IMPACT ASSESSMENT DISCUSSION PAPER NO. 22

The Contribution of IFPRI Research and the Impact of the Food for Education Program in Bangladesh on Schooling Outcomes and Earnings

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ABSTRACT

This paper evaluates the influence and impact that IFPRI research and related activities had on the initiation, evolution, and impact of the food for education (FFE) program in Bangladesh. It reviews the outputs from the IFPRI program and summarizes the perceptions of various stakeholders about the value and influence of these on the FFE program. A novel experimental evaluation methodology is used on household sample survey data to analyze the effects of FFE on schooling outcomes. Earnings functions are then estimated using national household income and expenditure survey data to assess the effect of schooling on earnings. Combining the two, the effects of the increased participation and duration of schooling (due to the FFE program) on lifetime earnings of children are derived. Using these incremental earnings figures, the internal rates of return for both national and private investments in the FFE program are estimated. From these, a conservative assessment of the economic value of IFPRI's contribution to the generation of the national benefits is made.

IFPRI had at least four acknowledged influences on the FFE program: (1) in the conception of the program; (2) in the evaluation of the program, leading to its expansion; (3) in improving the targeting effectiveness; and (4) in training and capacity strengthening in survey techniques and policy analysis. Although the FFE research program of IFPRI had a rather modest formal publication record, the working papers were effective in conveying to policymakers the results of the various monitoring and evaluation inputs of the IFPRI team.

The findings of IFPRI research on the effects of the FFE program on food consumption and nutrition outcomes were less persuasive than those on leakages and schooling outcomes. Using propensity score matching and difference-in-differences methodologies, we estimated 20–30 percent increases in school participation rates—more than double the increases estimated by the FFE researchers and around 20 percent more than the World Bank's estimates. Additionally, not only did FFE beneficiary children have measurably increased school participation rates; we also estimate that they remained in school between 0.4 and 1.4 years longer than their counterparts who were not FFE beneficiaries. We conclude that the combined effects of the increased participation and duration of schooling due to the FFE program on lifetime earnings of children are highly significant, especially for girls. FFE beneficiary girls can earn up to 33–35 percent more than their nonbeneficiary counterparts, and FFE beneficiary boys up to 11–18 percent more than their nonbeneficiary counterparts. The higher figures refer to situations in which urban rather than rural employment is acquired. The internal rates of return for national investment in the FFE are conservatively estimated by us as 18–24 percent for girls and 15–26 percent for boys. Private rates of return are more than double these national returns for girls and double for boys. These analyses imply that the FFE program represented not only an extremely wise economic investment for the government in terms of economic growth, but also a powerful tool for poverty alleviation, especially for women.

We conclude that a very conservative assessment of the economic value of IFPRI's contribution to the generation of the national benefits estimated above is that the FFE program began one year earlier than it might have without the IFPRI input. Based upon the total cost of

the IFPRI-FFE research program of US$151,000, the internal rate of return on this research investment ranges from 64–96 percent. If all the other benefits are added to this, clearly the IFPRI contribution has been an outstanding economic investment. These benefits might have been even greater had IFPRI had an explicit communications strategy with more timely and available publications, along with appropriate advocacy based upon a more thorough knowledge of the dynamic political economy of government decision making in Bangladesh.

1. INTRODUCTION

IFPRI has been undertaking research and related activities in Bangladesh since the institute's inception. In the late 1980s it launched the Bangladesh Food Policy Project (BFPP) with the support of the government of Bangladesh (GOB) and the Dhaka office of USAID. The BFPP undertook food policy research and provided technical assistance to the GOB, primarily through the Ministry of Food (MOF). A major rationale for the project was concern on the part of both the GOB and food aid donors about the inefficiencies of the public food distribution system in Bangladesh. The major elements of the BFPP were

- a study of price stabilization and private and public marketing,
- an evaluation of the effects of targeted distribution of foodgrains on consumption and nutrition,
- an examination of agricultural diversification as a source of sustained production growth, and
- capacity strengthening in food policy analysis.

Babu (2000) assessed the impact of IFPRI's food policy research in Bangladesh through the BFPP. He concluded that there were two major policy contributions: the abolition of the rural (*palli*) rationing program and the implementation of the food for education (FFE) program. Babu assessed the direct impact of the FFE program on poverty, food and energy consumption, and budgetary savings for the government. He did not assess the impact of the FFE program on schooling outcomes or human capital development.

Informed by the research undertaken through the BFPP, the GOB decided to initiate the FFE program in 1993. IFPRI was asked by the GOB to monitor and evaluate the effectiveness of the FFE program in its early years and then again later in the 1990s under a new project called the Food Management and Research Support Project (FMRSP). The FFE program was in operation for some eight years when it was terminated in 2001 and replaced by the cash for education (CFE) program.

This paper aims to assess the contribution of the IFPRI research and related activities to the initiation, evolution, and impact of the FFE program in Bangladesh. It is one of a series of studies commissioned by IFPRI to evaluate the impact of its research and related activities, as part of a process aimed at improving the effectiveness of IFPRI's work and documenting for donors and stakeholders the wisdom of investing in it.

The paper begins with a discussion of the origins of the FFE program, its modus operandi, and its evolution. Then follows a description of IFPRI's research and related activities in the period leading up to the launching of the FFE program and during its eight-year life. This discussion includes documentation of the outputs of the IFPRI program. The next section of the paper summarizes the perceptions of various stakeholders regarding the value of the IFPRI program and its influence on policies related to the FFE program in Bangladesh. These conclusions are based upon interviews with and survey responses from those concerned. Experimental evaluation methodology is then used on IFPRI household sample survey data from

Bangladesh to analyze the effects of the FFE program on schooling outcomes. Employing data from the national income and expenditure survey, we then estimate earnings functions to assess the effect of schooling on earnings. Combining the two, we derive the effects on children's lifetime earnings resulting from the increased participation and duration of schooling due to the FFE program. Using these incremental earnings figures, the internal rates of return for both national and private investments in the FFE program are estimated. From these, a conservative assessment of the economic value of IFPRI's contribution to the generation of the national benefits is derived. Following the authors' conclusions is a section that draws some lessons for IFPRI in its quest to enhance its impact in the future.

2. ORIGINS OF THE FOOD FOR EDUCATION PROGRAM AND ITS OPERATION

The chronology of the evolution of the food for education (FFE) program is outlined in Table 1. The government of Bangladesh (GOB) launched the FFE program in July 1993. Its aim was to use targeted food transfers to encourage poor families to enroll children in primary school and to keep them there. The expectation was that the program would have three benefits: enhance human capital and hence reduce long-term poverty, provide nutritional gains, and improve the targeting of government food subsidy programs. The third reason was arguably the primary motive for initiating the FFE program at this particular time. Under the Bangladesh Food Policy Project (BFPP), IFPRI had documented the large leakages from the palli (rural) foodgrain-rationing program that began in April 1989. IFPRI found that 70 percent of the subsidized foodgrain (mostly rice) in the palli rationing program was going to the nonpoor (Ahmed 1992; Ahmed and del Ninno 2002, p. 3). Yet in the more targeted Vulnerable Group Development (VGD) program, the leakages were much less, at 14 percent. This provided a degree of confidence in the ability of local authorities to target poor families.

Table 1: The evolution of the FFE program in Bangladesh

Date	Events
1988	IFPRI Bangladesh Food Policy Project (BFPP) begins with government of Bangladesh (GOB) and USAID Dhaka support. Begins to assess cost-effectiveness of palli (rural) foodgrain rationing scheme as part of the project.
May 1992	Foodgrain leakages to the nonpoor, estimated by IFPRI at 70% in the palli rationing scheme, reinforce prior political and donor concerns about distributional consequences and leads the GOB to abolish this food subsidy scheme.
1992	GOB forms the Working Group on Targeted Food Interventions (WGTFI), chaired by IFPRI, to examine alternatives to palli rationing.
February 1993	Draft report of WGTFI recommends either a food for education (FFE) or a cash for education (CFE) program.
July 1993	Based upon the WGTFI draft report, the GOB introduces a pilot FFE program.
June 1994	Preliminary assessment by the IFPRI BFPP of the FFE program estimates foodgrain leakages of 7%, along with increased school enrollments of eligible children. BFPP ends.
1994–2000	GOB expands the FFE program from a pilot program to one that covers 27% of primary schools in the country.
1997	IFPRI begins the Food Management and Research Support Project (FMRSP) with GOB and USAID Dhaka support.
1997–2000	GOB concerned about increased class sizes due to the success of the FFE program and the time required of teachers to manage the program at the schools and distribute the foodgrains to eligible households. GOB fears that the quality of education in FFE schools was being compromised. FMRSP examines these issues and undertakes another analysis of FFE impact.
February 1999	Grain dealers assigned the responsibility of distributing grain under the FFE program. Prior to this change, School Management Committees distributed grains.

Date	Events
2000	IFPRI holds policy seminar in Bangladesh. No reference made to new estimates of leakages.
2001	World Bank estimates leakages under the FFE program at >75%.
2001	IFPRI holds policy seminar in Washington, D.C. No reference made to new estimates of leakages.
2002	FMRSP evaluates effects of FFE program on schooling outcomes and quality of education. No reference made to new estimates of leakages.
July 2002	GOB ends the FFE program in favor of a CFE program.
June 2003	IFPRI FMRSP provides new estimates of leakages from the FFE. These are in the range of 14–17 %.

Others had also documented similar leakages (BRAC 1991). This meant that, in the palli rationing program, the GOB was spending Tk6.55 to transfer Tk1.00 to intended beneficiaries, whereas in the VGD the figure was only Tk1.50. The palli rationing program was also less than half as cost-effective as similar programs in other countries (Ahmed 1992, pp. 24–25). Primarily in response to these findings, the GOB abolished the palli rationing program in May 1992, largely at the behest of the Planning Commission and the Ministry of Finance (Chowdhury and Haggblade 2000, pp. 165–178). Factions within the government had been trying for years to end the palli rationing program, as had many donors. There was a concern that rice dealers chosen by the previous government were diverting public resources to their benefit under the scheme. The objective documentation of leakages provided a timely rationale for the program's abolition.

The abolition of the palli rationing scheme led to a surplus of procured rice in the public food distribution system that the GOB was keen to reduce. Two choices were available: reduce procurement prices and/or expand other outlets to reduce stocks. The Ministry of Food (MOF) was also concerned about the political implications of more than 6 million dispossessed palli ration-card holders.

The MOF requested that IFPRI examine alternatives to palli foodgrain rationing targeted to the poor, and in response a working group was formed in 1992, chaired by an IFPRI staff member, with another staff member as secretary (Babu 2000).[1] The FFE concept was introduced

[1] The deliberations of the working group are described by Babu (2000), along with the follow-up by the GOB at the level of the Office of the Prime Minister. The other institutional members of the working group were the Aga Khan Child Health Project, the Bangladesh Bureau of Statistics, the Bangladesh Institute of Development Studies (BIDS), the Directorate of Relief and Rehabilitation, Helen Keller International, Nathan Associates, Save the Children Fund, UNICEF, the World Bank, and the World Food Program (WFP). According to Babu, the WFP preferred a cash rather than an in-kind program, and when the working group decided to recommend the latter, the WFP withdrew from the working group. This issue, which has remained a key point of contention throughout the program, will be addressed in greater detail later.

in the first report of the working group in September 1992.[2] Based upon this recommendation, the GOB introduced a pilot FFE program in July 1993 to redeploy the savings from the cessation of palli rationing into a more effective targeted food subsidy program. The IFPRI role in the FFE program was largely conceptual; the institution was not involved in operational planning. There were apparently no international precedents on which to draw, as the idea was original. The aim was to use nonration channels (i.e., teachers) for distribution in the hope of reducing leakages, while at the same time helping the poor with the promotion of primary school enrollment, then a top national priority (Chowdhury and Haggblade 2000, pp. 165–178). A country memorandum of the World Bank in 1993 cited and supported the working group recommendation of an FFE program.

The FFE program provided a free monthly foodgrain ration to the household, contingent on the family being judged as poor and having at least one primary-school-age child attending school that month. The Primary Education Ward Committee and the School Management Committee jointly prepared the list of beneficiaries. The family could consume the grain and/or sell it, and there was no guarantee that eligible children attending school would necessarily be fed more. From its beginnings in 1993 as a large-scale pilot program, by 2000 the FFE program covered some 17,811 primary schools (27 percent of the total) and 2.1 million students (13 percent). Of the 66,235 primary schools in Bangladesh in 2000, some 62 percent were government schools and 38 percent nongovernment. The FFE program covered government schools and four of the eight categories of nongovernment schools. The FFE program expenditure of around US$77 million represented 20 percent of total expenditures on primary education in 1997–98, up from 4.7 percent in 1993–94 (Ahmed and del Ninno 2002). The cost per beneficiary student was about US$0.10 per day. Food aid donors such as the United States also provided a significant portion of the grain for the program.

If one primary-school-age child from a designated poor family attended school, the household was entitled to receive 15 kilograms of wheat or 12 kilograms of rice per month. To be eligible for the maximum of 20 kilograms of wheat or 16 kilograms of rice, the household had to send more than one child *and* all primary-school-age children to school. The enrolled children had to have attended 85 percent of classes in a month to be eligible; attendance records were kept by the teachers and submitted monthly to the Thana (local government) offices. They and the School Management Committee then arranged with the MOF for the grain to be delivered to a nominated warehouse for collection by the beneficiary families using a ration card. Due to concerns about the loss in teaching time spent on food distribution, the government in February 1999 relieved teachers of this responsibility and instead assigned the task to private dealers. This move had mixed success in terms of the efficacy of food distribution. However, it did serve to

[2] While the published report of the working group did not appear until April 1994 (The Working Group on Targeted Food Interventions 1994), the FFE recommendation found its way into the policy formulation process well before then (Ahmed and del Ninno 2002, pp. 3–4). In a postscript to the working group report, the chair, Steven Haggblade, said: "…We are pleased that these early drafts of the report have stimulated widespread discussion as well as introduction of Government's new Food for Education program" (The Working Group on Targeted Interventions 1994, p. vi). Apparently the secretaries of food Nurun Nabi Chowdhury (1988–90) and Ershad Ul Haq (1991–92) had been favorably disposed to the idea of FFE.

ease the burden on teachers, even though increased class sizes in FFE schools served to offset this reduced burden over the course of time.

The FFE program used a two-step targeting mechanism. First, two to three unions (districts) that were economically backward and had a low literacy rate were selected from each of the 460 rural Thanas. All government, registered nongovernment, community (low-cost), and satellite primary schools, and one Ebtedayee Madrasa (religion-based primary school) in these selected unions were covered by the FFE program. Second, within each selected union, households with primary-school-age children became eligible for FFE benefits if they met at least one of the following four targeting criteria:

1. The household was a landless or near-landless household that owned less than half an acre of land.
2. The household head's principal occupation was day labor.
3. The head of the household was a female.
4. The household earned its living from low-income artisanal occupations.

Although households that satisfied the above selection criteria in FFE unions should have been eligible for participation, three important conditions may have prevented them from receiving the food subsidy. First, only primary-school students could participate. In other words, those who were not at school or who were enrolled in high school were not eligible. Second, only students enrolled in FFE schools could receive the food subsidy. Some students from eligible households may have been enrolled in non-FFE schools and hence could not receive a food subsidy. Third, a maximum of only 40 percent of students in each FFE school could receive the subsidy. Thus, some students from FFE-eligible households did not receive a subsidy. Teachers made the decision on who should receive the subsidy if the students were from eligible households and enrolled in FFE schools, and these decisions could change over time. For example, if a child from an FFE-eligible household was enrolled in an FFE school but did not receive the food subsidy for one year, he or she could receive a subsidy in the following years if others dropped out. Teachers endeavored to select the least poor households for exclusion when they were faced with a number of potentially eligible households in excess of the 40 percent figure. However, it is not clear to what extent they succeeded.

Though initially arising from the imperative of designing more cost-effective targeted foodgrain distribution programs to replace the discredited palli rationing program, the FFE program also met the priority accorded by the GOB of providing basic education as a key component of a poverty reduction strategy.[3] This is reflected in the fact that education represented the largest single item in the national budget. Its budget share increased from 11 percent in the five years from 1986 to 1990 to 15.7 percent in 1996 to 2000. In 2001, primary education represented about 47 percent of education expenditures, down from 50 percent in the early 1990s (Chowdhury 2002). However, real spending on primary education more than doubled in this period.

[3] The need for effective, targeted safety nets for the poor remains strong in Bangladesh even today (Ahmed 2000). Food programs continue to represent a significant part of the GOB budget (Chowdhury and Haggblade 2000, pp. 165–178). The FFE represented 6 percent of the Bangladesh public food distribution system in 1993–94, 21 percent in 1997–98, and 15 percent in 1999–2000 (Ahmed and del Ninno 2002, p. 5).

In the 10 years from 1988-89, the number of primary schools in Bangladesh increased by 46 percent and the number of students in primary schools by 50 percent. Almost all the expansion was growth in nongovernment schools, which increased by 236 percent, mostly in the early 1990s, due to new government directives that provided incentives to rural communities to build new schools. As a consequence, the proportion of nongovernment schools rose from 16 percent in 1988–89 to 38 percent in 1997–98 (Ahmed and del Ninno 2002, pp. 5–43). The increase in the number of teachers did not keep pace with the growth in schools or students, and hence the student-teacher ratio rose from 61-to-1 to 70-to-1 during the same period.

3. IFPRI RESEARCH AND RELATED ACTIVITIES ON FFE

The IFPRI research on the FFE program can be considered in two phases. The first was the conceptual/initiation phase from 1991 to 1994. The second was the evaluation/expansion phase from 1995 to 2003. The total number of publications that emerged over this period was 21 (Table 2 and Appendix 1). This seems a modest record over such an extended period, although the IFPRI staff members concerned were not involved full-time with the FFE research program.[4] No more than one economist-year was devoted to FFE, according to records at IFPRI.

Table 2: Number of FFE publications 1991–2003

Type of publication	Number
Books, monographs, book chapters	2
Papers in refereed journals	0
Papers in discussion/working paper series	3
Papers presented at workshops, seminars, and conferences	6
Policy briefs, special reports, and others	10
Total	**21**

Source: Compiled by the authors with the assistance of A. Ahmed.

The first phase involved the finalization of the research on the extent of leakages in the palli rationing program, which ultimately gave rise to the FFE program (Ahmed 1992). Then followed the IFPRI involvement in the working group. In early 1994, nine months after the start of the FFE program, the GOB requested that IFPRI conduct an initial evaluation of the so-called pilot program as a precursor to expanding the program.[5] This evaluation was conducted under the leadership of A. Ahmed at the request of the Primary and Mass Education Division (PMED) of the Ministry of Education and the Ministry of Food, the former chairing a steering committee constituted to oversee the study (Babu 2000). Ahmed surveyed samples of FFE and non-FFE schools and village households. At that stage the leakages were estimated to be only around 7 percent, one of the lowest levels of any program, and the FFE program had been successful in increasing primary school enrollments, promoting attendance, and reducing dropout rates (Ahmed and Billah 1994).[6] While 12 percent of FFE beneficiaries did not meet the eligibility criteria, most were still assessed as poor. On this basis the GOB decided to expand the program

[4] The cumulative nominal total cost of the program over both phases amounted to US$151,000, with about 55 percent for the salary and related costs of the six IFPRI economists involved.

[5] The GOB formally announced that the initial phase was not a pilot program, although in many respects it was.

[6] Only the cash-for-work component of the Rural Maintenance Program was more cost-effective, at Tk1.32 per Tk1.00 distributed to beneficiaries, compared to Tk1.59 for the FFE program (Ahmed and Billah 1994, p. 13).

over the next few years. It tripled between 1993–94 and 1995–96, and Babu contends that the IFPRI evaluation was the key to this expansion (Babu 2000, pp. 32–33, 66). Indeed, he concludes, "…IFPRI's research was instrumental in the process of initiating and implementing this new innovative program" (p. 33). Babu describes, based on interviews with senior officials of the PMED, how that division acted as an independent evaluator of IFPRI's FFE research and accordingly conveyed to the GOB recommendations about the expansion of the program.

As time passed, the Ministry of Education and some donors, such as the EC and the World Bank, became concerned about the fiscal burden of the FFE and its impact on the quality of education because of the expansion in the numbers of students due to the influence of the FFE program. Class sizes were rising in FFE schools without commensurate increases in capacity and numbers of teachers. In addition, teachers were devoting significant time to FFE food distribution. The Ministry of Education commissioned a study by the Bangladesh Institute of Development Studies (BIDS) to examine this and other issues (BIDS 1997; Alam et al. 1999). This study, also based upon surveys, found that leakages were near 30 percent and that recipients were poorly selected. It found no statistically significant effects on enrollment or retention rates. It recommended that, in order to reduce the time required of teachers to attend to food distribution, this task be made the responsibility of grain dealers, and the GOB accepted this recommendation. The study concluded that if school quality could be improved, this would have its own positive effects on enrollment, and that school feeding programs would be more effective in increasing enrollments than the FFE program. At this time there was also increased interest in replacing the FFE with a cash-for-education (CFE) program, due to the perception that leakages were becoming unacceptably high. The Ministry of Food was not as well disposed to the CFE alternative as was the Ministry of Education.

After the conclusion of the BFPP, which was conducted from 1988 until 1994, IFPRI began a second project in Bangladesh in 1997 called the Food Management and Research Support Project (FMRSP), with the support of the USAID mission in Dhaka. The FMRSP formally ended in 2001. The three-year gap between 1994 and 1997 arguably led to some missed opportunities, which are discussed below. The FMRSP involved collaboration with the Food Planning and Monitoring Unit (FPMU) of the Ministry of Food, BIDS, the University of Minnesota, and the International Science and Technology Institute. Work on the second phase of the FFE program was included as a minor component of the FMRSP. Policy advisory services were a major element of the project. Other elements included food policy research, training, and information dissemination (FMRSP 2001). The FFE component had seven effects to assess (Ahmed, del Ninno, and Chowdhury 2001):

- macro-level effects;
- school enrollment, attendance, and dropout rates;
- targeting efficiency;
- quality of education;
- cost-effectiveness of income transfers;
- efficiency of foodgrain distribution; and
- food security and nutrition.

The FFE component represented less than 6 percent of all the outputs of the FMRSP (Table 3). The FFE program contributed half the data sets and around 10 percent of the seminars, workshops, and working papers.

Table 3: Some FFE outputs from the FMRSP 1997–2001

Output indicator (numbers)	Source	
	Those related to FFE	**Total for FMRSP**
Policy memos	1	53
Working papers	3	36
Synthesis papers	0	6
Other research papers	0	2
Data sets	1	2
Research seminars	1	11
Technology transfer workshops	1	9
Other policy advisory service outputs	0	10
Totals	**7 (5.4%)**	**129**

Source: Derived from FMRSP (2001) and other project documents.

The FMRSP work plan included provision for another survey of schools, village households, and traders to assess the effects of the FFE program on enrollment patterns. This subsequently led to the publication by Ahmed and del Ninno (2002) of a paper concluding that in FFE schools enrollment had increased by 35 percent after the introduction of the FFE program, whereas in non-FFE schools the increase was less than 3 percent. Using household survey data for 2000, they found that in FFE unions primary school enrollments in FFE beneficiary households were 20 percentage points higher than in nonbeneficiary households in the same unions. Using probit and Tobit analyses, they found that the probability of a child going to school increased by about 8 percent if the child was from an FFE household. They acknowledged that quality of education remained a problem in FFE schools, and that while targeting was good, a sizable number of poor households remained excluded. The dealer foodgrain distribution system was not satisfactory. Ahmed and del Ninno (2002) did not provide any new estimates of leakages in the FFE program, and Ahmed (2000) repeated the 7 percent figure from 1994. This is surprising, as the leakage issue had been a hardy perennial since 1996 and was to be a primary factor in the decision of the GOB in July 2002 to abolish the FFE in favor of a CFE program. At a workshop in Bangladesh in 2001, the World Bank had derived an estimate of leakages from the FFE in excess of 75 percent, using the 2000 Bangladesh Household Income and Expenditure Survey data from the Bangladesh Bureau of Statistics (World Bank 2002). It is apparent that this study had a major influence on the decision by the new government to abolish the FFE and replace it with the CFE program, despite reservations by many about the methodology used.

Only in 2003 did IFPRI provide new estimates of leakages from its surveys in 2000 (Ahmed, del Ninno, and Chowdhury 2003). These leakages were estimated at 14–17 percent.[7]

IFPRI research on the effects of the FFE program on nutrition and health has been more circumspect than that on schooling outcomes. Indeed, the FFE program was not included in the recommendations and conclusions of the FMRSP on a national comprehensive food security policy (FMRSP 2001, Annex 5). The FMRSP report (pp. 10–11) stated that calorie and protein consumption in beneficiary households had significantly increased. This claim was repeated in a press release issued by IFPRI on the FFE program on June 26, 2001, and in Ahmed (2000). However, in Ahmed and del Ninno (2002, pp. 25–27), no statistical tests on such differences are presented. Indeed, the tables show the mean consumption of these nutrients for beneficiary households to be less than that of nonbeneficiary households. Ahmed (2000), however, states clearly that despite differences in consumption, there were no differences in anthropometric measurements such as weight for age of preschool children and women. Hence, he concludes that access to food is not sufficient to eradicate malnutrition. Del Ninno and Dorosh (2002) estimate that the marginal propensity to consume wheat from in-kind foodgrain distribution in Bangladesh is quite high, at between 0.21 and 0.41 for the poorest households. These are considerably higher than the marginal propensities to consume wheat from current cash income. Hence, small in-kind transfers result in significantly higher wheat consumption than do increases in cash income. IFPRI would be well advised to clarify these apparent contradictory findings with further research, as these assumptions were a major part of the rationale for the FFE program at the outset.

The other component of IFPRI's FFE research involved examining the effectiveness of the targeting of the program. Ahmed, del Ninno, and Chowdhury (2003) report from their 2000 survey that average monthly per capita expenditures of nonbeneficiary households of students attending FFE schools was 60 percent higher than that of FFE beneficiary households of students attending FFE schools. These differences are statistically significant and imply that the FFE program was effectively targeted to low-income households. However, 13 percent of all households in FFE unions that had primary-school-age children did not send their children to any school. Their per capita expenditures were 5 percent lower than FFE beneficiary households, but this difference was not statistically significant. Hence, there were a large number of eligible households that did not benefit from the program. Alam et al. (1999) estimated that up to 26 percent of FFE beneficiary households in their 1997 sample did not fit any of the four listed targeting criteria. No doubt some of these households still had incomes below the poverty line, as 88 percent of the FFE beneficiary households in their sample were in poverty. On these estimates, better targeting could have ensured that all eligible households were included in the FFE program. The estimates of ineligibles included in 1997 range from 12–26 percent, while 13 percent of eligibles were not included.

IFPRI has held successful seminars and workshops conveying the results of its research work on the FFE program, both in Bangladesh and in Washington, D.C. One such seminar was

[7] IFPRI is currently conducting a study on the efficacy of the FFE compared to the new CFE (called the primary education stipend program [PESP]) by resurveying the FFE households and schools included in the 2000 survey.

held at the request of the PMED in June 2000 in Dhaka. The preliminary results from the 2000 surveys were presented (Ahmed, del Ninno, and Chowdhury 2001). An IFPRI Policy Seminar was also held in Washington, D.C., in June 2001, accompanied by policy briefs, a press release, and briefings of journalists; this seminar was followed by one in Bangladesh in July of the same year. Some of the major newspapers and wire services highlighted the work, both nationally and internationally.

The FFE program has been responsible for training a cadre of some 50 skilled survey enumerators, data analysts, and managers for the various school and household surveys conducted over more than 12 years. Indeed, the training was so successful that three of the original analysts and field supervisors for the 1991 surveys formed a consulting company called Data Analysis and Technical Assistance Limited (DATA) in 1994. This company designs and conducts field surveys and data compilation, management, and analysis for IFPRI and other agencies such as the World Food Program (WFP), the Population Council, Tufts University, MISEREOR Germany, World Vision, BIDS, the European Union, the World Bank, CARE, USDA, and Save the Children. Hence, the FFE program has been responsible for a significant enhancement of the capacity in Bangladesh to design and conduct high-quality field surveys and to analyze and store data from them in accessible forms. This is an impressive spillover benefit of the program that is difficult to value.

The IFPRI-FFE program was also responsible for strengthening the capacity of the Food Planning and Monitoring Unit (FPMU) of the Ministry of Food during both phases of the program. This included some 15 staff plus the then deputy director of the FPMU, who went to the United States to undertake a master's program. Indeed, in the FMRSP this was one of the important clients/audiences for the training and advisory services components. The FPMU also utilized many of the FFE-trained field survey staff for other GOB surveys, such as surveys of grain millers and costs of production. The FFE staff also provided training in policy and market analysis to the Ministries of Planning and Agriculture.

4. PERCEPTIONS OF THE VALUE OF IFPRI RESEARCH ON FFE

A total of 26 people were approached to elicit their perceptions about the conduct and influence of the IFPRI-FFE program (Appendix 2). The list was largely provided by the IFPRI staff involved in the FFE program over the two phases. Twenty individuals were approached personally, and of these 18 agreed to an interview. Of six who were approached by e-mail, five responded but two of these said they could offer no opinions. Hence, there were a total of 21 respondents. A questionnaire was used to structure the personal interviews and was sent to those contacted by e-mail (Appendix 3). In general, the responses to what were considered the nine key questions were favorable (Table 4). It is informative to elaborate on the individual responses.

One respondent was surprised by the finding that there was a reduction in schooling quality attributed to the FFE program; another expected the FFE program to improve nutrition but not to have a measurable impact on enrollment. The fact that the research showed the reverse was a big surprise. The IFPRI research was considered to be very useful and timely, especially in the area of policy formulation and implementation. "The IFPRI research work was the right input at the right time," said respondent 9. One respondent mentioned that the initial assessments in 1994 were especially useful, along with the earlier IFPRI work on the relative effectiveness of targeted food programs on nutrition in Bangladesh. That the FFE program was shown to have acceptable leakages and positive effects on enrollments was very influential in the GOB decision to proceed to the expanded program. These findings led to consideration of a new use for food aid in the FFE program by USAID, the involvement of the World Bank, and other adjustments in policy settings and in the conduct of the program.

One respondent pointed out that there was also a report by BRAC about the leakages in the palli rationing program that reinforced the IFPRI research on this issue. The survey approaches used by the FFE team were also mentioned as a positive influence on other aspects of the work of the Ministry of Food and the Ministry of Planning (Statistics). One respondent noted that he had heard that the IMF resident representative in Pakistan had heard that the FFE was a good program. He also spoke positively of IFPRI's seminars but suggested that the organization's influence may have been constrained by primarily working with the Ministry of Food (MOF). He was apparently denied access to the database and suspected that this was because of the sensitivity of the ministry. The IFPRI studies were cited frequently in GOB documents and by the World Bank because they were "independent and IFPRI had no stake in the research…IFPRI has a brand name" (respondent 14). The policy advisory service memos of the Food Management and Research Support Project (FMRSP) were mentioned as being especially effective.

The experience of the FFE program and IFPRI's documentation of the program's effectiveness were influential in the Global Food for Education program of USDA/USAID. Some respondents attested to this. The FFE was featured prominently on the website of USAID-Bangladesh. Indeed, the program received commendation and support at high levels of the U.S. government, including from former first lady and now senator Hillary Clinton (Babu 2000, p. 29) and former senators McGovern and Dole (Appendix 4). IFPRI is respected by USAID as a

"professional group" and participates in consultative processes as a result. Although not confirmed by the authors, a similar effort was reportedly initiated in Pakistan in 1995, patterned on the Bangladesh FFE program. As senior staff in GOB ministries have rapid turnover, a respondent noted that IFPRI has an obligation to continuously communicate if it wants to have sustainable influence. Perhaps as a consequence of the very modest refereed publication record of the IFPRI-FFE research program (Table 2 and Appendix 1), only one respondent indicated that he had cited IFPRI publications in his own research.

Table 4: Summary of responses to key questions in the interviews and survey

Question	Frequency of responses		
	Positive/ favorable	**Negative/ unfavorable**	**Neutral**
Did any IFPRI-FFE research results surprise you?	2	2	
Did you use the IFPRI-FFE research?	9	1	
If yes, how was the research influential?			
• Policy			
• Implementation	8		
• Capacity building	5		
• Other (e.g., citations of FFE publications)	1		
What was the quality of the research?			
• Excellent			
• Very good	2		
• Good	2		
• Acceptable	2		
• Poor	1		
		1	
Were there any gaps in the research?		2	1
Was the IFPRI staff responsive?	5	3	
How effective were IFPRI's communications activities?	7	2	
Should IFPRI have been more involved in influencing the decision to change the FFE to a CFE program?		2	2
Has IFPRI been regarded as an "honest broker"?	5	1	
Other comments?	6	3	

Note: Figures represent the number of respondents who were prepared to offer an opinion on the issue raised in the question.

With two exceptions, respondents judged the IFPRI-FFE research to be good or better. The FFE leakage estimations were viewed as having been carried out in a meticulous fashion.[8] IFPRI staff members were regarded as positive and helpful, for the most part. There did not seem to be a concern that there were any gaps in the scope of the research.

There was a mixed reaction to the question about the responsiveness of the IFPRI research staff. On the positive side, staff members were felt to be customer-oriented, providing information in user-friendly forms. The senior policymakers felt that the researchers understood their needs well and made every effort to satisfy them, even at the expense of devoting time to refereed publications. Generally, the impression was that IFPRI was more responsive in the first phase in the early 1990s than in the FMRSP phase in the late 1990s. The understandable preoccupation of the FMRSP team with operational matters in connection with the floods in 1998 was acknowledged to be a factor in this lower level of policy responsiveness.

However, a more serious concern was expressed about a lost opportunity to influence the evolution of the FFE program. Respondent 6 indicated that because IFPRI missed deadlines for reporting the results of the 2000 FFE evaluation surveys, its influence on the decision to change from the FFE to a CFE program was impaired. Leakages were a headline topic in 2000 and 2001, not only in relation to FFE but in other programs as well. The GOB and the donor community were engaged in active debate on this issue. The new IFPRI estimates of leakages (from its surveys in 2000) were not available in a timely way to inform this debate. IFPRI acknowledges this, as its seminar was held after the decision had already been taken on the CFE program. As a result of these delays, the collaborators in the Bangladesh Institute of Development Studies (BIDS) lost some enthusiasm for working with IFPRI.

IFPRI's communications activities were generally assessed to be quite good by most respondents who offered an opinion. The recent book *Out of the Shadow of Famine*, by Ahmed, Haggblade, and Chowdhury, was cited positively. The policy briefs were viewed as an effective vehicle to convey the major messages, as were the various meetings. The research papers were also acknowledged. One respondent felt that communications were better in the first than in the second phase, and that this may have been because the former had more of a research focus, whereas the latter seemed more like a consultancy. The unfavorable comments regarding communications related to a perception by respondent 11 that the IFPRI FFE staff tended to keep their knowledge about the program too close to their chest and limited data access, as mentioned previously.

Those few who had an opinion on IFPRI's role in the decision to adopt a CFE in lieu of the FFE program felt that, as stated previously, there was a missed opportunity to inform the debate. Respondent 6 believed that the IFPRI report was three years too late and that it might have affected the GOB decision if it had been on time. Respondent 1 had always felt that the CFE option was likely to lead to fewer leakages, and hence felt vindicated by the decision of the

[8] In contrast, the leakage estimations derived from the surveys conducted after the devastating floods in 1998 by another component of the FMRSP were assessed as inaccurate by one respondent and the report prepared as "mechanical" by another (respondent 11).

GOB. Indeed, he reminded us that the working group had originally suggested CFE as well as FFE options.

The vast majority of those with a view believed the IFPRI-FFE team was regarded as an "honest broker" in the eyes of the various stakeholders. Respondent 1 noted that the IFPRI-chaired working group held fast to the inclusion of CFE and monetization as options in the original recommendations, even though the World Food Program (WFP), which was represented in the group, stridently argued against these. Even when the WFP threatened to withdraw from the group if the report included a discussion of these options, the group stood firm. The WFP finally withdrew when these options were included in the report. The IFPRI team continued to receive regular requests from both the GOB and donors for briefings and assessments of what was occurring in grain markets, despite the differences of opinion with the WFP. Indeed, the WFP has more recently praised IFPRI's role (see below). The one respondent (16) who felt the IFPRI-FFE team was not an "honest broker" had this view because he believed, based on his own research, that the FFE leakage figures were underestimates and cost-effectiveness analyses overestimates. Perhaps of more concern, the respondent felt that the figures were somewhat biased in these directions in order for IFPRI to be able to convey a favorable impression of the value of FFE and use this to promote the concept internationally and hence gain kudos.

It is notable that the GOB, the WFP, and other donors entrusted IFPRI with the conduct of a sensitive food-aid leakage study that commenced in October 2002 and was completed in October 2003. The aim was to endeavor to derive definitive estimates to guide future strategies in recognition of the wide discrepancies of the past from a number of uncoordinated studies by different agencies. The study was a joint one, with ownership by all stakeholders, and IFPRI's role in orchestrating this effort was acknowledged by the WFP: "As this study addressed a very sensitive issue like leakage, it would not have been possible to progress so satisfactorily without the utmost sincerity and dedication of the IFPRI researchers. They have been successful in ensuring their acceptability to the stakeholder. In particular, the retreat and the session, facilitated by the researchers, have been very effective in achieving joint agreement on the recommendations and ownership of the study…I am also looking forward to IFPRI's leadership and future efforts on the 'cash vs. food' debate sparked by the World Bank in Bangladesh…" (D.C. Coutts, WFP Representative Bangladesh, in a letter to the IFPRI Director General, August 12, 2003).

In a report on the study by Ahmed, del Ninno, and Chowdhury (2003, pp. 95–97), the estimated leakages in the Vulnerable Group Development (VGD) program were stated as 8–14 percent. This is compared with the World Bank (2002) estimates of 41–66 percent. Ahmed, del Ninno, and Chowdhury contend that by using the Bangladesh Household Income and Expenditure Survey (BHIES) for all Bangladesh, the World Bank estimates are derived using an inappropriate sampling frame, as the VGD program is concentrated in more food-insecure areas. Also, the BHIES used annual self-reported recalls at different phases of the 18-month VGD cycle, with attendant large measurement and recall errors, whereas the Ahmed, del Ninno, and Chowdhury study used appropriately weighted samples. Although Ahmed , del Ninno, and Chowdhury did not conduct a similar comparison of the FFE program, it is likely that the differentials between the World Bank's FFE estimates of more than 75 percent leakage (using the same BHIES), and those of IFPRI (14–17 percent) were afflicted by similar sampling and

measurement errors as identified for the VGD program, with the exception that the FFE program, unlike the VGD, was not on a time-bound cycle at the time of the BHIES survey (Ahmed, personal communication, December 2003).

The WFP is also currently considering an IFPRI proposal for exploring the use of IFPRI's suggested indicator-based methods for improving the targeting of food aid at the household level (proxy means test). Clearly, IFPRI's reputation with the WFP is once again high, illustrating the benefits of conducting high-quality research and maintaining long-term engagement.

Respondents made several favorable general comments. One referred to the value of IFPRI's long period of research collaboration with Bangladesh, which had allowed the institute to understand and learn about the policy process and issues. Another said IFPRI's FFE research program represented "a high quality model of sound research informing important nutrition related policy" (respondent 3). Positive comments were made about IFPRI's role in supporting the creation and evolution of Data Analysis and Technical Assistance Limited (DATA). The rapid rural appraisal methods used by IFPRI were also found to be useful for poverty analyses by other ministries. The role of IFPRI in capacity strengthening in the Food Planning and Monitoring Unit (FPMU) of the MOF was acknowledged as well.

The three unfavorable general comments related primarily to the reluctance of IFPRI to collaborate beyond the MOF, especially with BIDS. There was a feeling that the Poverty Reduction Strategy Papers, for example, could have benefited considerably from more IFPRI input. Respondent 16 had difficulty accepting the policy conclusions from the IFPRI-FFE research, as they were at odds with his own.

5. EFFECTS OF THE FFE PROGRAM ON SCHOOL PARTICIPATION, DURATION OF SCHOOLING, AND FUTURE EARNINGS

One of the objectives of the FFE program was to enhance schooling outcomes and hence the long-run earning potentials of the poor. As part of this impact evaluation, we (Meng and Ryan, 2004, included as Appendix 5) employed recent experimental evaluation methodology on the data from the household surveys conducted by IFPRI in 2000 in the second phase of the FFE research program, as reported in Ahmed and del Ninno (2002). The analysis showed that the FFE program was successful in that the participating children had on average 20 to 30 percent higher school participation rates than their counterparts who did not participate in the program. There were no large differences between impact levels on boys and girls. This is a much larger impact on participation than the figure of 8.4 percent estimated by Ahmed and del Ninno (2002) or the 16 to 17 percent estimated by Ravallion and Wodon (2000). Possible explanations are provided in Appendix 5. Also, we estimated that, conditional on school participation, FFE participants stayed in school 0.4 to 1.4 years longer than their counterparts, and girls stayed in school much longer than boys.[9] The lower bound estimate is not included in Appendix 5, as it refers to constraining schooling to primary school years only, excluding potential secondary schooling. When this constraint is relaxed, the lower bound estimate is 1.1 years. However, in our later simulations, we use 0.4 years as the lower bound estimate to test the robustness of the rates of return calculations under the most conservative assumptions. Ahmed and del Ninno did not estimate the effects of the FFE program on the duration of schooling.

To evaluate the long-term effect of the FFE program, we focus on the effect of education on earnings. If the program makes children more likely to attend school and to stay in school longer, what will be the long-term earnings effect on these children? We explore this issue by estimating the effect of education on earnings for the current labor force in Bangladesh. The following equation is estimated:

$$\ln W_i = X_i\beta + \eta edu_i + \varepsilon_i \qquad (1)$$

where W_i is hourly earnings for individual i, X_i is a vector of exogenous variables that affect earnings, including age and its squared term, a dummy variable for married individuals, a dummy variable for males, and a vector of regional dummy variables. The variable edu_i may

[9] The estimates of the effects of the FFE program on schooling outcomes do not explicitly account for possible dropouts. However these were much less frequent among beneficiary students (6 percent) compared to nonbeneficiary students (15 percent) in FFE schools (Ahmed and del Ninno 2002). If a child dropped out of the FFE program at the same time he or she dropped out of school, he or she would be counted as a nonparticipant, and the FFE effects might be overestimated. If the child dropped out of the FFE program yet remained in school, this could result in an underestimation. As we do not have this type of information on dropouts, we are unable to assess the likely net effects. However, as the dropout rates are relatively low and much in favor of FFE beneficiary students, we feel reasonably confident that our estimates of the effects of the FFE program are robust and, if anything, are underestimates on balance.

take two values, whether the individual *i* has ever been to school or not, and if he or she has been to school, the number of years he or she attended. These two measures corresponded directly to the outcomes of the FFE program evaluated in Meng and Ryan (Appendix 5), namely, the probability of attending school and the duration of schooling.

The data used to estimate equation (1) are from the Bangladesh Household Income and Expenditure Survey (BHIES) 2000, which was conducted by the Bangladesh Bureau of Statistics. The sample comprises 7,445 households and 38,563 individuals. Among the individuals, only 6,661 were wage and salary earners and only 6,635 reported their earnings and working hours. This was the sample used in estimating equation (1). Our sample comprised 2,656 and 3,979 individuals whose main work was in the urban and rural sectors, respectively. Thirty-three percent of the former and 61 percent of the latter were illiterate. The earnings equation was estimated for male and female and urban and rural employment samples separately. Because the FFE program was implemented only in rural areas, our main focus was the effect of education on earnings in the rural sector. Nevertheless, rural-urban migration may be a choice for any individual, and hence we also estimated the effect of rural education on earnings in the urban sector.

Table 5 reports the results from ordinary least squares estimation of equation (1). The top two panels show the results for rural and urban samples with edu_i measured as a dummy variable for no schooling; the bottom two panels present the results for rural and urban samples with edu_i measured as number of years of schooling for the sample of individuals who have ever been to school. There are three pairs of columns in the table; the first is for the total sample and the second and third columns are for the male and female samples, respectively. The results from the top two panels indicate that individuals who were illiterate earned on average 20 and 46 percent less than individuals with any schooling for the total rural and urban samples, respectively. The effect of illiteracy had a larger effect for females than for males, and the difference was larger in rural than urban sectors. In the rural sector, illiteracy reduced hourly earnings by 16 percent for males and 69 percent for females. The effects in the urban sector were 38 and 69 percent for male and female workers, respectively.

Table 5: Effect of education on hourly earnings

	Using dummy variable for no schooling					
	Total		Males		Females	
Rural jobs	Coef.	Std. Err.	Coef.	Std. Err	Coef.	Std. Err
Constant	0.601	0.071	1.241	0.068	0.837	0.213
Dummy for no schooling	-0.204	0.019	-0.155	0.019	-0.689	0.086
Age	0.046	0.004	0.049	0.004	0.051	0.012
Age^2	-0.001	0.000	-0.001	0.000	-0.001	0.000
Dummy for married	0.150	0.029	0.109	0.034	0.136	0.075
Dummy for males	0.695	0.028				
Regional dummies	Yes		Yes		Yes	
Number of observations	3979		3485		494	
Adjusted R^2	0.34		0.24		0.22	

Table 5 (continuation)

	Using dummy variable for no schooling					
	Total		Males		Females	
Urban jobs	Coef.	Std. Err.	Coef.	Std. Err	Coef.	Std. Err
Constant	0.075	0.102	0.515	0.105	0.649	0.298
Dummy for no schooling	-0.461	0.027	-0.378	0.027	-0.689	0.080
Age	0.084	0.005	0.103	0.006	0.083	0.018
Age^2	-0.001	0.000	-0.001	0.000	-0.001	0.000
Dummy for married	0.092	0.038	0.014	0.043	-0.046	0.092
Dummy for males	0.831	0.033				
Regional dummies	Yes		Yes		Yes	
Number of observations	2656		2140		516	
Adjusted R^2	0.49		0.40		0.28	

	Using duration of schooling					
	Total		Males		Females	
Rural jobs	Coef.	Std. Err.	Coef.	Std. Err	Coef.	Std. Err
Constant	0.564	0.148	0.912	0.142	-0.171	0.755
Years of schooling	0.049	0.005	0.045	0.005	0.090	0.027
Age	0.051	0.008	0.050	0.009	0.077	0.048
Age^2	-0.001	0.000	-0.001	0.000	-0.001	0.001
Dummy for married	0.099	0.061	0.093	0.066	0.105	0.239
Dummy for males	0.321	0.068				
Regional dummies	Yes		Yes		Yes	
Number of observations	1247		1152		95	
Adjusted R^2	0.25		0.25		0.17	

	Total		Males		Females	
Urban jobs	Coef.	Std. Err.	Coef.	Std. Err	Coef.	Std. Err
Constant	-0.166	0.126	0.485	0.134	-0.219	0.459
Years of the schooling	0.060	0.004	0.053	0.004	0.107	0.016
Age	0.077	0.007	0.076	0.008	0.066	0.032
Age^2	-0.001	0.000	-0.001	0.000	-0.001	0.000
Dummy for married	0.019	0.046	0.041	0.050	-0.144	0.134
Dummy for males	0.587	0.044				
Regional dummies	Yes		Yes		Yes	
Number of observations	1556		1352		204	
Adjusted R^2	0.46		0.39		0.45	

Source: Estimated by the authors.

The World Bank (1998, p. 60) estimated that in 1995–96 rural household heads with some primary education in Bangladesh would have had an increased per capita consumption (a proxy for total income, not hourly earnings as in Table 5) of 6 percent. For those in urban areas, the comparable figure was 13 percent. Wage earnings provided about half of total incomes for the poorest households so earnings effects could be at least double the consumption effects. (World Bank 2002, p. vii). Our estimates hence are somewhat higher than the World Bank estimates. However, this could be due both to the difference in the dependent variables in the two studies and to increasing returns on education over the five-year interval for the data used.

The bottom two panels of Table 5 reveal that, conditional on school participation, each additional year of schooling increased the earnings of the total rural and urban samples by 4.9 and 6.0 percent, respectively. Once again, the effect was larger for the female sample than for the male sample. For those with rural jobs, every additional year of schooling increased the earnings of male and female workers by 4.5 and 9.0 percent, respectively, whereas for those with urban jobs the additional year of schooling increased the earnings of male and female workers by 5.3 and 10.7 percent, respectively. These are comparable to the estimates made by the World Bank (2002, p. 101) of 5–8 percent, using the same data but a different specification.

Equipped with these estimates and assuming the rate of return on education in Bangladesh will not change in the near future, we are now in a position to calculate the likely long-run earnings effect of the FFE program for the program participants. From Meng and Ryan (Appendix 5), we have the effect of FFE program participation on school enrollment and duration of schooling, while Table 5 reveals the effect of school attendance and years of schooling on earnings. Multiplying these two sets of results provides an estimate of the typical effect of FFE program participation on future earnings. These results are presented in Table 6.

The first row of Table 6 indicates the returns on attending school, which are the estimates from the top two panels of Table 5, with the opposite sign. The second and third rows multiply the first row and the lower and higher bounds (0.15 and 0.29) of the estimated effects of program participation on school attendance from Meng and Ryan (Appendix 5) to estimate the effects of the FFE program on earnings through increased school attendance. These effects are calculated to be 3–6 percent for the total sample if the program participants are not moving to the urban area and 7–13 percent if they possess urban jobs. The effect is much larger for females than for males. If the participants possess rural jobs, the effect will be 2–5 percent for males and 10–20 percent for females. If they acquire urban jobs, the effect will be 6–11 percent for males and 10–20 percent for females.

The fourth row of Table 6 presents the returns on each additional year of schooling for those who have ever attended school, from the bottom two panels of Table 5. The fifth and sixth rows multiply the fourth row by the lower and higher bounds of the estimated effect of program participation on duration of schooling (0.37 and 1.40 years). These two rows provide estimates of the effects of the FFE program on hourly earnings through increased years of schooling, which are calculated to be 2–7 percent for the total sample if they take rural jobs and 2–8 percent if they hold urban jobs. Once again, the effect is much larger for females than for males. With rural jobs, the effect on males and females is 2–6 percent and 3–13 percent, respectively. With urban jobs, the effect on males and females is 2–7 percent and 4–15 percent, respectively.

Table 6: Calculated long-run proportional changes in earnings from FFE program participation

Effects of:	Rural Jobs			Urban Jobs		
	Total	Males	Females	Total	Males	Females
1. Attending school	0.20	0.16	0.69	0.46	0.38	0.69
2. 15% increase in school attendance (low estimate)	0.03	0.02	0.10	0.07	0.06	0.10
3. 29% increase in school attendance (high estimate)	0.06	0.05	0.20	0.13	0.11	0.20
4. Return on extra year of schooling, given school attendance	0.05	0.05	0.09	0.06	0.05	0.11
5. 0.37 year increase in schooling (low estimate)	0.02	0.02	0.03	0.02	0.02	0.04
6. 1.40 years increase in schooling (high estimate)	0.07	0.06	0.13	0.08	0.07	0.15
7. Total increase in hourly earnings (low estimate)	0.05	0.04	0.13	0.09	0.08	0.14
8. Total increase in hourly earnings (high estimate)	0.13	0.11	0.33	0.21	0.18	0.35

Source: Estimated by the authors.

Adding these participation and duration effects together, the last two rows of Table 6 reveal the total effect of the FFE program on the future earnings of the participants. This effect is 5–13 percent if the participant is going to work in the rural sector and 9–21 percent if he or she is going to work in the urban sector. These are fairly large increments in future earnings.[10] Note that these estimates are based on the rate of return on education using 2000 data. In most developing countries, as economies grow, returns on education often increase. If that happens, the effect of the FFE program on the future earnings of program participants may be even higher. This could be offset to an unknown extent by involuntary unemployment rates, especially among the more educated in Bangladesh, which are a growing concern. In estimating the above rates of return on additional education, no allowance for possible unemployment has been made.

According to the BHIES survey data for 2000, the mean annual wage for those in rural employment was about US$365 for men and US$195 for women. For those in urban employment, the comparable figures were US$593 and US$265. The incremental effects of FFE participation on male rural workers would hence amount to additional earnings of US$15–$40

[10] These are comparable to the effects of the comprehensive education, health, and nutrition program PROGRESA, aimed exclusively at poor mothers in Mexico, as reported by Skoufias and McClafferty (2001). They estimate that on average the monetary enrollment grants of the program resulted in 0.7 years of additional schooling (10 percent increase) for children. Taking into account that higher levels of education are associated with higher levels of income, Skoufias and McClafferty estimate that children will have lifetime earnings that are 8 percent higher due to the educational benefits of PROGRESA.

per year, while for women the range would be US$27–64 (Table 7). The increments for a male urban worker would be US$47–107 per year, and for a female US$37–93.[11]

Table 7: Estimated private and national benefits/costs of the FFE program per beneficiary student[a]

Benefits and costs	Effects of FFE program			
	Boys		Girls	
	Lower bound	Upper bound	Lower bound	Upper bound
Initial *public* costs (US$)	13	50	13	50
Initial *private* costs (US$)	1.1	4.1	0.4	1.6
Initial total *national* costs (US$)	14.1	54.1	13.4	51.6
Annual incremental earnings benefits after age 18 in *rural* employment (US$)	15	40	27	64
Annual incremental earnings benefits after age 18 in *urban* employment (US$)	47	107	37	93
National internal rate of return with *rural* employment (% per year)	17	15	22	18
National internal rate of return with *urban* employment (% per year)	26	22	24	21
Private internal rate of return with *rural* employment (% per year)	38	35	55	49
Private internal rate of return with *urban* employment (% per year)	50	45	58	53

a This is based upon adult earnings increments beginning to occur 12 years after the completion of primary school and continuing for a further 27 years, a public FFE cost of US$36 per year of schooling and a private child opportunity school attendance cost of US$2.9 per school year from foregone earnings for boys and US$1.1 for girls (Ravallion and Wodon 2000).

The annual public cost of the FFE program per beneficiary student per year in 1997–98 was US$36 (calculated from Ahmed and del Ninno 2002, pp. 43–44). Hence, the lower bound estimates of the incremental earnings effects above, which are based on additional schooling of

[11] These benefits exclude the nutritional benefits from the additional foodgrains provided under the FFE program. Del Ninno and Dorosh (2002) estimated that the marginal propensity to consume wheat from the FFE program in Bangladesh was quite high, at between 0.21 and 0.41 for the poorest households. These were considerably higher than the marginal propensities to consume wheat from current income. Hence, small in-kind transfers result in significantly higher wheat consumption than do increases in cash income. Ahmed (2000) found that, in his sample survey, FFE program households significantly increased food and calorie intake at the household level, although he offers no statistical tests. He also states that none of the targeted programs has made any noticeable improvements in nutritional status, as measured anthropometrically. Alam et al. (1999) also could not detect significant anthropometric differences in their sample of beneficiary and nonbeneficiary FFE households.

0.37 years, would cost the government about US$13. The upper bound incremental earnings would cost about US$50, based on 1.40 additional years of schooling needed to achieve this.

Ravallion and Wodon (2000) have estimated that participation in the FFE program resulted in only a partial displacement of child labor by schooling. Only about one-third of the extra school attendance came at the expense of the opportunity costs of children's work.[12] Valuing the extra time at school based on the average boy's and girl's wages (from Ravallion and Wodon) of about US$98 and US$61 per year, respectively, implies that the private opportunity costs of school attendance for 0.37 of a year for a boy would be about US$1.10, while for 1.40 years it would be about US$4.10. Comparable figures for a girl are US$0.40 and US$1.60. These one-time up-front private costs of participation pale in comparison to the incremental *annual* earnings of between US$15 and US$107 (Table 7) resulting from the additional education. When the private costs are added to the public costs above, the total national costs for these two enhanced durations of schooling would be US$14 and US$54 for boys and US$13 and US$52 for girls.[13]

In Table 7 the above-estimated public and private costs and benefits of the FFE program are summarized and the internal rates of return calculated for both males and females. The internal rates of return on the total national investment in the FFE program are attractive, at more than 15 percent per year. For boys the range is 15–26 percent per year and for girls 18–24 percent. Private rates of return are around double national returns for boys and much more than double for girls. For those who are employed in the rural sector, private rates of return for girls are 14–17 percentage points higher than for boys. In the urban sector the differential is only 8 percentage points in favor of girls.

These analyses imply that the FFE program represented not only an extremely wise economic investment for the government in terms of economic growth, but also a powerful tool for poverty alleviation, especially for women. The FFE was effectively targeted to the poor, as has been shown by both IFPRI and other research. The fact that private rates of return are much higher than the attractive national rates of return indicates that the program was one of the rare "win-win" development opportunities, as the poor receive a disproportionate share of the national benefits and of the returns on their own investments in it.

In addition to the high rates of economic return due to the enhanced schooling outcomes attributable to the FFE program, there are a number of other benefits that have not been assessed here. These include the effects of increased education (especially for women, who are the major beneficiaries) on improved health and nutrition of children, reductions in fertility rates, and increased empowerment and political participation. Hence, the estimated economic benefits are quite conservative.

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[12] Skoufias and Parker (2001) estimated this effect to be 25 percent for PROGRESA in Mexico.

[13] Some might contend that child labor reductions represent a benefit and not a cost of the FFE program, as assumed here. Reduced risk of injury and adverse health outcomes could occur from the reductions in child labor. Hence, to the extent that these effects occur in Bangladesh, the economic return estimates would be biased downward.

It is interesting, however, that the average rates of return on additional years of schooling resulting from the FFE program decline as schooling duration increases (i.e., moving from the lower to the upper bound estimates in Table 7). This seems consistent with the review of 100 studies of rates of return on education by Psacharopoulos (1994), which showed that the average rate of return on investments in primary education was 18.4 percent, whereas that for higher education was only 10.9 percent.

6. ASSESSING AND VALUING IFPRI'S INFLUENCE ON THE FFE PROGRAM

IFPRI influenced the FFE program in at least four acknowledged areas: (1) the conception of the program; (2) evaluation of the program, leading to its expansion; (3) improving the targeting effectiveness; and (4) training and capacity strengthening in survey techniques and policy analysis.

As described above, IFPRI played a role both in the original decision to begin a pilot FFE program and then in providing the GOB and donors with research information on leakages and effects on schooling outcomes in the pilot phase—information that is widely acknowledged as having influenced the subsequent decision to expand the program. Hence, the IFPRI input could be considered as having hastened the decision to implement the program.[14] This is a conservative assessment of the influence, as it ignores contributions to the design and refinement of the program. Nevertheless, we can endeavor to value this timeliness contribution, as Ryan (2002) did in an evaluation of food policy research on rice trade policies in Vietnam.

The cost of the IFPRI-FFE research program from 1992 to 2001 is estimated to be US$151,000 (Akhter Ahmed, personal communication, 2003). This includes salaries, overhead, surveys, and travel. On the basis of 2,295,000 beneficiary students (the number in 2000), this amounts to 6.58 cents per beneficiary.[15] It would seem, at a minimum, that the IFPRI influence on the decision to initiate and then expand the FFE program could be assessed as having led to commencement of benefit streams for beneficiary students at least one year earlier. In other words, the annual incremental benefits in rows 4 and 5 of Table 6 would have begun one year earlier as a result of the expenditure of 6.58 cents for the IFPRI-FFE research program. So, after the student left school the streams would begin in year 11 instead of year 12 (see footnote to Table 7). Hence, the added benefits from the IFPRI contribution are the annual benefit figures in rows 4 and 5 for one extra (earlier) year—year 11. The internal rate of return on the research investment calculated in this way ranges from 64 to 96 percent. These are very conservative estimates.

[14] Reinforcing this is the perception on the part of many respondents that IFPRI's failure to publish its revised (2000) estimates of leakages from the FFE program in a timely fashion was a key factor in the GOB's decision to change from the FFE to a CFE program. Not having IFPRI's estimates, which were much lower than those of the World Bank (which are now recognized as being questionable), meant the GOB had little alternative. Hence, one could infer that the lack of timely IFPRI research information resulted in premature termination of the FFE.

[15] The figure would be much lower than this if the cumulative number of beneficiary students were used instead of the current number in 2000. Hence, the rate-of-return calculations below are underestimates.

7. SUMMARY AND CONCLUSIONS

IFPRI appears to have played a seminal conceptual role in the origins of the FFE program in Bangladesh—a role that arose from the institute's long-term involvement in the country. Its research documenting the unacceptably high leakages in the palli rural foodgrain rationing scheme provided the stimulus for the government of Bangladesh (GOB) to explore alternative food subsidy programs that better targeted the poor. The working group formed by the government to assess such alternatives was chaired by an IFPRI staff member. It recommended the FFE program; the GOB accepted this recommendation and implemented the program.

Further confirmation of the pivotal role of IFPRI in the initiation and evolution of the FFE program was the subsequent request by the GOB that IFPRI assist in monitoring and evaluating the pilot phase of the program. IFPRI's documentation of the effects of the first year of the FFE program on nutrition and school enrollment/attendance by the poor, and the modest level of leakages, was instrumental in convincing the GOB to expand the program. From its beginning in 1993, it grew to cover 27 percent of the country's primary schools and 13 percent of the students by 2000.

Although IFPRI's FFE research program had a rather modest formal publication record, with no refereed journal articles and only two refereed book chapters, the working papers were effective in conveying to policymakers the results of the various monitoring and evaluation inputs of the IFPRI team. This was especially so in the early phase, from 1991 to 1994.

In the later phase of the FFE research program, however, publication of a key working paper on the reevaluation of the program was delayed. This had a cost in terms of the decision of the GOB to halt the FFE in favor of a CFE program in 2002; this decision was based significantly on alternative (and methodologically questionable) estimates of leakages by the World Bank. Arguably, this was a lost opportunity for IFPRI. However, it does illustrate the influence of the IFPRI-FFE research on food policy formulation. Somewhat perversely in this case, in the absence of timely IFPRI research information that would have reinforced the wisdom of the current policy settings, policy was changed.[16]

The findings of IFPRI research on the effects of the FFE program on food consumption and nutrition outcomes were less persuasive than those on leakages and schooling outcomes. Food consumption by FFE households apparently increased, but this increase was not reflected

[16] Of course, it could be that a CFE program would offer even greater benefits than an FFE program. Recall that the working group originally suggested that either would suit, and Alam et al. (1999) recommended that a CFE replace the FFE program in order to further reduce leakages, which they estimated at 6–31 percent. The jury is still out on which type of program is more cost-effective, and IFPRI is involved in examining this issue. If it turns out that a CFE program is more cost-effective than the FFE program, then the relevant counterfactual to assess the impact of IFPRI's research would change. Regardless, the relevant institutions with varying estimates of leakages should have conferred more actively among themselves and with the GOB to better illuminate the policy environment.

in either nutrient intakes or anthropometric indices. The research on this was not definitive, however, and the issues must be further clarified by further IFPRI or other research.

The number and extent of workshops and seminars related to the FFE program were also somewhat modest and might have been given added attention in order to communicate better and in a more timely fashion with peers and policymakers. The FFE team did an excellent job training a cadre of technicians and analysts in the design, conduct, and analysis of household surveys, and this is providing lasting value, not only for other IFPRI researchers but also for various ministries of the GOB and international agencies. The creation of the private firm Data Analysis and Technical Assistance Limited (DATA), where most of the trained technicians now find employment, is due in no small part to the support and encouragement of the IFPRI-FFE team.

The IFPRI-FFE research was influential in the decisions made by USAID relating to its Global FFE program. This was acknowledged at the highest levels of the U.S. government. There is also a continuing derived demand from international agencies and the GOB for research by IFPRI on the leakage issue. This is further evidence of the value placed on the quality and independence of IFPRI research.

Employing recent experimental evaluation methods on the IFPRI household survey data gathered in the second phase, we confirmed the effectiveness of the FFE program on schooling outcomes of beneficiary children. Indeed, the 20–30 percent increases in school participation rates we estimated were more than double the increases estimated by the FFE researchers (Ahmed and del Ninno 2002) and around 20 percent more than the estimates of the World Bank (Ravallion and Wodon 2000). Additionally, not only did FFE beneficiary children have measurably increased school participation rates, but they also remained in school between 0.4 and 1.4 more years than their counterparts who were not FFE beneficiaries. The duration effects were greater for girls than for boys.

Using earnings functions estimated from the Bangladesh Household Income and Expenditure Survey for 2000, we show that the combined effects of the increased participation and duration of schooling (due to the FFE program) on lifetime earnings of children are highly significant, especially for girls. FFE beneficiary girls can earn up to 33–35 percent more than their nonbeneficiary counterparts, and FFE beneficiary boys up to 11–18 percent more than their nonbeneficiary counterparts. The higher figures refer to a situation in which urban rather than rural employment is acquired. Currently, national school participation rates for girls and boys in Bangladesh are similar. It could well be that the FFE has contributed significantly to this increased gender equality.

Using these incremental earnings figures, the internal rates of return for the national investment in the FFE program are conservatively estimated by us as 18–24 percent for girls and 15–26 percent for boys. Private rates of return are much more than double these national returns for girls, and double for boys. These analyses imply that the FFE program represented not only an extremely wise economic investment for the government in terms of economic growth, but also a powerful tool for poverty alleviation, especially for women. The FFE was effectively targeted to the poor, as has been shown by both IFPRI and other research. The fact that private

rates of return were much higher than the attractive national rates of return indicates that the program was one of the rare "win-win" development opportunities, as the poor receive a disproportionate share of the national benefits and of the returns on their own investments in it. These rates of return ignore other benefits arising from increased women's education, such as improved child health and nutrition, as well as declining fertility rates and increased empowerment and political participation.

IFPRI influenced the FFE program in at least four acknowledged areas: (1) the conception of the program; (2) evaluation of the program, leading to its expansion; (3) improving the targeting effectiveness; and (4) training and capacity strengthening in survey techniques and policy analysis. We conclude that a very conservative assessment of the economic value of IFPRI's contribution to the generation of the national benefits estimated above is that the FFE program began one year earlier than it might have without IFPRI input. Based upon the cost of the IFPRI-FFE research program of US$151,000, the internal rate of return on this research investment ranges from 64 to 96 percent. If all the other benefits are added to this, clearly the IFPRI contribution has been an outstanding economic investment. These benefits might have been even greater had IFPRI had an explicit communications strategy with more timely and readily available publications, along with appropriate advocacy.

8. LESSONS LEARNED

There are a number of lessons to be learned from this study that can enhance IFPRI's future impact. Some are new, but most reinforce the experience gained from other studies (see, for example, Ryan and Garrett's recent summary (2003))

- The short-term project mode of funding the FFE program led to some missed opportunities, especially between the Bangladesh Food Policy Project (BFPP) in the early 1990s and the Food Management and Research Support Project (FMRSP) in the late 1990s, and after the latter project ended in 2001. The need to satisfy bilateral country project donors may have compromised IFPRI's ability to be both timely and more public in providing research information at the time of the decisions surrounding the change to the CFE program. Bilateral donors are generally less interested in public goods than are multilateral donors. Also, although IFPRI had prepared a third project proposal for the donor to follow on from the FMRSP in 2001, and the donor had obtained a waiver for competitive bidding, this waiver was successfully challenged by alternative bidders and the contract was not awarded to IFPRI. Hence, without long-term core support to continue the research, IFPRI's role had to end. It is difficult to maintain momentum and influence under these conditions.

- There has been a tradeoff between the publication of refereed journal articles and book chapters and being responsive to the more immediate needs of policymakers and donors. This is related to the first point of overdependence on a short-term project mode of funding instead of longer-term core funding. The staff has done an admirable job of informing decision making and providing "deliverables" to project donors and ministries. But these reports are not in the form of public information and are generally not refereed. Without the provision of specific core funding at the end of such projects to enable the staff members to refine their research and subject it to peer review processes, they understandably involve themselves in preparation for the next series of short-term focused projects. The production of international public goods by IFPRI via professional publications hence suffers. The outputs, outcomes, and impacts remain largely national goods with limited audiences.

- The nonresidential mode of the primary IFPRI-FFE staff in the second (FMRSP) phase probably contributed to some missed opportunities to influence the policy process, as outlined in the first lesson.

- There was arguably too much dependence on collaboration with one ministry (Food), at the expense both of other ministries (Education, Treasury, and Agriculture) and the academic community (e.g., BIDS). When governments change, this can be a particular problem. The Ministry of Food arguably would have greater interest in the design of effective targeted food subsidy initiatives and their leakages, whereas the Ministry of Education would be primarily interested in the education outcomes. Historically, the Ministry of Food had been IFPRI's major collaborator, and this was reinforced by the terms of the grants from USAID, which was also concerned about its food aid. Hence,

IFPRI had few degrees of freedom to broaden the scope of its collaboration, given both the historical and funding contexts.

- The FFE program could have benefited from an explicit communications strategy. The publication delays have already been referred to. However, the delays may equally reflect a failure of IFPRI to fully appreciate the dynamic political economy of the decision-making processes in Bangladesh. This failure might have been avoided or minimized if senior staff had been in residence in Bangladesh for longer and more continuous periods.

- More attention could be given to the choice of a counterfactual or control situation to contrast with the presumed impact of the IFPRI research. This relates especially to the research of other institutions that are also influencing the policy environment and the issue of attribution. If these alternative suppliers of information, advocacy, and influence are recommending other policy initiatives (such as a CFE program in the current case) in lieu of those espoused by IFPRI and adopted by government (the FFE program), should the alternatives also be assessed for their cost-effectiveness as "control treatments"? Which is the "first best" policy and which is the "second best"? Has IFPRI advocated the latter instead of the former?

- IFPRI could have taken a greater leadership role in addressing the leakage controversy by convening symposia or seminars in which the differing methodologies, estimates, and perspectives were professionally evaluated by peers, partners, and clients. This might have avoided or minimized any costs of wrong decisions by the GOB.

- Like some other impact assessments at IFPRI, this one has suggested that there are large economic returns from IFPRI's research. It is, however, not clear how this fact should influence the establishment of future research priorities at the institute. How can IFPRI increase the chances of picking more winners in the future based upon these impact assessments? Are there certain themes and countries that deserve priority because the preconditions are more conducive to the generation of significant impacts, as demonstrated by earlier assessments?

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Appendix 1

IFPRI PUBLICATIONS AND PAPERS RELATED TO THE FFE PROGRAM (in reverse chronological order within classifications)

Books, monographs, and book chapters

Ahmed, A.U., C. del Ninno, and O.H. Chowdhury. 2003. Investing in children through the food for education program. Chap. 10 in *The 1998 floods and beyond: Moving towards a comprehensive food security in Bangladesh*. Edited by P. Dorosh, C. del Ninno, and Q. Shahabuddin. Draft.

Ahmed, A.U. 2000. Targeted distribution. Chap. 11 in *Out of the shadow of famine: Evolving food markets and food policy in Bangladesh*. Edited by R. Ahmed, S. Haggblade, and Tawfiq-E-Elahi Chowdhury. Baltimore: Johns Hopkins University Press for the International Food Policy Research Institute.

Papers in refereed journals

None

Papers in discussion/working paper series

Ahmed, A.U., and C. del Ninno. 2002. The food for education program in Bangladesh: An evaluation of its impact on educational attainment and food security. Food Consumption and Nutrition Division Discussion Paper No. 138. Washington, D.C.: International Food Policy Research Institute.

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Papers presented at workshops, conferences, and seminars

Ahmed, Akhter. 2002. Feeding minds while fighting poverty: Food for education in Bangladesh. Paper presented at the UNU-WFP Workshop on Preparing for the School-Feeding Research, Copenhagen, 30–31 May.

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Policy briefs, special reports, and other papers

Ahmed, A.U., S. Rashid, M. Sharma, and S. Zohir. 2003. A study on food aid leakage in Bangladesh. Washington, D.C.: International Food Policy Research Institute, October 7.

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Appendix 2

PERSONS CONTACTED DURING EVALUATION AND RESPONDENTS TO SURVEY

Academic Institutions—Bangladesh

Mahmudul Alam, Senior Research Fellow, Bangladesh Institute of Development Studies
Abdul Bayes, University of Jehangirnagar, Dhaka
Omar Haider Chowdhury, Project Director, Bangladesh Institute of Development Studies
Binayak Sen, Senior Research Fellow, Bangladesh Institute of Development Studies
Quazi Shahabuddin, Research Director, Bangladesh Institute of Development Studies
Sajjad Zohir, Senior Research Fellow, Bangladesh Institute of Development Studies

Consultants/Private Sector

Zahidul Hassan Zihad, Director, Data Analysis and Technical Assistance Limited, Dhaka
Mohammad Zobiar, Managing Director, Data Analysis and Technical Assistance Limited, Dhaka

Donors/International R&D Agencies

Akhter Ahmed, Senior Research Fellow, IFPRI
Raisuddin Ahmed, Former Director, Markets and Structural Studies Division, IFPRI
Craig Anderson, USAID Egypt
Tim Anderson, Food for Peace Officer, USAID Bangladesh
David Atwood, USAID Egypt
Ralph Cummings Jr., USAID Washington, D.C.
Paul Dorosh, Former Chief of Party, IFPRI Food Management Research Support Project, Bangladesh 1997–2001.
Steve Haggblade, Former Chief of Party, IFPRI Bangladesh Food Policy Project 1992–94,
Deborah Llwewllyn, Education Advisor, USAID Bangladesh
Buff Mackenzie, USAID
Martin Ravallion, World Bank
John Swanson, USAID Washington, D.C.
Salman Zaidi, Economist, World Bank

Government Agencies—Bangladesh

A.K.M. Nurul Afsar, Former Director General of Food, Ministry of Food
Faizuddin Ahmed, Project Director, Household Expenditure Survey, Bangladesh Bureau of Statistics, Ministry of Planning

Tawfiq-E-Elahi Chowdhury, Consultant; Former Secretary of the Ministry of Food
Naser Farid, Additional Director, Food Planning and Monitoring Unit, Ministry of Food
Badiur Rahman, Secretary, Planning Commission.

Appendix 3

QUESTIONNAIRE USED IN INTERVIEWS AND SURVEY

Questionnaire on Impact of IFPRI Research and Related Activities on the Food for Education (FFE) Program in Bangladesh

1. *Name and position:*

2. *Outline familiarity with the FFE program of the government of Bangladesh:*

3. *Outline familiarity with the IFPRI-FFE research (e.g., publications, seminars, discussions, etc.):*

4. *Did any results of the FFE research of IFPRI surprise you? If so, how?*

5. *Were you involved in the FFE program?*

6. *If so, in what capacity?*

7. *Did you use the IFPRI-FFE research?*

8. *If answer to 7 is yes, please detail how influential it was on:*
   Policy
   Implementation
   Capacity building
   Other ways (e.g., was it cited in your publications? If so, please provide details)

9. *Was the quality of the IFPRI research:*
   Excellent
   Very good
   Good
   Acceptable
   Poor?

10. *Were there any gaps? Please provide details.*

11. *Was the IFPRI staff responsive to requests for information and analyses? Please provide details.*

12. *How effective were IFPRI's communications activities (seminars, workshops, publications)?*

14. *The FFE recently changed from a foodgrain-based scheme to a cash stipend. Could/should IFPRI have become more involved in influencing this decision?*

15. *Has IFPRI been regarded as an "honest broker" in the eyes of the government of Bangladesh and donors?*

16. *Are there any other comments you would like to make on IFPRI's FFE research program and related activities?*

17. *Are there other people whom I should consult about the FFE program impact and IFPRI's role? Please provide contact details.*

Thank you very much in advance for your cooperation. Please send your completed questionnaire as an e-mail attachment to Jim Ryan at ryanjim@cyberone.com.au

Appendix 4

COMMENDATIONS OF IFPRI'S FFE WORK BY FORMER U.S. SENATORS MCGOVERN AND DOLE

UNITED STATES MISSION
TO THE
UNITED NATIONS AGENCIES
FOR FOOD AND AGRICULTURE
Rome, Italy

June 26, 2001

As the US Ambassador to the UN Food and Agriculture Organization in Rome, I have been deeply devoted to the problem of world hunger, especially for the 300 million hungry school-age children in Asia, Africa, Latin America and Eastern Europe.

The US Department of Agriculture has begun a $300 million pilot program to provide school lunches or breakfasts for 9 million children in 38 nations. Now, there is evidence of another successful food for education initiative that could improve the effectiveness of international school feeding programs. Called Food for Schooling, this program targets poor families and provides them with food if their children attend class. Results show that in Bangladesh, where half of the local population cannot afford enough food and hundreds of thousands of children die each year from malnutrition, the Food for Schooling program is working to raise both primary school attendance and food consumption among the poor families.

Nutrition, education, and development go hand-in-hand. Better-fed children can learn better in school. Educated girls grow up to have fewer children, marry at a later age and are more self-reliant. But in families where children are needed to supplement the family's income, education is not an option. Food for Schooling and the international school lunch program, if implemented together, would allow even more families to send their children to school and improve the chance that these children will escape poverty.

I commend the International Food Policy Research Institute for their ongoing research and leadership in the Food for Schooling initiative.

George McGovern

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Statement By Senator Robert Dole

June 26, 2001

Last year, Ambassador George McGovern and I proposed a bi-partisan, international school lunch program. This initiative would eventually bring nutritious meals to 300 million poor children in the world who receive no meal at school. It will both reduce hunger and encourage school enrollment.

Today, I would like to voice my support for a complimentary program that would increase the effectiveness of the school lunch program. Food for Schooling is an initiative that began in 1993, under the guidance of the International Food Policy Research Institute. This innovative program encourages parents to send their children to school by providing food to poor families whose children regularly attend primary school. While school feeding is helping individual children during school hours, Food for Schooling is helping their families avoid hunger.

About 2 million students and their families currently benefit from Food for Schooling in Bangladesh. The results have been remarkable. A comprehensive review of the program shows dramatic increases in student enrollment. In combination with school lunches, Food for Schooling will help fight illiteracy, poverty and hunger, and assist poor children and their families not only today, but also for the long-term.

Appendix 5

USING EVALUATION METHODOLOGY TO DETERMINE THE EFFECTS OF THE FFE PROGRAM ON SCHOOLING OUTCOMES

Does Food for Education Affect Schooling Outcomes? The Bangladesh Case*

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1 Introduction

Education is one of the most important forms of human capital investment. Yet, not all children have a chance to go to school. The fact that parents make decisions for their children implies that some children from poor households are likely to be poor in the future if their parents are unable to invest in their education.

The government of Bangladesh introduced a food for education program (FFE) in July 1993. The main feature of the program is to provide a free monthly foodgrain ration, contingent on the family being judged as poor and having at least one primary-school-age child attending school that month. The program is aimed at alleviation of both current and future poverty. The novelty of this program relative to other poverty alleviation programs is its commitment to long-term poverty alleviation via investment in children's education. Thus, to evaluate the effectiveness of this program, our main focus is on whether the poor households that are eligible for the FFE program are more likely to send their children to school (school participation) and keep them there (duration of schooling) than their non-FFE counterparts.

There are two previous studies evaluating the effects of the FFE program on children's education (Ravallion and Woden 2000; Ahmed and del Ninno 2002). These studies found that the FFE program has a positive and significant impact on school participation rates. The methodology adopted in these studies assumes that participation in the FFE program within the village is based upon unobservables, an assumption that is not in accord with reality (Ahmed and del Ninno 2002). The main point of departure of the current paper is the assumption that program participation is based upon observables and the use of propensity score matching methodology to derive more accurate estimates of the effects of the FFE program on educational outcomes of eligible children, relative to their counterfactuals. In addition, we also estimate the impact of the program on children's completed duration of schooling, an outcome previous studies have not investigated. Our results reveal a significantly larger impact of the FFE program on schooling outcomes than those presented in previous studies.

The paper is structured as follows. The next section introduces some background details on the FFE program, the survey, and the data used in the analyses. Section 3 describes the evaluation strategy and possible control groups. Sections 4 and 5 present the evaluation results. Conclusions are given in section 6.

2 Background, survey design, and data

Bangladesh is a developing country, and up until the mid-1980s rural education had been neglected. In the late 1980s and early 1990s, the government of Bangladesh realized the importance of education and identified the development of human capital as a primary strategy for reducing poverty.

In 1993 the FFE program was introduced. Its aim was to use targeted food transfers to encourage poor families to enroll children in primary school and to keep them there. The expectation was that the program would have three benefits: enhance human capital and hence

reduce long-term poverty, provide nutritional gains, and improve the targeting of government food subsidy programs. From its beginnings in 1993 as a large-scale pilot program, by 2000 the FFE program covered some 17,811 primary schools (27 percent of the total) and 2.1 million students (13 percent). Of the 66,235 primary schools in Bangladesh, some 62 percent are government schools and 38 percent nongovernment. The FFE program covered government schools and four of the eight categories of nongovernment schools. The annual FFE program expenditure of around $US77 million represented 20 percent of total expenditure on primary education in 1997–98, up from 4.7 percent in 1993–94 (Ahmed and del Ninno 2002). The cost per beneficiary student is currently about $US0.10 per day. Food aid donors such as the U.S. also provided a significant portion of the grain for the program.

Previous evaluations of the FFE program have indicated that it has had a substantial effect on enrollments in primary school. In a sample survey of Bangladesh schools in 1996, Alam et al. (1999) found that FFE schools had increased enrollments of 19–30 percent over a few years prior to the introduction of the FFE, compared to 2–5 percent in non-FFE schools. After the introduction of the FFE program the comparable figures were 13–14 percent and 1–6 percent, respectively. In cross-sectional comparisons, in 1996 FFE schools had 53 percent higher enrollments in Grade I than non-FFE schools and 30 percent higher in Grade IV. In a different survey in 2001, Ahmed and del Ninno (2002) found that in FFE schools enrollment changed by 35 percent after the introduction of FFE, whereas in non-FFE schools the change was less than 3 percent. The difference in primary school enrollments between the FFE beneficiary and nonbeneficiary households in the same unions was 20 percentage points. Using probit and Tobit analyses, Ahmed and del Ninno found that the probability of a child from an FFE household going to school is about 8 percentage points higher than that of one from a non-FFE household. Using the Bangladesh Household Expenditure Survey data for 1996, Ravallion and Wodon (2000) found that FFE participants have a mean enrollment rate that is 15 percentage points higher than for nonparticipants.[1]

These studies, however, adopted simple evaluation methodologies. To better understand the effect of the FFE program, we conduct a program evaluation based on rigorous evaluation methodology.[2] To do so, understanding how the FFE program works is important.

The FFE program provides a free monthly foodgrain ration, contingent on the family being judged as poor and having at least one primary-school-age child attending school that month. The local Primary Education Ward Committee and the School Management Committee jointly prepare the list of beneficiaries.

If one primary-school-age child from a designated poor family attends school, the household is entitled to receive 15 kilograms of wheat or 12 kilograms of rice per month. To be

[1] There are some problems associated with the methodologies used in Ahmed and del Ninno (2002) and Ravallion and Wodon (2000). These will be discussed in detail later.

[2] According to the survey information, the sample households on average consume about 21 kilograms of cereals per week. Hence, the subsidy received from the FFE program is almost equivalent to one-quarter of the monthly supply of cereal products for an average household.

eligible for the maximum of 20 kilograms of wheat or 16 kilograms of rice, the household must send more than one child and all primary-school-age children to school. The enrolled children must attend 85 percent of classes in a month to be eligible, and records on this are kept by the teachers and submitted monthly to the Thana (local government) offices. They and the School Management Committee then arrange with the Ministry of Food for the grain to be delivered to a nominated warehouse for collection by the beneficiary family using a ration card. The family can consume the grain and/or sell it. Due to concerns about the loss in teaching time for food distribution, the government in February 1999 relieved teachers of this responsibility and instead assigned the task to private dealers.

The FFE program uses a two-step targeting mechanism. First, two to three unions (districts) that are economically backward and have a low literacy rate are selected from each of the 460 rural Thanas (regions). All government, registered nongovernment, community (low-cost), and satellite primary schools, and one Ebtedayee Madrasa (religion-based) primary school in these selected unions are covered by the FFE program. Second, within each selected union, households with primary-school-age children become eligible for FFE benefits if they meet at least one of the following four targeting criteria as assessed by the above-mentioned school committees:

1. It is a landless or near-landless household that owns less than half an acre of land.
2. The household head's principal occupation is day laborer.
3. The head of the household is a female.
4. The household earns its living from low-income artisanal occupations.

Although in FFE unions households that satisfy the above selection criteria should be eligible for participation, four factors may prevent them from receiving the food subsidy. The first is that only primary-school students can participate. In other words, those who are not at primary school or who are enrolled in high school are not eligible. Second, only students who are enrolled in FFE schools can receive the food subsidy. Some students from eligible households may enroll in non-FFE schools, and hence cannot receive a food subsidy. Third, the enrolled children must attend 85 percent of classes in a month to be eligible. Those whose absent days exceed 15 percent (four or more days in a month) would not receive the subsidy for the corresponding month. Fourth, a maximum of only 40 percent of students in each FFE school, including those who are not eligible, can receive the subsidy. Thus, if in some schools more than 40 percent of all the students are eligible, some of these students do not receive a subsidy. In this situation, the decision on who should receive the subsidy is made by the headmaster and teachers, and it may change over time. In other words, if a child from an FFE-eligible household enrolls in an FFE school but does not receive food subsidy for one year, he/she could receive a subsidy in following years if others drop out. Teachers endeavor to select the least poor households for exclusion when they are faced with potentially eligible households beyond the 40 percent figure. It is not clear the extent to which they succeed. However, the survey data discussed below indicate that household income of students who receive the subsidy is on average 12 percent lower than that of students who are eligible and enrolled in the FFE school but do not receive the subsidy, indicating, to a certain extent, that teachers do endeavor to target the poorest when faced with an excess demand.

The data used in this study are from a survey of schools, households, communities, and foodgrain dealers conducted by the IFPRI-FMRSP (Food Management and Research Support Project) in September–October, 2000.[3] The sample includes 600 households from 60 villages in 30 unions and 10 Thanas. The sampling followed four steps. First, 10 Thanas were randomly selected with probability proportional to their size (PPS), based on Thana-level population data. Second, two FFE unions and one non-FFE union per Thana were selected at random. Third, two villages from each union were randomly selected with PPS, using village-level population data from the 1991 census. Fourth, 10 households that had at least one primary-school-age child were randomly selected in each village from the census list of households.

Table 1 indicates the distribution of households and primary-school-aged children among FFE/non-FFE-eligible households and FFE/non-FFE unions in the sample. In total there are 400 households from FFE unions and 200 from non-FFE unions. Within FFE unions, 209 households with 399 children of primary-school age (aged 6 to 13)[4] are program-eligible households, and 191 households with 336 primary-school-aged children are non-eligible. In the non-FFE union sample, the number of primary-school-aged children is 343.

As discussed before, not all children who are from eligible households actually participate in the FFE program. Table 2 presents the distribution of children aged 6 to 13 (primary-school-aged children) according to their program eligibility. For children from eligible households in FFE unions, around 14 percent of them are not at school, and 6 to 8 percent are attending non-FFE schools, depending on whether those who participated in the stipend program are included or not.[5] In addition, there are 95 eligible children (24 percent) attending FFE schools but not receiving the foodgrain subsidy. This may be due either to the 85 percent school attendance rule and/or to the operation of the rule that a maximum of 40 percent of the students in each FFE school can participate in the program at any one point in time. From the sample survey, which asks each household the number of days children were absent from school in the month before the survey date, we find that about 60 percent of the 95 eligible children who are not receiving the subsidy were absent on more than 15 percent of school days.

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[3] This survey is designed and conducted for the purpose of evaluating the FFE program. Detailed information on the surveys is presented in Ahmed and del Ninno (2002). Ravallion and Wodon (2000) use the 1995–96 Bangladesh nationwide Household Expenditure Survey.

[4] How to define "primary-school age" is a difficult issue. According to Ahmed and del Ninno (2002), primary school starts at age 6 and finishes at age 10. However, many children start school late and some may repeat grades. As a result, the majority of 11- to 13-year-olds in our sample are still in primary school. Including those who have never gone to a school, only 11 percent of 11-year-olds have finished primary school and the share for 12- and 13-year-olds is 22 and 39 percent, respectively. At age 14, this share increases to 60 percent. Thus, following Ahmed and del Ninno (2002) we define our primary-school sample as aged 6 to 13 years.

[5] The stipend program operates only in non-FFE unions and consists of a small cash subsidy to poor households whose children attend school. The subsidy is only a fraction of that in the FFE program. In our later analysis we exclude from our observations households that are receiving the stipend subsidy to ensure that the estimated FFE program participation effect is not contaminated by other factors.

Table 3 presents some summary statistics of variables that are relevant to selection rules for households from FFE and non-FFE unions as well as eligible versus non-eligible households within the FFE unions. The first panel of Table 3 compares the total sample of households from FFE unions with the total sample of households from non-FFE unions. The data indicate that the non-FFE unions are slightly more affluent than the FFE unions, with average annual household incomes for the two groups being Tk14,333 and Tk13,082, respectively. In addition, the FFE unions have slightly smaller landholdings, a higher percentage of household heads being a laborer or illiterate, and a higher percentage of female-headed households. None of these differences, however, are statistically significant. No detectable difference between average travel time to the nearest school is evident either.

Within the FFE unions, however, the differences between non-eligible and eligible households are much larger. These differences are presented in the second panel of Table 3. Incomes of the non-eligible households are more than double those of the eligible households. The non-eligible households have almost three times the landholdings of the eligible households, and 11 percent fewer household heads are laborers. These differences are statistically significant. The proportion of households headed by females is slightly higher among the eligible households than among the non-eligible households, as is the proportion of household heads who are illiterate, though neither difference is statistically significant.

Panel 3 of Table 3 compares the FFE-eligible households from the FFE unions with the households from the non-FFE unions. The differences in the relevant variables from this comparison are similar to those when comparing the FFE-eligible households with FFE-non-eligible households in the FFE unions in panel 2, although the differences are larger for the latter than for the former.

Given that the differences between the FFE and non-FFE unions in variables that are related to the selection rules are negligible, it would be interesting to compare the average difference in the two outcome variables, schooling participation and duration, for the two groups first. These data are also presented in the bottom of Table 3. We find that for the primary-school-age children, neither the average school participation rate nor the average duration of schooling differs significantly between the FFE and non-FFE unions. Should we conclude, therefore, that the FFE program has no effect on school participation and duration of schooling? It may be inappropriate to draw such a conclusion. Table 3 also presents the mean difference in the two outcome variables for secondary-school-aged children, who are not subject to the FFE program in either FFE or non-FFE unions. The data show that both the average school participation rate and the average duration of schooling are significantly higher for the non-FFE unions than for the FFE unions. It could be that without the FFE program the primary school participation rate for the FFE unions would have been lower than that for the non-FFE unions as well.

To further explore this issue, we compare the schooling outcome variables between the FFE-eligible households and FFE non-eligible households in the FFE unions in panel 2 of Table 3 and between the FFE-eligible households from the FFE unions and households in the non-FFE unions in panel 3 of the table. We find that the primary-school-age children from the FFE-eligible households of the FFE unions on average have a significantly higher school participation

rate and stay in school longer than children of the same age from the other two groups. In contrast, their older siblings are on average less likely to participate in school and stay in school for less time than children of the same age from the other two groups.

We plot these outcome variables for the three groups by age in Figure 1, which confirms that children between the ages of 6 and 13 from the FFE-eligible households in FFE unions are the most likely group to attend school (top panel of Figure 1) and have, on average, more years of schooling (bottom panel of Figure 1) relative to both children from non-eligible households in FFE unions and from households in non-FFE unions. The figure also shows that, for children above 13 years of age, the proportion who attend school and their *average years* of schooling are both *lower* for children from FFE-eligible households in the FFE unions compared to the other two groups.

The above simple mean comparisons indicate that the effect of the FFE program on school participation and duration of schooling for primary-school-age children is positive and statistically significant. These comparisons, however, do not take into account the differences in household and personal characteristics between different groups. Given that selection into the program is not random, these simple mean comparisons are biased. In the following sections more rigorous evaluations will be conducted.

3 Evaluation strategy and possible control groups

Before discussing our evaluation strategy, we need to define the treatment in our study first. In the evaluation literature, treatment is defined as program participation. There are two alternative treatment definitions in our case: being eligible for the program or actually receiving foodgrain subsidies. As shown above, there are more eligible households than those receiving food subsidies due to the 40 percent rule. Previous studies often used the second definition (Ravallion and Wodon 2000; Ahmed 2000; Ahmed and del Ninno, 2002). We believe that the choice depends on the outcome one is interested in evaluating. In this paper, two outcomes to be evaluated are school attendance and duration of schooling for school attendants. With regard to the first outcome, the treatment should be defined as the eligibility of a household to participate in the program but not whether the child is actually receiving the FFE foodgrain subsidy for attending school. This is because the decision to attend school is made by knowing that not attending school implies a zero probability of receiving the subsidy, whereas the probability of receiving a subsidy by attending school is very high, even though not a certainty in view of the 40 percent limit. With regard to the second outcome, the length of time spent at school, the treatment should also be the eligibility. As we discussed earlier, the subsidies given at school can be rotated among eligible children when those who are eligible exceed the 40 percent limit per school. This rule implies that children who initially do not receive a food subsidy but remain in school may eventually receive a subsidy, providing the child is from an eligible household. Thus, staying on at school may be affected not only by whether the household is receiving a foodgrain subsidy or not, but also by whether the child is eligible or not.

Having defined our treatment, we are now in a position to set up the problem. Our purpose is to evaluate the effect of the FFE program on an outcome variable, Y. Assume this

outcome variable depends on a set of exogenous variables, X, and on a treatment, *d*. The evaluation problem can be expressed as:

$$Y_i = X_i\beta + d_i\alpha + U_i \quad (1)$$

where α measures the impact of the treatment for individual i, β defines the relationship between X and Y, while U_i is the error term.

Because assignment into the FFE program is based on observable characteristics, that is, the union the children live in and the four targeting criteria for households within the participating unions, one can assume that the identification of this model comes from selection on observables.[6] Hence it is probable that the participation dummy variable d is uncorrelated with the error term U, and the simple regression estimation of equation 1 should give a consistent estimate of the treatment effect, α, provided that X includes all the variables affecting both participation and outcomes in the absence of participation. This is the so-called conditional independence assumption. This assumption ensures that given X, the nontreated outcomes are what the treated outcomes would have been had they not been treated (Rosenbaum and Rubin 1985; Rubin 1978; Blundell and Costa Dias 2000; Ravallion 2001).

Nevertheless, there are limitations associated with the simple regression estimate, which may result in inconsistent estimation of the treatment effect. First, the regression estimation imposes the assumption of a linear functional form, which may cause inconsistent estimation due to missing nonlinear terms in the error term, which could relate to the treatment. Second, the estimation of equation 1 assumes that in the control group there are individuals who have exactly the same X vectors as their treated counterparts, which may or may not be the case. This is the so-called common support condition (Black and Smith 2002). Unless the treatment effect is homogeneous, failure to satisfy the common support condition will cause biased estimates of the treatment effect (Heckman et al. 1996; Heckman, Ichimura, and Todd 1997). In our example, suppose income is the only conditioning variable and all low-income households are selected into the treatment group and high-income households are not. The linear estimation of equation 1 then will not be able to disentangle the effect of income from the effect of participation.

A recent development in the program evaluation literature offers a solution. The propensity score matching method (Rosenbaum and Rubin 1985; Rubin 1978; Blundell and Costa Dias 2000; Dehejia and Wahba 2002) solves the linearity problem and addresses the common support problem explicitly. Like the linear regression estimate, propensity score matching assumes selection on observables. The basic idea of matching is to construct counterfactuals for treated individuals who have similar characteristics, X, and then compare

[6] This is the main difference between our study and the studies by Ravallion and Wodon (2000) and Ahmed and del Ninno (2002). In their studies the assumption was made that whether a household is eligible for participating in the program depends on unobservable characteristics. Based on the information provided in the last section, this assumption does not accord well with reality. The four criteria discussed earlier are all observable characteristics and selection into the program at household level is based on these criteria.

the outcomes for those treated and their counterfactuals. The challenge in a simple matching model is how to construct counterfactuals when there are too many X s, which makes it impossible to find matches in every cell. This is the so-called dimensionality problem.

Propensity score matching assumes matching on X is the same as matching on $P(X)$, where $P(X) = Pr(d = 1 \mid X)$. Thus, all the dimensions in X can be summarized into a predicted probability of being treated. Those in the nontreated group who have the same or a similar probability of participating would be used as the counterfactuals for their treated counterparts. To illustrate, assume Y_i is the value of the outcome for a treated individual i, and $Y_i^!$ is the value of the outcome for the counterfactual, then the effect of the treatment on the treated, α, can be defined as:

$$\alpha_i = E(Y_i - Y_i^! \mid P(X), d = 1) \tag{2}$$

Note that if counterfactuals are from different time periods or different regions, the simple matching method may not be able to distill the influences of time or region, such as differences in the macroeconomic environment and other unobservable factors. However, combining matching with the difference-in-differences method may solve this problem.

The idea of difference-in-differences is very simple. If an outcome for the treated group is Y_{it_0} prior to the treatment and Y_{it_1} after the treatment, one may identify the effect of the treatment as $\alpha_i = Y_{it_1} - Y_{it_0}$ assuming that no changes in personal characteristics that may affect the outcome occurred during the period. However, the difference between the two outcomes may also be attributable to the change in the macroeconomic environment over time. If this is the case, then estimated α_i is not the pure treatment effect. To deal with this problem, one can identify a group of counterfactuals that experienced exactly the same changes in the macroeconomic environment and would have been treated in the program but were not. If the outcomes for this group in the pre- and post-program period are $Y_{it_0}^!$ and $Y_{it_1}^!$, respectively, the pure effect of the treatment can be written as $\alpha_i = (Y_{it_1} - Y_{it_1}^!) - (Y_{it_0} - Y_{it_0}^!)$. Combining propensity score matching with difference-in-differences, the effect of the treatment on the treated is then defined as:

$$\alpha = E[(Y_{it_1} - Y_{it_1}^!) - (Y_{it_0} - Y_{it_0}) \mid P(X), d = 1 \tag{3}$$

Equation 3 generates an estimate of the effect of treatment that distills both observable effects and time or regional effects on the outcomes.

Based on the survey design discussed in the previous section, there might be several possible control groups in this study. The first possibility is households that are from FFE unions but that do not meet the eligibility criteria for the FFE program. Hereafter, this group is referred to as control group 1. This group lives in the same macroeconomic environment as the group of households that are eligible, but as eligibility for the FFE program depends on the four criteria mentioned before, this group of households suffers from the problem of lack of the

common support condition relative to the treated group. For example, on average the household income for this group is more than double that for the treated group and the total landholding is almost triple that for the treated group (see Table 3). These indicate the seriousness of the lack of the common support condition. More importantly, this group of households is identified as not eligible. We, therefore, do not use this group as a counterfactual for the treatment group.

A second possible control group is some households in the non-FFE unions. Even though on average the households from the non-FFE unions are slightly more affluent than the FFE-eligible households from the FFE unions, some households within these unions may in fact satisfy the selection criteria and would have been eligible for the program had they been in the FFE unions. Thus, these households may serve as a more valid control group than the non-eligible households in the FFE unions. This group will be referred to as control group 2 in our empirical analysis. The possible drawback of using this group is that the macroeconomic environment of the treatment and control groups may be different. However, if we use propensity score matching combined with difference-in-differences, this problem may be overcome. The way to find these households is to estimate a probit equation for assignment into the program for households within the FFE union and use the estimated parameters from this estimation to predict the probability of program assignment for households in the non-FFE unions. Propensity score matching, then, allows us to match the treated and nontreated groups in the FFE unions with their respective counterfactuals in the non-FFE unions and to estimate $Y_{iFFE_1} - Y^{!}_{iNFFE_1}) = \alpha + R$ and $Y_{iFFE_0} - Y^{!}_{iNFFE_0}) = R$, where Y_{iFFE_1} and Y_{iFFE_0} refer to outcomes of the treated and nontreated groups in the FFE unions, respectively, while $Y^{!}_{iNFFE_1}$ and $Y^{!}_{iNFFE_0}$ are outcomes of those who are from the non-FFE unions but whose propensity scores are matched to observations from the treated and nontreated groups in the FFE union, respectively. R is the regional or macroeconomic environmental effect. The difference between the two estimators can distill the difference in the regional effect or the local macroeconomic environment effect, R, and leave us with a more accurate estimate of the treatment effect, α.

The third possible control group is children who are beyond primary-school age (i.e., 14 to 18 years, from both FFE and non-FFE unions) and hence not eligible to receive a foodgrain subsidy. The differences in schooling outcomes are evaluated between children of primary-school age from FFE-eligible and non-eligible households, and children beyond primary-school age from FFE-eligible and non-eligible households. The difference-in-differences between the two estimators can be used to eliminate the effect of age on outcomes. This enables us to obtain another estimate of the treatment effect, α. This difference-in-differences measure, however, implies the following assumptions. First, the regional effect on primary school attainment is the same as that on secondary school attainment. Second, there is no spillover effect of program participation to secondary school children in the treated group. It is very unlikely that these assumptions can be satisfied. This will be discussed in detail later.

4 Simple difference-in-differences analysis

We first estimate a standard probit regression model on children's school attendance and a piecewise constant hazard model on duration of schooling using the second control group

(children of households in the non-FFE unions) as counterfactuals.[7] For each of these models, two different specifications are estimated. The first is the standard regression as presented in equation 1 for a group of children who are aged 6 to 13. The coefficient α measures the treatment effect. The second regression includes the sample of children aged 6 to 13 years as well as those aged 14 to 18 years to obtain a difference-in-differences measure of the treatment effect. This model is specified below:[8]

$$Y_i = X_i\beta + d_i\alpha + Z_i\gamma + (d_i * Z_i)\delta + U_i \qquad (4)$$

where Z is a dummy variable that indicates children of primary-school age (aged 6 to 13). Recall that only households with primary-school-age children are entitled to FFE foodgrain subsidies. Those children who are not in primary school are not eligible for subsidies, even if they are from otherwise program-eligible households. Thus, the difference between coefficients α and δ provides a difference-in-differences estimator of the effect of the treatment on school participation and schooling duration, which can eliminate the differences in regional effects and age-related differences in school participation.

The independent variables included in the vector *X* are age, age squared, the gender of the child, whether the child is a sister or brother of the household head as opposed to being his/her child or grandchild, number of male and female children in a household, number of primary-school-aged children in a household, household size, mother and father's years of schooling, whether the household head is a laborer or not, the gender of the household head, total household income, household landholding, number of rooms in the house, value of the housing, distance between home and the nearest primary school, and a group of dummy variables indicating the region of residency.[9] The two outcomes evaluated are whether a child is attending school or not, and the number of years the child has been in school.

We compare the effect of the treatment on school participation for children from FFE-eligible households living in FFE unions with children from non-FFE unions (second control group). We then employ difference-in-differences using the older secondary-school-age group to eliminate the difference in age and regional effects. In addition to the problems associated with regression analysis (linearity and common support issues indicated earlier) there are deficiencies linked with using the older age group as a control group (see section 3). Thus, the estimated treatment effect from this section has to be interpreted with caution.

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[7] The probit model is specified as $Prob(Y=1) = \Phi(B'X)$ and the piecewise constant hazard model is specified as: $\lambda(t_i) = e^{\beta' X_i}\lambda_0(t_i)$.

[8] Note that although both equations 1 and 4 are specified in a linear form for simplicity, they are estimated as probit and piecewise constant hazard models in the empirical analysis.

[9] In Ahmed and del Ninno (2002) a vector of village-level variables is also included. These variables, however, are not obtained directly from the survey but are the sample means calculated for each village by the authors. We believe that these variables may not contribute significantly to either program participation or the outcomes of interest, and hence we do not include them in our estimations.

The results of estimated equations 1 and 4 on school participation using a probit model are presented in Table 4a. These results are mostly consistent across the two models. The following discussion will, therefore, focus on the results from equation 4, except when we discuss the effect of the FFE program.

We observe a strong inverse U-shaped relationship between the probability of school enrollment and children's age. This coincides well with Figure 1. Gender does not affect school participation. Both parents' schooling levels have positive effects on children's school attendance. Having more primary-school-aged children in the household reduces a child's chance of attending school. Household income has a significant positive effect on school participation, but there are no statistically significant effects of occupation and landholding. The more distant the school from the household the lower the participation rate.

In summary, most of the results are quite intuitive, suggesting that very young and older children are less likely to be in school and that poor households are less likely to send their children to school. In addition, more educated parents are more likely to send their children to school. However, the result that gender does not affect the school-participation decision is not a common finding in a developing country, especially in South Asia (World Bank 2001). Nevertheless Ahmed and del Ninno (2002) find a similar result: that girls are more likely to attend school than boys in Bangladesh.

Turning to our main interest in the effect of the FFE treatment on school participation, we find that the school participation rate of those treated is 7.6 percent higher than their nontreated counterparts (Table 4a). This result, however, could be biased due to the imposed linear relationship, the lack of the common support condition, and the differences in regional effects between the treated and the control groups.

Some of these biases (the difference in regional effects) may be eliminated by using the difference-in-differences estimator, which is presented in the panel indicated as "equation 4" in Table 4a. The coefficients of "program eligible household" and its interaction term with the "aged 6 to 13" dummy in the column suggest the differences in the school participation rate between the treated and the control group for children aged 14 to 18, and children aged 6 to 13 years, respectively. The difference between these two coefficients can eliminate the effect on outcomes caused by the difference in the regional macroeconomic and other environmental effects and the differences in age. We found that for children aged 6 to 13, the school participation rate for the program-eligible group is 15.2 percentage points higher than for the second control group. For children aged 14 to 18, however, this difference is minus 5.4 percentage points, though not statistically significant. Our difference-in-differences measure of the effect of program participation on school participation, therefore, is 20.6 percentage points, and the χ^2 tests show that the difference is statistically significant at the 5 percent level. This difference-in-differences estimator is 13 percentage points higher than the simple difference estimated from equation 1.

We also estimate equations 1 and 4 for male and female samples separately. The results on treatment effects are reported in Table 4b. Interestingly, the effect is much higher for girls than for boys.

In addition to the school enrollment outcome, we also evaluate the duration of schooling, conditional on ever attending a school. To do so, we use the difference-in-differences measures of reported current duration of schooling and complete duration of schooling. As most of the children in the sample are still in school, the data we have on duration of schooling is right-censored. The hazard model deals with this problem. To obtain the complete duration of schooling we first estimate the hazard model of duration of schooling and then use the estimated results to predict the complete schooling duration for each individual.[10]

Table 5a reports both the difference-in-differences for the reported duration (top panel) and for the predicted complete duration (bottom panel). The results for the reported duration show that, conditional on school participation, there is little statistical difference in duration of schooling between children aged 6 to 13 of the treatment group and control group 2. However, children aged 14 to 18 of the control group 2 stay at school on average 0.67 of a year longer than the same aged children of the treatment group, and the difference is statistically significant. When the difference-in-differences is calculated, we observe that primary school children from the treatment group actually stay in school 0.72 of a year longer than their counterparts from the control group. It is, however, only marginally significant.

The results for the complete duration show that children aged 6 to 13 years from the treatment group on average stay at school 0.23 of a year longer than their counterparts from control group 2, while the difference for children aged 14 to 18 years is negative. Using the difference-in-differences measure, we observe that the treated group on average stays in school 1.58 years longer than its counterpart.

We also estimated the effects for male and female samples separately (see Table 5b). In general, hardly any effect is detected for the male sample. For the female sample, however, positive and significant effects are observed, but the effect is mainly driven by the older age group.

The estimations from this section show that on average the FFE program increases the primary school participation rate by 20.6 percent. For girls participation increases 26 percent and for boys 19 percent. For those who go to school, the program also increases their duration of schooling by 1.6 years. These effects are quite significant, especially for girls, where duration is increased by 2.7 years compared to 0.9 for boys. However, these estimates may suffer from the problem associated with the linearity assumption and the lack of common support issue. In addition, the difference-in-differences measures presented in this section use the older age group to eliminate the regional effect. This imposes the assumption of a common regional effect for

[10] The results from the estimated duration model are available upon request from the authors. Note that complete durations for the same individuals vary depending on the assumptions made by the researcher. When there are only primary-school-age children in the sample, the assumption is that nobody will continue schooling after primary school, whereas if there are children of secondary-school age in the sample, the assumption is that nobody will continue schooling beyond secondary school. The calculated complete schooling in the latter case should be much longer than in the former. In this paper we assume that nobody will continue schooling beyond secondary school rather than primary school.

different age groups and no spillover effect from early FFE treatment to secondary-school participation. These assumptions are quite strong and are very likely being violated. The next section addresses these issues.

5 Propensity score matching with difference-in-differences estimators

To estimate propensity scores, a probit model of whether a child is from a program-eligible household is estimated for a sample of children from FFE unions.[11] The dependent variable is whether the household is eligible for the program and the independent variables include all the variables included in Table 4 except the program-eligibility indicators.[12] The estimated coefficients are then used to predict the probability of a child being in the program-eligible group for children from both FFE and non-FFE unions.

Figure 2 presents the distribution of predicted propensity scores (predicted probabilities) for the groups of children from the treatment and the two control groups. The figure indicates that at the right tail of the distributions, where most individuals from the treatment (eligible) group locate, there is a higher density of individuals from control group 2 (households from non-FFE unions) than from control group 1 (non-FFE households from FFE unions), indicating that control group 2 potentially provides a better common support condition for the treatment group. The mean predicted probability of being eligible for the treatment group is 0.64; for control group 2 it is 0.50, while for control group 1, it is 0.41. This suggests that had the program been introduced in the non-FFE unions, many households there would have been eligible to participate in the program. At the same time, we also observe that at the lower end of the propensity score distribution, there are more matched cases between control groups 1 and 2 than between control group 1 and the treatment group. This seems to suggest that within the non-FFE unions, there are some households that would have been in the treatment group and others that would not have been in the treatment group had the program been introduced there. Thus, we may be able to divide households from the non-FFE unions into pseudo treatment and control groups by matching their propensity scores with both the treatment group and control group 1.

The matching method used in this study is the "nearest neighbor matching" with replacement. This approach matches each treated unit with a single control unit that has the closest propensity score. Treated units for which no control unit is found within the maximum absolute distance specified are dropped. The distance is specified by setting a caliper width. As different caliper widths result in different numbers of treated units without a matching unit, the parameters being estimated will be different. To test robustness, we present results for two different caliper widths.

[11] The estimated results are reported in Table 8.

[12] When we match across FFE and non-FFE unions, the dummy variables for Thana rather than for union are used. This is because when matching across FFE and non-FFE unions, the union dummy variables are orthogonal to program participation and, hence, make the matching impossible.

We match the FFE households in the FFE unions with control group 2 and estimate the difference in their school participation rates. To eliminate the difference in the regional macroeconomic environment between the two groups, we match individuals from control groups 1 and 2 and obtain the difference in their school participation rates. As children from both control groups are not participants in the program, we expect that the differences between the school participation rates of these groups should be a pure regional difference. Taking difference-in-differences of these two estimates should provide an accurate treatment effect.[13] There is, however, one issue that requires discussion. The way we define treated and control groups within the non-FFE unions is by propensity score matching. It is possible, though, that some of the individuals in the non-FFE unions can be matched both to the treated group and control group 1 in the FFE unions. The overlapping of the matching will cause biased estimation of the treatment effect assuming a heterogeneous treatment effect. To avoid this, we exclude those from control group 2 who are matched to the treated group before matching it to control group 1.

These results are reported in the first panel of Table 6a. They show that, relative to control group 2, primary-school-aged children in the treated group are more likely to attend school and the difference is 11 to 13 percentage points. These results are 45 to 70 percent higher than the simple regression estimates presented in Table 4a. Comparing primary-school-age children in control group 1 with their counterfactuals in control group 2, however, results in a large negative difference of 14 to 16 percentage points, indicating that primary-school-age children in control group 1 are less likely to go to school than their counterfactuals in control group 2. The difference-in-differences measure indicates that the treatment effect may be on the order of 25 to 29 percentage points. This difference is statistically significant at the 1 percent level.

To test the sensitivity of this matching strategy, we try to use the full sample of control group 2, including those who are matched with the treated group, to match with control group 1. The other exercise we do is to match control groups 1 and 2 first, and then exclude those that are matched from control group 2 before matching the remainder of control group 2 to the treated group. These results are reported in Table 9, which provides a difference-in-differences measure of 18 percentage points for the first exercise and 15 percentage points for the second exercise. These differences are smaller in magnitude relative to the results presented in Table 6, but they are all statistically significant.

When we divide our sample into males and females, the matching results presented in panels 2 and 3 of Table 6a show that there is little difference between the treated male sample and their counterfactuals in control group 2, which is similar to the results of the simple regression analysis. For females, children of primary-school age from the FFE-eligible households are 17 to 18 percentage points more likely to attend school than those from control group 2. This is about double the effect using simple regression analysis (see Table 4b). The difference-in-differences estimation indicates a 16 to 19 percentage point improvement in school

[13] In other words, we try to construct pseudo treatment and control groups within the non-FFE unions and match them, respectively, to the treatment and control groups within the FFE unions.

participation for boys and 17 to 21 for girls. Naturally, the main effect of the difference-in-differences estimation for the male sample is driven by the difference in the two control groups, while for females, the difference in the two control groups is very small.

To provide a comparison with the regression analysis presented in section 4, we also use the secondary-school-aged children from the treated group and control group 2 to difference out the regional macroeconomic effect. The results are reported in Table 6b.[14] They show that the treatment effects are 9 to 15 percentage points, although they are not statistically significant. To some extent, this may relate to the small sample size used for the older age group. In addition, as discussed before, using the older age group as a control group to separate the regional effect may not be appropriate. This is because we impose two strong assumptions: a common regional effect for different age groups and no spillover effect of the FFE program for secondary-school-aged children.

The violation of the first assumption may cause an overestimation of the program participation effect if the regional effect is larger for secondary school participation than for primary school participation. This seems plausible, as children of secondary-school age may have more and better employment opportunities than their primary-school-aged counterparts and, hence, in poorer and less educated regions, demand for education may be lower, which, in turn, may generate the outcome of lack of secondary school provision in poorer regions.

The violation of the second assumption may cause an underestimation of the effect of the treatment if the spillover effect of the FFE program on secondary school participation is positive. Given that the program had been in operation for more than seven years when the survey was conducted, it is very likely that many children of secondary-school age had been participants in the program when they were younger. The effect of spillover, however, is an empirical question that can be tested. In our data, information on the time the first child of the household entered the FFE program is available. Using this information we are able to exclude children who are aged 14 to 18 and who participated in the FFE program when they were in primary school. Excluding this sample of children, we find that the difference-in-differences estimation is much larger than what is indicated in Table 6 (25 to 31 percentage points versus 9 to 15), suggesting that there is a spillover effect and the underestimation caused by this effect is quite large.[15] However, as it is not clear to us which one of the two effects dominates, we are unable to tell if the effect estimated here is under- or overestimation of the real treatment effect.

To investigate the treatment effect on duration of schooling, the matching combined with difference-in-differences method is also employed, and the results are reported in Table 7a. The first panel of the table presents the results of using control groups 1 and 2 to eliminate the regional effect. It shows that on average, the treated group has 0.67 of a year more schooling than control group 2, while control group 1 has 0.72 to 0.74 of a year less schooling than control group 2 (excluding those who are matched with the treated group). The difference-in-differences

[14] Note that the estimated propensity score in this matching uses a sample of children aged 6 to 18 years. The propensity score distribution for this estimation is reported in Figure 3.

[15] See Table 10 for the details.

estimates indicate a treatment effect of 1.4 years more schooling on the treated. The second panel of Table 7a report the results using the secondary-school-aged children to distill the regional effect, and the difference-in-differences estimator indicates a treatment effect on the treated of 1.1 to 1.2 years more schooling. Once again, we think that using the older group to eliminate the regional effect is less reliable for the same reasons mentioned earlier.

Table 7b presents the results for male and female samples separately. For the male sample, we find a 0.6 of a year treatment effect, which is not statistically significant. The large standard deviation may be related to the small sample size. The treatment effect for the female sample is much larger, ranging from 1.6 to 2 years.

In summary, the matching combined with difference-in-differences results presented in this section indicate that the effect of the FFE program on the treated (children from program-eligible households) is quite large and the main effect is on girls. The finding that the FFE has a larger effect on girls than boys is interesting. Our conjecture is that in a developing country where boy-preference is strong, poor households may prefer to send their sons to school rather than daughters. That is to say that had there been no FFE program, boys of the poor households would have been sent to school anyway. Thus, the FFE program actually provides incentives for parents to send their daughters to school. Schultz (2000) also found that the Mexican PROGRESA program had a larger effect on girls than on boys.

The results obtained in this study indicate a much larger effect of FFE program treatment on the primary school participation rate compared to the study by Ahmed and del Ninno (2002). In their paper they found a treatment effect of 8.4 percent. The difference between our findings and theirs may be due to the following reasons. First, in their study the control group used includes everyone from the non-FFE treatment households, both control groups 1 and 2. Second, the evaluation strategy adopted in their study is very different from ours. They assume that participation in the program is endogenous and, hence, utilized the instrumental variable strategy to deal with the endogeneity problem. The instrument they used to endogenize the program participation decision is whether an individual lived in an FFE union or not. This would have been similar to the local average treatment effect (LATE) estimation had there been households that participated in the FFE program in the non-FFE unions (Angrist and Imbens 1995; Angrist, Imbens, and Rubin 1996). Consider the LATE estimate in the simple Wald estimate setting. The denominator of the Wald estimate in this case should be equal to the proportion of households that participated in the FFE program in the FFE unions minus this proportion for the non-FFE unions. As the second term in the denominator is equal to zero, the estimated local average treatment effect is an underestimation of the true effect.[16] In this study we assume that selection into the program is based on observable characteristics, which is more realistic. Third,

[16] Ravallion and Wodon (2000), using 1995–96 Household Expenditure Survey data, estimate the effect of grain stipends on school participation. They find that every 114 kilograms of grain stipend received increases children's school participation rate by 18 to 19 percent. Given that the information on the average grain stipend received by each child is not provided in their paper, it is hard for us to compare their results with ours. Nevertheless, they use exactly the same methodology as Ahmed and Del Ninno (2002), so we expect that their estimation is also an underestimate of the "true" effect.

the evaluation conducted in Ahmed and del Ninno (2002) is based on regression analysis while this study adopts propensity score matching and difference-in-differences methodologies.

Our findings of the effect of the FFE program on school enrollment and duration of schooling of children in Bangladesh are also higher than the findings of the effect of the Mexican PROGRESA program on the same outcomes (Schultz 2000; Skoufias and McClafferty 2001), where a 7 and 14 percentage point increase in secondary school enrollment for boys and girls, respectively, and a 0.7 year increase in duration of schooling were estimated. The difference, however, is understandable due to the difference in country institutional settings, the difference in the program settings, and the difference in the evaluation methodology used.

6 Conclusions

This paper has evaluated the effect of the food for education program implemented in Bangladesh. Although the FFE program has several objectives, our main focus has been its impact on primary school participation and school duration. We found that on average the FFE program increased the school attendance rate of the treated group by 25 to 29 percentage points, and increased the duration of schooling by 1.1 to 1.4 years.

The treatment effect of the FFE program is larger for girls than for boys, which is an important gain of the FFE program, as girls are often not encouraged as much as boys are to attend school in developing countries.

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Table 1: Distribution of household program participation between FIFE and non-FFE unions

	FFE Union		Non-FFE Union	
	No. of HH	No. of children aged 6-13	No. of HH	No. of children aged 6-13
Participating households	209	399		
Nonparticipating households	191	336	200	343

Source: Authors' own calculation from IFPRI-FMRSP sample survey database as described in Ahmed and del Ninno (2002).

Table 2: Primary-school-aged children program participation status within FFE unions

	FFE-Eligible Households		FFE-Non-Eligible Households	
	Freq.	%	Freq.	%
Including stipend program[a]				
Total	399	100.00	336	100.00
Not attending school	55	13.78	102	30.36
Attending non-FFE school	33	8.27	110	32.74
Attending FFE school and receive	216	54.14	0	0.00
Attending FFE school not receive	95	23.81	124	36.90
Excluding stipend program participants[a]				
Total	388	100.00	319	100.00
Not attending school	55	14.18	102	31.97
Attending non-FFE school	22	5.67	93	29.15
Attending FFE school and receive	216	55.67	0	0.00
Attending FFE school not receive	95	24.48	124	38.87

Source: Authors' own calculation from IFPRI-FIVIRSP sample survey database as described in Ahmed and del Ninno (2002).

Note: [a] The stipend program is separate from the FFE program. See footnote 5 in the paper.

Table 3: Household (HH) characteristics for FFE-eligible and non-eligible groups

	FFE Unions vs. Non-FFE Unions				FFE-Eligible HH vs. Non-Eligible HH in FFE Unions				FFE-Eligible HH vs. HH in Non-FFE Unions			
	FFE U	NFFE U	Diff.	T-Ratio	FFE HH	NFFE HH	Diff.	T-Ratio	FFE HH	NFFE U	Diff.	T-Ratio
Household income	13082	14333	-1251	-0.84	8339	18271	-9931	**-6.04**	8339	14491	-6151	**-4.36**
	(16690)	(17447)			(9457)	(20863)			(9457)	(17530)		
	400	200			209	191			209	197		
Total land	97.89	99.58			51.09	148.72	–97.63	**–5.49**	51.09	101.07	–49.98	**–3.33**
	(175.79)	(193.24)	–1.69	–0.10	(70.85)	(232.82)			(70.85)	(194.41)		
	388	192			202	186			202	189		
Proportion of household heads as laborer	0.23	0.21	0.02	0.49	0.28	0.17	0.11	**2.78**	0.28	0.21	0.07	1.62
	(0.42)	(0.41)			(0.45)	(0.37)			(0.45)	(0.41)		
	400	200			209	191			209	197		
Male household heads	0.88	0.91			0.86	0.91	–0.05	–1.53	0.86	0.91	–0.05	**–1.64**
	(0.33)	(0.29)	–0.03	–0.95	(0.35)	(0.29)			(0.35)	(0.29		
	400	200			209	191			209	197		
Proportion of HH heads illiterate	0.28	0.26			0.28	0.27	0.02	0.34	0.28	0.26	0.02	0.41
	(0.45)	(0.44)	0.02	0.39	(0.45)	(0.44)			(0.45)	(0.44)		
	400	200			209	191			209	197		
Time to nearest school	13.13	11.97	1.16	1.26	11.91	14.48	–2.57	**–1.65**	11.91	12.03	–0.12	–0.14
	(15.08)	(7.44)			(10.06)	(19.07)			(10.06)	(7.46)		
	395	197			207	188			207	194		
6-13 school participation	0.79	0.80	–0.01	–0.23	0.86	0.70	0.16	**5.35**	0.86	0.79	0.07	**2.49**
	(0.41)	(0.40)			(0.35)	(0.46)			(0.35)	(0.41)		
	735	343			399	336			399	337		
6-13 school duration	3.12	3.07	0.04	0.22	3.33	2.87	0.46	**2.73**	3.33	3.06	0.27	**1.64**
	(2.22)	(2.29)			(2.06)	(2.36)			(2.06)	(2.29)		
	715	336			390	325			390	330		
14-18 school participation	0.44	0.61	–0.18	**–4.22**	0.42	0.45	–0.04	–0.55	0.42	0.61	–0.19	**–2.89**
	(0.50)	(0.49)			(0.50)	(0.50)			(0.50)	(0.49)		
	200	122			101	99			101	120		
14-18 school duration	6.26	6.99	–0.73	**–2.50**	5.62	6.93	–1.31	**–2.56**	5.62	6.98	–1.36	**–2.85**
	(3.50)	(3.30)			(3.52)	(3.37)			(3.52)	(3.33)		
	182	119			93	89			93	117		

Source: Authors' own calculation from IFPRI-FMRSP sample survey database as described in Ahmed and del Ninno (2002).
Note: Mean values are presented in the first row for each variable, standard deviations are in the second row in parentheses, and sample sizes are presented in the third row.

Table 4a: Probit estimations of equations 1 and 4 for eligible households in FIFE unions and households in non-FFE unions

		Equation 1		Equation 4	
		dF/dx	Std. Err.	dF/dx	Std. Err.
Dummy for program eligible households	(1)	0.076***	0.027	–0.054	0.053
Program eligible HH (1)*age 6-13	(2)			0.152***	0.056
Dummy for age 6–13				0.043	0.072
Child's gender (male=1)		–0.020	0.029	–0.030	0.032
Child's age		0.316***	0.050	0.189***	0.031
Child's age^2		–0.016***	0.003	–0.009***	0.001
No. of male children in HH		0.022	0.023	0.037	0.025
No. of female children in HH		–0.007	0.026	0.016	0.030
No. of primary-school aged child in HH		–0.066***	0.021	–0.082***	0.024
Child as sibling of the HH head		–0.019	0.098	–0.034	0.106
HH size		–0.007	0.014	–0.017	0.015
Gender of HH head male=1		–0.176	0.171	–0.173	0.187
Time for going to nearest school		–0.002*	0.001	–0.003*	0.002
Mother's years of schooling		0.011	0.008	0.014*	0.009
Father's years of schooling		0.013***	0.005	0.012***	0.005
Total household income* 10^{-4}		0.024**	0.012	0.039***	0.012
HH head being a laborer		0.012	0.029	0.041	0.033
Total landholding of the HH* 10^{-3}		0.020	0.084	0.110	0.110
Value of the housing* 10^{-4}		0.003	0.007	0.016*	0.010
Regional dummy		Yes		Yes	
Observed probability		0.83		0.76	
Predicated probability		0.89		0.82	
No. of observations		719		935	
Pseudo R^2		0.20		0.25	
Coeff. difference between (1) and (2)				0.21	
Chi^2 of difference between (1) and (2)				3.72	
Prob > chi^2				0.05	

Note: dF/dx are marginal effects from probit estimation. ***,** and * refer to statistical significance at the 1, 5 and 10 per cent levels, respectively in all tables.

Table 4b: Probit estimations of equations 1 and 4 for eligible households in FIFE unions and households in non-FFE unions for males and females separately

		Equation (1)		Equation (4)	
		Males	Females	Males	Females
Program eligible HH	(1)	0.065	0.090***	–0.046	–0.073
		(0.042)	(0.034)	(0.081)	(0.065)
Eligible HH* age 6-13	(2)			0.141	0.186***
				(0.085)	(0.073)
No. of observations		345	374	462	473
Pseudo R^2		0.19	0.30	0.24	0.30
Coeff. diff between (1) and (2)				0.19	0.26
Chi^2 of diff between (1) and (2)				1.35	3.78
Prob > chi^2				0.25	0.05

Note: (1) Only the results of program participation are reported in the table. Full results are available upon request from the authors.
(2) The marginal effects are reported and standard errors are reported in parentheses below the marginal effects.

Table 5a: Treatment effect on duration of schooling (years)

	FFE-Eligible Households in FFE Unions		Total Households in Non-FFE Unions		Difference	
	Mean	SD	Mean	SD	Mean	T-ratio
Reported duration [(1)]						
6 to 13 years of age	3.64	1.89	3.59	2.07	0.05	0.32
14 to 18 years of age	6.75	2.61	7.43	2.85	–0.67	–1.64
Diff-in-Differences					0.72	1.64
Complete duration [(2)]						
6 to 13 years of age	13.02	1.12	12.79	1.34	0.23	2.20
14 to 18 years of age	9.56	3.04	10.92	2.52	–1.35	–2.98
Diff-in-Differences					1.58	3.58

Note: (1) Reported durations are from the data, which include individuals who are still in school.
(2) Complete durations are predicted durations from the schooling duration hazard model estimated for children aged 6 to 18. The results of the estimated hazard model are available upon request from the authors.

Table 5b: Treatment effect on complete duration[(1)] of schooling for male and female samples separately (years)

	FFE-Eligible Households in FFE Unions		Total Households in Non-FFE Unions		Difference	
	Mean	SD	Mean	SD	Mean	T-ratio
Males						
6 to 13 years of age	12.50	1.94	12.34	2.03	0.16	0.70
14 to 18 years of age	9.93	3.52	10.62	2.92	–0.69	–1.03
Diff-in-Differences					0.85	1.17
Females						
6 to 13 years of age	13.35	0.94	13.20	1.28	0.14	1.15
14 to 18 years of age	8.82	3.25	11.33	2.65	–2.51	–3.96
Diff-in-Differences					2.65	3.92

Note: (1) Complete durations are predicted durations from the schooling duration hazard model estimated for children aged 6 to 18. The results of the estimated hazard model for male and female samples separately are available upon request from the authors.

Table 6a: Results from propensity score matching combined with difference-in-differences on primary school participation rate

Matching treated first	Treated vs. Cntrl 2		Cntrl 1 vs. Cntrl 2 (excluding matched)		Diff-in-diffs	
	clp=0.01	clp=0.005	clp=0.01	clp=0.005	clp=0.01	clp=0.005
Total						
Effect	0.13	0.11	–0.16	–0.14	0.29	0.25
Std. Err.	0.05	0.05	0.06	0.06		
T-ratio	2.74	2.41	–2.53	–2.31	3.67	3.30
No. of matched treated	365	355	267	206		
No. of matched control used	160	160	94	91		
Total treated	394	394	319	319		
Total controls	306	306	146	146		
Proportion of matched treated	92.64	90.10	83.70	64.58		
Proportion of matched controls	52.29	52.29	64.38	62.33		
Males						
Effect	0.02	0.01	–0.17	–0.15	0.19	0.16
Std. Err.	0.06	0.06	0.09	0.09		
T-ratio	0.28	0.11	–1.90	–1.64	1.72	1.42
No. of matched treated	168	141	118	86		
No. of matched control used	75	75	54	48		
Total treated	183	183	159	159		
Total controls	165	165	90	90		
Proportion of matched treated	91.80	77.05	74.21	54.09		
Proportion of matched controls	45.45	45.45	60.00	53.33		
Females						
Effect	0.17	0.18	0.00	–0.03	0.17	0.21
Std. Err.	0.06	0.07	0.10	0.10		
T-ratio	2.69	2.76	0.00	–0.31	1.48	1.80
No. of matched treated	186	160	98	65		
No. of matched control used	83	78	39	38		
Total treated	211	211	160	160		
Total controls	141	141	58	58		
Proportion of matched treated	88.15	75.83	61.25	40.63		
Proportion of matched controls	58.87	55.32	67.24	65.52		

Note: (1) clp refers to caliper width used to match observations.
(2) Complete durations are predicted durations from the schooling duration hazard model estimated for children aged 6 to 18. The results of the estimated hazard model are available upon request from the authors.

Table 6b: Results from propensity score matching combined with difference-in-differences on primary school participation rate, using older children as controls to distill regional effect

	Treated vs. Cntrl 2 (aged 6-13)		Treated vs. Cntrl 2 (aged 14-18)		Diff-in-diffs	
	clp=0.01	clp=0.005	clp=0.01	clp=0.005	clp=0.01	clp=0.005
Effect	0.06	0.07	–0.09	–0.02	0.15	0.09
Std. Err.	0.05	0.05	0.11	0.13		
T-ratio	1.35	1.54	–0.80	–0.16	1.26	0.68
No. of matched treated	371	344	67	49		
No. of matched cntrl used	158	157	41	34		
Total treated	388	388	88	88		
Total controls	306	306	93	93		
Proportion of matched treated	95.62	88.66	76.14	55.68		
Proportion of matched controls	51.63	51.31	44.09	36.56		

Note: (1) clp refers to caliper width used to match observations.
(2) Complete durations are predicted durations from the schooling duration hazard model estimated for children aged 6 to 18. The results of the estimated hazard model are available upon request from the authors.

Table 7a: Results from propensity score matching combined with difference-in-differences on complete duration of schooling

	Treated vs. Cntrl 2		Treated vs. Cntrl 2 (excluding matched)		Diff-in-diffs	
	clp=0.01	clp=0.005	clp=0.01	clp=0.005	clp=0.01	clp=0.005
Effect	0.67	0.67	–0.74	–0.72	1.40	1.39
Std. Err.	0.16	0.16	0.16	0.17		
T-ratio	4.19	4.19	–4.51	–4.22	6.16	5.94
No. of matched treated	363	356	263	210		
No. of matched cntrl used	168	165	94	93		
Total treated	388	388	319	319		
Total controls	312	312	141	141		
Proportion of matched treated	93.56	91.75	82.45	65.83		
Proportion of matched controls	53.85	52.88	66.67	65.96		

	Treated vs. Cntrl 2 (aged 6-13)		Treated vs. Cntrl 2 (aged 14-18)		Diff-in-diffs	
	clp=0.01	clp=0.005	clp=0.01	clp=0.005	clp=0.01	clp=0.005
Effect	0.67	0.67	–0.40	–0.55	1.07	1.22
Std. Err.	0.16	0.16	0.53	0.57		
T-ratio	4.19	4.19	–0.76	–0.96	1.94	2.05
No. of matched treated	363	356	72	52		
No. of matched cntrl used	168	165	48	39		
Total treated	388	388	88	88		
Total controls	312	312	95	95		
Proportion of matched treated	93.56	91.75	81.82	59.09		
Proportion of matched controls	53.85	52.88	50.53	41.05		

Note: (1) clp refers to caliper width used to match observations.
(2) Complete durations are predicted durations from the schooling duration hazard model estimated for children aged 6 to 18. The results of the estimated hazard model are available upon request from the authors.

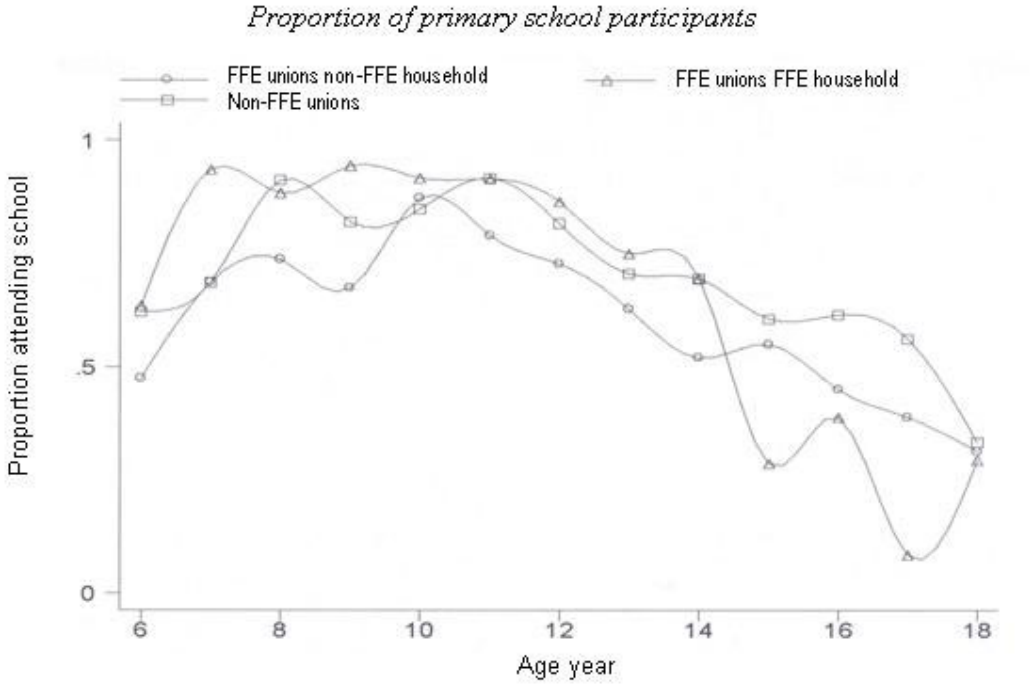
Table 7b: Results from propensity score matching combined with difference-in-differences on duration of schooling by gender

	Treated vs. Cntrl 2		Treated vs. Cntrl 2 (excluding matched)		Diff-in-diffs	
	clp=0.01	clp=0.005	clp=0.01	clp=0.005	clp=0.01	clp=0.005
Males						
Effect	0.52	0.39	–0.09	–0.22	0.60	0.61
Std. Err.	0.34	0.34	0.32	0.33		
T-ratio	1.52	1.14	–0.27	–0.66	1.29	1.28
No. of matched treated	158	139	108	89		
No. of matched cntrl used	86	80	53	49		
Total treated	181	181	159	159		
Total controls	167	167	81	81		
Proportion of matched treated	87.29	76.80	67.92	55.97		
Proportion of matched controls	51.50	47.90	65.43	60.49		

	clp=0.01	clp=0.005	clp=0.01	clp=0.005	clp=0.01	clp=0.005
Females						
Effect	0.58	0.51	–1.45	–1.12	2.03	1.63
Std. Err.	0.28	0.28	0.29	0.34		
T-ratio	2.08	1.81	–4.96	–3.32	5.03	3.71
No. of matched treated	186	156	89	55		
No. of matched cntrl used	86	83	35	31		
Total treated	207	207	160	160		
Total controls	145	145	58	58		
Proportion of matched treated	89.86	75.36	55.63	34.38		
Proportion of matched controls	59.31	57.24	60.34	53.45		

Note: (1) clp refers to caliper width used to match observations.
(2) Complete durations are predicted durations from the schooling duration hazard model estimated for children aged 6 to 18. The results of the estimated hazard model are available upon request from the authors.

Figure 1: Primary school participation and years of schooling by age and participation status



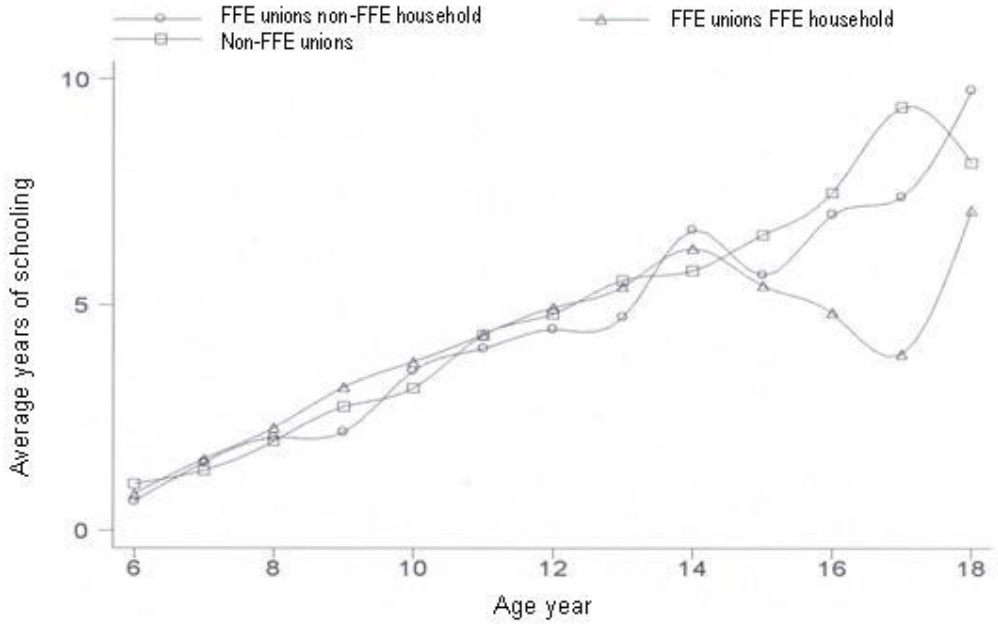
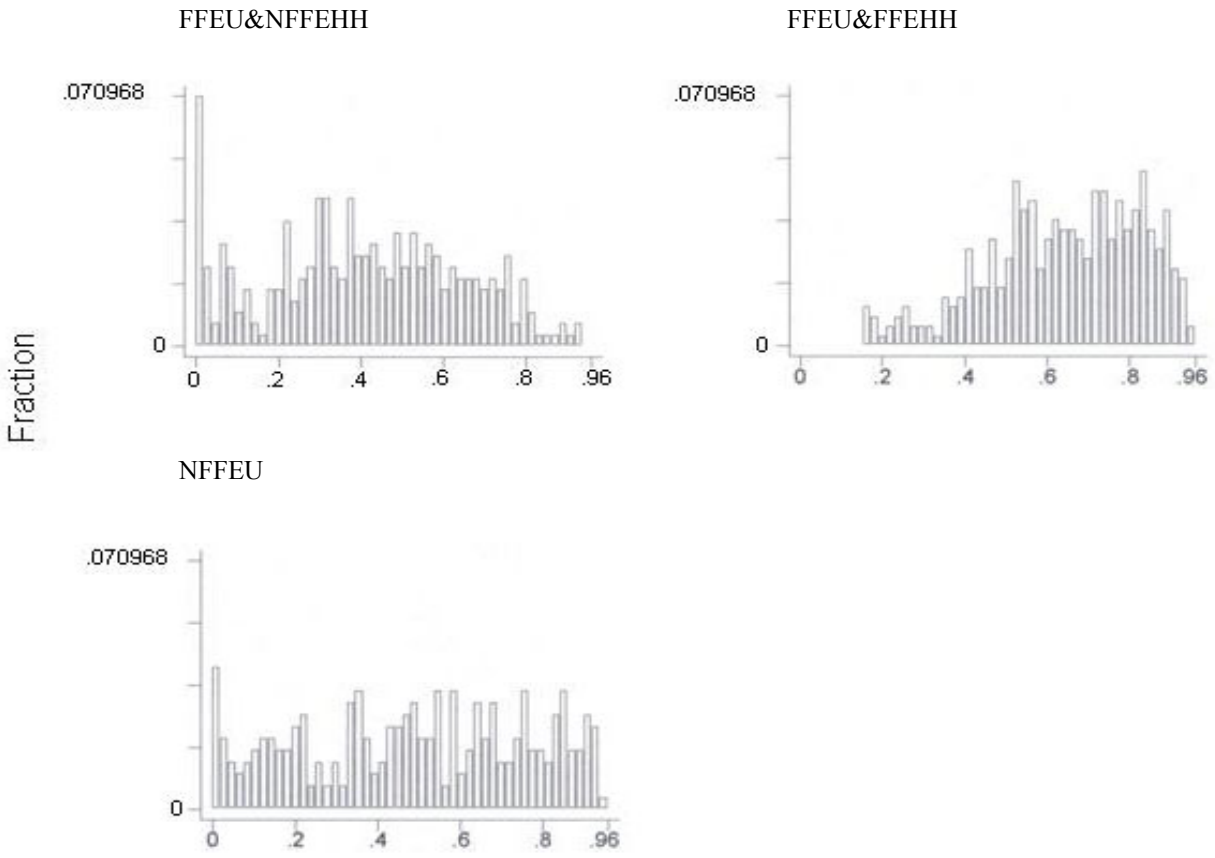


Figure 2: Distribution of propensity score for the three groups using sample of children aged 6 to 13 years



Note: Histograms by three categories of FFE U&FFE HH

FFEU&NFFEHH	refers to non-eligible households in FFE unions
FFEU&FFEHH	refers to eligible households in FFE unions
NFFEU	refers to households in non-FFE unions

Table 8: Probit estimation of propensity score for FFE program eligibility using FFE union households

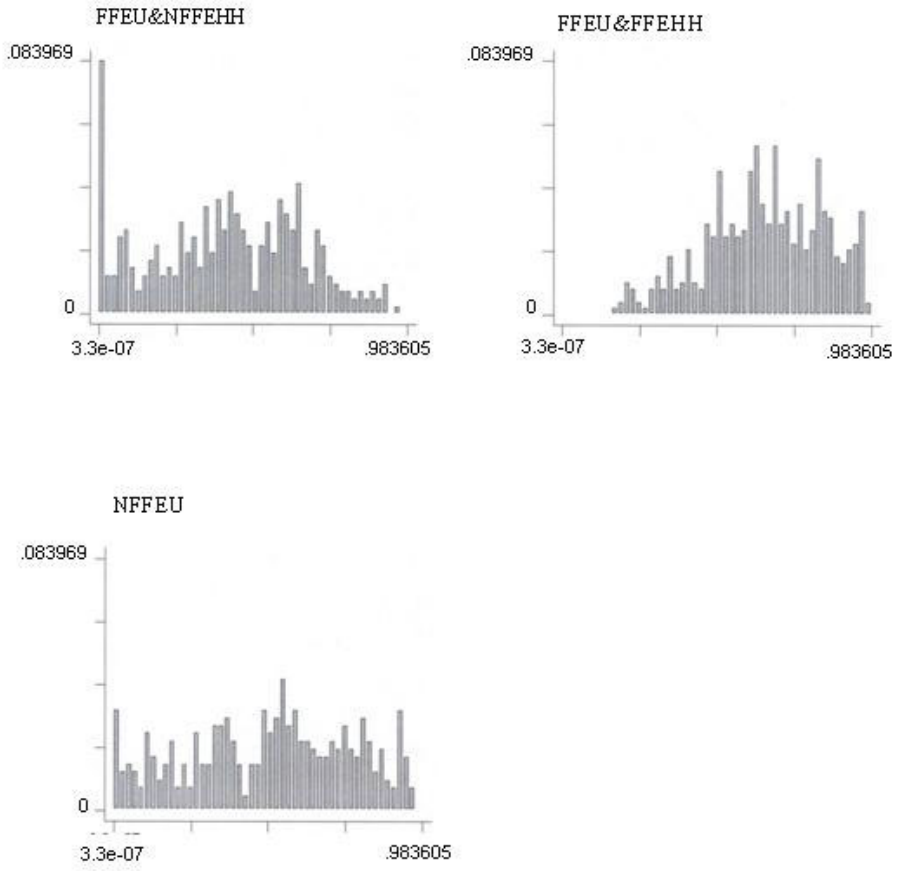
	dF/dx	Std. Err.	T-ratio
Child's gender male= 1	–0.051	0.050	–1.02
Child's age	0.047	0.088	0.53
Child's age^2	–0.002	0.005	–0.52
No. of male children in HH	–0.023	0.040	–0.58
No. of female children in HH	–0.030	0.039	–0.77
No. of prmry-schl aged chid in HH	0.096	0.036	2.64
HH size	–0.007	0.024	–0.28
Gender of HH head male=1	0.247	0.197	1.10
Time for going to nearest school	–0.004	0.002	–2.01
Mother's years of schooling	–0.010	0.013	–0.72
Father's years of schooling	0.023	0.008	2.90
Total household income*	–0.038	0.021	–1.77
HH head being a laborer	–0.019	0.056	–0.33
Total landholding of the HH*	–0.001	0.000	–3.30
Value of the housing*	–0.042	0.014	–2.92
Regional dummy		Yes	
Observed probability		0.53	
Predicated probability		0.51	
No. of observations		699	
Pseudo R^2		0.19	

Table 9: Sensitivity test for Table 6

	Treated vs. Cntrl 2		Cntrl 2 vs. Cntrl 1		Diff-in-diffs	
	clp=0.01	clp=0.005	clp=0.01	clp=0.005	clp=0.01	clp=0.005
Including matched in the 2nd match						
Effect	0.13	0.11	–0.05	–0.07	0.18	0.18
Std. Err.	0.05	0.05	0.05	0.05		
T-ratio	2.74	2.41	–1.07	–1.44	2.70	2.67
No. of matched treated	365	355	307	286		
No. of matched control used	160	160	167	166		
Total treated	394	394	319	319		
Total controls	306	306	306	306		
Proportion of matched treated	92.64	90.10	96.20	89.66		
Proportion of matched controls	52.29	52.29	54.58	54.25		

	clp=0.01	clp=0.005	clp=0.01	clp=0.005	clp=0.01	clp=0.005
Matching control 1 first						
Effect	0.10	0.08	–0.05	–0.07	0.15	0.15
Std. Err.	0.06	0.06	0.05	0.05		
T-ratio	1.66	1.33	–1.07	–1.44	1.96	1.95
No. of matched treated	315	236	307	286		
No. of matched control used	91	88	167	166		
Total treated	394	394	319	319		
Total controls	139	140	306	306		
Proportion of matched treated	79.95	59.90	96.24	89.66		
Proportion of matched controls	65.47	62.86	54.58	54.25		

Figure 3: Propensity scores for the three groups using sample of children aged 6 to 18 years



Probability of participation in the FFE program

Note: Histograms by three categories of FFE U&FFE HH

FEU&NFFEHH	refers to non-eligible households in FFE unions
FFEU&FFEHH	refers to eligible households in FFE unions
NFFEU	refers to households in non-FFE unions

Table 10: Test for spillover effect, including only the older children who have previously been in the FFE program

	Treated vs. Cntrl 2 (aged 6-13)		Treated vs. Cntrl 2 (aged 14-18)		Diff-in-diffs	
	clp=0.01	clp=0.005	clp=0.01	clp=0.005	clp=0.01	clp=0.005
Effect	0.06	0.07	–0.25	–0.19	0.31	0.25
Std. Err.	0.05	0.05	0.14	0.15		
T-ratio	1.35	1.54	–1.75	–1.23	2.08	1.62
No. of matched treated	371	344	32	27		
No. of matched cntrl used	158	157	21	20		
Total treated	388	388	44	44		
Total controls	306	306	93	93		
Proportion of matched treated	95.62	88.66	72.73	61.36		
Proportion of matched controls	51.63	51.31	22.58	21.51		

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