

Growth monitoring in the context of a primary health care programme

Fazlul Karim, Nasreen Huq, Laurine Brown, and A. Mushtaque R. Chowdhury

Abstract

During the last decade, growth monitoring has been promoted as an important intervention for child survival, but questions have been raised about its effectiveness and feasibility in less-developed countries. A growth-monitoring programme was carried out by the Bangladesh Rural Advancement Committee for over four years, covering about 20,000 children under two years of age. The programme was equally accessible to all socio-economic groups and both sexes. Children were weighed monthly in village centres, and their mothers were given health and nutrition education. A recent evaluation found modest coverage (43%) of the target children. Accuracy in determining ages of the target children was reasonably good, with more than 90% within 30 days of actual age. Eighty-seven per cent of the Salter round scales used gave accurate results, compared with only 17% of the Salter cylinder scales. Local volunteers, mostly women, participated in growth-monitoring sessions by weighing, recording, and demonstrating how to prepare supplementary diets. Growth monitoring was associated with increased use of selected child-survival interventions such as immunization. The nutrition status of participating children was not significantly better than that of a comparable group of children who did not participate ($p = .051$).

Introduction

Although weighing has been used to monitor growth in children since 1910 [1], the popularity of growth

monitoring as a tool for child survival is recent. Growth monitoring differs from nutrition surveillance in that the objective of the latter is research and monitoring changes over time, while growth monitoring emphasizes promoting the growth of children through one or more of the following activities: counselling, education, treatment for growth-retarding illnesses, and feeding.

With the initiation of the GOBI (growth-monitoring, oral-rehydration, breast-feeding, and immunization) strategy by UNICEF in the early 1980s, the role of growth monitoring in child survival was promoted and institutionalized. Unlike most other child-survival technologies, however, growth-monitoring programmes are difficult to implement [2], are controversial, and have not yet been accepted as a technology of choice in developing countries [1].

In 1987 growth monitoring was incorporated into a large primary health care intervention conducted by the Bangladesh Rural Advancement Committee (BRAC). A study of this component of the programme was undertaken in 1990 to help to clarify various factors contributing to the controversies surrounding the subject.

BRAC's primary health care programme

The health and nutrition status of the rural population of Bangladesh, particularly mothers and children, is unacceptably low. A national nutrition survey of 1981 found that about 80% and 97% of children 0–11 and 12–23 months of age respectively were suffering from mild to severe malnutrition [3]. The situation with respect to girls and women was even worse. Vitamin A intake was 808 IU per person per day, which meets only 40% of the requirement. Children 1–3 years old received only 25% of their vitamin C requirement. This has been attributed to numerous causes, including [4]:

- » poverty—lack of employment, underemployment, insufficient food availability and consumption;
- » lack of knowledge—low family education; lack of

Fazlul Karim, Nasreen Huq, and A. Mushtaque R. Chowdhury are affiliated with the Bangladesh Rural Advancement Committee (BRAC) in Dhaka, Bangladesh. Laurine Brown is affiliated with Tufts University, Boston, Massachusetts, USA.

Mention of the names of firms and commercial products does not imply endorsement by the United Nations University.

awareness about child and maternal nutrition, feeding, and weaning practices, breast-feeding, hygiene, vitamin A, and low birth weight; lack of nutrition counselling;

- » underlying illnesses—tuberculosis, pneumonia, measles, anaemia, iodine deficiency, diarrhoea, worms, protein-energy malnutrition;
- » lack of or insufficient services—insufficient health facilities or coverage, irregular supplies, lack of follow-up, lack of a referral system;
- » sociocultural factors—sex discrimination or preference, maldistribution of intrafamilial food, superstitions, food taboos.

In late 1986 BRAC, which is a non-government organization (NGO), launched a primary health care programme in six *thanas* (subdistricts), with a population of 1.2 million, with the major goal of devising a workable model of primary health care. It was hoped that such a model would ensure effective community participation and would be replicated by the government and other NGOs to improve the health and nutrition status of the population, particularly rural mothers and children. Eight components—promotion of oral rehydration therapy, immunization, vitamin A capsules, safe water, family planning, nutrition education, training of traditional birth attendants (TBAs), and basic curative services—were originally included in the programme.

A year later, to address child malnutrition specifically, growth monitoring was added, with the objectives of educating mothers about child growth, health, and nutrition through a village forum; screening malnourished children as a channel to provide health and nutrition education to their mothers; and detecting severely malnourished children in order to refer them to nearby health facilities for appropriate care.

Implementing growth-monitoring activities

All the BRAC field health workers and their supervisors underwent three days of training (two days in a classroom and one day of field practice) on the importance of growth monitoring, how to perform it, and the various equipment, materials, and techniques of nutrition education, in addition to the regular training they received from BRAC. The curriculum was designed in collaboration with UNICEF and Helen Keller International, an international NGO working in Bangladesh.

Prior to the formal launching of the activities, a two-stage pilot programme was undertaken to explore BRAC's management capacity to carry them out, to reinforce the training of health workers, and to assess people's response. The strategy was tried first in five villages of Manikganj Sadar thana and then in five villages of each of the other five thanas. Based on results from these initial experiments, the

programme was gradually extended to all villages in the six thanas.

Because of cost and management considerations, and because maximum growth faltering occurs between the ages of 6 and 12 months [5], BRAC decided to recruit children from among those under one year of age and maintain them in the programme until they were two.

Entry into a village

As a first step, villagers, particularly prominent individuals such as teachers and social leaders, were contacted and briefed and their cooperation was sought in implementing the activities. Afterward a household survey was carried out to identify children 0–12 months old. Parents were then contacted and motivated about the importance of monitoring in promoting child growth and survival.

Volunteers were selected and given on-the-job orientation on how to assist in growth-monitoring sessions by bringing mothers with children, recording and plotting weights on growth charts (based on NCHS standards), demonstrating how to prepare a supplementary diet, and maintaining order in the sessions.

Growth-monitoring sessions

A convenient place, preferably a house in the centre of the village, was chosen with the help of villagers as the site for sessions. The space was arranged in such a way that registration, weighing/charting, and nutrition education could be carried out sequentially. Resources such as scales, cards, and registers were provided by BRAC, and villagers provided the space and furniture.

Health workers from BRAC conducted the sessions with active support from village volunteers, including TBAs. The mothers of the target children and volunteers were informed of the programme in advance. On weighing day, one BRAC worker prepared the centre with the help of volunteers while another worker and/or volunteer reminded the mothers to bring their babies for weighing and nutrition education.

When growth faltering was identified during the weighing and charting, the mother was advised to give the child more food. Children needing treatment for illnesses were referred to government health facilities.

The volunteers demonstrated how to prepare a supplementary diet with locally available ingredients such as dark-green leafy vegetables, rice, lentils, and oil. The babies were fed as a part of the demonstration.

Health education covered supplementary diet, the diet of pregnant and lactating mothers, personal hygiene, vitamin A capsules, breast-feeding, colostrum feeding, immunization, and family planning.

Before the mothers left the centre, they were told about the next weighing date.

Follow-up

Children who were identified during a session as being severely malnourished (<60% of median weight for age) were visited in their homes by both health workers and medical officers of BRAC, who gave rehabilitative advice and, if necessary, referred them to nearby government health facilities. No feeding was provided.

Sustainability

Community participation played a significant role in the programme. In the early stages of introducing growth monitoring into a village, at least three BRAC workers were required to perform the entire gamut of activities. Gradually, volunteers such as village health committee members, TBAs, and mothers became involved in weighing, recording, and plotting weights, so that BRAC was able to reduce its staff involvement to 50% at the end of the programme. As noted, the villagers also contributed the space for holding sessions, as well as the demonstration food.

As a step towards sustainability, BRAC made a deliberate attempt to integrate growth monitoring with selected public-sector activities, namely the expanded programme of immunization (EPI) and the semi-mobile antenatal satellite clinics. Since the clinics were not made available in every village, however, this integration could not be carried out in all the villages. At the end of the programme, 10% of the villages had all three activities. In such villages, government workers carried out their own functions while BRAC workers and village volunteers conducted the growth monitoring.

In four years the programme expanded to 1,016 villages through 1,322 growth-monitoring centres. Approximately 20,000 children were weighed each month.

The study

Objectives

The objectives of the study were as follows:

- » to determine the level of operational efficiency of the BRAC approach to growth monitoring;
- » to evaluate the effectiveness of monitoring in increasing the use of other child-survival technologies such as oral rehydration therapy, immunization, and vitamin A capsules;
- » to measure the changes in the nutrition status of the children due to the monitoring;

- » to assess the perceptions of the villagers about the monitoring.

Methods

To address the above objectives, data from primary as well as secondary sources were used.

For the first objective, data were collected from eight villages of Manikganj Sadar and Gheor thanas. In these villages the Research and Evaluation Division of BRAC had been carrying out a passive surveillance system through which, among other things, births and deaths had been recorded since 1987. Thus the precise ages of children born since 1987 were available. As the target population for the growth monitoring was children under two years of age, households with at least one child of this age were chosen for study.

Data covering different aspects of the operational efficiency of the monitoring were collected by a variety of methods. For example, the extent of the programme's coverage of target children was determined by asking households whether they had growth-monitoring cards or not; the accuracy of the records of the children's ages was determined using registration data; the accuracy of weighing scales was measured using a standard 5-kg weight on eight round (25-kg) and six cylindrical (15-kg) Salter scales; the consumption of supplementary diet was investigated through 24-hour recall; and the accuracy of recorded weights was checked by direct observation.

To determine mothers' knowledge and how they interpreted the growth card, the following questions were asked: (1) On which part of the card should your baby's weight be for you to know that he or she is growing well? (2) Which part is bad? (3) What happens if the weight mark falls below the green belt? (4) What happens if the weight mark is in the green belt? (5) What happens if the weight mark is above the green belt? (6) What does it mean if the present month's weight is more than the previous month's? (7) What if the present month's weight is less than the previous month? All these data for the eight villages were collected during November–December 1990.

To ascertain whether the growth monitoring increased the use of other child-survival strategies, data were used from a survey of 3,048 households in five of the six primary health care thanas in September 1989 to assess the midcourse effects of the BRAC programme on the knowledge and use of its components. The survey asked mothers with children under two years of age whether, at the time of the survey, they were participating in the programme or had ever done so. Since the survey also collected data from the same mothers on the use of other

child-survival practices promoted by BRAC, this facilitated analysis of the data to see if participation in growth monitoring was related to their use of those components. No anthropometric data were collected during this survey.

To measure the impact of the monitoring on the children's nutrition status, data were used from a nutrition surveillance project in which BRAC had been participating since early 1990, together with several other NGOs, by providing data from two of its primary health care thanas (Saturia and Santhia). Through this project, the growth of a large number of children 6–59 months old was monitored quarterly using several anthropometric measures, under the supervision of Helen Keller International [7]. For the present study, all 496 children 6–23 months old from the two BRAC areas covered by the second and the third rounds of the surveillance were revisited. They were grouped according to whether or not they were participants in BRAC's growth monitoring, and the nutrition status (weight for age) of the children who participated was compared with that of those who did not participate.

To elicit villagers' perceptions of and attitudes toward the monitoring, qualitative data were collected through participant observations and 14 focus-group discussions [6].

Findings

Accuracy of age determination

Comparison of the children's ages recorded by health workers for growth monitoring with those recorded by the sample registration system operated by BRAC showed that in 22.5% of the cases the match was perfect (table 1). In 69% the difference between the two sources was 30 days or less.

TABLE 1. Discrepancies between the ages of children 0–23 months old shown in growth-monitoring records and their actual ages determined from birth registration records

Discrepancy (days)	Children	
	No.	%
0	25	22.5
≤ 30	77	69.4
> 30	9	8.1
Total	111	100

Data from a special survey in eight villages in two thanas.

Accuracy of weighing

Seven of the eight round scales checked gave exact weights. Only one of the six cylinder scales gave exact weights, while the other five gave weights in excess of 5 kg. In 89% of cases the weights were correctly read and recorded by the health workers.

In 80% of the cases the scale was adjusted to zero at the start of the weighing session. This was done infrequently afterwards, however; in only 47% of the cases was the scale adjusted at least once before the end of the day.

Coverage of target children

Our survey indicated that 43% of the target children under two years of age were actually covered by the monitoring, and the coverage for those under six months was only 12% (table 2). The 1989 survey of five thanas found that only 35.7% of households with children under two years of age had growth cards (ranging from 24% in Rangpur to 44% in Saturia). According to the nutrition surveillance project data for two thanas, 38% of the children 6–23 months old had growth cards (51% in Saturia and 26% in Santhia thana); there was no significant difference in the number of boys and girls participating (table 3).

TABLE 2. Coverage of children 0–23 months old in the growth-monitoring programme by age group

Age (months)	Total no. of children	Participants		Non-participants	
		No.	%	No.	%
0–5	40	5	12.5	35	87.5
6–23	158	80	50.6	78	49.4
Total	198	85	42.9	113	57.1

Data from a special survey in eight villages in two thanas.

TABLE 3. Coverage of children 6–23 months old in the growth-monitoring programme by sex

	Total no. of children	Participants		Non-participants	
		No.	%	No.	%
Males	248	89	35.9	159	64.1
Females	248	99	39.9	149	60.1
Total	496	188	37.9	308	62.1

Data for two thanas from the Nutritional Surveillance Project conducted under the auspices of Helen Keller International (rounds II and III).

Mothers' understanding of the growth-monitoring card

Forty-three per cent of the mothers who participated in the monitoring answered all seven questions about the card correctly, compared with 8% of non-participants. Among the participant mothers, 12% could not answer any of the questions correctly, compared with 45% of the non-participants.

Time spent by mothers in growth-monitoring sessions

The average total time spent by a mother from registration to completion of health education was 16.4 minutes. Average times spent weighing and recording and in receiving nutrition education were 1.7 and 5.3 minutes respectively. The time spent travelling to and from the centre was not considered.

Community participation

Community participation took a number of forms. As mentioned, the community provided various resources for the smooth conduct of the sessions. The community also provided volunteers, whose role increased as the programme matured. Depending on how long a growth-monitoring centre had been present in a village, their number varied from none at the initial stage to three in final months.

Most of the volunteers (85%) were women, with an average age of 42 years. The majority were directly or indirectly connected with other BRAC activities as village health workers, trained TBAs, or village health committee members. Approximately half of them were literate. Forty-seven per cent of the volunteers from Manikganj and 17% from Gheor were landless. (In Manikganj BRAC has concen-

trated its development programmes only on landless people.)

Impact on other child-survival practices

In evaluating the effect of participation in growth monitoring on other practices contributing to child survival promoted by BRAC, households from which at least one child in the target age range participated in the programme were designated participants, and those from which no child in the age group participated were designated non-participants. The participant households performed significantly better than the non-participant group in regard to all of the practices surveyed but one (waste disposal in a designated place; table 4).

Table 5 shows the mean frequencies of feeding different items for participants and non-participants. No significant differences were found between the groups.

We also compared selected background characteristics of participants and non-participants. The two groups were largely identical with respect to landholding, occupation of the father, and literacy of the mother (table 6).

Nutrition status

Nutrition status was evaluated using the Gomez criteria for weight for age (>90% of the median, normal; 90%–75%, mild malnutrition; 75%–60%, moderate malnutrition; <60%, severe malnutrition). Table 7 shows that a somewhat higher proportion of the growth-monitoring participants than of the non-participants had normal weight for age,

TABLE 4. Proportions of households or individuals observing various child-survival practices according to household participation in growth monitoring

Practice	Unit	Participants			Non-participants			p
		Total no.	Observing practice		Total no.	Observing practice		
			No.	%		No.	%	
Drinking tube-well water	households	606	536	89.9	943	797	84.5	<.01
Using safe latrine	households	606	91	15.0	943	82	8.7	<.01
Total immunization	children 12-23 months old	370	709	56.5	462	195	42.2	<.01
Receipt of vitamin A capsule	children 6-71 months old	1,042	669	64.2	1,527	818	53.6	<.01
Waste disposal in designated place	households	606	156	25.7	943	240	25.5	NS
Contraceptive use	women 15-49 years old	753	183	24.3	1,173	240	20.5	<.05
ORS ^a use	episodes	300	110	36.7	450	124	27.6	<.01

Karim and Chowdhury, unpublished data, 1990.

a. Oral rehydration solution of salt and unrefined sugar in drinking water, given to children experiencing diarrhoea.

TABLE 5. Mean frequency of intake of various foods by children 13-24 months old during the 24 hours preceding the survey

	Participants ^a	Non-participants ^b
Meat	0.7 ± 1.2	0.7 ± 1.1
Lentils	0.1 ± 0.5	0.4 ± 0.7
Milk	0.9 ± 1.3	0.9 ± 1.9
Dark green leafy vegetables	0.4 ± 0.9	0.6 ± 1.1
Other vegetables	0.9 ± 1.9	0.7 ± 1.1
Oils/fat	0.9 ± 1.3	0.9 ± 1.0
Fruit	0.4 ± 0.9	0.2 ± 0.5
Sugar	1.0 ± 1.4	1.3 ± 2.0
Starch	4.4 ± 3.1	4.2 ± 2.5

Data from a special survey in eight villages in two thanas.

Values are means ± SD.

a. N = 63. b. N = 49.

10.6% and 5.8% respectively, but this difference was not statistically significant ($p = .051$). The proportion who were severely malnourished appears to be higher among the non-participants, but the cell frequencies are unfortunately too small to support any conclusion.

Perceptions of growth monitoring

Non-participating mothers said that they had heard about growth monitoring but nobody had asked them to weigh their babies. They further indicated that they were not aware of the usefulness of weighing babies, since the health workers had not explicitly explained it to them.

The majority of the participating mothers believed that the monthly monitoring sessions informed them of their children's growth status and allowed them to

TABLE 6. Selected characteristics of participant and non-participant households

	Participants	Non-participants
Average landholding	140.1	135.7
Head of household a day labourer (%)	27.5	26.2
Mother literate (%)	16.1	19.9

Karim and Chowdhury, unpublished data, 1990.

take necessary measures to improve the status in a timely fashion. The sessions also enabled them to receive health education.

A number of mothers initially faced resistance to participating, as some family members thought that it was not good for the baby ("brings sickness"). Gradually such obstacles were overcome through motivation by BRAC workers.

The village leaders were aware of the sessions and were generally supportive and convinced of their usefulness.

Discussion

That growth monitoring can be an important tool in promoting child survival is beyond doubt, but its effectiveness in all developing countries has yet to be proved [1]. A reason for this controversy is the confusion between monitoring and nutrition surveillance [7]. Growth monitoring involves much more than just surveillance, such as nutrition education and community participation [9]. The BRAC programme in Bangladesh included these activities and thus provided an opportunity to examine growth monitoring

TABLE 7. Nutrition status of participant and non-participant children 6-23 months old

	Weight/age (% of median)	Participants		Non-participants		Total	
		No.	%	No.	%	No.	%
Normal	> 90	20	10.6	18	5.8	38	7.7
Malnourished mild	75-90	78	41.5	139	45.2	217	43.7
moderate	60-75	87	46.3	139	45.2	226	45.6
severe	< 60	3	1.6	12	3.8	15	3.0
total	< 90	168	89.4	290	94.2	458	92.3
Total		188	100	308	100	496	100

Calculated from data of the Helen Keller International Nutritional Surveillance Project (rounds II and III) and a follow-up survey by BRAC.

institutionalized and will be done quarterly in the programme areas (population, 2 million). The cylinder scales, which were found to be defective, have all been replaced by round scales. A standard weight is being provided to each programme area for daily appraisal of the accuracy of the scales. Assistance to severely malnourished children in terms of food supplementation is also being considered.

The new programme is also different in that BRAC will never completely withdraw. After the three-year women's health and development phase, the institutional development and credit components of BRAC programmes [14] will be introduced. Through this village-level effort, the poorer households will be identified and components such as children's education [15] and credit [14] will be intro-

duced that will facilitate addressing other causes of malnutrition in a systematic and sustained manner.

Acknowledgements

The authors acknowledge with gratitude the following individuals for their assistance in various stages of the study: Abbas Bhuiya, International Centre for Diarrhoeal Disease Research, Bangladesh; Lincoln Chen, Harvard University; Rezaul Karim, BRAC; Lyne Pacquet, formerly of Helen Keller International; Jon Rohde, UNICEF, New Delhi; and Nancy M. Gerein, Canadian International Development Agency, Ottawa.

References

1. Gerein NM. Is growth monitoring worthwhile? *Health Pol Plan* 1988;3:181-94.
2. Grant JP. *State of the world's children*, 1985. Oxford: Oxford University Press, 1985.
3. Ahmed K, Hassan N, eds. *Nutritional survey of rural Bangladesh, 1981-82*. Dhaka: Institute of Nutrition and Food Science, University of Dhaka, 1983.
4. Save the Children, USA. *Lessons learned in practical nutrition: approaches and actions in Bangladesh*. Westport, Conn, USA: Save the Children, 1990.
5. Rohde JE. Editorial. *Ind J Paediatr* 1988;55(suppl):51-2.
6. Folch-Lyon E, Trost JF. Conducting focus group sessions. *Stud Fam Plan* 1981;12:443-9.
7. Bloem MW, Menno M, Patwary Y, Lyne P, Paling A. Nutritional surveillance for disaster preparedness and prevention of nutritional blindness. *HKI Newsletter* 1990;1(2).
8. Rohde JE. Growth monitoring. *World Health* 1984; Oct:8-10.
9. Rohde JE. "Letter to A. Berg." Quoted in: UNICEF. *Growth monitoring of pre-school children*. Washington, DC: World Federation of Public Health Associations, 1985.
10. Gerein NM, Ross DA. Is growth monitoring worthwhile? an evaluation of its use in three child health programmes in Zaire. *Soc Sci Med* 1991;32:667-75.
11. Gopaldas T, Paul SC, Rita DA, Gujral S. Does growth monitoring work as it ought to in countries of low literacy? *J Trop Pediatr* 1990;36:322-7.
12. Chowdhury AMR, Ahmed M, Sarkar M, Islam J, Mahmud S. A tale of two wings: health and family planning programmes in an upazila in northern Bangladesh. Dhaka: BRAC, 1990.
13. Berg A. *Malnutrition: what can be done? lessons from World Bank experience*. Washington, DC: World Bank, 1987.
14. Chowdhury AMR, Mahmud M, Abed FH. Credit for the rural poor: the case of BRAC. *Small Enterprise Dev* 1991;2:4-13.
15. Lovell C, Fatema K. The BRAC non-formal primary education program. *Assignment Children*. New York: UNICEF, 1989.