very poor	Poor	Very poor	Poor	Very poor	Poor	Very poor	Poor
Cost with no leakage	$45	$45	$45	$45	$45	$45	$45	$45
Leakage	52%	32%	52%	32%	17%	10%	17%	10%
Cost with leakage (Ct)	$95	$66	$95	$66	$54	$50	$54	$50
Yearly benefit (Bt)	$53	$70	$53	$70	$53	$70	$53	$70
Years to complete school (N)	9	9	6	6	9	9	6	6
Break even discount rate (r)	3.16%	5.84%	4.01%	6.72%	5.47%	7.13%	6.34%	8.01%

Source: Author's computations. The very poor (respectively poor) estimation assumes that benefits for households who are not very poor (poor) represent a leakage. Numbers may not add up due to rounding. See the text for break even discount rates when the benefits from the grain are included.