

**Recommended Responses to the Rodent Crisis in
the Chittagong Hill Tracts:
Evidence from the Food and Nutrition Survey**

**Prepared For
United Nations Development Programme (UNDP) Bangladesh**



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Abbreviations

BCG	Bacillus of Calmette and Guerin
BMI	Body Mass Index
CHT	Chittagong Hill Tracts
DCO	Data Collection Officer
DPT	Diphtheria-Pertussis-Tetanus
EBF	Exclusive Breast Feeding
HH	Household
HKI	Helen Keller International
IPHN	Institute of Public Health Nutrition
MUAC	Mid Upper Arm Circumference
NCHS	National Centre for Health Statistics, USA
ORS	Oral Rehydration Solution
SD	Standard Deviation
SES	Socio Economic Status
SPSS	Statistical Package for Social Science
UNDP	United Nations Development Programme
VAC	Vitamin A Capsule
WHO	World Health Organization

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Executive Summary

In June 2008, UNDP requested Helen Keller International to conduct a comprehensive food and nutrition survey to determine the impact of the ongoing rodent plague on isolated, hard-to-reach indigenous communities in the Chittagong Hill Tracts. The survey used pre-tested, standard tools to assess the health and nutritional status of the under five children and their mothers and to explore changes to food consumption and livelihood patterns in the rat affected areas.

The data show that the already precarious nutritional status and food security of these remote, isolated communities has been severely compromised in the wake of the rat plague. Nearly all of the population is experiencing some degree of food insecurity due to the rodent infestation. As many as 80.4% households reported eating smaller meals in the 7 days prior to the survey, due specifically to the rodent plague. In over 45% of the households, at least one member of the household had skipped meals during the previous week. Knowing that women are more likely than men to reduce meals to provide more food for their children and spouses, it is essential that any disaster-response package pay immediate attention to meeting the dietary needs of women (especially breast-feeding mothers) and to carefully monitoring intra-household food distribution (HKI 2008, p. 16).

The prevalence of underweight among under-5 children was over 30%, and more than 7% of these children exhibited signs of severe malnutrition. Such a high prevalence of malnutrition is strongly correlated with childhood morbidity rates and demands prompt and comprehensive action. The extremely high incidence of stunting among <5 children reflects chronic, underlying malnutrition in the CHT region, but it is also closely related to the mothers' poor nutritional status, which has been adversely affected by food shortages and reduced dietary quality due to the rodent infestation (BDHS 2007, p. 33). Almost 20% of the surveyed mothers were found to be at least marginally under-nourished (with a BMI < 18.5 kg/m²), which significantly increases the risks of low birth weight and subsequent childhood morbidity and mortality among their children. Should livelihood and food insecurity continue or worsen with seasonal fluctuations, moderately undernourished children and mothers can very quickly slide into categories of more severe malnutrition.

Equally worrisome was the extremely low intake of vitamin A supplementation among < 5 children and by ante-natal women, which prevents night blindness and reduces the severity of measles infections. Vaccination coverage against BCG, Polio, DPT, and measles was also extremely low; only 44% of children in the surveyed regions had received all eight key immunizations before the age of 2. The prevalence of micronutrient deficiencies and low vaccination rates, coupled with isolation from public health facilities and outreach services raises the possibility that preventable and treatable childhood diseases can lead to severe morbidity or child mortality in the area.

Finally, an appropriate disaster response must acknowledge that the rodent plague will have a profound and long-term impact on the livelihoods and income-generating possibilities of the affected populations. With the bamboo and many other Jhum crops

destroyed, the surveyed populations have been forced to shift into day labor, migration, and other insecure employment areas. Food aid remains a critical resource for many vulnerable households, as they try to shift into new income-generation activities or rebuild damaged assets and croplands. Roughly one-fourth of the households still receiving food aid reported this to be their main source of food.

The rodent-affected populations in the CHT urgently require targeted short- and medium-term interventions (including ongoing distribution of fortified food aid, health monitoring, micronutrient supplementation and vaccination coverage, job support, and agricultural interventions) from a range of stakeholders to restore the most vulnerable populations to acceptable levels of nutrition, health, and food security. As women in this region tend to breastfeed their children for up to five years and are likely to be most affected by food shortages, addressing the dietary quality of lactating and pregnant women should be the first step to improving their own health outlook and that of vulnerable under-5 children.

**Table 1:
Key Nutrition Indicators**

Indicators	Numerator	Denominator	Percent	Confidence Limits
Nutrition				
% of under 5 year children who were stunted	667	1580	42.2	39.8 % - 44.6%
% of under 5 year children who were underweight	538	1578	34.1	31.8% - 36.4%
% of under 5 year children who were wasted	115	1567	7.3	6.0% - 8.6%
% of under 5 year children who were severely stunted	216	1580	13.7	12.0% - 15.4%
% of under 5 year children who were severely underweight	84	1578	5.3	4.2% - 6.4%
% of under 5 year children who were severely wasted	8	1567	0.5	0.2% - 0.8%
% of non pregnant malnourished mother (BMI<18.5)	261	1303	20.0	17.8% - 22.2%
Child feeding practice				
% of children aged 0–5 months who were given breast milk within 1 hour of birth	96	196	49.0	42.0% - 56.0%
% of children aged 0–5 months who were exclusively breastfed during the last 24 hours	140	196	71.4	65.1% - 77.7%
% of children aged 0–5 months who were fed colostrums	157	196	80.1	74.5% - 85.7%

Indicators	Numerator	Denominator	Percent	Confidence Limits
% of children aged 12–15 months who were continued breastfed	114	120	95.0	91.1% - 98.9%
% of children aged 20–23 months who were continued breastfed	76	85	89.4	82.9% - 95.9%
% of children aged 6–9 months who received breast-milk and complementary foods	98	120	81.7	74.8% - 88.6%
Vitamin A coverage				
% of children aged 12-59 months who received vitamin A capsule in last NID on 10 May 2008	524	1138	46.0	43.1% - 48.9%
% of mother who received vitamin A capsule within 42 days of delivery	135	917	14.7	12.4% - 17.0%
Crude Immunization coverage among children 12-23 month				
BCG	228	354	64.4	59.4% - 69.4%
DPT-1	227	354	64.1	59.1% - 69.1%
DPT-2	215	354	60.7	55.6% - 65.8%
DPT-3	205	354	57.9	52.8% - 63.1%
Polio-1	226	354	63.8	58.8% - 68.8%
Polio-2	214	354	60.5	55.4% - 65.6%
Polio-3	204	354	57.6	52.5% - 62.7%
Measles	168	354	47.5	42.3% - 52.7%
All vaccine	166	349	46.9	41.7% - 52.1%
Food consumption				
% of HH eaten lower quality of meal in 7 days prior to the survey	1098	1365	80.4	78.3% - 82.5%
% of HH escape any meal in 7 days prior to the survey	617	1365	45.2	42.6% - 47.8%
% of HH consume non staple food in 7 days prior to the survey	507	1365	37.1	34.5% - 39.7%
% of HH got food aid due to Rat plague	946	1359	69.3	66.8% - 71.8%
% of HH consumed less per capita rice than national (439gm, HIES 2005,BBS)	1257	1365	92.1	90.7% - 93.5%
% of HH consumed less per capita rice than CHT tribal community (456.5 gm, NSP Jun-JUL 2005,HKI/IPHN)	1272	1365	93.2	91.9% - 94.5%

Indicators	Numerator	Denominator	Percent	Confidence Limits
% of HH consumed less per capita rice than CHT tribal community (456.5 gm, NSP Jun-Jul 2005, HKI/IPHN)	1272	1365	93.2	91.9% - 94.5%

2. Background of the study

Since late 2007, residents in several remote, hilly regions of the Chittagong Hill Tracts have been coping with a massive increase in the rodent population caused by the simultaneous flowering of a species of bamboo that blooms after long intervals.¹ The phenomenon of simultaneous bamboo flowering typically occurs at intervals of 30-40 years. Within a week of pollination, the flowering leads to fruit setting, providing an abundant and nutritious supply of food for rodents. Subsequently, there is remarkable increase in breeding frequency among certain rodent populations, which may give birth up to eight times during a year during the period of food abundance. Ultimately, the rodents demolish the bamboo crop and typically move on to feed off agricultural crops in the fields.

The CHT region, which is geographically and socio-culturally distinct from the rest of Bangladesh, is populated by 13 diverse indigenous groups collectively referred to as the Jhumma.² The principle occupation of many of these indigenous groups is bamboo and Jhum cultivation (slash and burn agriculture). According to a rapid assessment conducted by HKI in May 2008, 572 villages in 7 upazilas have been affected by this crisis, including 25,680 households or 128,400 people. Along with the Jhum and bamboo crops, rats have destroyed other green plants (such as papaya, chili, gourd, and ginger), and had even begun destroying the young green paddy planted in the low valley lands far from the bamboo forests (HKI 2008, p. 7).

In addition to the immediate crop devastation and food shortages caused by the rodent overpopulation, the bamboo flowering can also have severe ecological and livelihood repercussions.³ Because it takes 4-5 years for bamboo plants to regenerate after flowering, the soil erosion that follows the rodent plague may cause flashfloods, landslides, and poorer harvests. Farmers dependent on bamboo for their livelihood will need to seek alternative income strategies, including migration and poorly paid day labor.

Malnutrition and food insecurity are serious public health problems throughout Bangladesh, but they are particularly pronounced in the Chittagong Hill Tracts (CHT), due to the poor public service delivery to the region as well as the long-running, low-

¹For more information related to this unusual ecological phenomenon and impacts it creates, see Pallava Bagla. "India Girds for Famine Linked With Flowering of Bamboo." National Geographic News June 22, 2001

² HKI (2008), Bamboo Flowering, Rat Infestation and Food Scarcity in the Chittagong Hills Tracts, Bangladesh (needs assessment report). United States Agency for International Development (USAID), April 24, 2008.

³ AELGA (2008), "Rodent Update - Bangladesh and India" February 22.

grade conflict in the CHT. There is a general lack of detailed health information on the region and among the more remote Jhuma communities in particular, although beginning in 2003, HKI and the Institute of Public Health Nutrition (IPHN) began collecting detailed nutrition data in the area. In 2003, the prevalence of malnutrition among < 5 children and women in the CHT was significantly higher than that in the rest of Chittagong division, as well as in comparison to other divisions in Bangladesh (HKI/IPHN,¹ 2003). HKI's 2006 Nutritional Surveillance Project (NSP) also reported high incidences of underweight, malnutrition, and other extremely poor health indicators in the CHT region.

With this in mind, it was considered highly probable that the rodent infestation (which reportedly has not occurred on such a massive scale in Bangladesh since 1958) may have a crippling immediate and medium-term impact on the vulnerable populations.

To determine the severity of the food security crisis in the CHT and to better assess continued food aid and nutrition support needs, UNDP in 2008 requested HKI to conduct a cross-sectional survey in the affected Bandarban and Rangamati districts of the CHT. The survey used pre-tested, standard tools to assess the health and nutritional status of the under five children and their mothers and to explore the impact of rat infestation on households food consumption pattern in the rat affected areas.

3. Methodology

3.1 Goals and Objectives

The goal of the study is to quantitatively document the impact of the rat infestation on the food and nutrition situation in the Rangamati and Bandarban districts of the CHT. Specifically, the survey had the following sub-goals:

1. To determine the nutritional status of children younger than 5 and their mothers through anthropomorphic measurements
2. To explore changes in households' food consumption patterns due to the rodent plague
3. To determine the prevalence of healthy child feeding practices (such as age at initiation of breast feeding, feeding of colostrum, exclusive breast feeding, age of complementary feeding, and duration of breast feeding)
4. To assess Vitamin A Capsule coverage among children and postpartum women.
5. To determine the extent of routine immunization among the target group.

2.2 Study Design

A cross-sectional quantitative study was conducted in 7 rodent-affected upazilas of Rangamati and Bandarban districts in the Chittagong Hill Tracts. These are Baghaichhari,

Barkal, Belaichhari, Jurai Chhari, Rowangchhari, Ruma, and Thanchi. Upazilas were purposively selected to target those most severely affected by the rodent impact. A total of 15 villages were selected from each upazila; within the upozilla, 13 households with at least one child under the age of 5 were randomly selected. In each village, selection of households began from the North-West side of the main mosque, school, or other important community landmark. If the household was not eligible to be surveyed, the surveyors moved on to the next household until an adequate number of respondents were identified.

Because the prevalence of wasting among children aged 0-59 months in the CHT during June-July of 2005 was 12.9%,⁴ sampling was done presupposing that the prevalence of wasting in the affected areas would be at least 15%. Accordingly, a minimum sample size of 1209 respondents was required to attain 95% confidence level with 3% absolute precision and a design effect of 2 to estimate the overall prevalence of wasting among children in the affected areas.

The sample size was calculated using the formula: $n_0 = z_{1-\alpha/2}^2 [P(1-P)/d^2]$

The refusal factor was considered 10%. Altogether, 1365 children were selected for the survey. Children's nutritional status was taken through anthropomorphic measurements, while their mothers were also asked to answer a 43-question survey on food intake, household resources and coping strategies, and other questions related to the impact of the rodent infestation. Measurements used to assess the nutritional status are defined according to the NCHS reference system, as follows:

- **Stunting:** Stunted children have low height or length-for-age, an indication of long-term or chronic under-nutrition. Calculated as Height-for-Age Z Score <-2 standard deviations [SD].
- **Underweight:** Underweight children have low weight-for-age ratios, which can indicate a mix of acute and chronic malnutrition. Calculated as Weight-for-Age Z Score between <-2 and <-3 SD.
- **Wasting:** Wasting, which can indicate recent, acute malnutrition, is calculated with weight-for-height ratios, with Z Score <-3 SD.
- **Body Mass Index (BMI)** is calculated for adult males and non-pregnant females using the formula weight [kg]/height [m²]. Adults with a BMI <18.5 kg/m² are defined as having moderate levels of malnutrition, and those with a BMI <17.0 kg/m² are considered as severely underweight.

⁴ HKI/IPHN (2006). Bangladesh in Facts and Figures: 2005 Annual Report of Nutritional Surveillance Project. Dhaka: Helen Keller International

- **Mid-Upper Arm Circumference (MUAC)** is measured at the mid-point of the upper arm and can be an additional indicator of sudden or severe malnutrition. Children with a MUAC <125 mm are considered at serious risk of malnutrition.

2.3 Training and Data Collection

Before the start of the survey, HKI's experienced data collection team provided a UNDP team with an 8-day basic training in collecting anthropomorphic measures and nutritional information. Altogether, 58 data collectors (37 men and 21 women) were trained by HKI. Data collection took place simultaneously in all the selected upazilas from the 9th to 27th of July, with seven data collectors and one monitoring officer deployed in each upozila.

HKI was responsible for monitoring and evaluation of the overall study. Following data collection in the field, the raw data was sent back to HKI in Dhaka in phases for processing. To assure the quality of the data, HKI sent teams of quality-control officers to revisit at least 5% of surveyed participants randomly. As shown in Annex 1, the variance between the collectors' and quality control officers' data was minimal, indicating the strong credibility of the information.

Data was entered and cleaned following standard procedures, and data analysis was performed using Statistical Package for Social Science (SPSS, version 11.5). Anthropometric data for children and women was converted to Z-scores based on NCHS reference, using the software package Anthro 1.1.

2.4 Limitations

Due to insecurity and occasional hindrance by the presence of armed guards, the HKI monitoring team was not able to monitor all data collection sites as planned. Moreover, as mentioned earlier, there is a paucity of ongoing series data from the CHT area with which to compare the current results. However, HKI had carried out an NSP in the CHT region in 2006, prior to the outbreak of the rodent infestation. While comparing the 2008 data with 2006 certainly does not reflect causality of the rodent plague, the 2006 data does provide a limited reference point and approximate "control group" for understanding nutritional and food security status before and after the rodent infestation. Because 98% of the respondents surveyed for the 2008 quantitative survey were from tribal populations, the interpretation that follows occasionally compares the 2008 data from the rodent-affected Rangamati and Bandarban districts with the same indicators taken from among the indigenous populations of the same districts during the 2006 data collection under the NSP. Thus, the analysis occasionally uses "2006 CHT Tribal Groups" as a pre-rodent reference point, as it supposes that the indigenous populations from these districts may share similar food and child-feeding habits, body proportions, agricultural practices, and geographical locations, and are similarly underserved by public and NGO health and vaccination services.

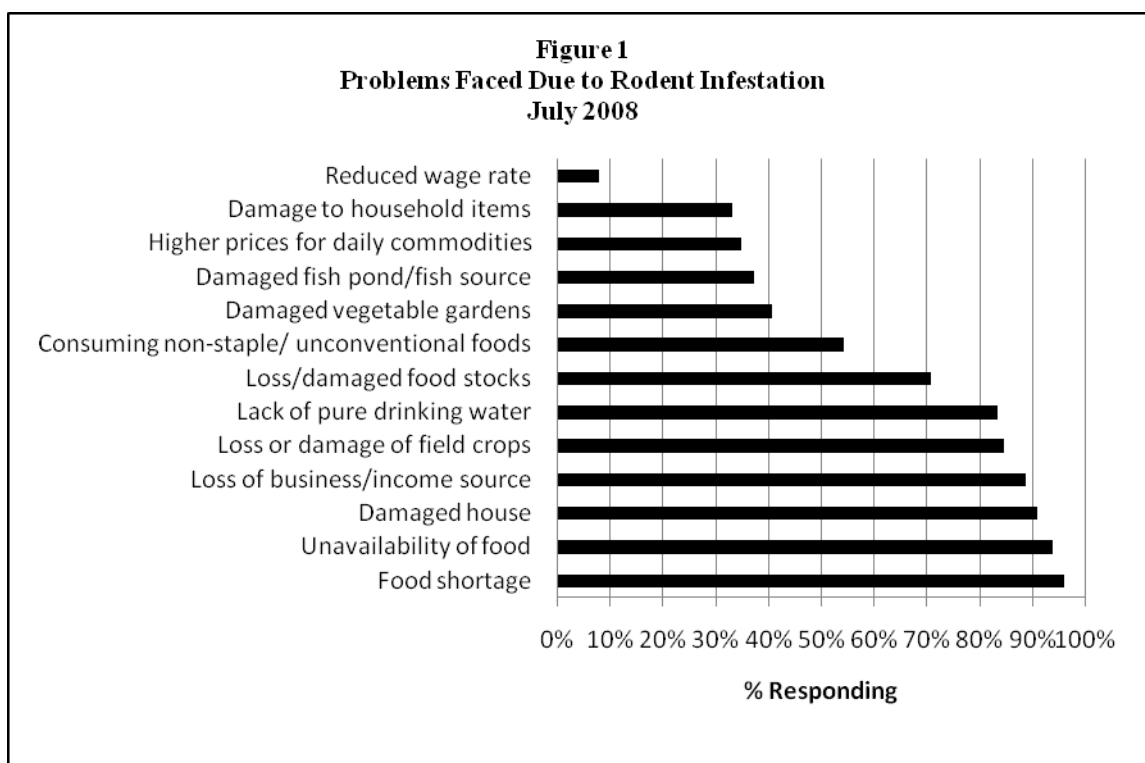
To correct for some limitations, the interpretation that follows draws heavily on the findings of a rapid assessment carried out by HKI in 3 upazilas of the two affected

districts in May 2008. This assessment (which used a combination of interviews and PRA tools), analyzed together with the 2006 NSP survey helps triangulate the 2008 data. In particular, the rapid assessment gives excellent insight into coping strategies and habitual nutrition and livelihood practices, allowing more accurate speculation about the significance of the nutritional data and the probable outcomes of the rodent plague.

3. Results and Discussions

3.1 Self-Reported Livelihood Changes and Coping Strategies

Nearly all of the surveyed respondents stated that they continued to be negatively affected by the rodent infestation at the time of the survey. In terms of medium and longer-term asset loss and livelihoods damage, the picture is quite grim. Seeds and poultry apparently have been relatively unharmed by the rodents, but over 80% of respondents reported damage to their principle income source, field crops, and homes. Prior to the rat plague, 26% of the households had been involved in bamboo cultivation; this figure had dropped to just 6% in the wake of the plague. Significantly, half of the people working in bamboo had previously derived between 25% and 50% of their household income from this activity. For fully 30% of the bamboo workers, this crop had previously provided between 50% and 75% of their income. Given that bamboo takes 4-5 years to regenerate, these figures present a probability of long-term underemployment, food and income insecurity, and other negative social consequences for those whose human and material resources have been concentrated around a single livelihood strategy.

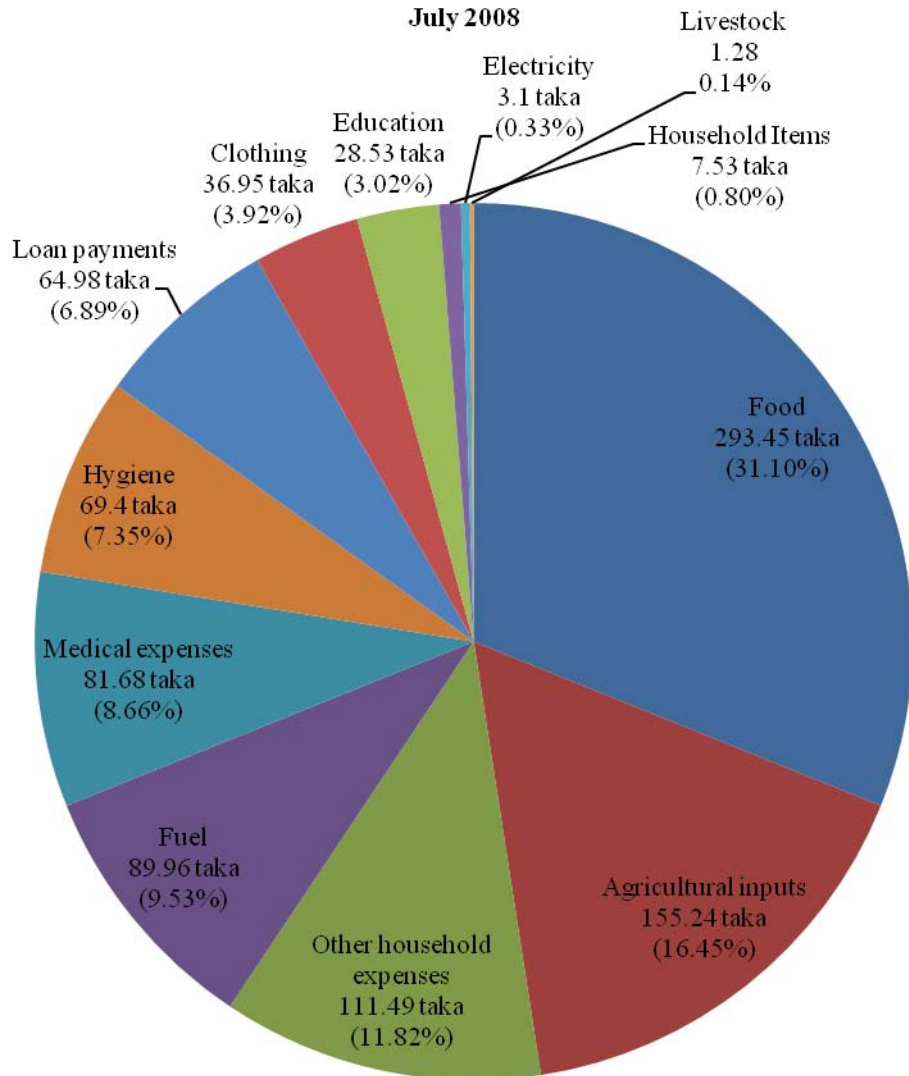


In the two months prior to the survey, the majority of respondents (54% of women and 64% of men) in the surveyed areas were dependent almost entirely on Jhum cultivation for their livelihood, but the rodent infestation has forced many residents to adopt crisis strategies for food consumption and livelihood maintenance. These strategies include temporary migration (24%) and borrowing money to buy food (60%). Both the survey and rapid assessment indicate that the increase in available day laborers has placed downward pressure on local wages (almost 10% reported reduced wages related to the rodent plague). If the striking trend toward distress-push migration is prolonged, it may have negative implications particularly for women who remain behind, as they may be faced with additional work burdens, may receive limited and infrequent remittances, and may be increasingly affected by sexual infections transmitted by migrant husbands.⁵

On average, the largest household expenditure (31% of the budget, or 293 taka per week) of the household budget went to food purchases, and 7% of the household budget went to loan payments, an amount nearly as high as that spent on medical care. The practice of borrowing money to purchase food in a region where communities would otherwise raise most of their own food is an indicator of critical food insecurity and distress that is likely to drive the most vulnerable households into long-term indebtedness.

⁵ http://www.iom.org.bd/images/publications/English-Synthesis-5_studies_on_Labour_Migration.pdf

Figure 2
Average Weekly Household Expenditure
In Taka
July 2008



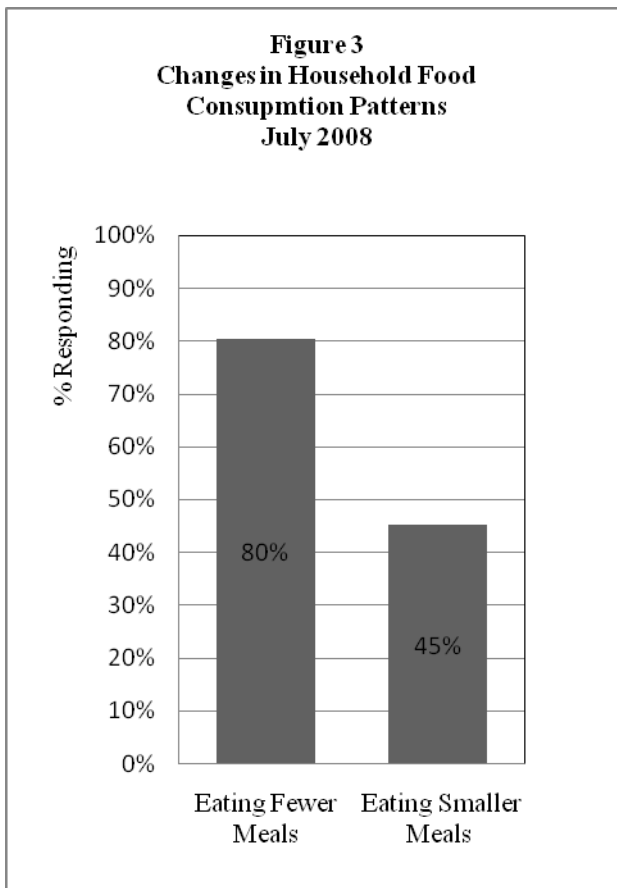
3.2 Food Insecurity, Shortages, and Coping Strategies

Indicators:

- % of households consuming smaller quantity of food in the 7 days before the survey
- % of households consuming fewer meals preceding 7 days of survey

When asked to report on specific types of problems faced during the past two months, 96% had experienced some degree of food shortage or unavailability. Some 80.4% of respondents in the survey areas reported that at least one household member had been compelled to eat smaller meals than usual during the week prior to the survey, due to the rodent infestation. In addition, 45.2% of the respondents reported that at least one member of the household had been forced to skip a meal during the previous week, due specifically to the rodent infestation. Furthermore, average per-person rice consumption among the surveyed households was 373 grams, far less than the national average of 456 grams per person recorded during the 2005 NSP.

Other critical indicators of food insecurity are the consumption of non-staple or unconventional foods (54%). Again, this finding supports data from HKI's 2008 rapid assessment survey in the rodent-affected districts, which indicated that collection and consumption of wild foods and yams had increased to 10%-20% since the start of the plague. As wild yams are a least-preferred food (consumed primarily to reduce hunger pains), this increase strongly suggests extensive crop damage and a shortage of other food sources (HKI 2008, p. 13). Consumption of poorer-quality wild foods can also increase the occurrence of diarrhea, micronutrient deficiency, and other morbidities among young children.



Food aid remains a vital resource for many vulnerable households, as they try to cope with income loss, shift into new income-generation activities, or rebuild damaged assets and croplands. Nearly three-quarters of the respondents had received food aid in the previous 2 months; for 26% of the recipients, this aid was their household's main source of food.

This picture of food insecurity and coping strategies support the findings of HKI's rapid assessment, which found that households that normally ate three diverse meals per day were down to two per day. Many women interviewed during the rapid assessment were eating just one meal per day. Gender dynamics throughout Bangladesh clearly point to the likelihood that women and girls will suffer first and most profoundly during a prolonged food shortage, as they tend to forego meals or eat less to leave more

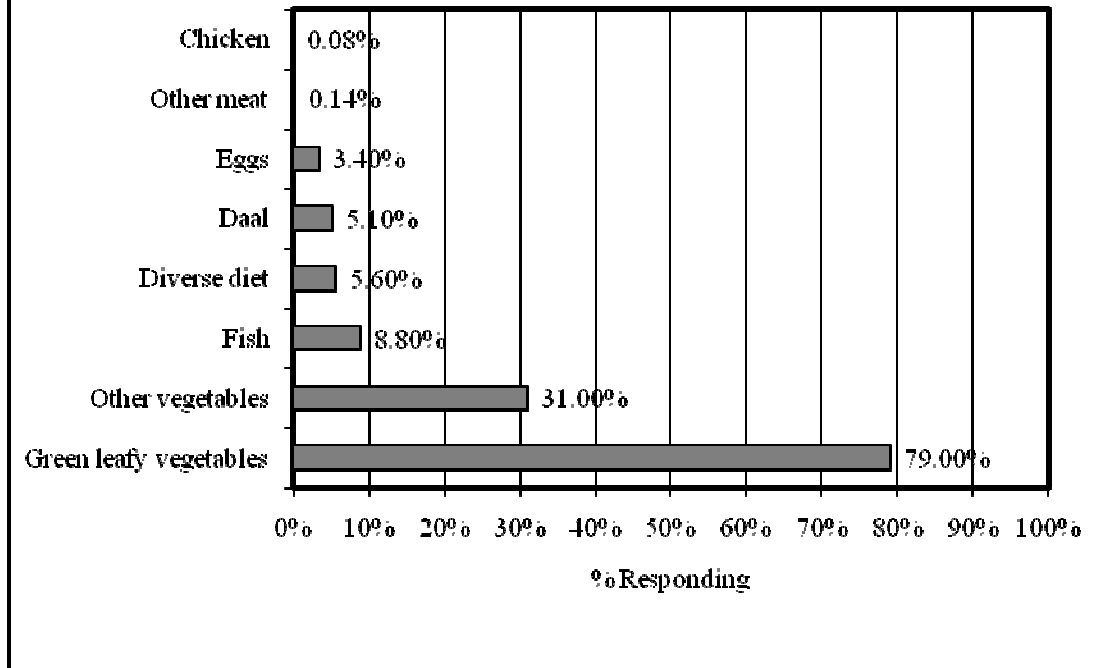
food for their children and working spouses. With the destruction of Jhum crops, women also need to expend more time and calories scavenging for wild foods, which raises their

caloric demands (HKI 2008). Given the early age of marriage, food shortages and micronutrient deficiencies also have stark implications for nutrient-deficient adolescent mothers, who even in normal circumstances face elevated risks of complications and hemorrhage during pregnancy and delivery.

3.3 Dietary Diversity and Quality

The majority of households were eating an extremely limited diet, composed principally of staples (though quantities consumed were reduced); green leafy vegetables; and other vegetable produce. Almost 80% of households were regularly consuming dark, leafy green vegetables (DLFV), most likely due to the high number of women (67%) engaged in household gardening as a form of income-generating activity. For the overwhelming majority of women eating next to no red meat and/or receiving inadequate iron supplements during and after pregnancy, high consumption of green leafy vegetables represents one positive counterbalance for maintaining maternal and child health, as these foods provide a good source of iron, vitamin A and other micronutrients. However, the dietary pattern clearly points toward generalized protein deficiency among the affected communities. The most available source of protein was fish, which had been eaten by almost 9% of households at least 1 or 2 times in the previous week. The overwhelming majority of households had consumed no sources of high-quality protein (dal, eggs, chicken, or other meat) during the previous week. Less than 1% of the households had eaten chicken or eggs, despite the fact that nearly 70% of the women involved in income-generating activities were raising poultry. As 45% of households reported selling poultry as a coping mechanism, it is possible that women may be selling their assets to purchase more basic food staples (such as rice) at the expense of more protein-rich foods. Negligible consumption of chicken and eggs may also reflect a response to avian influenza (AI), which affected parts of Bangladesh (including the CHT) during the same time period as the rodent plague.

Figure 4
% households consuming nutritious foods at least once
in the past 7 days
July 2008

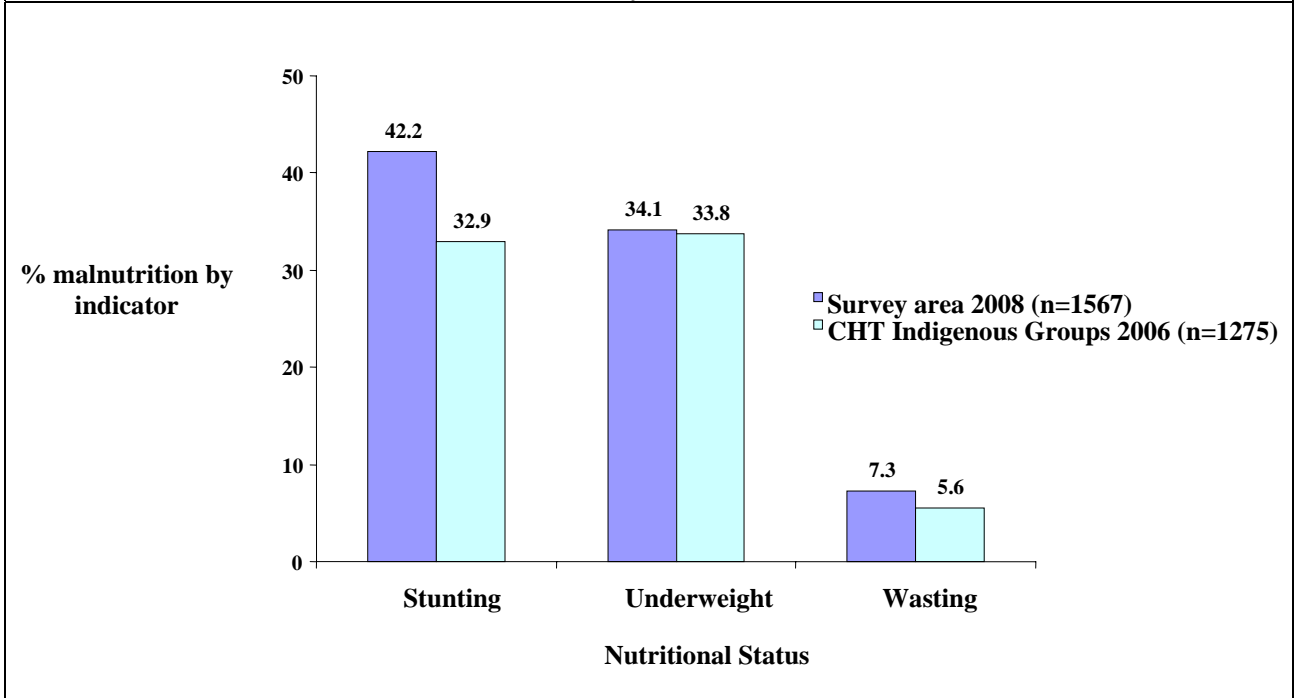


3.4. Nutritional Status of Under-5 Children

Indicators:

- % of children aged 0-59 months with low height/length-for-age ratios (stunting)
- % of children aged 0-59 months with low weight-for-age ratios (underweight)
- % of children aged 0-59 months with severely low weight-for-age ratios (wasting)

Figure 5
Nutritional Status for Children < 5 in Chittagong Hill Tracts by survey year
July 2008



The figure above depicts the nutritional status of children below five years old. According to WHO classifications, “very high” severity of malnutrition is indicated by an incidence of stunting that is greater than 40%, combined with underweight prevalence of >30%, and wasting prevalence of >15%. The data above (combined with the reported dietary quality information) clearly show that the affected communities are on the threshold of this “very high” level of malnutrition. Of the 34% of <5 children who were underweight, 7.3% were wasted, and 5% of these wasted children fell into the range of “severe-acute malnutrition” (weight-for-height index below -3 Z scores). Among the stunted children, 13.7% exhibited signs of severe growth failure (HFA index below -3 Z scores).

NSP data collected from the among the indigenous populations in the same districts in 2006 show that underweight, stunting, and wasting were already cause for concern prior to the rodent infestation, reflecting a baseline level of chronic food insecurity. However, the sharp increases in stunting and wasting are indicative of short-term, emergency food insecurity as well as a reflection of maternal malnutrition.

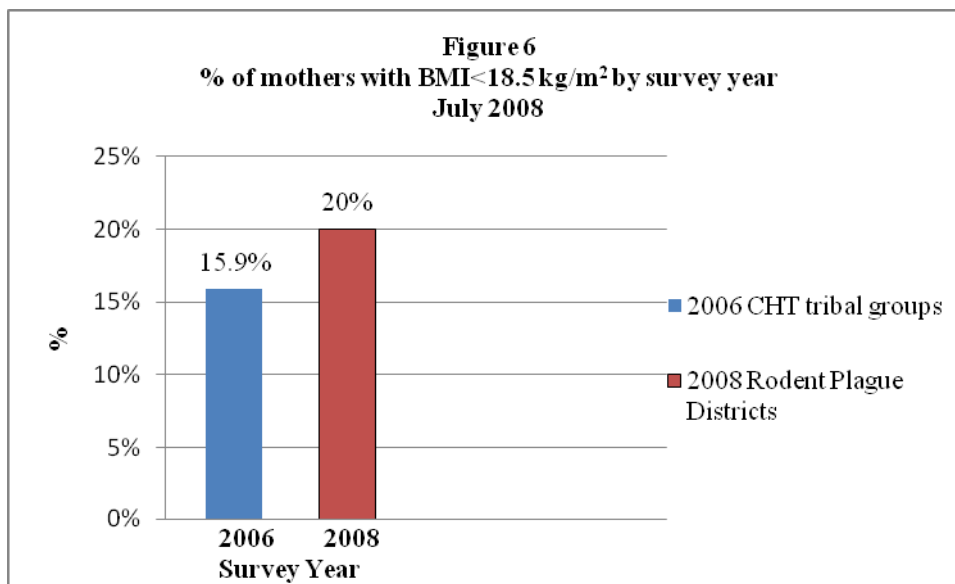
Clearly, the nearly 10% of children who are in the danger categories of moderate-to-severe underweight and/or wasting are extremely vulnerable to childhood morbidity and mortality and require immediate intervention. Equally significant, the proportion of children who fall into more moderate categories of underweight or malnutrition-risk can also slip within a matter of weeks into more extreme stages of deprivation. The poor water and sanitation conditions in the surveyed areas (where over 85% of the households obtaining water from unprotected sources and only 0.9% households demonstrate the

sanitary practices that are the pre-requisites for good health)⁶ compound the vulnerabilities of compromised children to morbidity and mortality from diarrhea and other preventable diseases.

3.5 Maternal Health and Breast-Feeding Practices

Indicators:

- % of mothers with BMI<18.5 kg/m² (marginal underweight)
- % of children aged 0-5 months receiving colostrum at birth
- % of children aged 0-5 months breastfeeding within 1 hour of birth
- % of children aged 0-6 months were exclusively breastfed
- % of children aged 6-9 months started complementary food
- % of children aged 20-23 months continued breastfeeding
- % of children aged 12-59 months who had consumed vitamin A capsule 6 months prior to the survey
- % of women who received vitamin A supplementation within 6 weeks of delivery



Nearly 20% of the women surveyed were at least moderately underweight (BMI<18.5 kg/m²), which is a sizeable increase from the average found among indigenous women in the 2006 NSP survey. While not as high as the rate of underweight among <5 children, maternal underweight has direct correlations with their children’s nutritional status and micronutrient intake. Because the measure used to calculate undernourishment among women (BMI) is only taken from non-pregnant women, the data do not indicate what percentage of pregnant women were meeting their caloric or body weight requirements. Given that 73% of the women interviewed were breast-feeding at the time of the survey,

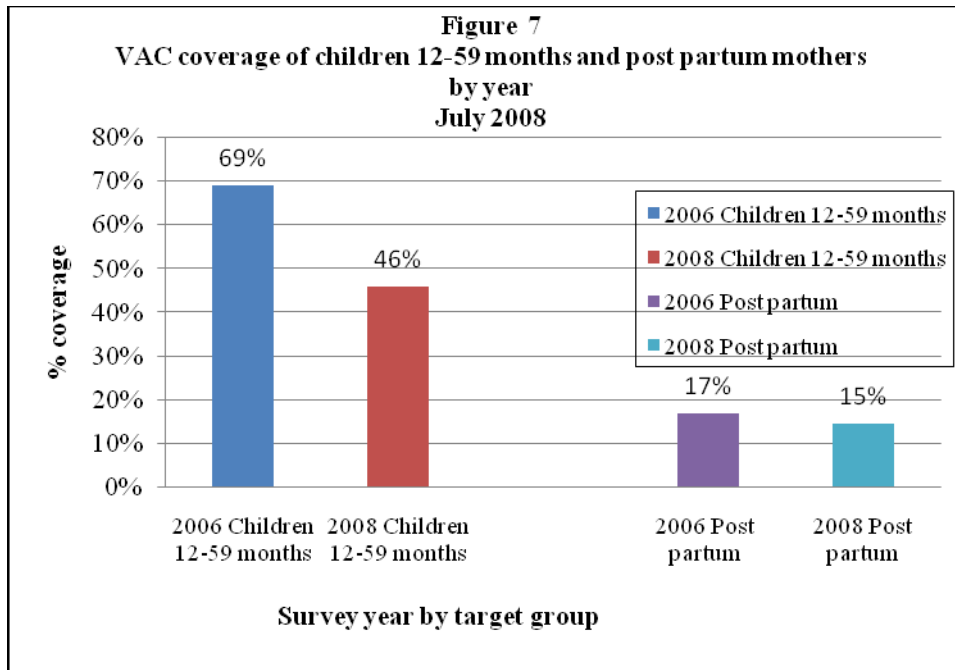
⁶ HKI (2008), Bamboo Flowering, Rat Infestation and Food Scarcity in the Chittagong Hills Tracts, Bangladesh (needs assessment report). United States Agency for International Development (USAID), April 24, 2008.

and nearly 20% of these women were at least marginally undernourished, it is apparent that across the board, women's nutritional needs (and subsequently the quality of their children's feeding) are compromised by their reduced food intake and the increased energy demands required for breast-feeding as well as jhum cultivation and food gathering.

The practices of colostrum feeding to newborns and exclusively breastfeeding infants for up to six months (which is optimal, according to WHO guidelines) were high in the surveyed areas. Generally, these breastfeeding practices are highly positive indicators for the healthy development and weight gain of children, as nutrient-rich colostrum is considered the first "immunization" for newborns and can provide protection against early childhood infections. There is little evidence to suggest that women have increased or prolonged breast-feeding due to rodent-induced food shortages, as women in the CHT tend to breastfeed predominantly for a longer period (up to age 4-5 years) than women in other regions of Bangladesh (HKI 2008, p. 17). However, the benefits of breast-feeding diminish when women's own caloric and micronutrient needs are not met. In particular, for women consuming inadequate food sources of Vitamin A (such as eggs), supplementation with Vitamin A capsules within six weeks (42 days) of delivery is essential to reduce the risk of maternal mortality and night blindness and support reproductive processes. The nutritional benefits are also transferred via breast milk to the developing child, dramatically reducing the risk of blindness, severe morbidity, and mortality, especially from measles and diarrhea. Among the surveyed women, just 14.7% had received vitamin A supplementation within six weeks of delivery, and less than half of the children had received vitamin A supplements at the critical age. Unquestionably, house-to-house delivery of high-dose vitamin A is an essential component of any intervention in the rodent-affected areas.

Table 2
Child Feeding Practices
July 2008

Indicators	Results
% of children aged 0–5 months fed colostrums at birth	80.1
% of children aged 0–5 months who were given breast milk within 1 hour of birth	49.0
% of children aged 0–5 months who were exclusively breastfed during the last 24 hours	71.4
% of children aged 6–9 months who received complementary foods in addition with breast-milk	81.7
% of children aged 20–23 months who were continued breastfed	89.4

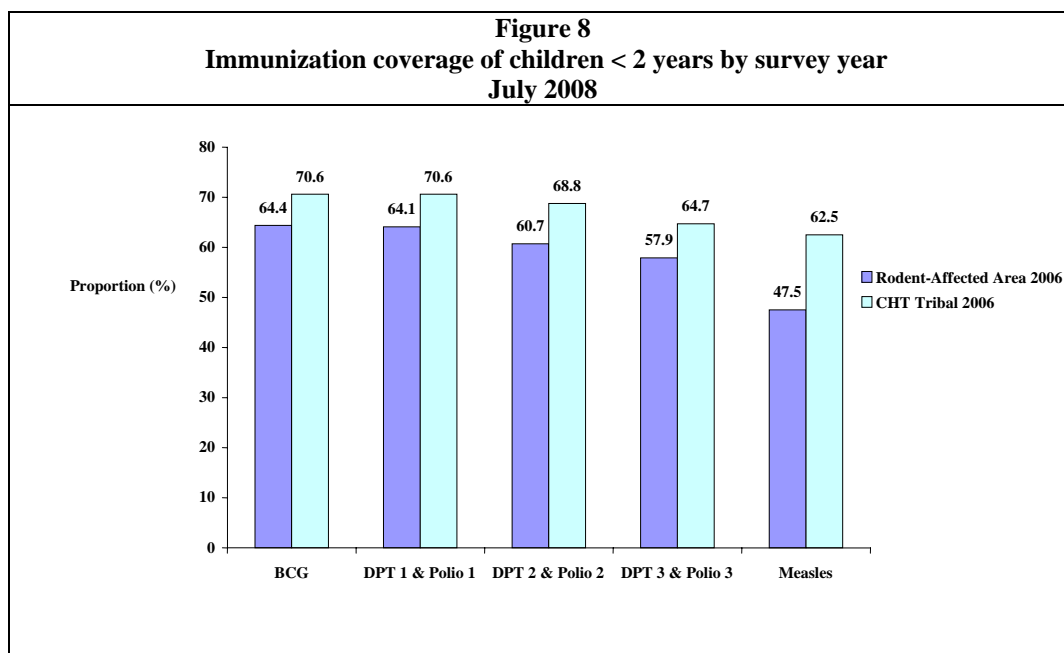


3.6. Vaccination Coverage

Indicators:

- % of children who received BCG at birth
- % of children who received DPT1 and Polio1 at age 1.5 months
- % of children who received DPT2 and Polio2 at age 2.5 months
- % of children who received DPT3 and Polio3 at age 3.5 months
- % of children who received Measles vaccine at age 9 months

As with vitamin A supplementation, the 2008 survey found a disturbingly low prevalence of vaccination coverage among children under the age of two. WHO guidelines indicate that to prevent the majority of serious childhood diseases, all children should receive one BCG vaccine, three doses of DPT, three doses of polio, and a vaccination against measles before their first birthday.



Only 64.4% of the children in the rodent-affected areas had received all of their vaccinations [BCG followed by DPT-1 & Polio-1 (64.1%), DPT-2 & Polio-2 (60.7%), DPT-3 & Polio-3 (57.9%), and measles (47.5%)]. This figure is much lower than Chittagong division as a whole (where 77% of children have received all vaccines) and significantly lower than the Bangladesh national average of 81.9%, according to the forthcoming 2007 Demographic and Health Survey. These extremely low immunization rates are particularly worrying because a National Immunization Day (a principle vehicle for advertising and delivering vaccinations) had been held on May 10, 2008 (prior to the survey but presumably during periods of food aid distribution), again reflecting the inadequacy of both public, private, and NGO-led service delivery to the hardest-to-reach, marginalized communities in the CHT. Taken together with the general deficiency of vitamin A (which can help children recover from measles), generalized malnutrition, and poor sanitation, inadequate vaccination coverage completes the preconditions for a population health disaster in the event of an outbreak of measles (one of the main causes of childhood mortality and morbidity in Bangladesh), polio, or other acute, communicable diseases.

4.0 Conclusions and Recommendations

Indicators measuring the health and nutritional status of populations in the remotest areas of the Chittagong Hill Tracts fall short compared to the rest of Chittagong division as well as other divisions of Bangladesh. In the context of the general livelihood damage and altered food consumption patterns in the wake of the plague, the rates of underweight, stunting, and malnutrition in the rodent-affected areas have reached moderate to critical levels. To curtail generalized malnutrition and stabilize food security, it is essential to mobilize an immediate, extensive, and multi-faceted response, designed and implemented by a range of stakeholders, including the communities themselves.

In terms of self-reported food insecurity and asset damage, over 80% have suffered some loss of main income source, and the level of food insecurity remains elevated. With almost 10% of <5 children severely wasted or malnourished, support to the affected communities is urgently required if mortality is to be prevented. However, it is also clear that an emergency intervention must be comprehensive in scope and should consider the long-term livelihood recovery and post-crisis transition needs of the affected groups. This survey points out several critical factors that must be taken into account in developing a response.

Food distribution programs

As reported above, food shortages persist in the affected areas, and over one-fourth of the surveyed population remains dependent on aid as a primary food source. Therefore, food distribution or food-for-work programs should not be discontinued until communities are able to recover food crops. A well-organized and monitored distribution process can rapidly correct micro-nutrient deficiencies, through selection of enriched foods, such as vitamin-A enriched rice, iron-fortified grains, or multivitamin sprinkles.

Immunization and vitamin-A supplementation

Unacceptably low vitamin A supplementation among the children age below five years puts vulnerable children at high risk of long-term underdevelopment, blindness, and mortality. Vitamin-A deficiency also greatly elevates the risk of maternal mortality and night blindness. Low immunization rates among the hard-to-reach communities <5 population greatly elevates the risk of polio and measles, which remains one of the main causes of childhood mortality. Rodent-affected populations in the remotest areas of the CHT should therefore be considered a high-risk group and the focus of targeted campaigns, using both food-aid distribution channels and existing programs centered on government-led National Immunization Days. Reaching the remote populations requires adequate staffing and stocking of satellite clinics, dissemination of accurate information about required immunizations and supplementations, and accurate record-keeping among the communities.

Protein deficiency

With over 90% of the population consuming no meat, fish, eggs, or dal, supplemental protein feeding will be an essential immediate measure, particularly for <5 children and mothers whose caloric needs are higher during pregnancy and breastfeeding. To ensure longer-term availability of protein in the community, distribution or micro-lending of livestock, poultry, or fish fingerlings should be introduced. While poultry raising (perhaps the easiest option) may have been discouraged due to recent avian influenza outbreaks, HKI has found that promoting local varieties of poultry (which tend to be less susceptible to AI), and demonstrating improved management techniques and regular vaccinations (provided by a trained, community-based vaccinator) can reduce the risk of AI outbreaks and help immediately pinpoint the source of the disease in the event of an outbreak. Restoring and stocking damaged fish ponds (which could be group managed)

may present another successful option for rapidly improving protein availability and dietary quality.

Gender dynamics and maternal malnutrition

As noted, 20% of the women surveyed exhibited moderate under-nutrition, and rapid assessment data from May 2008 found that many women were eating just one meal per day. As gender dynamics generally indicate that women sacrifice their own meals to provide for their children and spouses, an emergency response to the rodent plague must pay immediate and ongoing attention to improving women's dietary quality and monitoring intra-household food distribution.

Although dark green, leafy vegetables are a major component of their diet, women consumed negligible meat and very few had received iron supplements during or after pregnancy. Iron-deficiency anemia among women and adolescent girls is therefore highly likely, and their status should be monitored and corrected.

While exclusive breast-feeding prevalence practices are already high in the target areas, counseling and demonstration of proper breast-feeding techniques (including attachment and optimal introduction of complementary foods) can significantly improve infant health outcomes and enable mothers to better measure the food intake of their children. To encourage long-term outcomes in maternal and child health, male household members should be included in discussions on women's caloric needs during pregnancy and breast-feeding, as well as proper pre- and ante-natal care.

Livelihood transition and asset recovery

To promote rapid and comprehensive recovery, the response to the rodent plague must imperatively include a range of short- and medium-term livelihood initiatives to help bamboo and Jhum cultivators transition into other income-generating activities. Such interventions might include skills-training programs; cash-for-work initiatives (that help rebuild rodent-damaged infrastructure); seed and asset replacement; agricultural advice; and introduction or promotion of appropriate rapid-growing varieties of foods, higher-value cash crops, and other renewable forest resources. While the bamboo is regenerating, the crisis presents a potential opportunity to help communities diversify their crop cultivation (both for domestic consumption and income generation) and livelihood strategies. Advanced seed storage technologies and environmentally sound growing techniques can be introduced to prevent soil erosion, ensure seed security, and foster greater community resilience to future disasters.

Equity and social security

With 60% of households borrowing money to buy food, families with limited social capital and material resources are falling into vicious and inescapable cycles of poverty. In addition to providing immediate food relief and health support, creative debt-buying or social insurance schemes may be needed to lessen intra-community disparities and long-term vulnerabilities. If the emergency response is delayed and food insecurity is prolonged, populations that are already isolated and excluded from most public and private social services face severe morbidity and mortality, while other important

development objectives in the CHT (such as promoting girls' education, health-seeking behavior, and demand for government accountability and services) may be indefinitely held back.

Annex 1: Quality Control Check of Survey Data

Nutritional status		Figure from quality control officer (QCO), %	Figure from data collection officer (DCO), %
Stunting	< -2 SD	35.0	35.0
	>= -2 SD	65.0	65.0
	< -3 SD	5.8	5.8
	>= -3 SD	94.2	94.2
Underweight			
	>= -2 SD	36.9	35.9
	>= -2 SD	63.1	64.1
	< -3 SD	3.9	3.4
	>= -3 SD	96.1	96.6
Wasting			
	>= -2 SD	8.7	9.7
	>= -2 SD	91.3	90.3
	>= -3 SD	100	100
Mothers' nutrition			
	BMI < 18.5 kg/m ²	21.3	20.7
	BMI >= 18.5 kg/m ²	79.8	78.7

Following the data collection, a quality control officer (QCO) returned to a random 5% of the surveyed households and repeated selected survey questions and anthropometric measurements to verify the quality of the original data. For the standard survey questions, a maximum 5% variation between the responses collected by the DCOs (data collection officer) and QCOs is considered acceptable. However, for anthropometric data, if the variation is more than 2%, it is considered poor quality data. As Annex 1 indicates, the variation between QCO and DCO data in terms of anthropometric measurements did not vary more than 2%; thus, it can be considered sound data. The very slight weight variations displayed above reflect normal fluctuations based on the time of data collection, such as whether the measurement was taken before or after a meal or defecation.

Annex 2: Distribution of Sample by Upazila

Population	Baghaic hhari	Barkal	Belaichh ari	Jurai Chhari	Rowang chhari	Ruma	Thanchi	Total
Household surveyed	195	195	195	195	195	195	195	1365
Children under 5 years	227	236	227	211	223	231	227	1582
Children under 6 months	31	23	25	26	24	26	41	196
Children 6 to 9 months	21	18	24	14	19	10	17	123
Children 12 to 15 months	21	24	19	9	10	23	14	120
Children 20 to 24 months	11	17	12	12	17	11	5	85
children 12 to 23 months	34	55	45	31	42	41	20	268
children 12 to 59 months on NID (10th May 2008)	149	175	156	158	167	176	157	1138
Non-pregnant mothers	167	189	182	193	194	185	193	1303
Mothers who gave birth in the last 3 years	146	154	140	110	121	138	130	939