

# Does provision of food in school increase girls' enrollment? Evidence from schools in sub-Saharan Africa

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## Abstract

**Background.** The problem of low female literacy rates in Africa starts with low primary school enrollment, particularly in areas of high food insecurity. The provision of food in, and through, schools is considered to be one way of enrolling more girls in school, keeping them enrolled, and enhancing their adult well-being and productivity as a result.

**Objective.** To investigate the effects of provision of food and additional take-home rations in schools on girls' enrollment.

**Methods.** A retrospective cross-sectional study was designed based on school-level surveys in 32 African countries between 2002 and 2005. The study population consisted of girls and boys in primary schools targeted by the World Food Programme (WFP) and located in food-insecure areas that also suffered from lack of access to education.

**Results.** Provision of food in schools through the Food for Education (FFE) program contributed to increasing absolute enrollment in WFP-assisted schools by 28% for girls and 22% for boys in the first year. Post year-one enrollment patterns varied according to the type of FFE program. Where provision of take-home rations for girls was combined with on-site feeding for all pupils, the increase in girls' absolute enrollment was sustained at 30% after the first year. However, in schools providing on-site feeding alone, the rate of increase in absolute enrollment after the first year reverted to the rates of increase found in the year prior to FFE implementation. The provision of take-home rations also appeared to reduce the dropout rate of female students, particularly in the higher grades.

**Conclusions.** FFE programs can have a lasting positive influence on school enrollment and, by providing extra take-home rations to girls, in addition to on-site feeding, can make a strong contribution to the Millennium Development Goals.

**Key words:** Food aid, girls' education, school feeding, take-home rations

## Introduction

Achieve universal primary education: By 2015, ensure that all boys and girls complete primary school. (Millennium Development Goal II [1])

In short, one in five eligible girls does not go to school. (Global figure, "Children out of school," UNESCO 2005, page 19 [2])

In a world of constrained resources, national governments in developing countries are faced with a need to identify and prioritize different policies aimed at achieving the Millennium Development Goals. In the last decade, access to primary education has improved significantly in many parts of the world [3]. However, globally, an estimated 61.6 million girls of primary school age are still not enrolled in school, accounting for 53% of the total number of children out of school [2].

During the last 40 years, the World Food Programme (WFP) has become the largest international implementer of Food for Education (FFE) programs in the developing world. In 2005, WFP-assisted FFE programs were ongoing in 72 countries, reaching approximately 21.7 million beneficiaries. WFP FFE programs are designed to support equitable access to education among the most vulnerable and food-insecure population groups of the assisted countries. By supporting FFE programs that provide school feeding (school meals or snacks) and/or take-home rations WFP intends to support efforts aimed at achieving universal primary

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education and reducing gender disparities in education [4]. However, in order to help people facing simultaneous needs in different areas, there is a need to evaluate the level of attainment of such objectives in practice, particularly as FFE programs have been implemented in many different social and educational contexts.

The broad range of contexts in which FFE interventions have been designed and implemented has led to an increasing awareness of the potential benefits of FFE in different socioeconomic dimensions, including education, nutritional status, social equity, and agricultural development. The impact of FFE on educational outcomes is perhaps the most studied. Evaluations of FFE programs [5–8] have shown that the programs lead to increased enrollment and attendance (of girls in particular), reduced dropout rates, particularly in the lower primary school grades, and improved student learning capacity. Although the FFE programs are today generally designed to achieve educational goals, including the Millennium Development Goal for universal primary education, the “food” element of FFE interventions often leads practitioners to also expect nutritional outcomes. It is particularly important to clarify this element of confusion when we evaluate the progress of FFE interventions that are designed to achieve positive educational outcomes. If secondary benefits of FFE include improved nutritional status, an outcome that well-targeted FFE interventions providing micronutrient-fortified meals are designed to achieve, then this effect should also be assessed separately.

Since 2001, WFP has been implementing standardized school feeding surveys to provide a sound basis for monitoring, evaluation, management, and reporting of FFE programs. This report consolidates, for the first time, results from all WFP-assisted schools in sub-Saharan Africa surveyed between 2002 and 2005. The surveys covered over 1 million pupils in over 4,000 schools in 32 countries. This article will describe the methodology employed in the study, outline the empirical results of the analysis, and discuss the main findings and conclusions.

## Methods

### Study design

The objective of this study was to describe the effect that the different FFE programs—on-site feeding or on-site feeding combined with take-home rations—can have at the school level in supporting access to primary education, especially for girls, in countries in sub-Saharan Africa. A retrospective cross-sectional quantitative study was designed to accomplish the study objective. The study population consisted of all WFP-targeted primary schools, which were usually located in food-insecure areas that also suffered from lack

of access to education. Schools assisted by WFP FFE programs are targeted on the basis of food insecurity and vulnerability analysis and mapping (VAM; VAM assessments analyze the causes of food insecurity and vulnerability among populations affected by conflict, natural disasters, or economic decline) as well as an analysis of the educational context in each country. A standard questionnaire was applied to a representative sample of schools that included official primary school grades (generally from grades 1 to 5) and were assisted by the WFP FFE program. The structured questionnaire included interviews with school heads, groups of teachers, groups of parents, and groups of pupils. The questionnaire covered educational indicators, particularly enrollment and attendance, as well as an indicator of the relief of short-term hunger by school feeding programs. Data on school infrastructure, classrooms, teaching, and other school quality-related indicators that were part of the Essential Package (a set of 12 interventions to improve the health and nutrition of school-age children, based on the FRESH [Focusing Resources on Effective School Health] intersectoral framework) [9] were also collected to monitor the educational context in which FFE assistance is provided, since the provision of complementary services in FFE-assisted schools is necessary in order to achieve the desired educational outcomes.

### School selection and survey implementation

The sample of surveyed schools was initially selected by simple random sampling or, in the latest studies during 2005, by using random sampling with probabilities proportional to school size as measured by total absolute enrollment (the number of children enrolled in a school according to the school register at the beginning of the school year). In countries where the WFP program assisted a relatively small number of schools (usually fewer than 150), the survey would cover all assisted schools. The sample frames were stratified by the length and the type of program, i.e., schools with recently introduced FFE programs and schools with FFE programs that had been operating for 1 year or more.

The surveys covered the period from October 2002 to February 2005. The questionnaires were slightly modified from year to year but retained the core sections covering enrollment information. During each survey, the questionnaire release was staggered according to the WFP Country Office throughout the survey period, and the fieldwork in each country lasted an average of 65 days and a median of 37 days. A team of enumerators, often subcontracted by WFP country offices, were trained prior to the implementation of the surveys. In order to examine short-term trends, each country collected enrollment data for a maximum of 3 years prior to the survey year. Prior to each survey,

clearance was granted from each country's ministry of education. Heads of schools, or the equivalent, also gave consent on behalf of the parents.

### Data analysis

Once collected, the survey data were sent to WFP headquarters in Rome to be entered into a database, cleaned, and analyzed by different software packages. The questionnaires used in the different countries varied throughout the survey period, and the first step in data analysis involved a harmonization of the different data sets to match the definitions of each variable. In practice, it was not possible to aggregate all the data collected throughout the 5 years for the purpose of this analysis, and in this study we focus mainly on the analysis of trends in absolute enrollment observed throughout the survey years; full results for each of the different surveys have been published by WFP [10, 11]. The pupil-to-classroom ratio (the number of children enrolled in a school, as listed in the school register at the beginning of the school year, divided by the number of classrooms in the school) and the pupil-to-teacher ratio (the number of children enrolled in a school, as listed in the school register at the beginning of the school year, divided by the number of teachers registered to work in the school) could also be aggregated in the data set used in this analysis, enabling us to gain some insights into the classroom environment in WFP-assisted schools.

Schools were divided according to the type and length of the program: those with existing programs, those that had had the program for less than 1 year—categorized as those with on-site meals or take-home rations—and those that were going to initiate a program within the year (used as proxy controls). The short-term trends (2 years) in absolute enrollment for girls and boys were then evaluated within each category. Out of 4,175 schools in the sample, 903 did not yet have

an FFE program, 593 had had an FFE program for 1 year, and the remaining 2,680 had had an FFE program for more than 1 year. Because of limitations in the survey tools, it was not possible to reliably distinguish schools with only a take-home rations program from those providing take-home rations combined with on-site feeding (particularly during the first phase of surveys); for the purpose of this analysis, all programs with take-home rations also offered on-site feeding. This assumption is fairly robust from the programming perspective, since in most WFP FFE programs in sub-Saharan Africa, take-home rations are provided in combination with on-site feeding.

## Results

This report includes data collected in 32 sub-Saharan Africa countries from 2001 through 2005. The results are presented from a sub-Saharan Africa regional perspective. Unless specified otherwise, the results are school-level averages weighted according to the number of beneficiaries.

### Influence of different types of FFE programs on girls' enrollment

In schools due to receive FFE within the year, the absolute enrollment increased at an average yearly rate of 14% for both girls and boys. During the first year of FFE assistance (of any type), absolute enrollment increased by 28% for girls and 22% for boys. After the first year of the FFE program, the rates of increase in absolute enrollment reverted to values fairly close to those found during the year prior to the introduction of FFE.

We then analyzed the impact of different types of FFE programs on the absolute enrollment of girls. The yearly percentage changes in absolute enrollment according to FFE program type are shown in

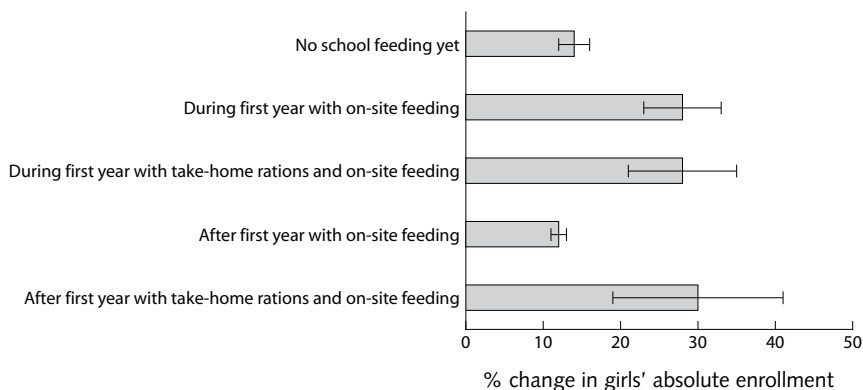


FIG. 1. Yearly percentage changes in girls' absolute enrollment in sub-Saharan Africa according to type of FFE program (averages, weighted by beneficiaries). Bars represent 95% confidence intervals.

### figure 1.

During the first year of FFE, girls' absolute enrollment increased by values close to 30% for both on-site only feeding programs and programs combining take-home rations and on-site feeding.

After the first year of FFE, yearly enrollment increases for girls of 30% were sustained in schools with both take-home rations and on-site feeding. In schools with only on-site feeding, however, absolute enrollment increased after the first year of the program at rates similar to those found in schools during the year prior to FFE implementation.

### Enrollment simulations

We can illustrate the results shown in **figure 1** by considering a hypothetical group of three identical schools, with each school having a total of 100 girls enrolled. One of the schools will implement 3 years of on-site feeding only. Another will combine on-site feeding and take-home rations for 3 years, whereas the third will not implement any FFE programs.

In our simulation, after 3 years of FFE implementation, the school with a combination of on-site feeding and take-home rations will have 68 more girls enrolled than the school with no FFE at all. The different trends in absolute enrollment for these simulation schools are shown in **figure 2**.

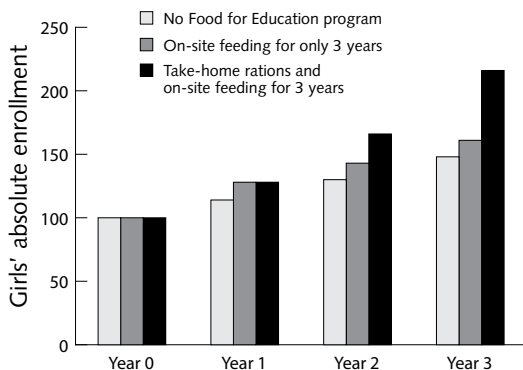


FIG. 2. Models of average school enrollment in hypothetical schools with different types of FFE programs

TABLE 1. Yearly percentage changes in girls' absolute enrollment according to grade in sub-Saharan Africa (averages, weighted by number of beneficiaries)<sup>a</sup>

Grade	A	95% CI	B	95% CI	C*	95% CI	D*	95% CI
1	31%	± 7%	25%	± 10%	46%	± 10%	22%	± 5%
2	25%	± 8%	42%	± 16%	20%	± 5%	38%	± 9%
3	31%	± 9%	43%	± 15%	17%	± 4%	33%	± 9%
4	40%	± 7%	29%	± 10%	19%	± 4%	35%	± 9%
5	24%	± 7%	42%	± 15%	18%	± 4%	46%	± 8%

CI, confidence interval

\* Differences between values in columns (C) and (D) are significant at  $p < .05$

a. (A) During first year with on-site feeding; (B) during first year with take-home rations and on-site feeding; (C) after first year with on-site feeding; (D) after first year with take-home rations and on-site feeding.

### Changes in enrollment gender parity index

The impact of take-home rations also becomes clearer when we look at changes in the enrollment gender parity index (GPI; the number of girls divided by the number of boys enrolled in school). Gender parity is achieved when the GPI is equal to 1. A GPI less than 1 indicates a low access to education by girls, i.e., that for each boy in school there is less than one girl.

In schools combining on-site feeding with take-home rations, the increase in the enrollment GPI was double that in schools with only on-site feeding and was not limited to the first year of FFE assistance. The enrollment GPI was found to increase by 19% after the first year of combined FFE, whereas no significant change in the GPI was found after the first year in schools offering on-site feeding only.

### Changes in girls' enrollment according to school grade

By looking at girls' absolute enrollment according to grade in two consecutive years, we estimated the yearly changes in absolute enrollment in each primary school grade (**table 1**).

Schools with only on-site feeding showed the highest rates of increase in grade 1 throughout the assistance program, year after year. Generally, after the first year of assistance, the average percentage changes in girls' absolute enrollment in schools with combined take-home rations and on-site feeding were most significant in the higher primary school grades. In grade 5, FFE programs combining on-site feeding with take-home rations drew over 40% more girls per year, more than twice the yearly increase in the same grade in schools implementing only on-site feeding.

### Enrollment by grade simulations

The results shown in **table 1** were used to simulate absolute enrollment in a hypothetical pair of schools over a period of 3 years. Both schools' initial enrollment figures were modeled by using the average enrollment figures for girls found in real schools that were soon to receive FFE assistance (**fig. 3**).

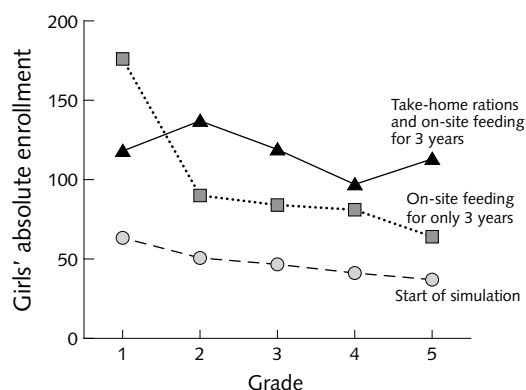


FIG. 3. Simulations of girls' absolute enrollment according to grade in schools with different types of FFE program

The results of the simulation show that after 3 years, in schools with combined on-site feeding and take-home rations, girls' absolute enrollment would be higher than in schools providing only on-site feeding in all grades but grade 1. These results suggest that take-home rations can significantly both sustain girls' absolute enrollment and reduce girls' dropout from higher primary school grades.

### Classroom conditions

The average classroom conditions in WFP-assisted schools, as summarized by the pupil-to-classroom and pupil-to-teacher ratios, showed a significant increase in the number of students without an increase in the number of teachers or classrooms during the first year of FFE assistance, followed by a decline after the first year of the program to ratios found before FFE programs had begun (table 2). This finding suggests that in WFP-assisted schools, schooling infrastructure and number of teachers were successfully scaled up throughout the course of the FFE programs in order to accommodate the increase in enrollment.

### Discussion and limitations

FFE, in the form of school meals, snacks, or take-home rations, is considered to be one means of enrolling more girls in school, keeping them enrolled, and thus

enhancing their adult well-being and productivity. Based on findings of surveys conducted in 32 countries in sub-Saharan Africa between 2002 and 2005, this article explores the effects of WFP FFE programs on girls' enrollment. The changes in absolute enrollment in WFP-assisted schools showed that FFE had a positive impact. The average absolute enrollment increased at a rate of 28% for girls and 22% for boys during the first year of any FFE program.

The increases in absolute enrollment after the first year of FFE varied substantially according to the type of program. In particular, in schools with FFE programs that combined on-site feeding for all students and take-home rations for girls, rather than having only on-site feeding, the increase in girls' absolute enrollment was sustained at values close to 30% after the first year. When only on-site meals were provided, the rate of increase in absolute enrollment after the first year of FFE implementation reverted to rates similar to those of the year prior to implementation. Take-home rations programs are usually implemented in areas where there is a significant gender gap in access to education. The provision of take-home rations also appeared to support girls' absolute enrollment across primary school grades, thus suggesting a reduction in the dropout rate of female students, particularly in the higher grades. Since the opportunity cost of sending girls to school tends to increase with a girl's age, this finding suggests that the income transfer from take-home rations to families of female students tends to offset the opportunity cost of sending older girls to school. Therefore, combining on-site feeding for all students with take-home rations targeting only girls in grades 4 and 5 (rather than all girls, which would be more costly) should be considered in WFP FFE programs where large gender disparities exist. Evidence from this study also suggests that in WFP-assisted schools, school infrastructure was scaled up and improved throughout the course of FFE programs. It seems that the issue of crowded classrooms that often follows FFE implementation was being addressed in WFP FFE programs through the use of government or other partners' activities. Results from other WFP studies [12] also suggest that FFE programs can act as a platform for school-based interventions.

The operational nature of the surveys used in this study limits the robustness of the experimental design,

TABLE 2. School level indicators in WFP-assisted schools in sub-Saharan Africa (averages, weighted by beneficiaries)

Indicator	No FFE yet	95% CI	During 1st yr with FFE	95% CI	After 1st yr with FFE	95% CI
Pupil-to-classroom ratio*	64	± 3.02	90	± 4.80	65	± 2.00
Pupil-to-teacher ratio*	51	± 1.37	62	± 2.38	55	± 5.11

WFP, World Food Program; FFE, Food for Education; CI, confidence interval

\* Differences significant at  $p < .05$  across the implicit time series.

since the data were collected as part of WFP's ongoing school-level monitoring and evaluation of FFE programs and not as part of a specific impact assessment. Because of the lack of strict control groups, we have limited ourselves to comparing the effects over time of different types of FFE programs on absolute enrollment. Schools due to start receiving FFE assistance are considered only as a proxy control group, since the prospect of receiving FFE assistance in the near future would probably also act as an incentive for enrollment. For example, in a study carried out in Pakistan [13], where true control groups were used to evaluate the impact of the WFP FFE program, the "natural" increase in enrollment was half the rate observed in this study (7% vs. 14%). Schools assisted by WFP FFE, including those in the proxy-control group, are targeted on the basis of food insecurity and vulnerability analysis and mapping (VAM), as well as an analysis of the educational context in each country [14].

Establishing the net enrollment ratio (the enrollment of the official age group for a given level of education expressed as a percentage of the corresponding population), an official Millennium Development Goal target indicator, still provides a huge challenge to governments and development agencies because of a lack of reliable population statistics [15] in developing countries. The results for absolute enrollment provide only a partial picture of the progress made in achieving Millennium Development Goal II. However, by analyzing trends in absolute enrollment we can provide useful insights on the impact of the different FFE interventions aimed at supporting access to education.

### Programming implications

In order to fully explore the programming implications of this analysis, it is important also to consider the costs of the different FFE types. A recent analysis of WFP FFE expenditures in 43 countries in 2005 [12] estimated that the average cost per child per year, standardized over 200 school days with one 700-kcal meal per day, was approximately US\$17 for on-site meals and US\$19

for combined on-site meals and take-home rations. These cost estimates do not fully take into account the costs to the community and the schools of running FFE programs, and work is under way to estimate the costs of these contributions. However, they do indicate that combining on-site feeding for all students with take-home rations targeting only older girls, or other vulnerable children identified by the problem analysis in the specific operational context, would achieve lasting benefits at a modest additional cost per child per year. FFE programs designed to support, for example, the education of older girls or of orphans and vulnerable children, should consider providing on-site meals for all children while at the same time providing take-home rations to specific vulnerable groups.

This study has shown that FFE programs can have a lasting positive influence on average school absolute enrollment, and that providing extra take-home rations to girls in addition to on-site meals can make a strong contribution to achieving the Millennium Development Goals and gender equality in primary education. The results of this study also highlight the importance of combining FFE with interventions addressing the quality of the schooling environment.

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