

# Relative efficiency of government and non-government organisations in implementing a nutrition intervention programme – a case study from Bangladesh

M Mahmud Khan<sup>1</sup> and Shakil Ahmed<sup>2,\*</sup>

<sup>1</sup>Tulane University School of Public Health, New Orleans, LA 70112, USA; <sup>2</sup>Health Economics Unit, Public Health Sciences Division, International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B), GPO Box 128, Dhaka – 1000, Bangladesh

Submitted 7 January 2002; Accepted 6 June 2002

## Abstract

*Objective:* The Bangladesh Integrated Nutrition Programme (BINP) experimented with two models of delivery: the first model uses the Government of Bangladesh's (GOB) own management structure and the second uses the non-government organisations (NGOs) working in the local community. This study compares the relative efficiency of GOB and NGO management in the provision of nutrition services.

*Design:* A detailed costing survey was carried out to estimate the cost of delivering nutrition services from the Community Nutrition Centres (CNCs). The number of individuals enrolled, the number actually participating in the programme and person-days of service delivered were used as effectiveness measures.

*Setting:* Thirty-five CNCs were randomly selected from five BINP areas, of which 21 were in GOB-run areas and 14 in NGO-run areas.

*Results:* The cost of providing nutrition services per enrollee was US\$ 24.43 for GOB-run CNCs and US\$ 29.78 for NGO-run CNCs.

*Conclusions:* Contrary to the widely held view, the analysis implies that the NGO facilities are not more efficient in the delivery of nutrition services when cost per person-days of service delivered is considered. The food cost component of BINP is so high that, irrespective of the delivery mode, policy makers should examine carefully the components of BINP in order to find the most cost-effective mix of services.

**Keywords**  
Nutrition intervention  
Cost-effectiveness

The nutritional status of the population in Bangladesh is considered one of the worst in Asia. Despite quite rapid growth in income and food production, nutritional status has remained low with considerable impacts on health, quality of life, labour productivity and mental ability<sup>1–3</sup>.

The 1995–96 Child Nutrition Survey of Bangladesh<sup>4</sup> showed that more than 50% of children between the ages of 6 and 71 months are stunted. Prevalence of wasting, an indicator of short-term nutritional deficiency, is also very high. Stunting has shown some improvements in Bangladesh over the last 10 to 15 years but the rate of progress has remained very slow. The stunting rate among children declined from about 60% to about 50% over the years 1985 to 1995, and, if this rate of decline continues in the future, reduction of stunting to the level of 25% will require another 25 years. What is more disturbing is the complete lack of improvement in the prevalence of wasting; rather than showing a decline over the last 10 years, the wasting rate has actually increased<sup>4</sup>.

The Bangladesh Integrated Nutrition Programme

(BINP) was adopted to improve the nutritional status of the population, especially of women and children, through community-based nutrition interventions. The BINP developed two models of partnership for implementing nutrition intervention activities at the community level. The first model uses the Government of Bangladesh's (GOB) own management structure to run the programme activities. The second model uses the non-government organisations (NGOs) working in the local community. At the sub-district level (third level of administrative structure), the programme contracted out all activities of the nutrition programme to a specific NGO. The NGO was reimbursed the cost of carrying out the nutrition activities from BINP based on the number of individuals enrolled in the programme.

The community-based nutrition component (CBNC) of BINP focuses on growth monitoring of children, dissemination of nutrition-related information and supervised supplementary feeding of target women and children at Community Nutrition Centres (CNCs) in the

\*Corresponding author. Email [sahmed@icddr.org](mailto:sahmed@icddr.org)

villages. Each CNC, run by a Community Nutrition Promoter (CNP), has about 1000 to 1500 people in its coverage area. A number of BINP documents describe the details of CNC structure, personnel and activities<sup>5</sup>.

The BINP programme intends to enrol all pregnant women with a body mass index (BMI) of less than  $18.5 \text{ kg m}^{-2}$  at three months of pregnancy. After enrolment, food supplementation of pregnant women continues through the pregnancy until six months after the baby is delivered. After delivery the woman is categorised as a member of the 'lactating mothers' group. Children with a weight-for-age less than 60% of the reference median of the National Center for Health Statistics (NCHS) are defined as the target of the programme.

Each woman is provided with four packets of supplemental food per day, for six days in a week. Each malnourished child gets two packets and the growth-faltered child gets one packet of food daily through the BINP. The food supplementation packet, a standardised packet defined by the BINP, contains roasted rice, roasted pulses, molasses and soybean oil. The total energy content of a packet is about 161 kcal.

The Government of Bangladesh has adopted the National Nutrition Programme (NNP) based on the experiences and lessons learned from the BINP. The NNP intends to provide a similar mix of services being delivered under the BINP, and scaling up the activities to the whole country will cost about US\$ 150 million per year<sup>6</sup>. Given the high cost of the NNP, it is important to identify cost-effective approaches of delivering nutrition services. This study compares the two alternative service delivery modes of BINP (NGO versus GOB) to identify the more cost-effective approach.

## Methods

### *Selecting the survey areas for data collection*

The BINP was implemented in Bangladesh in a phased manner. For this study, five of the six first-phase BINP sub-districts were surveyed. The sixth sub-district used a targeting mechanism significantly different from other sub-districts, and therefore it was decided not to include this area in the study. The GOB-led sub-districts in the survey were Mohammadpur, Faridpur Sadar and Rajnagar, and the NGO-led sub-districts were Shahrasti and Banaripara.

In each of the BINP sub-districts, all of the CNCs were listed using the Management Information System of the BINP programme office. On average, each sub-district had 140 CNCs at the time of the survey. From the sub-district list, seven CNCs were selected randomly and from the five sub-districts 35 CNCs were selected. Among these 21 were in GOB areas and the rest (14) were in NGO areas.

A research team of six enumerators collected information from the CNCs during October 1999–March 2000. The enumerators actually observed the operation of the

CNCs to estimate the resources being used and the number of individuals being served.

### *Methodology of costing*

The 'ingredient' approach was followed for costing nutritional intervention activities. In this approach, the enumerators actually observed the types and quantities of inputs being used and outputs produced during the delivery of nutrition services<sup>7,8</sup>. On the day of the observation, field survey researchers listed all of the inputs and resources used at the CNC and categorised these into community-donated, procured by the programme from the local area and procured by the programme from outside the local area.

A number of resources used in organising CNC sessions may not actually be observable during the delivery of services. One example is the preparatory activities for organising the CNC activities. Co-ordinating with various personnel of the sessions, ensuring adequate supply of supplements, etc., require additional resource use not observable at the point of delivery of nutrition services. To identify these resources, the research team interviewed the CNP and listed all activities performed prior to the actual organisation of a nutrition session. The resources used after the session was also observed or obtained through interview.

The time frame of costing is one whole year. However, the survey data are specific to certain months of the year and the full-year cost has been approximated from the sample months. Annual personnel costs were derived by multiplying BINP-reported monthly salary by 12. When the cost item was likely to vary over the months, month-specific costs were obtained either from secondary data sources or through interview of individuals knowledgeable on the specific cost item.

### *Methodology of measuring effectiveness*

Ideally one should collect information on final outcome indicators to compare the efficiency of GOB- and NGO-led delivery structures. In this study, since the actual delivery of services was observed rather than the final nutritional impact of the programme, a number of 'process indicators' were used as the effectiveness measures. One measure of effectiveness is the number of individuals officially enrolled in the programme. Each enrollee is supposed to visit the CNC to receive food supplementation and nutrition education every day. Since all enrollees do not visit the CNCs on a daily basis, the number of enrollees actually visiting the CNCs should be a better measure of effectiveness for comparing the cost-effectiveness of alternative delivery mechanisms. The number of beneficiaries enrolled in a month is available from the BINP information system. Actual participation was observed directly by the research team during their visits to the CNCs. Therefore, this study uses measures of effectiveness calculated from the following two parameters:

number of individuals enrolled in the programme and the number of individuals actively participating in the programme.

A spreadsheet was prepared with the list of all inputs used and outputs obtained, and each of these inputs was evaluated using the fair market price (the market price of products of similar quality in the local market; or, for items not available locally, import price or price at an urban centre plus transportation cost). Number of enrollees was obtained from the programme's Management Information System. Using an assumed economic life of inputs, all capital costs were annualised using 5% discount rate<sup>9</sup>. The donated materials and resources were evaluated in monetary terms using the opportunity cost or the market price of similar resources in the local area. The personnel costs or time costs are of two types: employees of the programme and the volunteers from the community. The employment costs were derived using the current salary and benefits of the BINP employees. The community volunteers' time was evaluated by using the salary level of similar workers in the rural areas.

Combining all of the different cost components of the nutrition programme, the total annual cost of providing comprehensive nutrition-related activities was derived.

## Results

### *Comparative statistics for GOB- and NGO-led CNCs*

Table 1 reports the average cost per CNC per year for GOB-led and NGO-led CNCs. Note that almost all of the cost items between these two groups were similar except for the food cost. The average food supplementation cost for an NGO-led CNC was US\$ 1578 per year compared with only US\$ 825 for a GOB-led CNC. The non-food cost of GOB facilities was slightly higher than for the NGO facilities, and this difference can be explained by the additional personnel cost incurred by the GOB CNCs for appointing helpers at the CNCs. The value of community-donated resources for the NGO facilities was about 5%

higher than that in GOB facilities. Another important difference between these two groups in terms of costs is the value of goods and supplies procured by the programme from outside the local area. The average procurement cost outside the locality was about US\$ 18 for NGO-led CNCs and US\$ 28 for GOB-led CNCs.

Table 2 shows the effectiveness measures for the NGO- and GOB-led CNCs. The number of target women was quite similar for both GOB and NGO facilities on average. However, the number of children targeted was 22% higher in NGO facilities than in GOB facilities. The number of women and children enrolled per CNC was 79 for the NGO facilities compared with only 41 for the GOB facilities.

In terms of participation rates in the programme, a significantly higher proportion of targets was enrolled to receive food supplementation in the NGO-led facilities compared with GOB-led facilities. This is true for all three types of enrollee defined by the programme (pregnant women, lactating mothers and children below the age of 2 years). About 30% of all target populations were enrolled in the programme in the NGO-led CNCs, while the ratio was only 18% for the GOB-led CNCs. In contrast, the percentage of enrollees actually showing up for services was higher in the GOB-led CNCs, where 78% of the enrollees participated compared with 60% in the NGO-led facilities.

### *Relationship between costs and effectiveness*

The BINP reimburses costs to the implementing agencies based on the number of individuals enrolled. However, participation in the programme is actually lower than enrolment in both NGO and GOB facilities. During the survey, the team visited the CNCs and collected information on actual number of enrollees showing up to obtain services and these numbers were also used to define the effectiveness measures.

Table 3 reports a number of cost-effectiveness measures for NGO- and GOB-run CNCs. Since the number of

**Table 1** Average cost (95% confidence interval) per CNC per year in Bangladesh

Input valued	Cost per NGO-led CNC (US\$)	Cost per GOB-led CNC (US\$)	P-value
Community-donated resources	91 (57–125)	86 (70–103)	0.787
Goods procured locally by programme	10 (9–11)	11 (10–12)	0.059
Goods procured from outside the area by programme	18 (9–26)	28 (21–34)	0.045
Community-donated time	49 (–)	49 (–)	–
Personnel cost of programme	162 (161–163)	203 (201–203)	<0.000
Costs associated with official meetings	2 (1.86–2.36)	–	<0.000
Cost of food procured for supplementation	1578 (1067–2088)	825 (638–1011)	0.002
CNO's equipment locally procured	1 (0.97–1.02)	1 (0.98–1.03)	0.019
CNO's equipment procured from outside	19 (18–20)	18 (17–19)	0.006
Total non-food cost	352 (315–389)	396 (378–414)	0.017
Food supplementation cost	1578 (1067–2088)	825 (638–1011)	0.002
Total cost	1930 (1434–2425)	1221 (1025–1416)	0.003

CNC – Community Nutrition Centre; NGO – non-government organisation; GOB – Government of Bangladesh; CNO – Community Nutrition Organiser.  
Source: Khan<sup>9</sup>.

**Table 2** Average number of beneficiaries (95% confidence interval) of the nutrition programme by NGO and GOB facilities

Item	Number per NGO-led CNC	Number per GOB-led CNC	P-value
Pregnant women (per month)			
Number targeted	14.57 (9.30–19.85)	14.86 (10.99–18.73)	0.925
Number in the programme	9.36 (5.20–13.52)	6.33 (4.63–8.04)	0.113
Number observed participating	4.86 (2.49–7.22)	5.14 (3.54–6.74)	0.827
Lactating mothers (per month)			
Number targeted	16.86 (12.41–21.31)	17.71 (10.95–24.48)	0.844
Number in the programme	9.71 (6.59–12.84)	5.29 (3.79–6.78)	0.005
Number observed participating	4.86 (3.12–6.59)	4.24 (2.68–5.80)	0.587
Children (per month)			
Number targeted	66.43 (51.61–81.25)	54.52 (45.46–63.59)	0.132
Number in the programme	10.29 (7.57–13.00)	4.38 (3.28–5.48)	<0.000
Number observed participating	7.79 (5.42–10.15)	3.10 (2.42–3.77)	<0.000
Estimates of enrolment and participation in a year			
Number of targets	329 (250–407)	283 (226–341)	–
Number of individuals enrolled	79 (54–105)	41 (30–52)	–
Total number of participants	51 (33–68)	31 (22–40)	–
Number of adult-equivalent* terms	35 (22–48)	25 (17–33)	–
Person-days of service provided based on enrolment	9190 (6060–12 320)	5008 (3662–6354)	–
Person-days of service actually delivered	5480 (3452–7499)	3906 (2705–5105)	–

NGO – non-government organisation; GOB – Government of Bangladesh; CNC – Community Nutrition Centre.

\* Adult equivalent: two times the number of pregnant women plus lactating mothers plus children in the programme. This corrects for the higher number of food packets received by pregnant women.

individuals enrolled or participating in the programme does not reflect the total number of days of participation (due to unequal duration of participation in BINP by the three demographic groups), we have converted these numbers into days of service delivery or person-days. Person-days of enrolment were derived by multiplying the number of individuals enrolled by the average days of enrolment for each. Note that cost per one person-day of enrolment is lower for the NGO-run CNCs than for the

GOB-run CNCs. If the costs per person-days of participation are compared, GOB facilities appear better than NGO facilities.

If the underlying malnutrition prevalence rates are more or less comparable in both NGO and GOB areas, the lower cost per participant in GOB centres indicates that the NGO-run CNCs are not more efficient than the GOB-run CNCs. However, it is possible that the lower cost at GOB facilities may have been achieved by not enrolling the individuals who should be in the programme if the enrolment criteria were strictly followed. The BINP data on malnutrition rates<sup>10</sup> can be used to approximate the degree of under- or over-enrolment of target populations in the programme. Given the number of women and children in the CNC catchment areas, the numbers malnourished were derived using the prevalence of malnutrition found by the BINP. All of these malnourished women and children should have been enrolled in the programme. The estimates of expected enrolment suggest that the NGO-led CNCs enrol a significantly higher number of individuals than expected. Similarly, the GOB facilities show lower enrolment than expected. The NGO-led CNCs should have enrolled 24 individuals in a month, on average, rather than 29.4, and the GOB-led CNCs should have enrolled 23 individuals rather than 16.

When increasing the GOB-led CNC costs proportionately to allow for the provision of services to the seven individuals not enrolled, the cost-effectiveness measures remain unchanged. On the other hand, if the mistargeted individuals are excluded from the effectiveness measures of NGO-led CNCs, the cost per effectiveness indicator becomes higher for the NGO facilities. These new estimates are shown in the second part of Table 3.

**Table 3** Cost-effectiveness ratios for NGO-run and GOB-run CNCs of BINP

Cost-effectiveness indicator	Cost-effectiveness ratio (US\$/effectiveness measures)	
	NGO-led	GOB-led
Effectiveness measures based on survey*		
Cost/individuals enrolled	24.43	29.78
Cost/individuals participating	37.84	39.38
Cost/adult equivalents participating	55.14	48.84
Cost/person-days enrolled	0.21	0.24
Cost/person-days participating	0.35	0.31
Effectiveness measures based on national parameters†		
Cost/individuals enrolled	30.92	29.78
Cost/individuals participating	49.58	39.38
Cost/adult equivalents participating	68.78	48.84
Cost/person-days enrolled	0.25	0.24
Cost/person-days participating	0.44	0.31

NGO – non-government organisation; GOB – Government of Bangladesh; CNC – Community Nutrition Centre; BINP – Bangladesh Integrated Nutrition Programme.

\* Effectiveness numbers were observed during the survey of 35 CNCs.

† Values derived using national-level parameters reported by BINP. Using the prevalence rates of malnutrition among women and children, the numbers of women malnourished in the GOB and NGO CNC areas were calculated. All malnourished individuals should have been enrolled. From this estimate numbers of participants were derived using actual participant to enrolment ratios.

## Discussion

The average cost of running a CNC was found to be about US\$ 1930 for the NGO and US\$ 1221 for the GOB centres. In NGO-led CNCs the cost of food supplementation was about US\$ 1578, while in the GOB-led CNCs the food cost was only US\$ 825. The only factor that can affect the food cost is the number of beneficiaries of the programme and its composition. Therefore, the higher food cost at the NGO facilities should reflect higher enrolment and participation than at the GOB facilities.

The economic value of community donations was 11% and 7% for GOB- and NGO-led CNCs, respectively, and most of it was in terms of physical space provided. Apart from the physical space, the community members also donated furniture and their time. In NGO facilities, the absolute value of community donations was 5% higher than in the GOB-led facilities. Although the community-donated resources represent a relatively small proportion of the total cost, it was about 25% of total non-food expenses for a CNC.

On average, the NGOs enrol a higher number of individuals in the programme than the GOB facilities. It is not clear why the NGO facilities show such a high rate of enrolment. The possible reasons could be higher underlying prevalence of malnutrition among the target population, better identification of potential enrollees by NGOs, or over-enrolment in the programme by the NGO. The BINP-reported underlying nutritional status of the target population indicates that NGO facilities have over-enrolled individuals in the programme.

Moreover, the official enrolment number is actually higher than the number of participants in the programme. Food supplementation requires that the participants visit the CNCs every day to receive the food. Our survey found that the participation rate (among enrolled individuals) varies considerably between the GOB-led and NGO-led CNCs. If we ignore the over-enrolment in the programme and lower actual participation of the enrollees, the NGO becomes relatively more efficient in terms of cost per person-days of enrolment. However, cost per person-day of participation was found to be lower for GOB facilities.

## Conclusions

The NGOs in Bangladesh and many other developing countries of the world have become an alternative mechanism of delivering various social, health and nutrition services, replacing public sector programmes. It is usually assumed that the NGOs are more efficient and effective in organising and delivering these services. Since the NGOs usually work at the grass roots level, participation of the population in NGO-run social programmes is also expected to be better than in government-run activities.

This paper compares the cost-effectiveness ratios of NGO- and GOB-run facilities in the provision of nutrition services to poor households in Bangladesh. The comparison indicates that the NGO facilities appear relatively more efficient than the GOB if cost per enrollee is considered. However, if 'active participation', i.e. the number of individuals actually participating in the nutrition programme, is used in estimating the cost-effectiveness ratios, the GOB facilities become more efficient than the NGO facilities. The survey found that a higher proportion of enrolled individuals in NGO areas did not show up at the CNCs compared with that in GOB areas.

One potential criticism of this type of comparison is that we are assuming enrolment and participation without looking into potential mistargeting. If we derive the expected enrolment by using the malnutrition rates found by the BINP, it is clear that enrolment rate was lower in GOB facilities and higher in NGO facilities than that expected for rural Bangladesh. Re-estimating the cost-effectiveness measures with expected enrolment numbers makes the NGO facilities even less efficient compared with the GOB facilities. Therefore, the NGO facilities in Bangladesh are not more efficient than the government-run facilities in the delivery of nutrition services.

Another interesting finding to note is that the grass roots connections of NGOs could not ensure a high participation rate of individuals enrolled in the programme. The reasons for this relatively low participation should be examined carefully, to determine whether the NGO social mobilisation activities somehow failed to reach the malnourished group or if the initial enrolment itself represents significant mistargeting, so that some of the individuals enrolled actually do not need the nutrition services offered.

On average, the BINP delivered nutrition services and food supplementation to the participants at a cost of about US\$ 0.33 per day (average of all CNCs). As mentioned earlier, 75% of this cost is due to food supplementation packets alone and, therefore, food supplementation costs about US\$ 0.25 per participant per day. With this expenditure per day, the BINP delivered about 480 kcal of energy to the participants. Allowing 25% of the total cost for administration and management, the actual cost of food becomes US\$ 0.20 per participant per day. If the project were to use this amount of money to buy rice from the local market, the calorie content of the rice obtained would be more than 2000 kcal. The programme delivers less than a quarter of this amount of energy to malnourished individuals using the same amount of money. In other words, if the programme were simply to buy rice from the local market and give that to the enrollees, the total supply of calories to malnourished individuals would be significantly higher than what BINP is now supplying. Unless the food supplementation process generates other types of benefit (beyond supplying nutrients), such a high level of cost cannot be

justified. Even if the programme generates other benefits like nutrition education, community involvement, etc., policy makers should compare the relative efficiency and effectiveness of BINP with its separable components to determine whether concentrating on specific components will generate higher levels of social benefits per dollar spent than the comprehensive programme.

### Acknowledgements

The study was conducted by the Health Economics Unit (HEU) of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B) with financial assistance from the Bangladesh Integrated Nutrition Programme – Operations and Policy Research Programme. We would like to express our thanks to Professor George Fuchs, Dr S.K. Roy and Saskia Osendarp of ICDDR, B for their advice and suggestions. The HEU is funded by the Department for International Development (UK) and ICDDR, B would like to acknowledge with gratitude the commitment of donors to the Centre's research efforts.

### References

- 1 Reutlinger S, Van Holst P. *Poverty and Hunger: Issues and Options for Food Security in Developing Countries*. Washington, DC: World Bank, 1986.
- 2 Berg A. *Malnutrition: What Can Be Done? Lessons from World Bank Experience*. World Bank Publication. Baltimore, MD: John Hopkins University Press, 1987.
- 3 Mellor JW. In: *Nutrition Issues in Developing Countries for the 1980s and 1990s*. Proceedings of a Symposium. Washington, DC: National Academy Press, 1986; 25–42.
- 4 Government of Bangladesh. *Child Nutrition Survey of Bangladesh*. Bangladesh Bureau of Statistics Report. Dhaka: Ministry of Planning, 1995–96.
- 5 Bangladesh Rural Advancement Committee (BRAC). *Nutrition Facilitation Programme. Annual Report*. Dhaka: BRAC, 1997.
- 6 Khan MM. *Cost Estimates for National Nutrition Program: Resource Mobilization through User Charges*. Technical Report. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 1999.
- 7 World Health Organization (WHO). *Cost-Effectiveness Analysis, Programme for Control of Diarrhoeal Diseases*. Geneva: WHO, 1988.
- 8 Creese A, Parker D. *Cost Analysis in Primary Health Care: A Training Manual for Programme Managers*. Geneva: World Health Organization, 1988.
- 9 Khan MM. *Cost of the Bangladesh Integrated Nutrition Program Activities at the Community Level: An Analysis Based on Community Nutrition Centers in Five Thanas of Bangladesh*. Technical Report. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 1999.
- 10 Government of the People's Republic of Bangladesh. *Bangladesh Integrated Nutrition Program. Baseline Data Sheet for BINP Program Planning, Monitoring and Evaluation (based on data collected in 44 sub-districts)*. Dhaka: Ministry of Health and Family Welfare, 1997.