

SCHOOL NUTRITION

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Nutrition for School-Age Children

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School Feeding Programs:
Improving Effectiveness
and Increasing the Benefit
to Education

A Guide for Program Managers

The Partnership for Child Development
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The Partnership for Child Development (PCD) was established in 1992 to help co-ordinate global efforts to assess the developmental burden of ill health and poor nutrition at school age. It brings together a consortium of countries, donor organisations and centres of academic excellence to design and test strategies to improve the health and education of school-age children.

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The environment in which School Feeding Programs (SFPs) operate today is quite different than even a decade ago, and significantly different from several decades ago, when many of the on-going SFPs were initiated. World food resources are dwindling, increasing the competition for food aid, while the use of public sector resources for feeding programs is being more carefully scrutinized. Against this backdrop of potentially more limited resources, the gains in child survival (the proportion of children living beyond age 5 in the developing world today is almost 90% versus 72% in 1950) have made it clear that the school-age group requires attention. Data are beginning to show that school-age children may not, in fact, be healthier than younger children. Most important, clinical trials show a critical link between learning and schoolchildren's health and nutrition, suggesting a substantial gain in educational effectiveness from improving children's nutrition and health. The developing world and the development community are beginning to acknowledge the problem of health among school-age children and the importance of improving it.

Within this context, the role of SFPs is beginning to be viewed differently by some; that programs can and need to be designed as part of an effective package of interventions that address the nutrition and health needs of school-age children. To realize this, however, requires in most cases a significant shift in current programming. SFPs have gained a reputation over the years for being expensive, fraught with implementation problems and ineffective in meeting health, nutrition or educational objectives. This reputation may not be completely unfounded, and in reality the impact of SFPs is uncertain at best, since little work has been done on evaluating them. Until recently, SFPs were viewed as predominantly nutrition/feeding interventions aimed at improving the nutrition status of schoolchildren, so the effects of SFPs on educational outcomes were often not emphasized or examined. An exception is the recognition of the role that SFPs play in encouraging school enrolment and attendance, an objective that continues to be important in some countries today.

This guide is designed to assist those engaged in the process of creating new SFPs or seeking to improve the effectiveness of on-going ones. It is based on a review of the SFP research and program literature from the last decade. The guidelines include:

- **A brief rationale for addressing nutrition and health in schoolchildren.** This section provides the context for this guide by briefly summarizing the role that health and nutrition of school children can play in learning. The reader is referred to *Class Action: Improving School Performance in the Developing World through Better Health and Nutrition*, to *Malnutrition and Infection in the Classroom* and to the World Bank's School Health Website (<http://www.ceid.ox.ac.uk/schoolhealth>) for a more detailed discussion of this subject.
- **A summary of the potential benefits of SFPs for education.** This section reviews the research literature that provides evidence that SFPs can improve educational quality and efficiency. References to the key literature documenting the benefits of SFPs to education are provided. Annex 1 contains an annotated bibliography of most of the literature related to SFPs from the last decade.
- **Seven recommendations for building effective SFPs as an integral part of a package of nutrition and health interventions for school-age children.** This section is the core of the guide, discussing the steps to take to implement the seven recommendations, which aim to enhance the impact of SFPs on education. Program examples, both successes and failures, are presented to assist the reader in understanding the potential advantages and caveats in implementation. Specific data are provided on the costs and rations of actual programs to provide a point of reference for other programs.

Implementing these guidelines should help to generate programs that are more effective and efficient in contributing to educational objectives. Hunger and malnutrition among school-age children are significant deter-

rents to school progress and to current and future good health. School feeding programs can be an important component of school-based health programs designed to ameliorate these problems. By adopting the recommendations presented here, countries can help to ensure that SFPs better contribute to children attaining their full educational potential and good health.

1 Education and Learning Depend on Good Nutrition and Health

Nutritional and health status are powerful influences on a child's learning and on how well a child performs in school. Children who lack certain nutrients in their diet (particularly iron and iodine), or who suffer from protein-energy malnutrition, hunger, parasitic infections or other diseases, do not have the same potential for learning as healthy and well-nourished children. Weak health and poor nutrition among school-age children diminish their cognitive development either through physiological changes or by reducing their ability to participate in learning experiences—or both.

Contrary to conventional wisdom, nutritional status does not improve with age. The extra demands on school-age children (to perform chores, for example, or walk long distances to school) create a need for energy that is much greater than that of younger children. Indeed available data indicate high levels of protein-energy malnutrition and short-term hunger among school-age children. Moreover, deficiencies of critical nutrients such as iodine, vitamin A and iron among the school-aged are pervasive (Partnership for Child Development, 1998a). It is estimated that 60 million school-age children suffer from iodine deficiency disorders and that another 85 million are at risk for acute respiratory disease and other infections because they are deficient in vitamin A. The number suffering from iron deficiency anemia is greater still—210 million (Jamison and others 1993).

Parasitic worms that infect the intestines or the blood are a major source of disease and malnutrition in school-age children. An estimated 320 million school-age children are infected with roundworm, 233 million with whipworm, and 239 million with hookworm (Partnership for Child Development, 1997a). Schistosomiasis affects an estimated 200 million people throughout the world, approximately 88 million of whom are under 15 years old (Montresor et al, 1998).

Poor nutrition and health among schoolchildren contributes to the inefficiency of the educational system. Children with diminished cognitive

abilities and sensory impairments naturally perform less well and are more likely to repeat grades and to drop out of school than children who are not impaired; they also enroll in school at a later age, if at all, and finish fewer years of schooling. The irregular school attendance of malnourished and unhealthy children is one of the key factors in poor performance. Even temporary hunger, common in children who are not fed before going to school, can have an adverse effect on learning. Children who are hungry have more difficulty concentrating and performing complex tasks, even if otherwise well nourished. Research and program experience shows that improving nutrition and health can lead to better performance, fewer repeated grades and reduced drop out.

2 How School Feeding Programs Can Improve Educational Quality and Efficiency

SFPs are one of several interventions that can address some of the nutrition and health problems of school-age children. SFPs, and other school-based nutrition and health programs, can also motivate parents to enroll their children in school and to see that they attend regularly. Experience shows that properly designed and effectively implemented SFPs can:

- **Alleviate short-term hunger in malnourished or otherwise well-nourished schoolchildren.** This helps to increase the attention and concentration of students producing gains in cognitive function and learning.
- **Motivate parents to enroll their children in school and have them attend regularly.** When programs effectively reduce absenteeism and increase the duration of schooling, educational outcomes (performance, dropout, and repetition) improve.
- **Address specific micronutrient deficiencies in school-age children.** Most important of these are iodine and iron, which directly affect cognition. Meeting the iron and iodine needs of school-age children can translate into better school performance.
- **Increase community involvement in schools,** particularly where programs depend on the community to prepare and serve meals to children. Schools with their communities behind them are more effective than schools with less community involvement.

Alleviate Short-Term Hunger and Improve Cognition

The number of hungry school-age children is unknown, but is likely to be a significant problem in various circumstances. Many factors contribute to hunger in schoolchildren : the long distances children have to travel to school, cultural meal practices that include no or small breakfasts or a lack of family time or resources to provide adequate meals to children

before and/or during the school day. Simply alleviating this hunger in schoolchildren helps them to perform better in school.

- In Jamaica providing breakfast to primary school students significantly increased attendance and arithmetic scores. The children who benefited most were those who were wasted, stunted, or previously malnourished (Simeon and Grantham-McGregor, 1989).
- A US study showed the benefits of providing breakfast to disadvantaged primary school students. Before the start of a school breakfast program, eligible (low-income) children scored significantly lower on achievement tests than those not eligible. Once in the program, however, the test scores of the children participating in the program improved more than the scores of non-participants. The attendance of participating children also improved (Meyers, 1989).
- In Peru 23 malnourished and 29 well-nourished 9 to 11 year old boys were studied to assess the effects of breakfast on cognitive performance. Each boy served as his own control in a manner comparable to the Jamaica study cited above. Breakfast was a nutritionally fortified beverage and a baked grain product fortified with iron, similar to the meal provided in the government-sponsored school breakfast program. A series of cognitive tests were administered in an experimental setting. Speed in performing a short-term memory test and discrimination of geometric patterns were improved under the breakfast condition in both groups. The effect was more pronounced in the nutritionally disadvantaged children (Pollitt, Jacoby and Cueto, 1995).

Increase Enrollments and Improve Attendance

Children in poor health start school later in life or not at all. A study in Nepal found that the probability of attending school was 5% for stunted children versus 27% for children of normal nutritional status (Moock and Leslie, 1986). In Ghana malnourished children entered school at a later

age and completed fewer years of school than better nourished children (Glewwe and Jacoby, 1994). The number of days that a child attends school is related to cognition and performance (Ceci, 1995; Jacoby, Cueto and Pollitt, n.d.). SFPs can have a positive effect on rates of enrollment and attendance.

- A recent evaluation of an on-going school feeding program in Burkina Faso found that school canteens were associated with increased school enrollment, regular attendance, consistently lower repeater rates, lower dropout rates in disadvantaged provinces, and higher success rates on national exams, especially among girls (Moore, 1994).
- A small pilot school feeding program in Malawi was evaluated for its effect on enrollment and attendance. Over a three month period there was a 5% increase in enrollment and up to 36% improvement in attendance/absenteeism compared to control schools over the same period (WFP, 1996a).
- Niger has one of the five lowest school enrollment rates in the world; the school feeding program is intended to enhance attendance of nomad and transhumant families, particularly of girls. Beneficiaries receive the equivalent of the total daily recommended food intake (2,079kcal) in three meals per day. In addition, as an incentive for girls' participation in schools, some families receive an additional take-home ration. Evidence from past experience with the SFP shows that it contributes to its objectives: whenever canteens have been closed, even provisionally, immediate and high absenteeism follows and children are withdrawn from school. In areas with nomadic and transhumant populations, the school year cannot commence until food stocks arrive (WFP, 1995; 1996).

Although not a school feeding program in the traditional sense, school-based food distribution has also been used successfully to improve enrollment and attendance among school-age children, particularly girls.

- In Bangladesh a program of school-based food distribution increased enrollment by 20% versus a 2% decline in non-participating schools (Ahmed and Billah, 1994).
- In Pakistan, a program provides an income transfer in the form of one or two tins of oil to families whose girls attend school for 20 days per month. In its pilot phase the oil incentive program demonstrated that it could make a significant contribution to full attendance. In participating schools enrollment improved by 76% compared to 14% in the province overall. Attendance increased from 73% to 95% among participants. The program also claims to put additional food into the hands of mothers and to serve as a contact between mothers and teachers on distribution days (WFP, 1995; 1996).

These food transfer mechanisms do not offer the same potential benefits, for example, meeting short-term hunger and specific nutritional needs, as programs that deliver food directly to beneficiaries. These kinds of programs should therefore be assessed within the context of other food and resource transfer programs. A detailed discussion of the range of options from food stamps, coupons and vouchers to a cash transfer for food can be found in *The Design, Implementation and Impact of Food Stamp Programs in Developing Countries* by Tarsicio Castañeda.

Address Micronutrient Deficiencies and Improve Learning

Deficiencies of iron and iodine are among the most harmful types of malnutrition with regard to cognition. Iron deficiency renders children listless, inattentive and uninterested in learning. The research literature suggests a causal link between iron deficiency anemia and less than optimal behavior for learning (Nokes, van den Bosch and Bundy, 1998). Poor performance on a wide range of achievement tests among iron deficient children in school has been consistently documented. Remediation of iron deficiency through supplementation has eliminated the differences in

school performance and IQ scores between schoolchildren previously deficient in iron and those without iron deficiencies (Seshadri and Gopaldas, 1989).

In the case of iodine, most studies have focused on the differences in cognitive test performance between children who lived in communities with and without endemic goiter. The results show differences in favor of the non-goiter areas. In Sicily, for example, the proportion of children with below-normal cognitive scores was 3% in areas with sufficient iodine, 18.5% in areas where iodine was inadequate, and 19.3% where iodine was inadequate and cretinism was endemic (Vermiglio, et al, 1990). Studies in Indonesia and Spain have documented similar effects on children in areas with insufficient iodine (Bleichrodt et al, 1987).

Fortification of school rations is the most efficient and effective route to alleviating micronutrient deficiencies in schoolchildren where SFPs are in operation.

- In South Africa, soup fortified with iron and vitamin C was provided to 350 schools in an area of low socio-economic development on the Cape Peninsula. Results showed that initially 12% of six to seven year old and 20% of 8 to 12 year old children had low weight-for-age, and 49% and 31% had low serum ferritin (a measure of iron deficiency) respectively. At follow-up, after 15 weeks of intervention, iron status improved significantly; falling from 49% to 28% in 6 to 7 year old children and 31% to 21% in 8 to 12 year old children (Kruger and Badenhorst, 1994).
- A relatively new breakfast program in Peru, which includes an iron-fortified ration, was evaluated for its short-term impact on diet, amongst other factors. The program significantly increased dietary intakes of energy by 25%, protein by 28% and iron by 46% (Jacoby and Pollitt, 1997).

- A case-control study of the impact of providing heme-fortified cookies to school children in Chile found higher concentrations of hemoglobin among children receiving the fortified cookies through the school lunch program. The impact was most significant among children with greater demands for iron such as post-menarchial girls and pubertal boys (Walter and Hertrampf et al, 1993).

Promote Community Participation

Schools that depend on the community to organize and implement SFPs offer certain advantages. These advantages include: increasing the contact, and hence communication, between parents and teachers, officials and others; giving parents the opportunity to become more aware of what goes on at schools; and serving to raise the value of education/the school for parents and the whole community. For example, school canteens are viewed as an important feature of education policy in Morocco. Since 1978 WFP and the government have supported school feeding. The programs have strong government and community support and are viewed as part of a necessary package of inputs for improving education. The feeding program is credited with helping to maintain high enrollment and attendance and encouraging community participation in education. School cooperatives support the school canteens and parent associations assist with the transportation of food aid (WFP, 1993).

3 Seven Steps in Developing School Feeding Programs that Improve Education

The research and program literature on SFPs shows the potential that school feeding has to contribute to improving education. These guidelines provide seven recommendations for improving the design and implementation of programs in order to meet some of this potential. The first recommendation, which calls for the establishment of a policy and objectives for school feeding programming, will provide the framework for implementing the subsequent recommendations. These focus on the most critical aspects of school feeding programming including targeting, cost and financing issues, ration composition and meal delivery, program implementation, and monitoring and evaluation, and on the integration of feeding with other interventions that address the nutrition and health needs of schoolchildren.

Specifically, it is recommended that program managers and policy makers:

1. Build a consensus on a policy and objectives that focuses on how school feeding can effectively contribute to improving education and to meeting the nutrition and health needs of school-age children.

Program managers and policy-makers need to agree on *what* 'problems' or 'situations' the school feeding program will to address, *who* the program will serve, and *which* program models are feasible for implementation. School feeding programs are highly visible and as a result often have a significant political dimension, particularly since they can represent a considerable income transfer. This reality should not inhibit establishing a policy and objectives that will take advantage of the substantial potential for improving the impact of SFPs on education.

2. Develop targeting criteria and mechanisms that concentrate program resources on high risk children and communities.

There is a built-in tendency toward universal coverage—providing meals for all schoolchildren—since all children in school throughout the day will

require food. Furthermore, program coverage and targeting is always subject to a series of political, logistical, technical and informational constraints. In view of the fact that resources are finite, particularly in the poorest countries, and that providing food is expensive, targeting is a critical element of any effort to improve the impact of a SFP on education. Targeting is essential if the program is to reach families and communities that lack the resources to adequately provide for their school-age children or those that need to be motivated to enroll their children in school and to have them attend more regularly.

3. Analyze and identify alternative financing and cost options for SFPs.

The cost of school feeding programs is a major issue for both governments and donors. Feeding programs of any kind are expensive. Financing may include international assistance, but in all cases available public resources, or the potential to draw on them, are required. Cost alone can indicate little about the value of a SFP but, unfortunately, cost-effectiveness analyses, which assess costs relative to impact on nutrition and education outcomes are for the most part unavailable. Nonetheless, implementing the recommendations in this guide should help to ensure that the benefit-side of the program is enhanced while controlling the cost side.

4. Elaborate appropriate guidelines for ration composition and the timing of school meals.

To establish appropriate ration guidelines, program managers and policy makers need to analyze the nutrition and health needs of school-age children. Conditions in the education sector, such as levels of school enrollment, attendance, and performance, the availability of infrastructure and the capacity to implement different kinds of SFPs also need to be assessed. Information is also required on the community's perceptions and capacity to participate in school feeding programs.

5. Identify and address any potential bottlenecks in implementation: such as the availability of supplies and other resources, the appropriateness of cooking practices and the management of private sector inputs.

This recommendation is particularly relevant for a program manager who is already operating a program. Once school feeding programs are in place, altering them can meet strong resistance, however, a range of new experiences is now available that has the potential to alleviate some of the common obstacles to efficient and effective programming. Where a school feeding program already exists, a wealth of information is readily accessible; a critical step towards a better program is to thoroughly analyze this on-going experience.

6. Develop monitoring systems that focus on program processes, that is, how a program is functioning, and institute an evaluation system to assess the impact of the program on specific outcomes.

The need to monitor and evaluate programs is not unique to SFPs, but this recommendation is critical to increasing the impact of SFPs. Despite decades of experience there is a dearth of concrete information on the functioning and effectiveness of school feeding programs. This guide provides a general framework for establishing monitoring and evaluation systems for SFPs. For detailed guidance on creating these systems, see *Monitoring and Evaluation: A Guidebook for Nutrition Project Managers in Developing Countries* (Levinson et al, 1998).

7. Integrate feeding programs with other interventions that address the primary nutrition and health problems of the school-age population.

Last, but by no means least, the past decade has shown the added value of integrating other nutrition and health interventions with feeding. Specifically recommended are deworming, micronutrient fortification or

supplementation, and health nutrition and hygiene education. These interventions are described in more detail in *Class Action: Improving School Performance in the Developing World through Better Health and Nutrition* (Del Rosso and Marek, 1996) and in the publications of the Partnership for Child Development (see reference section).

4 Step One: Define the School Feeding Program Policy and Objectives

Although many SFPs have been conceived out of ideological, political and economic pressures, the prejudices of international or national personnel, or even commercial or other non-objective influences, the first step toward an effective program is to build programs on sound and transparent objectives. Since SFPs are highly visible and can offer a significant income transfer to families they will always be inherently political. To avoid the use of programs for political purposes, information on programs—especially, who the program is for and why and targeting measures—must be made readily available to the public.

Policy development and setting the objectives of school feeding provides the framework for implementing all the other recommendations aimed at improving the contribution that a SFP can make to education and better health and nutrition. The process of policy development calls for compiling information on: *what* 'food-related' and education-related problems exist in the school-age population which could be addressed by school feeding; *where*, geographically, the problems are located; and *which* school feeding options are available, or could be developed, for addressing these problems.

Policy Development

Analyzing the nutrition and health situation of school-age children has become a way to engage governments in the problems of this age group. The appropriate method of collecting information will vary by needs, circumstances and resources. Techniques include collecting routine statistics, making special surveys, conducting interviews, and holding focus group discussions with parents, teachers, students and health workers. The idea is to generate a rapid assessment of the situation as opposed to implementing a protracted, expensive and bureaucratically complex study. The goal is to quickly grasp the problems and launch a discussion of the possible solutions within the context of the human and financial resources available in any given country (Partnership for Child Development, 1999c).

Content of Policy

The written framework or policy for school feeding programming should address the following issues: Who is the program intended to serve? How will the program be financed? What should the program provide in terms of rations and when should these be served? How should the program be implemented? What monitoring and evaluation systems are needed? What other interventions should be a part of the school feeding program package? Although the exact form of the policy document will vary by the circumstances in each country, the following questions should provide some guidance for policy generation:

Targeting and coverage: who should the program serve and where are these groups.

- Are schoolchildren hungry at school?
- Is hunger a universal problem, or is it limited to certain geographic areas or to individuals within schools?
- What proportion of children are enrolled in school?
- What proportion of girls are enrolled?
- What are the reasons for low school enrollment?
- How often are children absent from school?
- What are the reasons for school absences?
- Is there a difference in female and male enrollment and attendance?
- Are there certain areas of the country where enrollment and attendance are more important issues than in other areas?

Financing programs: options for covering the costs of programs.

- What are the sources of financing and support for school feeding?
- How are these divided among national, international, and local sources?
- What other sources of food for consumption by schoolchildren, if any, other than existing school feeding programs, are available at schools?
- What proportion of these other sources include sales through local food vendors or school canteens?
- What proportion of school children take advantage of all existing food options?
- What other potential, untapped, sources of financing are available at the international, national and local levels of the country?
- What proportion of needs of children are normally met at home?

Food rations and timing of meals: what foods and meals should the program provide.

- Why are children coming to school hungry?
- Are children hungry because the family does not have the resources to provide an early meal for children?
- Is consuming breakfast culturally inappropriate?
- Are long distances between home and school a factor in hunger at school?

- Are there other reasons that children are hungry at school? What are these?
- Does hunger in schoolchildren affect their capacity to perform in school?
- Is there evidence of the impact of hunger of schoolchildren on school performance?
- What quantitative and qualitative nutritional deficiencies are prevalent in school-age children?
- What other dietary factors are important among school-age children?

Implementation: what issues are associated with the implementation of on-going school feeding programs.

- What are the logistical mechanisms used for on-going school feeding programs?
- Do these mechanisms operate effectively?
- What infrastructure is available and used?
- What human resources are available and used?
- What training has been provided?
- What on-going/in-service training is available?
- What are the major problems associated with school feeding in the country?
- How have these problems been addressed?

Monitoring and evaluation: the experience of current programs.

- Have there been any evaluations of school feeding programs?
- Has there been any measurable impact?
- What systems for monitoring and evaluation have been used?
- Are any of these systems currently in operation?

Box 1. Failure of Targeting in the Gambia

Pressure to maintain almost universal coverage of school feeding in the Gambia has resulted in a less effective program. World Food Program has supported SFPs in the Gambia since 1971, providing a ration comprised of rice, wheat flour, canned meat, oil, and sugar. The program has served on-site meals for about 92% of primary school children but resources for the program have been diminishing as enrollments have increased. Program administrators have diluted rations (provided smaller portions per child) in lieu of targeting to particular regions or schools, maintaining 92% coverage. An effort was made to produce local foods in school gardens as a way to increase supplies, however, these efforts have not been wholly successful.

Sources: King J, Del Rosso JM. (1994) "School Feeding in the Sahel: The Experiences of Burkina Faso, Cape Verde and the Gambia." (Unpublished)

Integrated interventions: other programs that would complement school feeding.

- What is the current nutrition and health situation of school-age children?
- What are the primary nutrition and health problems?
- Are other programs in operation which address any of these problems?

The goal of targeting is to identify and reach families and communities that lack the resources to adequately provide for their school-age children. If the SFP is intended to motivate families to enroll children in school and to ensure more regular attendance, the target group is families whose children are not in school or who are frequently absent. Mechanisms and criteria for SFP targeting are similar in many cases to those used for other social programs: economic, geographic, and nutrition status. In addition, specific education criteria such as overall enrollment, female enrollment, absenteeism, or student performance would also be included under some circumstances. In general it appears that SFP targeting is best done at the level of the school, or based on some other criteria—e.g., location—rather than on individual selection. The coverage of SFPs will depend on how many resources are available for programs and on the size of the problem that the program is intended to address.

Targeting Mechanisms

Economic Targeting. Economic or household income targeting is the most difficult of the targeting mechanisms available to implement, since measuring income is not straightforward, particularly where in-kind contributions to family income are substantial. Targeting is dependent on the availability of literate and numerate workers if bureaucratically administered income criteria are to be used. Community leaders, teachers, local government entities or voluntary organizations can participate in identifying the poorest households, but this requires clear criteria that are transparent and not based on political favoritism. If economic targeting is already in place for other programs, the school program could build on it, however, singling out individual children in a classroom or school for a feeding program or for a reduced price can be stigmatizing and socially and politically unacceptable.

Geographic Targeting. Targeting by geographic area is most commonly used in school feeding programming. By using a poverty map, programming is restricted to certain administrative areas in which people have a high probability of being poor. This type of targeting does not require administrative intervention, but people who are outside of the area may move or travel distances to participate in the program or may enroll their children in those schools. Changing established targeting criteria, usually restricting programs to certain areas, can be difficult and may not be acceptable (see Box 1).

Targeting by Nutrition Status. Targeting SFPs according to nutrition status is usually linked to geographic targeting. A census that records the height and age of first grade children can quickly and easily identify geographic areas at risk for malnutrition. It obtains these results at low cost—about 10 US cents per child—and can be implemented within a few months. Census results can also be used to target other social programs, in addition to school programs, increasing the benefits of the census relative to its cost. The census can also provide an updated register of schools, including the number of first grade children and their age at entry. This census technique may be less valuable for targeting programs in countries where malnutrition is widespread. It is not recommended to use the height census to select individuals nor is it recommended to do nutrition screening in schools exclusively for a school feeding program. The height census has been used extensively in Latin America, for example in Guatemala, Honduras and the Dominican Republic, to help pinpoint those regions and areas most in need of SFPs.

Gender Targeting. School feeding programming, particularly that supported by the WFP, has recently concentrated on addressing the need to encourage female enrollment and continuation in both primary and secondary school. Toward this end programs are not only targeted at specific regions within countries where female participation in school is a problem, but the ration provided to girls may be of higher nutritional and

caloric content to serve as an even greater incentive for girls to attend and stay in school. In some cases the continuation of WFP-assisted programs is contingent on a certain proportion of girls participating in the program (See Box 2).

Box 2. Increasing Female Enrollment and Attendance with School Feeding and other Food Transfer Mechanisms

In Pakistan a WFP-assisted program provides an income transfer of one or two tins of oil to families whose girls attend school for 20 days a month. In participating schools enrollment increased by 76% compared to 14% in the province. Attendance also increased from 76 to 93% in participating schools (WFP, 1995f).

In Bhutan, a similar program that provides an additional meal for girls has increased attendance in lower grades and newer schools. School enrollment has not changed since demand for school already outstrips supply (WFP, 1994a).

In Niger, where school enrollment is one of the lowest in the world, a WFP-assisted program is providing, in some areas, the equivalent of the total daily recommended food intake in three meals a day, as well as a take-home ration to attract nomadic girls to school. Evidence shows that when school canteens have been closed immediate and high absenteeism follows and children are withdrawn from school. Often the school year cannot start in some nomadic areas until the food stocks have arrived (WFP, 1996b).

SFPs, by virtue of the fact that they include food, are expensive. Beyond the costs of the food itself, the costs associated with food management, logistics and control can represent a significant financial burden for governments. On-site feeding is costly as it requires daily preparation and delivery of food, but is also a model that can invite, or require, community participation (See Box 3). In response to the difficulties of on-site feeding and a new focus on delivering an appropriately-timed (with regard to effecting improvements in learning capacity) and high quality, consistent ration, some countries are developing program models that include less costly commodities and more efficient systems for delivery to schools.

Programs that make good use of the education infrastructure for delivery and logistics will be most efficient. The very fact that SFPs do not require, for the most part, additional infrastructure means that they can be less costly than other types of feeding programs which distribute benefits to groups that are not in one location. Programs that finance expensive kitchen equipment and supplies or build new infrastructure/canteens, however, will significantly raise the costs and lower the relative cost-effectiveness of programs. Finding ways to minimize implementation problems, particularly food losses, either to spoilage, to the black market or leakage, will help to ensure the financial feasibility of programs. Some SFPs are intentionally designed as an income-transfer for families, especially those that are trying to help attract girls to schools; the benefit received by families from these programs must therefore surpass the costs of having their daughters away from home attending school.

What Do Programs Cost

A comparison of the costs of SFPs is problematic; the number of feeding days varies, as does the quantity of the rations and their quality. In the early 1990s two sizable studies made some accurate comparisons of cross-country cost information by standardizing and controlling for some of these differences. In one instance the data show that the cost of SFPs

ranges from US\$19.25 to US\$208.59 per 1,000 calories per student per day for 365 days (1989 US dollars). The mean program cost was US\$88.74, the median US\$81.46. These costs were found to be comparable to those of other types of feeding programs. See Table 1 below for the details of this analysis (Horton, 1992).

A study of feeding programs in Latin America provides the other major source of summary data of standardized school feeding costs. In this

Table 1: Sample of Standardized Costs of School Feeding Programs

Country	Ration (kcal)	Days per year	Cost per 1,000 kcal/day/365 days/year (US\$)	Number of Beneficiaries
Tamil Nadu Mid-Day Meal	418	200	67.02	NA
Madras Mid-Day Meal	418	NA	132.47	NA
Bolivia—4 Programs	325	165	53.53	2 large; 2 small
Ecuador—collection	365	165	61.10	200,000
Guatemala	456	165	19.25	1,093,000
Honduras—2 programs	180	165	24.38	300,000 and 294,393
Paraguay	324	165	208.29	76,493
Gambia	858	196	81.46	376,202
Morocco WFP 2288 Exp II	900	140	96.90	1,024,350
Tunisia WFP 3408	843	120	104.70	775,400
Nepal 3718 mix MCH and SF	622	293	56.50	377,650
Bolivia WFP 2795	1175	200	126.70	70,500

Source: Horton, S. (1992) "Unit Costs, Cost-Effectiveness, and Financing of Nutrition Interventions" PHN Working Paper 952 World Bank, Human Development Department, Washington, D.C

analysis of 16 SFPs, delivering 1,000 kcal, cost between US\$0.03 and US\$0.84; most were around US\$0.30. The cost for 100 grams of protein, another way to value the food delivered, ranged from US\$0.04 to US\$2.07, with milk at the extreme high end of the scale (World Bank, 1991). Annex 2 summarizes some of the program information from this study.

An analysis of three donor-assisted SFPs in Burkina Faso, Cape Verde and the Gambia show the range of costs associated with these SFPs. Consistent with the Horton research, the three programs cost between US\$43.12 and US\$171.43 per 1,000 kcal per student per day for 365 days/year. This analysis included the cost of the programs without the value of the food since the food does not represent an actual outlay for the countries. This calculation yields standardized program costs ranging from US\$17.24 to US\$56.05 per pupil per year. See Annex 3 for more detailed information on these cost comparisons.

Unlike these donor-assisted programs, some governments are developing and supporting SFP models that draw on the lessons learned regarding the timing of meals, alternative delivery mechanisms, decentralized management and the integration of other interventions with feeding. These programs are only in the early stages so that actual program data is unavailable, but for comparison it is useful to look at the proposed/budgeted food costs for these new programs. (See Box 3)

Financing And Cost Issues

Food Aid. Food aid is an important source of support for SFPs. There are high costs associated with transportation, warehouses and distribution; adequate storage facilities are required at every stage from port to the point of distribution. These costs are often borne by recipient governments. Management and distribution of food requires trained people to keep track of food inventories and their location, human resources may be as much of a constraint as cash and physical facilities. Nonetheless, if

Box 3. New Approaches to School Feeding

The new SFP in Indonesia is providing between US\$0.10 and US\$0.15 per ration per day to village schools via the village bank. The guidelines for the relatively small, locally made ration are that it should contain 300 kcal and about 5 grams of protein. It will be provided three times a week for nine months. The key to the Indonesian program is not only that it is a snack program, intended to be additional to rather than replacing a family meal, but that the food is integrated with other interventions - deworming, health and nutrition education and water and sanitation (Bappenas, 1996).

In South Africa, a national school breakfast program takes a similar approach with decentralized management, provision of funds for local food purchases and integrated interventions. The estimated cost of the ration, which will provide about 25% of the recommended daily allowance (RDA) for calories is about US\$0.30 per child per day. An additional 10% per child per day is intended to cover local operating costs (PSNP, 1994).

Bolivia's new USAID-assisted SFP is integrated with the educational reform underway in Bolivia. One objective of the reform is to increase parental involvement in education and the SFP is one mechanism for this. The municipalities will pay about US\$1.60 per student per year and contribute to transportation costs of the donated foods from warehouses to schools. The total cost per child per year is estimated at US\$4.00 for a snack program consisting of fortified bread and hot chocolate. The program will also integrate parasite treatment, health education and vision and hearing screening (USAID, 1996).

the economic and financial costs are acceptable then the cost of these programs may not be prohibitive relative to the benefit provided.

Private Sector. Drawing on the private sector for school feeding programming overcomes many of the difficulties of on-site preparation of meals, and may be one of the least costly ways to feed children in schools. The private sector in this case can be street vendors, local canteen or a large canteen company (in cities and more commercially sophisticated areas). However, even these programs incur costs in monitoring and supervision, and the start-up costs for developing school meal alternatives and making arrangements with vendors can be substantial. Programs that utilize school canteens or street food vendors for school-based feeding programs may offer the most economical approach to school feeding. However, the technical and logistical implications, and hence costs in training and supplies to improve the provision of food through these sources are not insubstantial. Remarkably little concrete analysis has been done on this approach to school feeding.

Food Selections. Certain food selections are particularly expensive; foremost among these is milk, which is expensive per the number of calories, and nutrients it provides, and is perishable, which if figured in with the cost increases costs even further. UHT milk alternatives, which overcome the perishability issues, are particularly expensive to produce, especially in developing countries where the relevant technology is not widespread.

Community Support. Parent-teacher or other community associations can play a significant role in a SFP and ultimately assume some of the costs. Efforts to strengthen parent-teacher organizations and increase the links between communities and schools are highly recommended.

Targeting. Where feasible, more refined targeting mechanisms that maximize the participation of the most needy populations improve the effi-

ciency of programs. Ultimately this can mean charging fees to students who can afford them for participation in the program.

Sustainability. Food transfer programs cannot be considered 'sustainable' in the same way as, for example, a revolving credit program, which ultimately pays for itself. A continual input of resources is required in order to provide food for school children. From the donor point of view, a program may be seen as sustainable if the government commits to continuing the program (in similar or another form) after donor support is removed. From the perspective of the individual beneficiary, the sustainable aspect of the program is likely to be the lasting impact on behavior changes brought about through education or other interventions that are part of the program (Rogers, 1994).

7 Step Four: Determine Optimal Rations and Timing of Meals

The 'best ration' and when to deliver it depends on the program's objective. School meals provided early in the school day to alleviate hunger before or while classes are in session should help to improve attention, concentration, and achievement among children. Historically, and even now, political and social objectives dominate in school feeding programming. School meals were viewed, and in many cases still are, as a means for a school child to receive a large meal in the middle of the day, which typically coincides with local dietary practices. These programs served, and continue to serve, not only as nutrition programs, but perhaps more as social welfare programs that provide a substantial economic benefit to the family since the child will not eat at mid-day from the family pot. Nonetheless, the nutritional quality and quantity of a ration should always be assessed as well as the effects of the timing of ration delivery. Other factors such as local food habits, logistical considerations, food availability, and cost will also influence the selection of the ration. General ration guidelines that can be applied almost universally are:

- A school snack or meal usually provides from one-third to one-half of the recommended daily allowance for energy and protein for the school-age group targeted by the program. A substantial ration is recommended to ensure overcompensating in order that parents don't withdraw more food at home than the child receives at school. Programs which include older children, particularly adolescents, in the target group will require larger rations to meet the increased nutritional needs during this period (see Table 2).
- Rations that fill the actual micronutrient gaps in the diets of school-age children are higher in nutritional quality and can be expected to have greater impacts on learning (see Table 3). Ensuring that the appropriate level of micronutrients is included in the school ration may require more than selecting the appropriate mix of foods. Fortification may be an option if the size of the ration is relatively small, where the ration itself, or a component like flour, is centrally processed, or where the foods to be used do not contain a high level of the most critical micronutrients (See Box 4).

Table 2: Mean Daily Per Capita Energy Requirement and Safe Protein Intake

	Pre-Primary 3–5 years	Primary 6–12 years	Adolescent 11–14 years*
Energy (Kcal)	1700	1900	2350
Protein (grams)	32	40	46

Sources: Energy and Protein Requirements World Health Organization, Geneva, 1985 (WHO Technical Report Series No. 724).

*Adopted from Recommended Dietary Allowance, 9th ed., 1980, with 1989 RDA numbers. These are U.S. standards that are generally higher for calories and lower for protein than international standards. WHO and FAO are in the process of preparing new guidelines for daily nutrient intake for all population groups.

- Fresh milk, although it appears to be nutritious and convenient, is not recommended as it is usually an expensive source of calories and is perishable and subject to contamination.
- A meal or snack provided early in the school day will eliminate hunger so that children are more attentive in class.

Table 3: Recommended Mean Daily Intakes for Vitamin A, Iron and Iodine

Age group	Vitamin A (ug retinol/IU)	Iron (mg)	Iodine (ug)
Pre-primary (1–6)	400/1330	10	90
Primary (7–10)	400/1330	10	120
Adolescents	500/1665 (10–12yrs)	12 (boys 11–14yrs)	150
	600/2000 (12–15yrs)	15 (girls 11–14yrs)	

Sources: Requirements of Vitamin A, Iron, Folate and Vitamin B. Report of a joint FAO/WHO Expert Consultation, FAO, Rome, 1988; USDA Website; WHO and ICCIDD, 1997; WHO Vitamin Requirements, Vitamin A, Iron, 1990.

Box 4. Filling the Micronutrient Gap through Fortified Rations

WFP-assisted programs offer the option of using fortified blended foods such as corn-soy blend or wheat-soy blend. These foods provide at least two-thirds of the daily micronutrient requirements of young children. Locally manufactured blended foods with similar quantities of micronutrients are available in many countries, for example, FAMIX in Ethiopia, HEPS in Zambia, INDIAMIX in India and Likuni Phala in Malawi (WFP, 1996d).

Local alternative programs such as the snack programs in the Dominican Republic and Peru offer another approach to providing a fortified ration. In the Dominican Republic the corn meal used in the production of the cookies and muffins for the SFP is fortified with 100% of the iron requirement for young children. All producers must purchase and use this corn meal in the production of the school ration. Similarly in Peru, one requirement in selecting producers of the grain product for the SFP was that the product contains at least two-thirds of the daily requirement for iron and vitamin A.

On-site prepared meals, pre-prepared meals and food in bulk or coupons are the primary school feeding program models. Each model is associated with a different set of issues related to program implementation (see Table 4).

In many cases the current emphasis on the timing of meals - providing the school meal early in the day to maximize the impact of the program on educational objectives- involves a significant change from current practice. Furthermore, given the conditions for meal preparation in many developing countries—e.g., the need to utilize volunteers, long distances to fetch water and fuel for cooking, slow cooking facilities—the successful preparation and provision of meals to children early in the day is not easy. New program approaches have recently been developed and tested to overcome some of the technical and logistical obstacles associated with SFPs that countries might consider in developing new and modifying on-going programs:

- **Use of snack foods.** Providing a snack as opposed to what may be a more traditional school meal (school lunch) will significantly cut the preparation time. In Indonesia, for example, a new program will provide from 10 to 15 US cents per ration for the local production of a snack food with 300 kcal and 5 grams of protein. The intent of this program is specifically to avoid industrially produced snack foods, since another objective is to increase local food production, however, the emphasis is equally on the delivery of an appropriately-timed snack. The basic foods to be used are tubers (cassava sweet potato, taro), cereals (rice, corn), fruits, and vegetables. Snack foods also avoid the problem of substitution of the school meal for one of the family meals; this is preferable from a nutritional perspective since the school meal will be additional to the normal diet (Bappenas, 1996).
- **Products with quicker cooking times.** Blended foods and cereal flours can be prepared much more quickly than unmilled whole grains. In Kenya, for example, a long-running program that provided a school

Table 5: The Logistics of Different School Feeding Program Models

Model	Infra-structure required	Staff requirements	Meal options	Feasibility of providing early meal	Issues
On-site meal preparation (donated food)	High	High	High (wide range of commodities possible)	Medium (cooking time involved)	High organizational requirements; monetization could simplify logistical problems; risk of substitution (i.e., replace family meal)
On-site meal preparation (local food)	Medium (if decentralized)	Medium	High depending (on local resources available)	Medium (cooking time involved)	Quality control of meals possible problem; mid and local level expertise needed; risk of substitution
Off-site prepared meal/snack—private sector participation	Low	Low	Low	High (if transport issues are resolved)	Monotony of ration; inadequate size/quality to meet food/nutrition deficit; difficulty reaching inaccessible areas
On-site prepared meal/snack—local food vendors	Low	Medium	Low (limited to local availability)	Medium (cooking time involved)	Quality control; hygiene and sanitation; mid and local level expertise needed for technical issues and management; relatively untested approach
Take-home coupons or cash or food in bulk	Medium	Medium	No meal	No meal	No expected impact on learning; unclear how much gets to the child

lunch to children involved more than 4 hours of preparation time. A recent pilot program which substituted the traditional meal of maize, beans, bread, vegetable oil etc. for a program which provided an early morning drink and biscuits and a mid-day porridge, made with a blended food, effectively cut the preparation time to less than an hour. Unfortunately, although the foods were readily accepted and there were savings in fuel costs, this saving was canceled out by the 35% higher cost for transportation since the shelf life of products was much shorter (WFP, 1994c).

- **Monetization.** Monetization is the sale of donated foods in the general market so that the central government can give the proceeds to school systems for feeding programs; the school systems then purchase the food in their local communities. This practice obviates the need to transport large quantities of food around countries, which in many cases is a severe obstacle to implementing consistent and effective programs. It also can increase the choice of food commodities that can be used in the feeding program. This practice is becoming increasingly popular. Although it generates income for the local economy, putting donated food in the market can depress indigenous food production and increase the risk of mismanagement and corruption. Issues of food preparation also need to be addressed.
- **The private sector.** The off-site prepared meal/snack program addresses many of the technical and logistical concerns of SFPs. Programs in Peru and the Dominican Republic are examples of the private sector approach to school meals. In both cases the meal provided is a snack or breakfast which is itself a break from the traditional school lunch. Utilizing private enterprises to prepare and deliver the snack foods to schools facilitates the provision of the ration early in the day as well as ensuring a consistent and high quality ration while taking a minimal time away from learning. One problem with these programs can be the monotony of the ration.

- **The informal private sector/street vendors.** Enlisting the support of local street vendors to provide better quality school meals to children is an option to consider. In Lesotho, for example, former local vendors who successfully bid to provide the privatized service run school canteens. In Nigeria, state and local governments train and license vendors who sell to schoolchildren. In other cases school principals exercise their authority locally and choose the vendors to serve their schools. A major concern that must be addressed in using this option is the quality and hygiene of the food served (Cohen, 1991).
- **Information, education and communication (IEC) campaigns.** Effective IEC programs which promote understanding of the benefits of providing meals earlier in the day and encourage the practices needed to realize early meal preparation, while addressing resistance to this approach, will help to encourage change to more cost-effective programs. Furthermore, it may be possible to alleviate hunger in schoolchildren without a formal feeding program. Encouraging and educating parents to feed their children before sending them to school or to provide a bag lunch or money for them to purchase food while at school may be an appropriate objective for IEC campaigns.

9 Step Six: Ensure Useful Monitoring of Processes and Evaluation of Outcomes

Program Monitoring

The purpose of program monitoring is to refine and optimize the approach to delivering the SFP to the beneficiaries. The monitoring system is not intended to assess the impact of a program, but to assess how consistently a program is operated relative to its design. The intention is to gather information that will help program administrators and participants to assess program operation. Such monitoring would ideally lead to the identification of bottlenecks in program operation and to suggestions of areas for improvement. It would inform program implementers, in particular, on the 'nuts and bolts' of program operation, such as:

- how many children are reached and where;
- what level of inputs are being delivered: number of meals served, calories delivered, micronutrients received;
- the quality and quantity of the activities under the SFP, for example, the training or education programs for staff and teachers, food storage and inventory practices, the organization and participation of the community in the program;
- how much is being spent in the various elements of the program.

Evaluation

The evaluation of a SFP entails looking at the impact of the program on some aspect of children's lives, for example, nutrition status, learning or school performance. The purpose of evaluating an on-going program is to explore what the effects of the program have been, to review how things have changed since the program has been in operation and to determine if the program has made a difference. Program evaluation is intended to contribute to informed decisions that could lead to the continuation of the program in its current form, discontinuation of the pro-

gram or to changes/improvements in the design. The indicators or measures of program performance to use in program evaluation will vary in each particular situation; availability of data will vary as will the capacity of local personnel and institutions. The expected impact of a particular program—the purpose of a SFP—will also vary; for example, those that are aimed at improving gender issues versus those that emphasize alleviation of short-term hunger in all children. Nevertheless, experience suggests that the following general guidelines can be usefully applied in the evaluation of SFPs:

- Indicators that are simple and feasible (in terms of ease of collection) are best. If local implementers cannot easily collect and analyze evaluation data then the system will not be useful.
- Where reliable and valid achievement and learning measures are not built into schools, proxy indicators for student learning can be devised. Attendance data is a proxy for learning; the research is clear that children who attend school more regularly learn more. Since attendance data is usually only available at the level of the school it is difficult to obtain. It is important to check the validity and reliability of this data and it would be useful to explore the possibility of collecting additional proxies for learning, such as classroom observations in a sample of schools, to assist in validating the attendance data.
- Gender-specific enrollment and other school data such as pupil flow (dropout, repetition) which is usually centrally collated may be easier to access. This data represents important measures for assessing program impact particularly where programs are intended to address gender issues. However, there tends to be a risk of substantial subjectivity in the measurement of these outcomes.
- Simple tools to assess health status in children—e.g. height-for-age, prevalence of parasitic infection—can also be used to demonstrate the impact of programs.

Offering other school-based health and nutrition interventions in addition to food can boost the educational and nutritional value of SFPs. Treating children for parasites, for example, can improve both their appetites and the nutritional benefit of the food ration. If the ration is not a good source of nutrients or adequately fortified with them, the SFP can be used to deliver micronutrient supplements. Nutrition and health education aimed at changing specific nutrition and health practices could also enhance the benefits of SFPs.

Key Interventions

School-based helminth control. School-based helminth control delivers deworming drugs to children through schools in areas where infection is common without screening individuals for infection. Treatment is inexpensive, safe, easy to deliver, and highly cost-effective (PARTNERSHIP FOR CHILD DEVELOPMENT, 1999b, Montresor et al, 1998). Bypassing the need for screening not only decreases cost but also increases compliance because some children choose to avoid the diagnostic procedure, which requires collection of a stool sample. Moreover because school-age children typically harbor the most intense helminth infections, treatment of this group is one of the best ways to reduce infection in the entire community. Integrating helminth control with SFPs is becoming a popular way to address this significant health problem of school-age children as well as to increase the value of the school meal. (See Box 5)

Micronutrient supplementation. As with school-based helminth control programs, school-based micronutrient supplementation programs are based on the premise that a large proportion of children are deficient in certain micronutrients, especially iron, iodine and vitamin A, and supplements can be easily and inexpensively delivered in a school setting. The costs of the micronutrients are quite low and if integrated with the delivery system of a SFP, no additional delivery costs need be incurred. Fortification of school rations remains the best alternative to alleviating micronutrient deficiencies where this is possible. If deficiency problems

Box 5. Integrated Approaches to School Feeding Programming

The new Indonesia SFP described above integrates deworming of students with feeding in participating schools. Earlier pilot efforts in Indonesia showed that combining deworming with the provision of food had an even greater impact on growth than when the food alone was provided.

In the state of Gujarat, India primary school students participating in a school meal program were provided with Albendazole (a treatment for intestinal parasites) along with the meal. The results of this program indicate a reduction in parasite infection from 71% to 40% with minimal additional costs since the SFP infrastructure was used for implementation (Gopaldas and Gujral, 1996).

A new school feeding program in Bolivia is another example of the integrated approach to SFPs. The program will include treatment of parasites, supplementation with micronutrients and Information, Education and Communication (IEC). Similarly, World Bank-assisted education projects in preparation in Haiti and Panama are integrating deworming and IEC in conjunction with improved targeting and delivery mechanisms for on-going SFPs.

are particularly severe or other factors inhibit the fortification of the ration, supplementation is the next best choice until fortification through the regular food supply is possible and widespread.

Information, education, communication (IEC). Inappropriate behavior by school-age children, such as playing in or drinking impure water, is the basis of many nutrition and health problems. Education that ad-

addresses specific nutrition and health practices is a critical element of school nutrition and health programs, including SFPs. Such education complements, and can help sustain, the benefits of short-to medium-term interventions such as deworming and micronutrient supplementation, which will in turn increase the benefits of SFPs. In addition, as mentioned earlier, IEC programs are important for promoting needed changes in SFPs and addressing resistances to these changes.

Introduction

This bibliography contains the majority of the literature related to SFPs produced in the last 10 years. Much of the experience with SFPs is not contained in the published literature, but is documented in unpublished evaluations and reports from development and government agencies involved in school feeding activities. This bibliography therefore includes not only published journal articles but also a significant sampling of the gray/unpublished literature related to school feeding. It is up to the reader to assess the value of this literature. This bibliography also includes a selective description of country SFPs for which some documentation is available. This is not a comprehensive, up-to-date listing of school feeding projects. The purpose is to provide the reader with a sense of the range in types of projects and a starting point for further investigation of programs in selected countries.

Review Articles

ABEL (Advancing Basic Education and Literacy) Information Bulletin. (1992) "School Feeding Programs and Educational Achievement." No. 36.

The research findings on the effects of SFPs on children's academic performance are explored. This is based primarily on the 1986 USAID evaluation of school feeding programs conducted by Levinger, and the 1990 UNESCO review of the literature on malnutrition and educational achievement by Pollitt. Detailed summaries of some of the most important early research linking school feeding to attendance (e.g. Gall and Eckroad on the Dominican Republic, Roy and Rath on India) and nutrition with academic performance and cognitive development are also included.

Del Rosso JM, Marek T. (1996) "Class Action: Improving School Performance in the Developing World through Better Health and Nutrition." Directions in Development, World Bank.

A summary of how improved nutrition and health can contribute to education is presented. In a discussion of suggested actions to take to enhance nutrition and health, school feeding programs are presented as a way to alleviate hunger in school children. Some of the major problems encountered in school feeding programs are presented with ways to enhance programs and maintain affordability.

Janke C. (1996) "SFPs and Education: Establishing the Context." Catholic Relief Service (CRS) School Feeding/Education Guidebook, Background Document.

Part of a series of documents prepared for CRS by the Education Development Center (EDC) to support CRS's effort to strengthen its food-assisted education programs, this document summarizes selected literature on the impact of SFPs on enrollment and attendance. It also explores ways that SFPs can contribute to enhanced academic achievement and learning outcomes. The author presents a series of lists of "best practices" for school feeding programs to: improve school enrollment and attendance; improve enrollment and attendance of girls and other vulnerable groups; improve health and nutrition status; mitigate short term hunger; address sensory impairments; provide complimentary health/nutrition interventions; address psychosocial status; and address school-based factors associated with learning outcomes (i.e., curriculum, teaching and infrastructure).

King J, Del Rosso J. (1994) "School Feeding in the Sahel: The Experience of Burkina Faso, Cape Verde and the Gambia." World Bank. (Unpublished)

This report summarizes and contrasts the results and conclusions of three SFP field assessments conducted in Burkina Faso, Cape Verde and the Gambia in late 1992. Information compiled on each program includes coverage, targeting, ration composition and quality, organizational and management issues, complementary interventions, costs and community

participation. The report includes a series of lessons learned and suggested steps toward improving program effectiveness.

Levinger B. (1986) "School Feeding Programs in Developing Countries: An Analysis of Actual and Potential Impact." Agency for International Development, USAID Evaluation Special Study No. 30.

The literature examining the relationships between SFPs and school attendance, enrollment, cognitive development and academic performance prior to 1986 is reviewed. The conclusion of the author was that SFPs seemed to make a difference in enrollment and attendance when there was a good fit between the design of the program and the operating environment. The author concludes that the research in studies reviewed on the impact of SFPs on cognitive development and school achievement is inconclusive.

Lusakulira-Villeneuve S. (1995) "An Overview of School Feeding Programs in Developing Countries: Effective Outcomes and Program Principles." (Unpublished)

A selective review of the impact of SFPs on nutrition status is presented. Of ten studies cited, seven showed a positive impact on nutrition; three were inconclusive. Studies are largely from the 1960s and 1970s. The author suggests that UNICEF, who sponsored the review, will increasingly be called upon to play a role in supporting SFPs as some agencies begin to withdraw support.

Pollitt E. (1990) "Food Supplementation and Hunger," in Malnutrition and Infection in the Classroom. UNESCO.

This chapter contains a review of the research literature related to school feeding. It discusses supplementation in early life and during the school period and the effects of this on school learning variables. The studies

discussed include the field experiments in Jamaica and Lawrence, Massachusetts, USA as well as the experimental studies examining the effects of hunger on school performance and cognition. Based on the research at that time the author concludes that there is a lack of consistency in the findings although there is a trend that suggests that hunger affects school competency. The author suggests that the contradictions in the literature are due to suspect methodologies and designs, the possibility that hungry children in the classroom adjust to their 'hungry' situation and school feeding programs that are nutritionally inadequate and do not remedy the nutritional deficiencies associated with learning difficulties.

Sanghvi TG, Moore EC. (1997) "Nutritional Supplementation of School Children: Nutrition, Health and Income to Support Primary Education." USAID Opportunities for Micronutrient Interventions (OMNI) Project. (Unpublished)

The choices in design of cost-effective supplemental programs for school-age children are summarized. Case studies from India, the USA, Honduras, Burkina Faso and Chile are presented. The authors suggest that supplemental school nutrition programs can be improved by streamlining management and logistical procedures, paying attention to quality and consistency, and developing mechanisms for cost recovery where possible. The key factors in program design highlighted by the authors include: configuring cash or food subsidies for maximum income transfer and carefully targeting these subsidies; timing the intake of supplements to maximize the impact on learning; contracting out logistical and administrative tasks to the private sector; and integrating health inputs (micronutrient supplements and deworming) with food.

Select Committee on Hunger; United States House of Representatives. (1987) "Alleviating World Hunger: Literacy and School Feeding Programs." US Government Printing Office.

Strongly endorsing United States support for SFPs, this review calls the widely-cited 1972 Checchi evaluation, which concluded that SFPs have no impact, are "impressionistic and methodologically weak" and points to other research that demonstrates a positive impact. Examples discussed are Tamil Nadu, Lesotho, Peru, Philippines, the Dominican Republic and Haiti. The review argues that instead of condemning school feeding, efforts need to be made to improve targeting, management and monitoring. Specifically, it calls for the review and modification of reporting and monitoring of programs and that the proceeds of monetization are now available for this. More limited scale evaluations are suggested to test hypothesized relationships between achievement or cognitive development and nutrition status conducted in field settings. Other recommendations include: better targeting by region or school, varying the size of rations, introducing payment schemes, improving communication with parents and other community members and integrating other education and nutrition projects and programs, including those that improve food security, with school feeding programs. Targeting issues raised include the political unpopularity of targeting and the lack of targeting infrastructure. Suggested targeting strategies are geographical targeting, varying the size of the ration and varying the amount charged for participation. Phasing out SFPs is recommended however, the authors say that little evidence exists to support the idea that the participation of communities, beneficiaries and governments in programs will successfully transfer the responsibilities for funding and operating school feeding.

World Bank. (1991) "Feeding Latin America's Children: An Analytical Survey of Food Programs." Report No. 9526 - LAC. Human Resources Division, Technical Department, Latin America and the Caribbean Regional Office.

This review of a wide-range of feeding programs in Latin America and the Caribbean is a compilation of data on virtually all SFPs in this region at the time. Summary data by country includes program coverage, number of beneficiaries, program, food and related costs and ration composition.

The report concludes that SFPs do not fit neatly into the category of poverty or nutrition program and suggests that SFPs be judged according to how well they help children stay and learn in school. The report also points to the logistical inadequacies of SFPs as a major factor in program effectiveness.

Breakfast and Cognition

Chandler AMK, Walker SP, Connolly K, Grantham-McGregor SM. (1995) "School Breakfast Improves Verbal Fluency in Undernourished Jamaican Children." Journal of Nutrition, 125 (4): 894-900.

The short-term effects on cognitive performance of giving breakfast to primary school children who were mildly malnourished, compared to adequately nourished, were investigated. A cross-over design, where each child experienced both conditions - breakfast and fasting - and was then compared with themselves, was used. A placebo (one-quarter of an orange) was given in the fasting condition to control for any extra attention that the children given breakfast might have received. The performance of undernourished children improved significantly on a test of verbal fluency when they received breakfast, whereas that of adequately nourished children did not change. No other effects of breakfast on test scores were evident. These findings replicate those from other Jamaican studies conducted under more controlled conditions and support the targeting of school meals to undernourished children.

Grantham-McGregor S, Chang S, Walker S, Powell C. (1995) "Jamaica School Feeding Studies." Tropical Metabolism Research Unit. (Unpublished)

A recent field-based Jamaica school breakfast program evaluation, which utilized a matched (nourished/malnourished) cross-over design, is the primary focus of this review paper. In addition to assessing the impact of breakfast on cognition and school performance measures, the

study looked at the effects of feeding on classroom behavior. The authors conclude that undernourished children improve in cognition when they receive breakfast but that the mechanism through which this occurs is unclear and requires further investigation. The impact on classroom behavior was not as straightforward: having breakfast was not necessarily beneficial to overall behavior. Only the children in the best-equipped school improved their behavior with breakfast and in two schools children spent less time on the tasks with breakfast. The authors hypothesize that where classroom organization and facilities are poor and the atmosphere noisy, the improved state of the child could not be channeled into constructive activities but served to increase disorder. A discussion of some of the developed country experimental studies is also included.

Levinger, B. (1989) "Malnutrition, School Feeding and Educational Performance." *Unesco-Unicef-WFP Cooperative Program, Notes, Comments, No. 186.*

This booklet reviews the literature on cognitive development and school achievement focusing on school breakfast participation and cognitive development in developed and developing countries. Important issues raised in the discussion that are still relevant are: how can cognitive development or school performance be best measured and; by what standard should a program be judged as either successful or unsuccessful? The author concludes that the evidence that SFPs can enhance cognitive development is inconclusive. In particular the author cites a lack of analysis of the difference in student populations and exposure times to school feeding programs as a major deficiency. Factors exogenous to the SFP exert as much influence on school performance as the program she argues.

Lopez I, de Andraca CG, Perales E, Heresi M, Castillo M, Colombo M. (1993) "Breakfast omission and cognitive performance of normal, wasted and stunted schoolchildren." *European Journal of Clinical Nutrition* 47:533-542.

The effects of missing breakfast on the cognitive performance of Chilean school children were examined. Children were assigned to a breakfast or a fasting group and were administered cognitive tests via a microcomputer. Other child characteristics including social-economic variables, previous day's food intake, IQ and nutrition status were collected and analyzed. Children who reported they had eaten breakfast on the day of the assessment were assigned to the breakfast group. No consistent association was found between study condition (fasting versus breakfast) and performance on cognitive tests. Stunted children showed significantly lower scores in attention under both conditions. Missing breakfast did not affect the accuracy of cognitive performance of children. This was true for both undernourished children and well-nourished children, although undernourished children did show a cognitive deficit compared with well-nourished peers.

Mathews R. (1996) "Importance of Breakfast to Cognitive Performance and Health." *Perspectives in Applied Nutrition*: 3,3: 204–212.

This article provides a summary of the main findings of a symposium held in August 1995 to review current investigations of breakfast and its relationship to cognitive performance and health. The consensus of the symposium, based on researchers' review of the science, was that breakfast is important to learning, memory and physical well-being in both children and adults. The main conclusions were as follows:

- Skipping breakfast is costly, particularly for children;
- Children who skip breakfast are not as efficient in the selection of critical information for problem-solving as their peers who have had breakfast;
- The ability to recall and use newly-acquired information, verbal fluency, and control of attention are principally affected;

- Both undernourished and well-nourished children experience these negative effects;
- The importance of breakfast for cognitive functions also has been demonstrated in young adults and the elderly;
- The reason is that brain function is sensitive to variation in the immediate availability of nutrient supply and energy;
- School breakfast programs are beneficial to nutrient intake, school attendance and academic performance;
- School breakfast programs represent a public health intervention that promotes well-being of children and improves the efficiency of the educational system in developed and developing countries;
- The benefits of breakfast and the consequences of missing breakfast need to be recognized.

Pollitt E. (1995) "Does Breakfast Make a Difference in School?" Journal of the American Dietetic Association, 95(10): 1134–1139.

The focus of this selective review of the literature on the effects of breakfast on cognition and school performance is on studies since 1978. The author suggests that while no definitive conclusions could be drawn based on the earlier literature, new data available from experimental studies since 1978 suggest that brain function is sensitive to short-term variations in nutrients. This is found to be the case particularly for nutritionally at risk 9 to 11 year old children. Moreover, the author concludes that in populations where children are nutritionally at risk, availability of breakfast may make it possible for a child to be well-nourished over the long-term and may prevent reversion to nutrient deficiencies that affect cognition. The analysis distinguishes between experimental and field

studies. Experimental studies are drawn from research in the United States, Jamaica, Chile, Great Britain, and Peru. The results of these studies showed that breakfast benefited undernourished children; the impact on well-nourished children was unclear. The field studies of school breakfast programs were from the United States, Jamaica and Peru. Their results were insufficient to draw definitive conclusions regarding the educational benefits of school breakfast programs.

Pollitt E, Cueto S, Jacoby E. (1995) "Breakfast and Memory Function in Children." Department of Pediatrics and Program of International Nutrition, University of California, Davis. (Unpublished)

The authors set forth the hypothesis that fasting for 14-16 hours has an adverse effect on working memory. The paper contrasts the results of experiments from the US and Peru. Experimental studies in the US fail to find a difference in the performance of children with or without breakfast. In contrast, in Peru, fasting led to delays in the retrieval of information from working memory.

Simeon DT, Grantham-McGregor S. (1989) "Effects of missing breakfast on the cognitive functions of school children of differing nutritional status." American Journal of Clinical Nutrition 49:646-53.

The effects of missing breakfast on cognitive function of three groups of children - stunted, non-stunted, previously severely malnourished - was examined experimentally. After an overnight fast, half of the children received breakfast on their first visit and a cup of tea on the second. The treatment order was reversed for the other half of the children. When breakfast was omitted, both the stunted and the previously malnourished children responded similarly; they received lower scores on cognitive tests compared to the control group. The authors conclude that cognitive functions are more vulnerable to missing breakfast in poorly nourished children.

Impact on Education (Enrollment, Attendance, Performance)

Agarwal DK, Upadhyay SK, Tripathi AM, Agarwal KN. (1987) Nutritional Status, Physical Work Capacity and Mental Function in School Children. Nutrition Foundation of India, Scientific Report 6.

A study of the state of health, nutrition and physical and mental competencies of 1,336 children, aged 6–8 years in the rural schools of Uttar Pradesh, for a period of more than three years, found that the problems of malnutrition and ill health cannot be overcome by the school meal program which provides less than 15% of the recommended daily allowance for calories. However, the program did improve school attendance and academic performance as well as reduce the school drop-out rate. Nutrition status appeared to be the most important determinant of scholastic performance.

Ahmed AU, Billah K. (1994) "Food for Education Program in Bangladesh: An Early Assessment." International Food Policy Research Institute, Bangladesh Food Policy Project, Dhaka.

Income supplements through food distribution in 4,787 primary schools - 30 kg of wheat per month to 698,000 beneficiaries—has achieved its objective of raising enrollment and attendance and reducing dropout of low-income families. This report documents a cost-effectiveness evaluation of this government-sponsored program. The survey covered 104 food for education (FFE) schools and 97 non-FFE schools. Enrollment increased by 20% in FFE schools compared with a 2% decline in non-FFE schools. Attendance improved in FFE and drop out was lower than in non-FFE schools. The program effectively targeted the program to low-income households, however the income benefits may not be great enough to entice children from the poorest households to attend schools. The FFE program transfers income to target households at least cost compared to other food-based programs—1.59 taka per 1 taka benefit

versus 6.55 to 1 in the rural rationing program. The cash-based rural maintenance program "cash-for-work" costs 1.32 taka per 1 taka benefit, the lowest of all targeted programs in Bangladesh.

Babu SC, Hallam JA. (1989) "Socioeconomic Impacts of school feeding programs: Empirical evidence from a South Indian village." Food Policy: 58–66.

A nutritious free meal is provided in Tamil Nadu to children aged 2–15 whose families have incomes below the poverty line. The program is implemented seven days a week throughout the year. Results indicate that the food from the SFP enabled households to increase their expenditures on non-food items and to spend less on cereals and more on milk, fruit and vegetables. A significant increase in school enrollment and in continuing education beyond the elementary level is also associated with the program.

Meyers AF, Sampson AE, Weitzman M, Rogers BL, Kayne H. (1989) "School Breakfast Program and School Performance." American Journal of Disabled Children 143:1234–1239.

A strong, positive evaluation of the US school breakfast program in Lawrence, Massachusetts, USA, an ethnically diverse city with a high proportion of low-income families, is presented. Six schools participated in the evaluation. All children in grades 3 to 6 were considered eligible to enroll in the study if they had qualified to receive free or reduced price school meals and had been registered in the public school system for the second semester of the school years 1985-1986 and 1986-1987. The school breakfast program began in late January before the start of the second semester of the 1986-87 school year. Participation in the program was related to improvement in standardized tests and rates of absenteeism and tardiness compared to children who qualified for the program but did not participate. The authors conclude that participation in the

breakfast program is associated with significant improvements in academic functioning among low-income school children.

Moore, EC. (1994) "Evaluation of the Burkina Faso School Feeding Program." Catholic Relief Services, consultant report. (Unpublished)

Analyses of the CRS/Burkina Faso SFP were based on: national data on enrollment, drop-out, and exam scores with participation in school feeding; individual 5-year time series data from 18 schools that had had their school canteen program suspended or was newly integrated into the program; and 18 matched pairs of schools to control for socio-economic status, quality of school, language, PTA operation, etc. The author concludes that the greatest impact of the SFP was on school attendance, and, in fact, the data may underestimate the impact since teachers are sanctioned based on low attendance rates. The relationship with enrollment was not consistent. There was an association between the school canteen and lower dropout rates in the most disadvantaged provinces. A relationship between higher success rates on the end of 6th year exams and participation in the program was also apparent, particularly among girls.

Organizacion Panamericana de la Salud. (1990) Evaluacion de un Programa de Alimentacion Escolar: El Caso Argentino. OPS.

Based on data collected in 1985–86 a study was designed to assess the impact of the SFP on school outcomes, participation and nutrition status. The study also assessed the operational aspects of the program such as success of decentralized control, costs, and coordination and management. The book outlined a wide range of problems associated with the program at the various levels of operation. At the national level the transfer of resources was inconsistent, there was poor or no supervision, and the rations were not based on nutritional necessity. At the provincial level there was an absence of criteria to guide the program effectively, i.e.,

ration guidance, beneficiary selection criteria, etc. and, inadequate resources to purchase food. At the local level the major problems related to financial deficiencies including infrastructure and equipment inadequacies as well as ineffective program administration. The results of the evaluation showed that the program had no impact on enrollment, which is already very high, or on dropout rates, already quite low. There was no clear impact on absenteeism except among low socio-economic groups where the program helped to reduce absences. There appeared to be a negative relationship between school feeding and achievement perhaps a reflection of the fact that the program operates in the poorest areas.

Phillips M, Saenz G, Fiedler J, Rogers B, Tatian P, Sanghvi T, Behrman J. (1995) "The Costs and Cost-Effectiveness of School Feeding and School Bonos Programs in Honduras." LAC Health and Nutrition Sustainability, USAID. (Unpublished)

In 1990 a food coupon program (*bono*) was initiated to subsidize the poorest sections of the population and provide a safety net. The *bonos* are distributed two to three times per year to parents of selected children based on socio-economic criteria. A school snack program is also available to some disadvantaged groups as an incentive for enrollment and participation in school. The costs and effectiveness of these two food aid programs supported by USAID in Honduras in 1993 were examined. Both programs appeared to serve as an inducement for school enrollment and participation; the *bono* program did this more efficiently. The snack program worked less well as an income transfer mechanism and in improving attendance but it is not as politically vulnerable and has a more direct impact on nutritional intake since it provides an appropriately timed snack.

Rogers BL, Sanghvi TG, Tatian P, Behrman J, Calderon M, Crelia S, Garcia M. (1995) "Food and Income Subsidies and Primary Schooling in Rural Honduras: An Evaluation of the Impact of the Bonos (BMJF) and PL480 Title II School Feeding Programs." Latin America and Caribbean Health and Nutrition Sustainability, USAID. (Unpublished)

The impact on enrollment, repetition, attendance, achievement scores and a composite indicator 'years ahead' of USAID/CARE's PL480 school feeding program and the PRAF's bonus income subsidy program (*Bonos*) in primary schools in Honduras is evaluated. The main sources of data used were a national household sample survey of 2700 households and a random sample of 132 selected rural primary schools and 2112 students. The results suggest that both programs have a significant impact on students' rate of academic progress. The effect of having school feeding available is to increase the rate of academic progress by over a quarter a year among 7–13 year old children. The effect is even greater in older children. The *bono* program has a positive, highly significant effect on attendance rates and is more popular among mothers. The SFP does not substitute for meals provided at home. Children who participate in the SFP have diets that are more adequate in calories, protein and vitamin A while the *bono* program was not associated with a change in dietary adequacy.

Pollitt E, Jacoby E, Cueto S. (1996) Desayuno Escolar y Rendimiento: A Proposito del Programa de Desayunos Escolares de Foncodes en el Peru. Lima, Pacific Press.

This book (only available in Spanish) reports the results of two studies that evaluated the impact of the school breakfast program initiated in Peru in 1993. The evaluation assessed the impact on diet, attendance, school performance and individual cognition. Chapter 1 provides background information on the history of SFPs. Chapter 2 describes the current program; a snack program provided through the private sector but with the participation of the communities and parents. Chapter 3 describes the methodology of the evaluation and presents the results of the initial field study. Chapter 4 presents a laboratory study designed to explain the results of the field trial. Chapter 5 integrates the results of the two studies. The overall conclusions of the authors are that (short-term) variations in energy and nutrients affect cognition especially for the nutritionally at-risk. The SFP was successful in increasing the daily intake of

children in the short- and long-term. School feeding also reduced absenteeism. Fasting had detrimental effects on cognition that affects performance. The final chapter discusses the relevance of SFPs to education.

Powell CA, Walker SP, Chang SM, Hutchinson SE, McGregor S. (1996) "Nutrition and School Performance in Rural Jamaican Children: Evaluation of the Effects of Breakfast and Determinants of Achievement." Tropical Metabolism Research Unit. (Unpublished)

About 400 undernourished students in grades 2 to 5 were matched with an equal number of well-nourished students in 16 rural Jamaican schools. Following baseline measures of weight, height, socio-economic status, breakfast history and attendance, children were randomly assigned to breakfast or placebo groups (who were given half an orange) for the school year. Although the effects were small, children who received breakfast had improved growth and attendance, and children in grades 2 and 3 who received breakfast improved in arithmetic compared with children who received the placebo. An additional analysis of 800 randomly chosen 5th grade children for iron status, helminths and other variables found that children with anemia and *Ascaris* had lower attendance levels; that shorter children had poor achievement in arithmetic and that children with *Trichuris* or *Ascaris* had lower levels of achievement in some subject areas. Food consumption data revealed a high consumption of snacks, sweets and syrup drinks, low participation in the 'nutribun' and cooked breakfast program (partly due to the irregularity of supplies for programs).

Rajan SI, Jayakumar A. (1992) "Impact of Noon Meal Program on Primary Education: An Exploratory Study in Tamil Nadu." Economic and Political Weekly: 2372–2380.

The impact of the noon mid-day meal program in India was assessed by analyzing existing data in pre- and post-program periods to identify trends in enrollment, attendance and dropout in participating primary

schools. The results suggest that the program has not had a positive impact on aggregate enrollment, but did have a positive impact on attendance and drop-out.

Simeon DT. (1995) "Evaluation of the Jamaican School Feeding Program." Tropical Metabolism Research Unit. (Unpublished)

The results of two evaluations of the impact of a school meal on achievement, attendance and growth are presented. Children in grade seven (12–13 year olds) who had the lowest ability were selected to participate and were followed for 2 semesters. Children received a school meal (milk 130kcal, cake 250 kcal or patty 600kcal—each for 33% of the time), a syrup drink (33 kcal) or nothing. The two controls were combined since no differences were observed. With breakfast, attendance and arithmetic improved; there was no change in spelling or child weight. Controlling for attendance, arithmetic improvement was still significant. In the second study 9–10 year old children were studied and showed similar results.

Weitzman M. (1987) "Excessive School Absence." Advances in Developmental and Behavioral Pediatrics 8:151–178.

Based on an analysis of experience in the United States, particularly in urban settings, the relationship between excessive school absence and poor student performance and premature dropout is documented. The link between excessive school absence and academic achievement is less conclusive. The author suggests that school absence could serve as a practical marker for 'at-risk' students.

World Food Program. (1995) "Thematic Evaluation of Long-Term School Canteen Projects in West Africa." WFP, Office of Evaluation.

To help assess the value of continuing WFP support for school canteen programs in West Africa, four country assessments—Mauritania, Gambia, Cape Verde, Niger—were undertaken. The study concludes that: the

impact of school canteens on enrollment is difficult, if not impossible, to ascertain; the impact on attendance is easily and statistically ascertainable; the impact on pupils' learning capacity can be shown qualitatively through day-to-day activities. On the negative side the results suggest that no improvement in hygiene and nutrition education can be expected in the present context and that school feeding does not appear to be a motivation for sending girls to school in situations where sociological prejudices against schooling girls exist. Information, Education and Communication (IEC) programs are needed to address resistance to sending girls to school. The sustainability of school canteen programs in West Africa by governments appears unlikely given the slow rate of development in this area. Finally, vegetable gardens have not significantly contributed to SFPs.

World Food Program. (1996) "Report on Pilot School Feeding Program." Evaluation report, WFP/Malawi. (Unpublished)

A pilot for a school feeding program conducted in 8 schools (4 receiving the program and 4 control schools) on the outskirts of Lilongwe in Malawi showed that the SFP clearly had an impact on enrollment and attendance. Schools participating in the program provided children with a cooked porridge (soya and maize flour, iodized salt) providing one-third of the daily recommended caloric intake during the morning of each school day. In addition, deworming tablets were provided to children twice at six month intervals and latrines were under construction at the pilot schools. In program schools there was an increase of about 5% in enrollment over three months; there was no increase in control schools. There was an even greater impact on absenteeism: 1-2% in program schools compared to 27-36% in control schools over the same period.

Wyon D, Abrahamsson L, Jartelius M, Fletcher R. (1996) "The effects of energy intake at breakfast on the school performance of 10-year-old Swedish children." National Institute of Occupational Health, Denmark. (Unpublished)

Two studies conducted in Sweden to assess the impact of different breakfast conditions on school performance are reported on in this paper. Both were carefully controlled random trials. In both experiments voluntary physical endurance and performance on creativity tests were significantly better with an adequate breakfast (more than 500 kcal) than after an inadequate breakfast (less than 200kcal). Errors in routine tasks decreased with increased energy intake. There was a 12-year interval between the two studies yet the results were almost identical. The more recent study was designed to overcome some of the deficiencies of the earlier one.

School Feeding and Dietary Intake

Chambers CM. (1991) "An Evaluation of the World Food Program (WFP)/ Jamaica 2727 School Feeding Program." *Cajunas* 24(2): 91-102.

A questionnaire, including a 24-hour dietary recall, and measures of anthropometric status (weights and heights) were analyzed to assess the impact of a school breakfast program, consisting of a bun and 1/2 pint of milk. Random selection was used and the sample included both participating and non-participating students so that comparisons could be made. The results show that the program appears to make a significant contribution to the diet of some school children by providing 32.2% of daily energy needs and 45.1% of protein. There was no discernible effect on nutrition status or on school attendance. Compliance/participation in the school breakfast program and school attendance are highly influenced by socio-economic status. Children from better-off families were more likely to attend school regularly, but less likely to participate regularly in the SFP.

Dall'Acqua FM. (1991) "Economic Adjustment and nutrition policies: Evaluation of a school-lunch program in Brazil." *Food and Nutrition Bulletin* 13(3): 202-209.

This qualitative assessment of the major 'nutrition' program in Brazil (25 million students, 80% of school children in 1986) examines the impact of the lunch program on the consumption of calories and protein by school children in Sao Paulo. For 60% of parents the program served as an incentive to send their children to school. Access to the program increased the availability of calories based on an analysis of the estimated coefficients for income elasticity of nutrient and calorie consumption. Access to the school lunch program is associated with an increased availability of 357 calories and 8.5 grams of protein per student.

Jacoby E, Pollitt E. (1997) "Benefits of a School Breakfast Program among Andean Children in Huaraz, Peru." *Food and Nutrition Bulletin* (in press).

A randomized control trial was conducted to measure the short-term impact of the Peruvian school breakfast program on diet, school attendance and cognition in fourth and fifth graders. Ten schools on the rural outskirts of the Andean city of Huaraz were randomly assigned to either a control (no breakfast program) or treatment (breakfast program) group. The program significantly increased dietary intakes of energy by 2%, protein by 28% and iron by 4% , and improved rates of attendance. An analysis also showed improved performance in a vocabulary test among heavier children. The authors suggest that among stunted children, being relatively overweight poses a cognitive risk that can be partially reversed by school breakfast.

Kennedy E, Davis C. "USDA School Breakfast Program." *Center for Nutrition Policy and Promotion. (Unpublished)*

This paper provides an overview of the US school breakfast program serving 6.3 million children in 64,000 schools in 1995. It reviews the evaluation literature on the school breakfast program concluding that there is clear evidence that the program improves the dietary intake of low-income children. Only two studies are available which assess the

impact of the breakfast program on cognition. One of those showed no effects on cognition although 90% of children ate breakfast.

Satoto. (1993) "Preliminary Executive Report Evaluation of School Feeding Program (PMT-AS) in Lombok." (Unpublished)

The guidelines of the pilot PMT-AS SFP in Lombok, Indonesia provided to 16,000 school children called for local food supplies to be used to produce a cooked school meal of between 200–300 calories and 3 to 5 grams of protein per ration. Some schools also provided anthelmintic treatment to school children. A matched school (participating versus non-participating) evaluation assessed the impact of the feeding on nutrition status, school attendance, IQ, and school performance. The impact of the combined intervention—food and deworming—was also assessed. Both the SFP and the anthelmintic treatment were associated with increased calorie intake (204 kcal for SFP, 306 kcal with both interventions). A sub-sample of children was tested for the impact on hemoglobin levels; none was detected. Height-for-age and weight-for-age improved with the SFP and with the combined intervention. The best results were obtained with both treatments, while anthelmintic treatment with Mebendazole alone improved nutrition more than food alone. Males benefited more than females and children aged 6–7 benefited the most. The impact on height-for-age was greatest in 8 to 9 year old children while no effect was discernible in 10 to 11 year old group.

School Feeding and Iron

Kruger M, Badenhorst CJ, et al. (1994) "The effects of an iron fortification in a school feeding scheme and anthelmintic therapy on the iron status and growth of 6-8 year old school children." (Unpublished)

A clinical trial was conducted in South Africa to determine the effect of iron fortification of soup in a school feeding scheme and anthelmintic therapy on iron status and hemoglobin. The children (N= 179) received

either iron fortified or unfortified soup with either anthelmintic therapy or a placebo. Measurements were taken before intervention and after 6 months of intervention and were repeated 5 months later. Children with low baseline iron stores benefited most from the intervention. Significant positive effects of the anthelmintic therapy on hemoglobin and iron stores were found. By combining the two treatments (fortified soup and deworming), additional benefits were observed. Children with adequate baseline iron stores showed smaller, but similar beneficial changes.

Ranum P. (1994) "Report on Project to Fortify School Lunch Foods in the Dominican Republic with Iron." Elf Atochem N.A. Buffalo, NY. (Unpublished)

This report describes a feasibility study for adding iron to the corn meal used to make the cookies and muffins provided in the Dominican Republic school feeding program. The report discusses the iron source selected, the level of iron to be added, the method of fortification, and information on labeling and safety of the fortified corn meal. The author concludes that the concept of using a highly fortified corn meal as a baking ingredient could be extended to other feeding programs such as one in a rural area in the Dominican Republic and serve as a prototype for other country programs.

Walter T, Hertrampf E, Pizarro F, Olivares M, Llaguno S, Letelier A, Vega V, Stekel A. (1993) "Effect of bovine-hemoglobin-fortified cookies on iron status of schoolchildren: a nationwide program in Chile." *American Journal of Clinical Nutrition*, 57:190-194.

A case-control study of the impact of providing heme-fortified cookies to school-aged children in Chile found significant differences in hemoglobin concentrations. Higher concentrations of hemoglobin were found in children receiving fortified cookies through the Chilean school lunch program than in those who received un-fortified cookies. The impact was most significant in children with greater demands for iron, such as post-

menarchial girls and pubertal boys. No effect was evident in the prevalence of iron deficiency anemia. The authors suggests this is due to the low levels of anemia in both groups of children and that in regions of high prevalence of anemia the effect of the heme-fortified cookie on iron status would be even more important.

Food Aid and Education

World Food Program (1993) "Evaluation of the World Food Program: Final Report." Chapters 6.0, 6.3, 6.3.2.

In 1990–91 WFP estimated that there were 700 to 800 million chronically undernourished children in the world. This was part of the rationale for the continuation of food aid. The advantages of utilizing food aid cited are that food does not lose value and enables targeting those most in need. The biggest drawback is that food is expensive to transport and manage and is perishable. The report confirms the dearth of evaluation data on SFPs; extremely little exists beyond anecdotal information and mission reports. Important issues presented are that school feeding tends to benefit better off families, create dependence, and that the food management, logistics and control of food aid represents a significant financial burden for governments.

World Food Program. (1995) "Operational Guidelines for WFP Assistance to Education." WFP Document SCP15/INF/3.

These guidelines, prepared in conjunction with UNESCO, were developed to ensure rigor and consistency in the design, implementation and evaluation of projects in the education sector. Chapter 1, 'The importance of education in the alleviation of poverty and hunger,' establishes the link between education and the WFP's mandate to alleviate poverty and hunger. Chapter 2, 'The importance of food aid for education—the case of school feeding,' provides an overview of the research findings on the effects of school feeding. Chapter 3, 'Operating principles for formulation

of projects assisting the education sector,' draws the operational implications of the preceding information for WFP's activities.

Feeding and Complimentary Interventions

Gopaldas T, Gujral S. (1996) "The Pre-Post Impact Evaluation of the Improved Mid-Day Meal Program, Gujarat (1994–continuing)." Tara Consultancy Services, Baroda, India.

The results of a field-level impact evaluation of an improved SFP assessing nearly 6,000 school children in 3 districts in Gujarat are summarized. The SFP, which reaches about 3 million children, integrated the provision of a six-monthly dose of an anthelmintic, vitamin A and daily iron supplements with feeding for 85 days in a school term. The evaluation consisted of the analysis of the baseline and re-survey (6–9 months after the implementation of the interventions) data on parasite prevalence, iron and vitamin A status and growth of school children participating in the program. The results were as follows: a reduction in parasitic infection from 71 to 4%; an improvement in hemoglobin status from 10.5ug/L to 11.7ug/L serum ferritin for girls and 10.7ug/L to 11.9ug/L serum ferritin for boys; a decline in the signs of vitamin A deficiency from 48 to 2%; an improvement in growth both in younger and older children. Of note is the authors' conclusion that the information, education and communication channels were not effective and required strengthening.

Gopaldas T, Gujral S. (1996) "A report on the Process Evaluation of the Improved Mid-Day Meal Program, Gujarat (1994–Continuing)." Tara Consultancy Services Baroda, India.

The process evaluation of the Improved Mid-day Meal Program in Gujarat examined procurement, training, coordination, storage, transportation and coverage. The highlights of the evaluation are that supplies were adequate and that planning, coordination and procurement were commended. The authors report that no extra costs were incurred for the

transportation, logistics and training associated with the delivery of the additional inputs (vitamin A, anthelmintic, iron). This conclusion is based on the analysis of a structured questionnaire administered to teachers, administrators and principals. The report includes a copy of the instruments used.

Tara Consultancy Services. (1995) A Sentinel study: Evaluation of the Process and Impact of the Mid-day Meal and School Health program in Gujarat, 1993–1996. Baroda, India.

In 1994, 250 children aged 6–15 years participating in the new SFP were studied. Information was collected on socio-economic and environmental status, intestinal parasitic infections, anthropometrics, dietary intake and hemoglobin levels. The major feature of this report is the parasitic analysis. Overall 75% of children were infected with intestinal parasites. Non-infected, older children, age 11 to 15 years, were on average 2.4 kg heavier and 3.5 centimeters taller than infected children. There was also a negative relationship between parasitic infection and hemoglobin levels.

Monitoring and Evaluating School Feeding Programs

Levinger B. (1996) "How to Design a Monitoring and Evaluation System to Improve the Quality of CRS-Sponsored School Feeding Interventions." CRS School Feeding/ Education Guidebook, Mini Handbook.

Part two of the Catholic Relief Service (CRS) guidebook series provides a general approach to monitoring and evaluation SFPs and a matrix tool to facilitate the adoption of this approach. Guidance on data collection, selection of indicators, questionnaire design and other relevant information to facilitate the successful application of the matrix in the field is also provided. Subsystems of SFPs are defined and include training, outreach and dissemination; service delivery; program management and logistics; community organization; and monitoring and evaluation. The author ar-

gues that the purpose of evaluation is to explore the terrain, to review what has happened since an intervention or policy was tried, to collect impressions about the extent to which the intervention made a difference, to suggest what problems remain and to speculate about alternative designs for similar projects or programs. In other words it is to contribute to informed decisions, rather than to come to a definitive conclusion that project X led to result Y, and that Y would not have occurred in the absence of the project. Four ways to validate the conclusions of an evaluation are discussed: to conduct evaluations using highly qualified development experts; to ensure that the study is conceptually clear, to provide for comparisons, i.e., matched schools; and to use appropriate and careful data collection techniques. Generic monitoring and evaluation questions are included.

Street Foods

Cohen M. (1991) "Use of Microenterprises in the Delivery of Food Programs to School Children." (Unpublished)

The author discusses the significant contribution street food trade makes in some areas to the diet of school-age children and argues for using this part of the food distribution system when considering school feeding programming. Project experiences suggest that the informal institution of street food vendors have been effectively used to deliver nutrition/food assistance to school children. Working with street vendors to improve the nutritional quality and safety of these foods for children involves an approach that considers not only the needs of children but also the financial viability of the enterprise and the training and management needs of the individual vendor. The author argues that the success of using this approach for school feeding programming depends on involving all institutions which may affect the legitimacy of this economic activity, i.e., municipal and local government, ministries of education and health, and non-governmental organizations which represent vendors' interests.

Food Security

Hicks KM. (1996) "Food Security and School Feeding Programs." Catholic Relief Service (CRS) School Feeding/Education Guidebook, Background Document.

Part three of the Catholic Relief Service (CRS) Guidebook provides an analysis of the links between SFPs and food security. The author argues that SFPs can have an impact on both short- and long-term food security if they are targeted to food secure communities, have solid, comprehensive designs and are well implemented. Simply providing a meal to a child is not adequate to effect change in food security. The author suggests that rations should be bolstered in the lean season and that other interventions such as income generation or agricultural extension need to be introduced. The concept of a 'comprehensive' SFP is introduced: one that can be designed to do much more than deliver food to children. For example, it may include efforts to foster local food production, food processing and small-scale enterprise, or help to finance improvements in school infrastructure. Detailed criteria for ration assessment, including the objectives of the ration (quantity, quality, timing, targeting), whether these are met and how to maximize the benefits are provided.

ANNEX 2. Sample of Standardized Costs of School Feeding Programs in Latin America

Country	Ration (annualized)	Number of Days of Feeding	Cost per 1,000 kcal (US\$)	Number of Beneficiaries
Bolivia	572	200	0.22 (food only)	21,100
Chile	700	> 200	0.59	459,241
Colombia	248	130-170	0.24	1,559,477
Costa Rica	216	150	0.35	384,578
Dominican Rep	382	180	0.24	88,000
Ecuador WFP	252	190	0.13	300,000
Ecuador GOE	144	150	0.21	400,000
El Salvador	237	160	0.36	224,804
Guatemala	163	180	0.12	1,239,520
Honduras	88	160	0.26	558,749
Jamaica	242	180	0.79	80,000
Panama	111	180	0.02 (food only)	58,860
Paraguay	43	180	0.84	82,500
Peru WFP	484	180	0.03	300,000
Uruguay	375	312	0.41 (food only)	126,000
Venezuela-1	851 (lunch)	260	0.12	310,576
Venezuela-2	304 (snack)	260	0.11	483,452
Venezuela-3	149 (milk)	260	0.33	1,819,643

Source: World Bank. (1991) "Feeding Latin America's Children: An Analytical Survey of Food Programs." Report No 9526—LAC. Human Resources Division, Technical Department, Latin America and the Caribbean Regional Office.

**ANNEX 3. Costs and Characteristics of SFPs
in Three Sub-Saharan African Countries**

Characteristic	Burkina Faso	Cape Verde	The Gambia
Food (grams/day)	Cornmeal (200) Pinto Beans (50) Oil (25)	Rice (50) Corn-Soya (50) Milk (30), Oil (15) Canned Meat (40) Sugar (10) Dried Fruit (20)	Rice (160) Wheat Flour (20) Canned Meat (30) Oil (20)
Calories per day	1109	760	850
Protein (grams)	29	32	20
Beneficiaries	315,000	73,000	83,000
Number feeding days per year	160	189	200
Cost per 1,000 kcal per child per 365 days/year(US\$)	\$43.12	\$171.43	\$79.68
Cost per 1,000 kcal per child per 365 days/year (without the value of the food) (US\$)	\$17.24	\$56.05	\$23.75

Source: King and Dei Rosso, School Feeding in the Sahel: The Experience of Burkina Faso, Cape Verde and the Gambia, Unpublished, 1994.

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