Disasters, 2003, 27(2): 172–184

The 1998 Flood in Bangladesh: Is Different Targeting Needed During Emergencies and Recovery to Tackle Malnutrition?

S.M. Moazzem Hossain
Save the Children UK Bangladesh

Patrick Kolsteren
Institute of Tropical Medicine, Antwerp

Bangladesh suffered the century's worst flood during July–October 1998 and appealed for assistance. To provide information for appropriate interventions to tackle nutritional problems, a rapid assessment survey was conducted to look at the nutritional situation, problems encountered by the community, their coping mechanisms and rehabilitation priorities in six rural areas. The survey was repeated after four months to measure the outcome of activities during the flood and the necessity for future assistance. There were 3,048 children measured in both surveys (1,597 and 1,451). The sample of most interest was a sub-group of 180 children present in two previous independent surveys.

The analysis found that while moving from the crisis period to post-flood phase there was evidence of a 'crossover phenomenon' in the recovery pattern of nutritional status. Sixty-eight per cent of the children who were malnourished (WHZ <-2SD) during the crisis period (18 per cent) recovered enough to cross the cut-off point and became normal after four months. Another 8 per cent of children (9 per cent of all normal) who were normal during the crisis period, after four months had deteriorated to be malnourished. Thus, despite there being a shift in the overall distribution of nutritional status, there has been another shift that reduced the net effect. Subsequent episodes of diarrhoea, access to food and loan burden had also influenced the recovery pattern of the children's nutritional status as evident from the statistically significant associations. These findings raise questions about targeting acute malnutrition during emergencies, and using the same criteria during both the crisis and rehabilitation phases.

Keywords: Bangladesh, flooding, nutritional status of children, post-flood effects.

Introduction

Bangladesh experienced one of the worst floods in its recorded history from late July until early October 1998. Some 30 million people in six million families were affected by the crisis. The people there have extraordinary coping mechanisms for dealing with floods which occur there on a regular basis. Nevertheless, the scale and duration of the 1998 flood put these mechanisms under considerable strain, and there were serious concerns about the possibility of a large-scale famine similar to that which followed the floods of 1974. Many people exhausted all their assets and were forced into debt in

© Overseas Development Institute, 2003.
Published by Blackwell Publishing, 9600 Garsington Road, Oxford OX4 2DQ, UK and 350 Main Street, Malden, MA 02148, USA.

order to survive the post-flood period. The poorest families ran out of food supplies; they had no alternative but to eat their seed supplies, sell their animals and take high-interest loans to pay for food and medical care (Disaster Forum, 1998).

Throughout Bangladesh there was widespread mobilisation of volunteer assistance during the flood to support communities. Immediate help came in the form of search-and-rescue efforts when lives were at risk. Flood shelters were built by many agencies while others used existing structures, such as community meeting places or schools. Food assistance was the most common type of external aid. Free food distributions were targeted at those with the most urgent needs, especially the poorest. Both government and local organisations (called NGOs but sponsored by INGOs) intervened during this period. Government intervention was mostly limited to medical care but it also supported rice and wheat distributions either through the Vulnerable Group Feeding (VGF) programme or Open Market Sale (OMS). NGOs focused on distributing food, shelter and other necessities like cash. Together with government, some NGOs also provided primary medical care in remote treatment centres or through mobile teams. Teams travelled into remote areas to provide treatment for diarrhoea, acute respiratory infections and skin diseases. Nutritional interventions (distributed by some NGOs) included supplementary feeding for those households containing a malnourished child and a vitamin-A capsule whenever a child with symptoms of night blindness was detected. General rations (rice, lentils and oil) were also distributed to those households meeting targeting criteria (different for different NGOs). Nutritional surveys were conducted on a small and large scale by many agencies to decide whether specific nutrition interventions were needed and this study by SC-UK was part of that process. However, there is hardly any information about any other evaluation survey conducted besides this one.

After the emergency phase, rehabilitation activities were initiated. These included repair of damaged houses and supply of agriculture products like seeds and fertiliser. Many NGOs organised cash-for-work programmes as a means of providing beneficiaries with income for household consumption needs, as well as to regain productive assets. Cash grants and interest-free loans were also supplied by many agencies.

There was debate among the NGOs about how to target resources in the planning phase. Some activists argued that since the flood had affected almost everyone in the area, all should be helped whereas the counter-argument was that the resources do not allow adequate assistance for all and hence there should be more assistance for those with more urgent needs. It should be mentioned here that the external assistance was mobilised by only a few INGOs (such as CARE, Oxfam, SC-UK) and in most cases, targeting criteria was also set by them. However, selecting the beneficiary and distribution of food (or other aid) was done by the local NGO.

Targeting of the interventions was directed towards those most in need predominantly using the presence of malnourished children in the family, being landless, having a female-headed household or having a member with some disability as a proxy for urgent need. Despite various criteria set in advance, it has been observed in most of the emergency aid operations that local NGOs are biased towards beneficiaries who are somehow linked with the regular development activities, especially micro-credit programmes. Those who are engaged in those activities (called NGO members) always get priority since that helps the local NGOs achieve better recovery of their loans which could be at risk from to flood damage. Many experts and evaluators have questioned the efficiency of targeting the true beneficiary irrespective of the interventions and criteria (Young, 2000), and this could be even worse in cases of complex emergencies (Jaspars and Shoham, 1999).

Although the interventions differed during crisis and rehabilitation, the targeting criteria was set during crisis period and the same beneficiaries were again assisted during the rehabilitation phase. Here, findings are presented after following a group of children and they underline the need to consider different indicators for targeting during both the emergency phase *and* the rehabilitation phase.

Materials and methods

Study areas

Two cross-sectional surveys were done in flood-affected areas of Bangladesh situated on the banks of the Jamuna River that originates in the mountains of neighbouring India, enters Bangladesh through its northern border and ends at the south in the bay of Bengal. During the monsoon (June–August), the banks of the river and the charlands (small islands in the middle of the river or near shores) are usually flooded annually but during 1998, the floods started earlier and stayed longer than other years (May–October). All the study sites consisted mainly of charlands stretched over seven *thanas* (the lowest functional administrative unit containing a population of about 200,000) that fell under the geographical boundaries of five districts. They are: Roumari and Ulipur in Kurigram district; Fulchari and Shaghata in Gaibandah district; Dewanganj in Jamalpur district; Chouhali in Sirajganj district; and Naria in Shariatpur district. Sites were located in the upper, middle and lower parts of the course of the river and approximately 40–50km apart. Despite the scattered location of sites, the background characteristics and livelihoods of the people remain very similar in all places.

Livelihoods of char-dwelling families

Most of the char-dwellers are effectively landless (either have no land or have lost land through river erosion), and depend on low-yield farming, cattle/goat rearing, fishing, boating, selling daily labour or 'migratory labour'. All these activities are fully exposed to the effects of floods except for boating and fishing. Whatever the small amount of assets (land, cattle, crops or furniture) accumulated during the normal period may be washed away again in the next flood (causing distress sales) or in the process of river erosion. Charland people have also very limited access to basic services like education and health-care. To gain access to land, employment and, particularly, to cope with emergency and stress, many char-dwellers have to depend on loans, mostly from private moneylenders or 'mohajons' who charge interest rates as high as 200 per cent a year. Despite the fact that these loans make people victims of long-term exploitation, they do provide some protection against uncertain stress. A few lucky families may have access to soft loans (at very low or no interest) either from relatives, banks or NGOs. Very few char-dwelling families have any possibility of moving to a more secure and less flood-prone environment in the short term.

Study period and sample

Two separate surveys were done in two different periods in August (the peak of the flood) and in December (the post-flood harvesting period). During the flood, unemployment was high and food supply was low. Many people depended on relatives or relief for food. The water and sanitation situation deteriorated severely, morbidity increased and there were more malnourished children. All these variables showed a significant improvement during the second survey round in December.

Sample size was estimated on the assumption that p (probable proportion of malnutrition in population) was 20 per cent, z as a constant (1.96) at 95 per cent confidence interval and 5 per cent acceptable error. The overall sample was based on a multi-stage cluster survey design with a total of 60 clusters (WHO, 1995; Hossain and Shuaib, 1998). Information on the flood levels was collected from the Flood Control and Warning Centre at Dhaka (the capital of Bangladesh). A list of villages was made based on the Population Census Report (BBS, 1991) and constituted the sampling frame. Villages were randomly selected as Primary Sampling Units (PSU) by probability proportional to size. Selected villages were then divided into segments or clusters of 30–40 households and one of the segments was chosen at random. A total of 60 clusters in six areas were visited and data collected during the first survey. All the households in a cluster were visited but only those with at least one child of 6–59 months were interviewed. During the second survey, all the villages were visited again but the clusters were randomly chosen. However, the survey could only be done in 56 villages because four villages refused to have their children measured.

A total of 1,597 children aged 6–59 months were measured for nutritional assessment during August 1998 and 1,451 children during December. Since the villages (60) were common in both rounds of surveys but the clusters (arbitrary) in those villages were randomly chosen each time, there were thus some clusters either totally or partially overlapped in both rounds. A total of 180 children appeared in both the surveys and hence formed the group for a secondary analysis. Their background characteristics such as age, gender and land ownership (of households) were checked and found to be similar either with the first or the second survey (see Table 1). This papers highlights the findings from the secondary analysis on the information about these 180 children and their households.

Table 1 Comparison of background characteristics between the sample of the two surveys and the common 180 children considered for secondary analysis

Indicators	*First survey N=1,597*	*Second survey N=1,451*	*Common children N=180*
Age			
6–23 months	33.1%	33.6%	32.3%
24–59 months	66.9%	66.4%	67.7%
Gender			
Boys	52.7%	50.7%	55.6%
Girls	47.3%	49.3%	44.4%
Land ownership			
Landless	38.6%	43.9%	37.8%
Any amount of land	61.4%	56.1%	62.2%

Data-collection method

A total of 12 teams (three members in each team) conducted the survey in less than two weeks and all of them were trained for five days at the beginning of the survey. The household head or next responsible person was interviewed and the children measured for weight and height. Children were weighed with Salter scales (Salter glass, 25kg x 100g, approved by UNICEF) calibrated daily. Length (for children up to two years) was measured in a lying position and height (children more than two years) was measured with the child standing using a measuring-stick prepared according to standard guidelines (UN, 1990a, 1990b). Weight for age, weight for height and height for age were calculated using anthropometric software obtained from EPINUT. The nutritional indices were expressed as standard deviation scores (z scores) of the reference medians.

Definition of variables

A household was defined as a group of people who cook together (BBS, 1998). Household information includes age, sex and education of the head. The head of the household is that person whom the others consider to be so, usually the eldest. Amount of land here includes both homestead and agricultural land. There is absolute landlessness and functional landlessness. Asset value was calculated by estimating the price of individual items in the household if sold in a normal functioning market at the time of survey. Asset loss was calculated in taka (US$1=50 taka, approximately) by deducting the selling price from the estimated value (perception of the respondent crossed by the interviewer) at market. The possibility of over-estimation was balanced by double-checking with neighbours in doubtful cases. If the asset was water damaged or stolen, the total estimated selling cost was considered as a loss. Proportion of asset loss was calculated by dividing the total loss by the total value of the assets. Loan burden was assessed by asking about the total amount borrowed and then checked with each source (relatives, *mohajon,* NGO). The amount of total loan variable was dichotomised at 3,000 taka and above since several NGOs gave a crisis credit of 3,000 taka. NGO membership was defined as those involved in either a credit or savings programme with any local NGO, and thus eligible to get soft loan (at low interest). Sources of food for the last week were categorised as own stock, loan or relatives and donation. Assistance was defined as receiving money, rice, other food or major items either from local or external agencies. Compromised food habit was defined as either having three meals per day but smaller than normal or two meals per day or anything below these two.

Morbidity was reported by seeking information on any episode of diarrhoea (three experiences of watery stools in 24 hours) in the week preceding the survey. Wasting (less than –2 SD of weight-for-height z-score) is mainly used in this study to define malnutrition because it is considered as the most appropriate indicator to measure acute malnutrition (UN, 1990a, 1990b). Changes in nutritional status between the two surveys were computed by deducting the weight-for-height z-scores (WHZ value) of the first survey from those of the second. Positive values were considered as improved and negative values as declined. There were no values at ‘0’.

Data analysis and results

Data were entered into the computer using database software (FoxPro 2.6) and analysed in statistical package programmes (SPSSPC 9.0 and EPI Info 6.0). Anthropometric measurements were compared with NCHS median and z-scores calculated using EPINUT. Uni-variate analysis was done to see the association between variables. Chi square and Student t tests were also done as appropriate.

A total of 180 children were measured during both the August and December 1999 surveys. Of these, 17 per cent were malnourished (WHZ score <-2SD) in August and 12 per cent in December (p=0.011). Although there was a net improvement of 5 per cent in the malnutrition prevalence, the recovery pattern was not straightforward.

Figure 1 presents the nutritional status of the children from August to December. Ninety per cent of the malnourished children improved with 82 per cent returning to a point above -2SD, here defined as 'normal'. In contrast, half of the children who were well (WHZ score ≥-2SD) saw their nutritional status worsen so that in December, 9 per cent became malnourished. Of the whole group, 57 per cent improved and 43 per cent declined in nutritional status although the overall prevalence declined from 17 per cent to 12 per cent. Fourteen of the 23 malnourished (64 per cent) were 'new' cases or previously normal children. We can thus observe an important cross over phenomenon, and it might be useful to look for the reason behind such a trend in recovery pattern. In the first survey it was found that 5.1 per cent of children showed no change in weight, while the second survey showed 20.8 per cent of the children decreased in weight, leaving about 74.2 per cent children who actually increased in their weight. Finally only 55.4 per cent children were found to have improved their WHZ score, although not all of them could move past the cut-off point for malnutrition (-2SD for WHZ in this case).

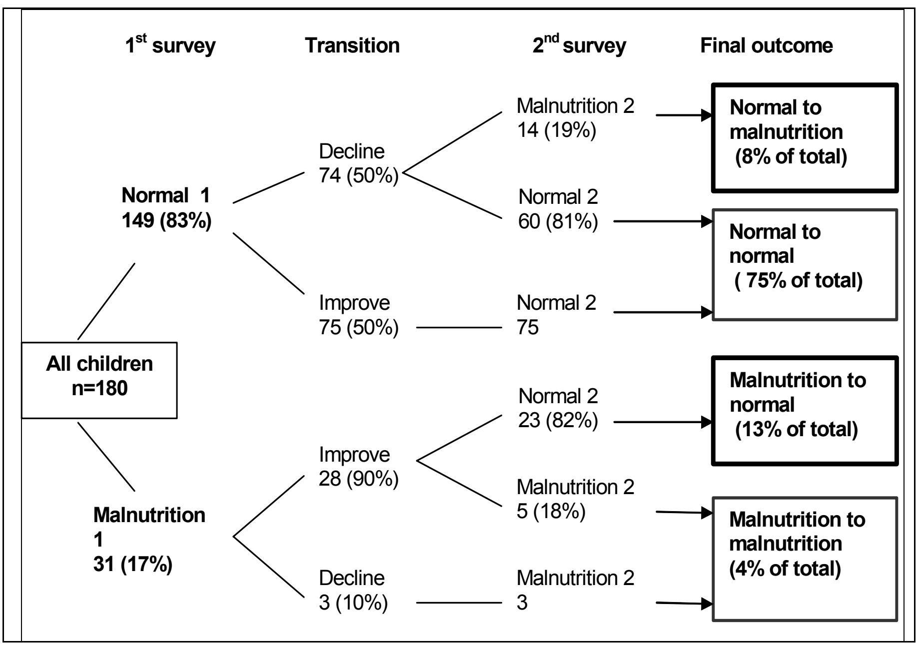

Figure 1 Recovery outcome of the children from the first survey to the second survey in terms of nutritional status

Table 2 compares a number of variables between children who improved in nutritional status versus other children who declined. The table also compares variables for those children who crossed over and became either malnourished (WHZ <-2SD) or who normalised.

The loan burden variable seemed to have a strong association with the recovery pattern when any improvement or decline was considered as the outcome. When crossing over is considered as an outcome, proportion of asset lost, either single or repeated episode of diarrhoea and source of food during the week preceding the survey of December were found to have a significant relationship. The rest of the variables showed some trend but without a statistically significant association.

Table 2 Comparison of means of different variables and type of recovery in nutrition status of the children during and four months after flood

Variables	*Change in nutrition status*			*Crossing the cut-off point*		
	Declined	*Improved*	*OR (CI)*	*Normal to malnutrition*	*Malnutrition to normal*	*OR (CI)*
	N= 77	*N= 103*	*N= 180*	*N= 14*	*N= 22*	*N= 36*
% of male children	61	52	1.5 (.8– 2.7)	86	55	5.0 (.9–27.8)
Mean year of mother's schooling (SD)	6 (2.8)	7 (3)		6.5 (3.7)	7 (4.3)	
% landless	33	41	.7 (.4 – 1.3)	43	36	1.3 (.3–5.1)
% who lost >95% assets	36	38	.9 (.5–1.7)	50	10	9.5* (1.6–57)
% loaned from *mohajon*	65	62	1.1 (.6–2.1)	79	55	3.1 (.6–14.3)
Mean amount of loan in taka (SD)	3,854 (±4,377)	2,392+ (±1,654)		2,218 (±1,972)	1,875 (±1,076)	
% of families loaned >3,000 tk	25	12	2.5* (1–5.5)	21	5	5.7 (.5–61.7)
Proportion loaned from others	8	13	.6 (.2 – 1.6)	--	1	
Mean amount of loan in taka (SD)	2,583 (±1,562)	3,473 (±2,464)		--	--	
% of diarrhoea 1st	33	36	.9 (5–1.6)	64	27	4.8* (1–20)
% of diarrhoea 2nd	30	26	1.2 (.6–2.3)	57	32	2.9 (.7–11.4)
% repeat diarrhoea	13	13	1.0 (.4–2.5)	43	5	15.8* (1–41)
% who had own food stock in 1st round	66	63	1.2 (.6–2.1)	71	77	.7 (.2–3.4)
% who had own food stock in 2nd round	52	54	.9 (.5–1.6)	79	36	6.4* (1.4–30)
% got assistance	61	58	1.1 (.6–2.1)	50	64	.6 (.2–2.2)

* p value significant (<.05) using chi-square test
+p value significant (<.05) using student t test

Although not significant, the proportion of male children (6–59 months) was almost the same in both the groups who improved or declined (52 per cent versus 61 per cent) but more boys became malnourished from normal as opposed to those who became normal (86 per cent versus 55 per cent). The percentage of non-school attendees among the mothers of these children was slightly higher among those who improved, and the mean level of education was always higher among the same groups.

The proportion of absolutely landless families did not vary significantly between the groups. The total asset value was higher in the group which went from malnutrition to normal but these were also the groups in which significantly fewer people lost more than 95 per cent of their assets. In the group with children who became malnourished, 50 per cent had lost virtually everything.

Almost all the people contacted had to take out some sort of loan during or after the flood but there is a variation in the sources. Although the proportion of loans from a *mohajon* was similar for those who nutritionally either improved (62 per cent) or declined (65 per cent), the mean amount was much higher in the groups which declined (3,854 taka) than for those which improved (2,392 taka). Even so, the proportion of families that took out a loan of more than 3,000 taka was higher among those which declined (25 per cent versus 12 per cent). The difference in the loan amount among the groups was significant (p=0.022). Lending from other sources such as neighbours or banks was very limited. The proportion of families who had access to loans from other sources was higher among those who improved nutritionally than those who declined (13 per cent versus 8 per cent). On the contrary, none of those who declined from normal to malnourished had any access to this type of loan. The mean loan from other sources was also higher among those who improved (3,473 taka) than those who declined (2,583 taka).

Episodes of diarrhoea had some relationship with crossing over cut-off points but not with simple improvement or decline in nutritional status. Sixty-four per cent of the children who were malnourished in December had an episode of diarrhoea in the week prior to the August study. This figure was 27 per cent among the children who normalised their malnutrition by December and shows a significant relationship (p=0.028). The association between worsening of nutritional status and repeated episodes of diarrhoea became even more pronounced. In August, 43 per cent of the normal children who became malnourished had repeated diarrhoeal episodes compared to 5 per cent in the group who were malnourished but became normal (p=0.005; OR 15.8; CI 1–41).

The children of families with access to various sources of food had better chances of improving than declining. Although the proportion of those who did not have any access or did not want any loan or donation for food was very similar among various groups during the flood period (August), it varied during December. The difference in proportion did not matter much for mere improvement or decline but made a significant difference in moving from normal to malnutrition or the reverse. The 79 per cent of those who deteriorated to malnourished had depended only on their own stocks of food, versus only 36 per cent in the other group (p=0.013; OR 6.4; CI 1.4–30). This meant that they had less access to food either through loans from relatives or donations from local or external agencies.

When looking at the background characteristics of those who received assistance, it was found that those who were NGO members, were landless, had a higher loan burden, more compromised food habits and had malnutrition during floods received more assistance than others (see Table 3). Although not significant, the

Table 3 Background characteristics of those who received any assistance or did not

Variables	*Status of those getting any assistance*		
	Yes *N=107*	*No* *N=73*	*OR (CI)* *N=180*
% of malnutrition during Aug 1998	18	16	1.1 (.5–2.6)
% of malnutrition during December 1998	11	15	.7 (.27–1.9)
% of NGO members	44	23	2.6 (1.3–5.3)
% of absolutely landless families	43	29	1.9* (1.0–3.5)
% of functionally landless families	79	63	2.3* (1.2–4.4)
Proportion who lost >95% assets	30	49	.45 *(.2–.8)
Mean amount of total loan taken (SD)	4,437 (±4,836)	2,690+ (±2,110)	
Proportion of loan from m*ohajon*	67	58	1.5(.8–2.8)
Mean loan from m*ohajon* (SD)	3,505 (±3,724)	2,285+ (±1,859)	
Mohajon loan >3,000 taka	31	21	1.6 (.6–4.3)
Proportion of loan from others	10	11	1.8(.8–4.2)
Mean loan from other sources	4,318 (±2,348)	2,016+ (±1,121)	

* p value significant (<.05) using chi-square test
\+ p value significant (<.05) using student t test

proportion of malnutrition during August was slightly higher (18 per cent) among those who received assistance than those who did not (16 per cent), it was reversed during December (11 per cent versus 15 per cent). The proportion of NGO members was significantly higher among those who got assistance than those who did not (44 per cent versus 23 per cent, p=0.005). Families who were absolutely and functionally landless received more assistance than those who had more land (43 per cent versus 29 per cent; p=.053 and 79 per cent versus 63 per cent; p=0.015). It is important to note that the proportion of families who lost more than 95 per cent of their assets were also less likely to receive assistance than those who had not suffered such a high losses (30 per cent versus 49 per cent; p=0.014). Although the proportion of loans from *mohajon* or other sources showed a similar trend while compared to different groups (assisted versus unassisted), the mean amount of 'total loan', loan from *mohajon* or other sources were always much higher among the assisted than those not assisted (4,437 versus 2,690 taka, p=0.004; 3,505 versus 2,285 taka, p=0.036; and 4,318 versus 2,016 taka, p=0.015, respectively, for total loan; loan from *mohajon*; and other sources).

Nutritional status improved from August to December for several reasons: land tenure in August was higher (r=0.19; p=0.022); proportion of asset loss was smaller (r=-0.262; p=0.001); loans from *mohajon* smaller (r=-0.171; p=0.011); and loans from other sources higher (r= 0.171; p= 0.001).

Discussion and conclusions

In the study area almost every individual had been affected by the flood so it is difficult to isolate specific factors that could have influenced the vulnerability of a child to become malnourished during the flood or recovery afterwards. During the flood, all socio-economic indicators declined. Food stocks were exhausted leading to more households depending on loans or donations for their daily food. Similar findings were reported by other agencies as well (HKI-NSP, 1999; Hossain and Shuaib, 1998).

Negative impact of natural disasters on child malnutrition has been reported by several studies in Bangladesh (HKI-NSP, 1999; Chowdhury and Bhuiya, 1993). The studies demonstrate an association between malnutrition and educational level of the caregivers, land ownership and reported illness (Bhuiya et al., 1986a). A high rate of diarrhoea during the flood was reported in some studies (Briend et al., 1987; Stewart et al., 1990; HKI-NSP, 1999; Hossain and Shuaib, 1998). Nutritional status was also associated with health-related behaviour before and after each episode of illness, gender preferences and age of children (Bhuiya et al., 1986b; Briend et al., 1989). Most of these findings have been confirmed by surveys done in our study area which were reported previously (Hossain, 2000).

This study observed an increase in the malnutrition rate that was higher than the national average (BBS, 1997), but it is not clear how the associations between nutritional status and other factors affect the recovery pattern of the children with malnutrition. The striking finding of the present study was the crossover phenomenon: some children improved from malnutrition to normal while others deteriorated from normal to malnutrition when they moved from the crisis into the rehabilitation period. Ultimately the impact on the prevalence of malnutrition is a mixed effect and the net improvement is reduced by the crossover phenomenon. Of all the malnourished children counted in the recovery period, 61 per cent are new cases. Despite the limitations of the study some interesting observations can be made. There was a significantly higher proportion of asset loss, loan burden and, in particular, the type of loan (from *mohajons*) in families whose children became malnourished. Although the reasons for improving or decline could not be established, yet there was a suspicion that failure to gain appropriate weight was the main reason for not improving the nutritional status rather than other factors.

Mohajons are moneylenders who lend money at very high rates at times of crisis to poor people with minimal reserves or collateral. Inability to repay the money usually ends in loss of their remaining assets or having to supply free labour for any number of days decided by the moneylenders. Unfortunately, taking loans from this source is negatively correlated with improved nutritional status. On the contrary, having access or the ability to obtain a loan from other sources (banks, relations or neighbours) with long-term repayment schedules at very low or no interest was positively correlated with improved nutritional status. This suggests that flood-affected families need to be assisted *before* the moment when they exhaust their resources and are forced to take loans from *mohajon* or that their access to other loans should be widened.

The other factor that seemed to have some influence on the recovery pattern was repeated attacks of diarrhoea. Although there was some association between an attack during the flood (August) and deterioration from normal to malnutrition, it was absent when checked with an episode of diarrhoea during December. The association became even stronger when checked against those who had repeated episodes of diarrhoea, namely during the flood (August) and the post-flood period (December). It has been documented earlier that reported incidence of diarrhoea remains high during and immediately after floods. Despite this fact, deterioration from normal to malnutrition could be stopped if the later episodes of diarrhoea could be prevented by taking adequate care of those who had been ill during the flood. Diarrhoeal control and treatment is a top priority in flood-affected areas.

The third and probably most operationally relevant finding of this study was that the targeting criteria for assistance was not suitable for all periods of the emergency. It may be that eligibility criteria for assistance needs to be different for the immediate crisis and the rehabilitation phase. Results show that those who were poor and in need during flood were helped. It appears that those who had a malnourished child during the flood (crisis) had more possibility of getting assistance, which fits with the anthropometric criteria used by agencies involved in the flood response. However, crisis is not the same as recovery. In a crisis, the aim is to save as many lives as possible. It is therefore legitimate to target assistance based on clinical criteria such as malnutrition. But in a rehabilitation or recovery phase, the situation becomes completely different, in particular if the flood affects all people indiscriminate of their socio-economic condition. Those who coped and survived well during the flood might have exhausted all their assets during flood. They would be more vulnerable in the rehabilitation phase in comparison to those who were poor and vulnerable during flood and were assisted by a local or external agency. Moreover, assistance was targeted at the land ownership and missed the fact that those who lost almost everything (more than 95 per cent of their assets) were more vulnerable than those who lost less. Their coping capacity is stretched to the limit and the possibility of recovery is small. Since they are not ineligible for a 'normal' or 'soft' loan, they are forced to find money at very high interest rates. Asset loss was significantly associated with deterioration from normal to malnutrition.

A last point is that more beneficiaries of assistance were 'members' of any NGO. Although the NGOs claimed that they consulted the local community to identify appropriate beneficiaries, the current findings may allow critics to raise the question whether aid agencies help the affected people in general or aim first to promote their own development programme and help their own beneficiaries (Young, 2000). However, it could also be that the NGO members were among that vulnerable group who required assistance more than others.

The results of the present study have to be interpreted with care. An observation of a crossover phenomenon was made, some associated factors were identified and an explanation is available. However, this was not a longitudinal design, the numbers are small and information on asset losses could be biased because of some hidden expectation for relief. We do feel however that the findings merit further consideration and particular attention, certainly in future disaster episodes. We strongly feel that during a disaster of large scale that spares almost none, all should be helped. If targeting needs to be done on the basis of a lack of resources, there should be two separate criteria for assistance, one for the crisis period and a new one for the rehabilitation phase. During the analysis it was also strongly felt that there should be better-designed longitudinal studies set up in periods of flood to look at these issues more carefully and produce appropriate recommendations. Sensitive indicators should be tested that will be easily applicable by community people but appropriate to respond to the problems of that period and of that place.

Acknowledgements

We would like to acknowledge the contribution of Save the Children Fund UK who funded the initial surveys through the money that came from DEC Appeal 1998. We are grateful to Lola Gostelow, emergency advisor and Anna Taylor, nutrition advisor, SCF-UK for their encouragement, questions and comments during the whole period of this study. We are indebted to Martine Billanou, the then programme director of SCF-UK Bangladesh Programme (currently the programme director of SC-UK Tanzania) who managed to sponsor a visit to Bangladesh during the current study for data re-organisation. Thanks to Muhammad Shuaib and Abdullah-Al-Harun (currently with SC-UK) of SURCH for their support during the initial surveys and the secondary analysis. We are also indebted to the children and their parents who were affected during the flood but always cooperated during data collection. The views expressed in this paper are exclusively those of the authors and not related to the work of Save the Children UK.

References

BBS (1991) The Population Census Report. Ministry of Planning, Government of People's Republic of Bangladesh, Dhaka.

—— (1997) Child Nutrition Survey of Bangladesh–1995–96. Ministry of Planning, Government of People's Republic of Bangladesh, Dhaka.

—— (1998) Statistical terms/concepts/definitions Needed in Censuses/surveys of BBS and Other National/International Agencies. Ministry of Planning, Government of People's Republic of Bangladesh.

Bhuiya A., S. Zimicki and S. D'Souza (1986a) Socio-economic Differentials in Child Nutrition and Morbidity in Rural Areas of Bangladesh. *J Trop Paedia* 32(1): 17–23.

—— , B. Wojtyniak, S. D'Souza and S. Zimicki (1986b) Socio-economic determinants of child nutritional status: boys vs. girls. *Food and Nutrition Bulletin* 8 (3): 3–7.

Briend A., B. Wjtyniak and M.G. Rowland (1987) Arm Circumference and Other Factors in Children at High Risk of Death in Rural Bangladesh. *Lancet* 2 (8561): 725–8.

—— , K.Z. Hasan, K.M. Aziz, B.A. Hoque and F.J. Henry (1989) Measuring Change in Nutritional Status: A Comparison of Different Anthropometric Indices and the Sample Sizes Required. *Eur J Clin Nutr* 43(11): 769–78.

Chowdhury, A.Y. and A. Bhuiya (1993) Effects of Bio-social Variable on Changes in Nutritional Status of Rural Bangladeshi Children, Pre- and Post-monsoon Flooding. *J Biosoc Sci* 25(3): 351–7.

Disaster Forum (1998) Bangladesh Disaster Report 1998. Disaster Forum, Dhaka.

Goyet, C.V., J. Seaman and U. Geijer (1978) *The Management of Nutritional Emergencies in Large Populations*. World Health Organisation, Geneva.

HKI-NSP (1999) Impact of the 1998 Floods on Rural Households in Bangladesh. A Special Report from the Nutrition Surveillance Project. Helen Keller International, Dhaka.

Hossain, S.M.M. (2000) Tackling Child Malnutrition During Floods: Experience from Charlands of Bangladesh. Unpublished thesis, Institute of Tropical Medicine, Antwerp.

—— and M. Shuaib (1998) *Rapid Nutrition Assessment During Flood 1998: Coping Mechanisms and Community Perception of Suitable Rehabilitation, Vols 1 and 2*. The Save the Children Fund (UK), Dhaka.

Jaspars, S. and J. Shoham (1999) Targeting the Vulnerable: A Review of the Necessity and Feasibility of Targeting Vulnerable Households. *Disasters* 23(4): 359–72.

Stewart, M.K., V. Fauveau, J. Chakraborty, A. Briend, M. Yunus and A.M. Sarder (1990) Post-flood Nutritional Anthropometry of Children in Matlab, Bangladesh. *Ecology of Food and Nutrition* 24: 121–31.

UN (1990a) Assessing the Nutritional Status of Young Children. National Household Survey Capability Programme, Statistical Division, United Nations, New York.
—— (1990b) How to Weigh and Measure Children. National Household Survey Capability Programme, Statistical Division, United Nations, New York.
WHO (1986) Use and Interpretation of Anthropometric Indicators of Nutritional Status. *Bull World Health Organ* 64(6): 929–41.
—— (1995) Field Guide on Rapid Nutritional Assessment in Emergencies. World Health Organisation, Regional office for the Eastern Mediterranean, Alexandria.
Young, R. and Associates (2000) DEC Bangladesh: 1998 Flood Appeal. An Independent Evaluation Report. Disaster Emergency Committee, London.

Address for correspondence: S.M. Moazzem Hossain, Project Officer (Nutrition) UNICEF Islamabad, 6–7 floors, Suadi Pak TowerBlue Area, Islamabad, Pakistan. E-mail: <<smhossain@unicef.org>>