

On the transition to sustainability: An analysis of the costs of school feeding compared with the costs of primary education

Donald Bundy, Carmen Burbano, Aulo Gelli, Claire Risley, and Kristie Neeser

Abstract

Background. The current food, fuel, and financial crises have highlighted the importance of school feeding programs both as a social safety net for children living in poverty and food insecurity, and as part of national educational policies and plans.

Objective. To examine the costs of school feeding, in terms of both the absolute cost per child and the cost per child relative to overall education expenditure and gross domestic product (GDP) in low-, middle-, and high-income countries.

Methods. Data on the costs of school feeding in different countries were collected from multiple sources, including World Food Programme project data, reports from government ministries, and, where such searches failed, newspaper articles and other literature obtained from internet searches. Regression models were then used to analyze the relationships between school feeding costs, the per capita costs of primary education and GDP per capita.

Results. School feeding programs in low-income countries exhibit large variations in cost, with concomitant opportunities for cost containment. As countries get richer, however, school feeding costs become a much smaller proportion of the investment in education. The per capita costs of feeding relative to education decline nonlinearly with increasing GDP.

Conclusions. These analyses suggest that the main reason for this decline in the relative cost of school feeding versus primary education is a greatly increased

investment per child in primary education as GDP rises, but a fairly flat investment in food. The analyses also show that there appears to be a transitional discontinuity at the interface between the lower- and middle-income countries, which tends to coincide with changes in the capacity of governments to take over the management and funding of programs. Further analysis is required to define these relationships, but an initial conclusion is that supporting countries to maintain an investment in school feeding through this transition may emerge as a key role for development partners.

Key words: Costs, education, school feeding, sustainability

Introduction

The current food, fuel, and financial crises have highlighted the importance of school feeding programs both as a social safety net for children living in poverty and food insecurity, and as part of national educational policies and plans. Appropriately designed school feeding programs have been shown to increase access to education and learning and improve children's health and nutrition, especially when integrated into comprehensive school health and nutrition programs. As school feeding programs run for a fixed number of days a year and normally have a predetermined food basket, they also provide an opportunity to benefit local farmers, producers, and processors by generating a stable, structured, and predictable demand for their products, thereby building the market and the enabling systems around it.

A recent analysis of school feeding programs jointly undertaken by the World Bank and the World Food Programme (WFP) suggests that today, perhaps for the first time in history, every country for which we have information is seeking to provide food, in some way and at some scale, to its schoolchildren. The coverage is most complete in the rich and middle-income

Donald Bundy is affiliated with the World Bank, Washington, DC; Carmen Burbano is affiliated with the World Food Programme, Rome; Aulo Gelli, Claire Risley, and Kristie Neeser are affiliated with the Partnership for Child Development, Imperial College, London.

Please direct queries to the corresponding author: Aulo Gelli, PCD, Department of Infectious Disease Epidemiology, Imperial College Faculty of Medicine, St. Mary's Campus, Norfolk Place, London W2 1PG, UK; e-mail: aulo.gelli09@imperial.ac.uk.

countries, and it seems that most countries that can afford to provide food for their schoolchildren do so. However, where the need is greatest—in terms of hunger, poverty, and poor social indicators—the programs tend to be the smallest, though usually targeted to the most food-insecure regions. These programs are also those most reliant on external support [1].

The recent review also highlights the fact that many countries for which data are available do not seem to seek to cease providing food to their schoolchildren. On the contrary, many countries appear to seek to expand the coverage of their programs and establish them as national programs mainstreamed into national policy. The aim is not to phase out the programs, but rather to transition from externally supported projects to national programs, including in many cases a move toward procuring food in more decentralized or “local” purchases.

The monitoring of financial inputs into school feeding is critical for a number of reasons, including accountability, equity, and transparency. Moreover, assessing the costs of school feeding relative to expenditure on education is a key element in the analysis of the transition from externally funded programs to nationally owned, sustainable programs. In this paper we describe the details of the analysis included in the joint World Bank and WFP study on the costs of school feeding, in terms of both the absolute cost per child and the cost per child relative to overall education expenditure and gross domestic product (GDP), in low-, middle-, and high-income countries.*

In general, in low- and middle-income settings, school feeding programs are designed with educational goals and are framed within educational sector policies and plans. The program theory on the educational benefits of school feeding is generally well established and underpinned by an increasingly robust evidence base. School feeding programs can help to get children into school and help to keep them there by enhancing enrollment and reducing absenteeism; and once the children are in school, the programs can contribute to their learning by averting hunger and enhancing cognitive abilities (see Adelman et al. [2] for a recent review of program impact). Seen from this perspective, the comparison between per capita expenditures on education and per capita costs of school feeding offers useful insights into the financial capacity in low- and middle-income settings to sustainably fund program implementation.

* This analysis was prepared as a background paper that was summarized in Bundy et al. [1]. This paper includes the detailed data analysis and full report of the findings.

Methods

Despite its popularity, there are very few studies that assess the costs of school feeding, and reliable figures are difficult to obtain. Data on the costs of school feeding in different countries were collected from multiple sources, including WFP project data, reports from government ministries, and, where such searches failed, newspaper articles and other literature obtained from internet searches. For low-income countries, WFP cost data were used, as reported in a comprehensive study using data from 42 countries [3]. In this case, we adjusted the WFP costs to include implementing partner costs using scaling parameters from previous studies (see Galloway et al. [4] for on-site meals, Gelli et al. [5] for biscuits, and Ahmed et al. [6] for take-home rations). Estimated daily costs per on-site meal were converted to annual costs per child using a fixed school year with 200 feeding days. All estimates were converted to US dollars with the use of an internet-based currency converter set to a fixed reference date.

Data on the per capita costs of education were obtained by multiplying the per student share of GDP expenditure on primary education by the per capita GDP [7]. We analyzed the relationships between school feeding costs and costs of education against GDP per capita by linear regression models (see **fig. 1**). We then explored the relationship between the ratio of the absolute cost of school feeding to the costs per child of primary education against GDP per capita. To fit the curve, we used data from the linear regressions of school feeding cost and education cost per child on GDP per capita. The data are heteroskedastic, so the sum of squares term that was minimized to calculate the best fit was

$$SS = \sum \log(|x - xr|)^2$$

where x is the value of the school feeding or education cost data point, and xr is the value of the linear regression at this point. The gradient and intercept were varied to minimize this SS. The expression describing the curve fit is the ratio of these regression equations (as shown in **fig. 2**). The data that fit to this curve were also fitted to two straight lines. The two points between which the discontinuity was best placed were found by finding a least sum of squared differences between the two-line model and the y values of the points in **figure 2**.

Results

A rigorous search for data was undertaken, but it is not claimed that the data are comprehensive. The absolute costs of school feeding per child per year were identified in 27 low-income countries, 36 middle-income countries, and 8 high-income countries. The summary

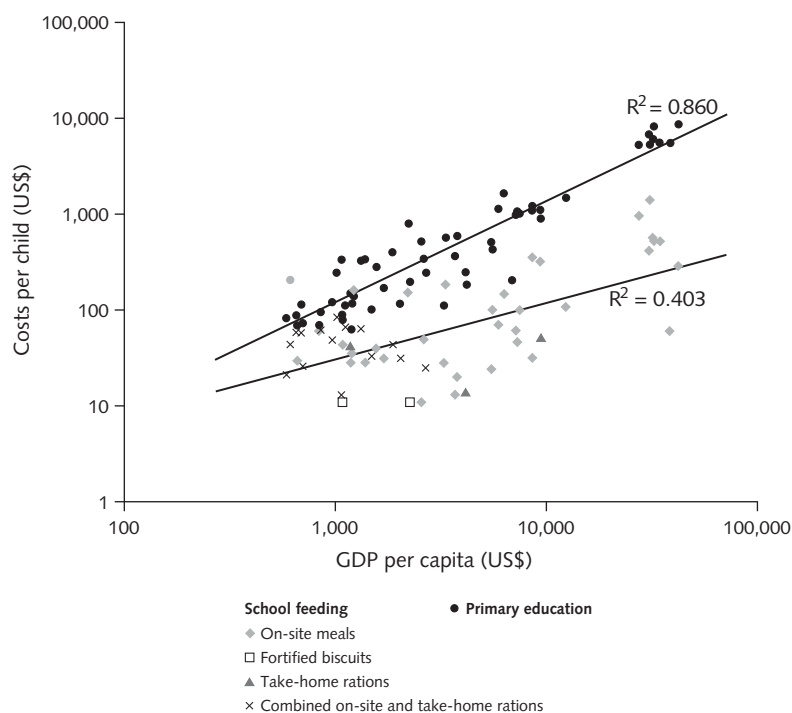


FIG. 1. Changes in the costs per child of school feeding and primary education with economic growth (per capita GDP) for 58 countries. GDP per capita (purchasing power parity, constant 2005 international US dollars), and education costs per child are from the UNESCO Institute for Statistics, and school feeding costs per child were calculated from country program documents and World Food Programme reports. A rigorous search for data was undertaken, but it is not claimed that the data are comprehensive

statistics for the absolute costs of school feeding per child per year, the ratio of the cost of school feeding per child to the per capita cost of education, and the ratio of the cost of school feeding per child to the per capita GDP are reported in **table 1**. Scatter plots, with linear regressions, of the costs of school feeding per child, and the costs of education, against GDP are shown in **figure 1**.

The results show, as expected, that the per capita costs increase with GDP (see **fig. 1**). The best-fit lines for the school feeding costs and education costs demonstrate how education costs increase more with GDP growth than do school feeding costs. These are logarithmic data, so the real differences are greater than they appear. The education data are for primary education only, and no attempt is made here to standardize education provision (for example, years of education) between countries. The school feeding costs are per beneficiary estimates and make no allowance for differences in coverage, which are typically much lower in low-income countries. The costs of school feeding are shown for three different modalities and one type of combination.

Figure 2 shows the ratio of the per child cost of school feeding over the cost per child of education,

plotted against GDP per capita, alongside details of regression data. **Figures 1 and 2** taken together show considerable variation in the per capita cost of school feeding and the ratio between this and the per capita cost of primary education, but largely in the poorest countries. **Figure 2** highlights how the relative cost of school feeding versus education becomes consistently low as GDP rises. The analysis in **figure 2** also shows that the best placement for a discontinuity is around a per capita GDP of US\$2,500 to US\$2,600, with countries below this level showing variation in cost ratios from 5% to 120%, and data from richer countries being much more consistent at around 10% to 20%.

Discussion and conclusions

In this paper, we have examined the available data on the costs of school feeding, in relation to the cost of education and to GDP. Two conclusions are apparent from this analysis. (For more detailed discussion on these points see Bundy et al. [1].) First, school feeding programs in low-income countries exhibit large variations in cost, with concomitant opportunities for cost containment. Second, as countries get richer, school

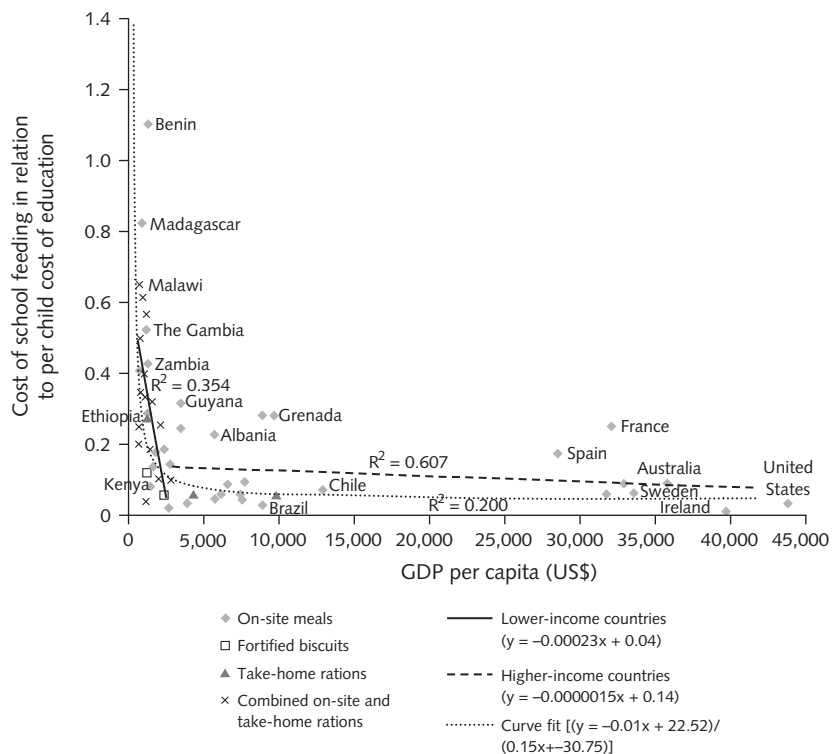


FIG. 2. Ratio of the cost per child of school feeding in relation to the cost per child of basic education, versus per capita GDP. As in **figure 1**, GDP per capita (purchasing power parity, constant 2005 international US dollars) and education costs per child are from the UNESCO Institute for Statistics, and school feeding costs per child were calculated from country program documents and World Food Programme reports. A rigorous search for data was undertaken, but it is not claimed that the data are comprehensive.

feeding costs become a much smaller proportion of the investment in education. For example, in Zambia the cost of school feeding is about 50% of the annual per capita costs for primary education; in Ireland it is only 10%.

Note that these analyses are based on absolute per beneficiary costs and that feeding in low-income countries is typically at levels of coverage of less than 5%, whereas basic education will probably benefit more than 50% of the population. Thus, the actual per child costs of school feeding, even in these settings, is relatively much lower than that of primary education. This result for the lower-income countries contrasts with the frequent anecdotal claim that per capita school feeding costs are often the same as those for education: they certainly are in some countries, and there is one example here where school feeding costs are actually higher than the costs of education, but there are also many examples where the costs of feeding are much lower. This raises the important issue of what causes these differences, apart from the contribution of differing accounting rules. Modality is certainly important, with the costs of biscuits or snacks being much lower than other options. But this is not the only explanation—the

data show that there are programs providing meals plus take-home rations that are less costly than meals-alone options. The underlying explanation for the cost variation cannot be addressed here, but it is clearly a very important area for research, given that it implies that there is considerable opportunity for cost containment in precisely those countries where the need is greatest. There is also emerging evidence from other studies [8] that as countries grow economically, the school feeding programs include in many cases a move toward procuring food by more decentralized or local purchases, which has been shown in modeling exercises to potentially reduce overall costs quite considerably [9].

The per capita costs of feeding relative to education decline nonlinearly with increasing GDP (see **fig. 2**). These analyses suggest that the main reason for this is a greatly increased investment per child in primary education as GDP rises, but a fairly flat investment in food. The analyses also show that there appears to be a transitional discontinuity at the interface between the lower- and middle-income countries, which, as described in the joint World Bank and WFP analysis, tends to coincide with changes in the capacity of governments to take over the management and funding of

TABLE 1. Mean and range of per capita costs of school feeding, school feeding as a proportion of the cost of primary education, and school feeding as a proportion of GDP^a

Country income level	Value	School feeding cost	School feeding cost/education cost	School feeding cost/GDP
Low	Mean	45	0.40	0.05
	Minimum	11	0.04	0.01
	Maximum	160	1.14	0.13
	<i>n</i>	27	22	27
Middle	Mean	73	0.13	0.02
	Minimum	8	0.02	0.00
	Maximum	354	0.33	0.07
	<i>n</i>	36	27	35
High	Mean	584	0.10	0.02
	Minimum	60	0.01	0.00
	Maximum	1,392	0.26	0.05
	<i>n</i>	8	8	8
Total	Mean	119.78	0.23	0.03
	Minimum	8	0.01	0.13
	Maximum	1,392	1.1.4	0.03
	<i>n</i>	71	57	70

a. GDP per capita (purchasing power parity, constant 2005 international US dollars) and education costs per child are from the UNESCO Institute for Statistics, and school feeding costs per child were calculated from country program documents and World Food Programme reports. A rigorous search for data was undertaken, but it is not claimed that the data are comprehensive.

programs. Further analysis is required to define these relationships, but an initial conclusion is that supporting countries to maintain an investment in school feeding throughout this transition may emerge as a key role for development partners. If true, this is a particularly important conclusion, because it suggests that external support for school feeding is a transitional and time-bound requirement in national development. Planning for the transition should, however, consider support framed within extended development timelines that

are flexible enough to allow governments to adapt to changing contexts and evolving objectives for school feeding.

Acknowledgments

The authors would like to thank Patrick Webb for his valuable feedback and input.

References

1. Bundy DAP, Burbano C, Grosh M, Gelli A, Jukes M, Drake L. Rethinking school feeding: social safety nets, child development and the education sector. Washington, DC: World Bank, 2009.
2. Adelman S, Gilligan DO, Lehrer K. How effective are food for education programs? A critical assessment of the evidence from developing countries. Washington, DC: International Food Policy Research Institute, 2008.
3. Gelli A, Al-Shaiba N, Espejo F. The costs and cost-efficiency of providing food through schools in areas of high food insecurity. *Food Nutr Bull* 2009;30:68–76.
4. Galloway R, Kristjansson E, Gelli A, Meir U, Espejo F, Bundy DAP. School feeding: costs and outcomes. *Food Nutr Bull* 2009; 30:171–82.
5. Gelli A, Izushi K, Islam Z, Matthew M, Espejo F. The costs and outcomes of fortified biscuit interventions on primary school-age children. Rome: World Food Programme, 2006.
6. Ahmed T, Amir R, Espejo F, Gelli A, Meir U. Food for education improves girls' education: The Pakistan Girls' Education Programme. Rome: World Food Programme, 2007.
7. UNESCO. 2008. UNESCO Institute for Statistics. <http://stats.uis.unesco.org>.
8. Espejo F, Burbano C, Galliano E. Home grown school feeding. Rome: World Food Programme, 2009.
9. Brinkman HJ, Aberman N, Baissas M, Calef D, Gengerich C, Subran L, Gelli A, Sharma M, Stoppa A. Home-grown school feeding to support local farmers in Africa. Rome: World Food Programme, 2007.