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HOUSEHOLD FOOD AND NUTRITION INSECURITY IN FOUR DROUGHT-HIT INDIAN STATES

A study in Bihar, Chhattisgarh, Rajasthan and Telengana

Household Food and Nutrition Insecurity in Four Drought-Hit Indian States:
A study in Bihar, Chhattisgarh, Rajasthan and Telengana

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EXECUTIVE SUMMARY

INTRODUCTION

Globally, an estimated 50 million children aged under 5 years are wasted and 17 million severely wasted [UNICEF, WHO and World Bank, 2016]. India shares about one third of the world's burden of child wasting. In India, 15 per cent (8 million) of under-fives are wasted and 5 per cent (1 million) are severely wasted [Ministry of Women and Child Development, 2015].

Poor quality and quantity of food, repeated bouts of infections and referral neglect are major reasons for child wasting [WHO, 2012]. Wasting levels rise during the lean food-insecure seasons, as rates of wasting tend to 'surge' seasonally during the year [Maleta et al., 2003]. Undoubtedly, if a food shortage calamity strikes, children belonging to poor food-insecure households that are already consuming poor diets for most parts of the year are worst affected. Drought is one such calamity.

In 2016, 266 out of 361 districts across 11 Indian states were declared drought affected [UNICEF, 2016]. Water scarcity and dry environments affected cropping patterns, shrank the household food basket, increased dependence on markets and reduced agri-based livelihoods [UNICEF, 2016].

Rapid surveys done post-drought do not collect information on the household food and nutrition situation systematically or target and equitably distribute an adequate quality and quantity of food aid and emergency nutrition interventions.

With this background in mind, a study was conducted in four Indian states – Bihar, Chhattisgarh, Rajasthan and Telangana – hit by drought in early 2016 to assess (i) the prevalence of wasting and severe wasting in children aged 6-59 months and their mothers; (ii) household food insecurity experiences reported by households using the Food Insecurity Experience Scale (FIES), and the internal validity and reliability of the scale; and (iii) the co-existence of stunting and food insecurity in the wasted and severely wasted population.

METHODOLOGY

We interviewed a cross-section of mothers of 377 children aged 6-59 months for household food insecurity using the Food and Agriculture Organization's eight-item FIES and conducted anthropometric assessments of the mother-child dyads (weight, height/length and mid-upper arm circumference (MUAC)). We assessed association of maternal and child nutritional status and household food insecurity using binary logistic regression and used RASCH analysis to test FIES internal validity and reliability.

RESULTS

Prevalence of wasting, severe wasting and stunting among children 6-59 months was 26 per cent, 4 per cent and 47 per cent, respectively. Proportion of mothers with short stature (height <145 cm), wasting (MUAC <230 mm) and severe wasting (MUAC <210 mm) was 11 per cent, 31 per cent and 13 per cent, respectively.

A small proportion (14 per cent) of children were both stunted and wasted. The proportion of households who experienced food insecurity (moderate/severe) was 36 per cent. Odds of child wasting was higher when the gender was male (OR 1.78; 95%CI 1.10, 2.85), the child was 6-11 months (OR 1.39; 95%CI 0.69, 2.77), the mother was severely wasted (OR 1.67; 95%CI 0.83, 3.35) and households were severely food insecure (OR 1.44; 95%CI 0.64, 3.23). The FIES had moderate internal validity and reliability (infit statistics 0.79-1.35 and Cronbach's alpha 0.67).

DISCUSSION

Five inferences can be drawn with implications for programmes:

1. Critical GAM situation requires therapeutic feeding programmes

The prevalence of Global Acute Malnutrition (GAM) of 26 per cent in children aged 6-59 months indicates a 'critical' situation, which requires to be treated as an emergency [WHO, 2010]. It would be critical to set up outpatient therapeutic feeding programmes for children with GAM, which is presently absent in drought management procedures.

2. Multi-pronged approach needed to tackle multiple deprivations

The co-existence of stunting and wasting was also seen in 14 per cent of children and it is known that wasting and stunting share direct and underlying causal factors. Drought intensifies these conditions and a multi-pronged approach is needed to tackle multiple deprivations.

3. Special strategies to cope with food insecurity should be part of drought mitigation

In food-insecure households, over half the children were stunted and the prevalence of GAM was 27 per cent. During the period of drought, households often reduce their intake of cereals (rice/wheat), proteins (pulses/flesh foods), fruits and vegetables, influencing their dietary diversity and impacting their nutritional status [Devereux, 2000; WFP, 2016], which is reported in this study.

Although the Indian National Food Security Act (2013) covers food security for all citizens it does not account for food security during disasters, such as drought [Desai and Vanneman, 2015]. This suggests a need to integrate special strategies for coping with food insecurity in drought either in the operational manuals associated with the Act or as part of drought mitigation.

4. Couple programmes for mothers to therapeutic child feeding programmes to tackle maternal SAM

Maternal SAM is also high (13 per cent), indicating the need to tap the missed opportunity to couple programmes for mothers to outpatient therapeutic child feeding programmes, including both preventive services and curative services for those at risk.

5. FIES may be used in the Indian context and should be included in drought assessment surveys

Responses to the items in the seven-item scale were found to be reliably associated with the trait of food insecurity based on the point bi-serial (item-score) correlations and the acceptable value of Cronbach's alpha (0.67). Even though, the eight-item FIES scale was used to collect responses, the item severity and infit values for the 'hungry all day and night' variable led to its exclusion from analysis. Thus, the HFI scores are based on the seven-item scale.

Very few studies have used FIES in the Indian context, it is suggested to include these scales in drought assessment surveys. This achieves two goals: (i) to adjust the HFI scale to the Indian setting; and (ii) to generate data to inform policy and programmes aimed at integration of food security and acute malnutrition programmes [Sethi et al., 2016].

CONCLUSION

The high prevalence of maternal and child acute undernutrition in drought prone states calls for the integration of food security and nutrition Standard Operating Procedures in drought assessment and management guidelines.

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REPORT

INTRODUCTION

Globally, an estimated 50 million children aged under 5 years are wasted and 17 million severely wasted [UNICEF, WHO and World Bank, 2016]. India shares about one third of the world's burden of child wasting. In India,15 per cent (8 million) of under-fives are wasted and 5 per cent (1 million) are severely wasted [Ministry of Women and Child Development, 2015].

Wasting is a form of acute malnutrition in which there is a reduction of body weight in relation to height. Wasting has been shown to increase the risk of death in childhood from infectious diseases, such as diarrhoea, pneumonia and measles [Pelletier et al., 2013]. Severely wasted children are, on average, 11 times more likely to die than their healthy counterparts [McDonald et al., 2013]. Even higher mortality has been reported when children are both wasted and stunted (low height-for-age) [McDonald et al., 2013].

Poor quality and quantity of food, repeated bouts of infections and referral neglect are major reasons for child wasting [WHO, 2012]. Wasting levels rise during the lean food-insecure seasons, as rates of wasting tend to 'surge' seasonally during the year [Maleta et al., 2003]. Undoubtedly, if a food shortage calamity strikes, children belonging to poor food-insecure households that are already consuming poor diets for most parts of the year are worst affected. Drought is one such calamity.

In 2016, 266 out of 361 districts across 11 Indian states were declared drought affected [UNICEF, 2016]. Water scarcity and dry environments affected cropping patterns, shrank the household food basket, increased dependence on markets and reduced agri-based livelihoods [UNICEF, 2016].

India's drought management system does not have ready national guidelines to identify those at nutrition risk and to manage them in case of drought. Rapid surveys done post-drought do not collect information on the household food and nutrition situation systematically or target and equitably distribute an adequate quality and quantity of food aid and emergency nutrition interventions.

With this background in mind, a study was conducted in four Indian states hit by drought in early 2016 to assess (i) the prevalence of wasting and severe wasting in children aged 6-59 months and their mothers; (ii) household food insecurity experiences reported by households using the Food Insecurity Experience Scale (FIES), and the internal validity and reliability of the scale; and (iii) the co-existence of stunting and food insecurity in the wasted and severely wasted population.

METHODOLOGY

The study was a cross-sectional rapid assessment. It was conducted across 96 villages in eight districts within four Indian states – Bihar, Chhattisgarh, Rajasthan and Telangana – declared as severely affected by drought in early 2016 by state and district authorities.

In each state, the survey was conducted by a four-member team (three trained investigators and one supervisor) in the local language using pretested tools. In each of the 96 villages, all eligible households (i.e., those with children between 6-59 months) were firstly enumerated using the door-to-door method. Then using systematic random sampling, five households per village were selected, such that an estimated sample of at least 60 children 6-59 months were covered per district. Prior to the interview, oral informed consent was obtained from the respondents.

In each selected household, the child's weight, height/length and mid-upper arm circumference (MUAC) were taken. Then, weight, height and MUAC of the mothers of the measured children were taken. The mothers were asked about their household food insecurity experiences using the eight-item FIES of the Food and Agriculture Organization of the United Nations (FAO) [Ballard, Kepple and Cafiero, 2013]. Basic socio-demographics were also enquired from the mother.

Anthropometric measurements were taken using the UNICEF SECA weighing scale (model: 874 with mother-child function) and wooden boards (procured from the UNICEF supply department) using standardized World Health Organization (WHO) protocol [WHO, 1995]. To ascertain age, immunization card or birth proofs were checked or in the absence of official documentation, the birth date was estimated using a local event calendar.

The questions in the FIES scale included: During the last 12 months, was there a time when, because of lack of money or other resources (job/access to subsidized grains/land/entitlements), you or any other adult member of the household:

1. Were worried that you might not be able to get enough food to eat?
2. Were unable to eat food that you considered nutritious?
3. Replaced nutritious/staple foods with cheaper varieties?
4. Cut the meal size or ate less per meal than normal days?
5. Skip a meal?
6. Was there a time when there was no food in the household?
7. Slept hungry because of lack of food?
8. Went without eating whole day and night because of lack of food?

Household food security responses were categorized as follows: Never: not even once in past year; Rarely: only once or twice in past year; Sometimes: in some months but not every month; Often: almost every month. 'Sometimes' and 'Often' were treated as affirmative responses and the household food insecurity (HFI) score was calculated based on it.

Summed affirmative responses were calculated for each household based on the household food insecurity score (0-7). Households with 0-3 affirmative responses were classified as 'Food secure households', those with 4-6 affirmative responses were classified as 'Moderately food insecure' and those with 7 affirmative responses were classified as 'Severely food insecure households'.

Double data entry in MS Excel of visited households was done at the end of day by teams, verified by supervisors. Z scores of weight-for-age (WAZ), weight-for-height (WHZ)

and height-for-age (HAZ) were calculated for children using WHO Anthro [WHO, 2011]. Weight and height data of the mother were used to calculate body mass index (BMI).

Upon data entry, after accounting for missing data (age) and omitting inaccurate and deviant data, the analytical sample for analysis was 377, in which complete data were available for the mother, child and household food security situation.

First, standard descriptive statistics were calculated. Percentages of undernourished and severely undernourished children were calculated based on the WAZ, HAZ, WHZ and MUAC cut-offs. Children were considered stunted, wasted and underweight when their Z score was <-2 SD of the WHO growth standard median.

When the Z score of these measures was <-3SD of the WHO growth standard median, it implied severe stunting, wasting and underweight. MUAC <115 mm was considered severe wasting and that between 115-125 mm was considered moderate wasting. The percentage of mothers who were stunted (height <145 cm), had low BMI (<18.5 kg/m^2) and had MUAC <230 mm was calculated.

Internal consistency and reliability of the eight-item FIES were examined using item point bi-serial correlations and Cronbach's alpha. Rasch model-based item severity parameters and fit statistics were estimated using conditional maximum likelihood methods [Fisher and Molenaar, 1995; Viviani, 2016]. Infits between 0.7 and 1.2 were considered acceptable.

Item outfit statistics were also examined. Outfit values substantially above 1 indicate a greater than expected frequency of erratic or highly unusual responses, given that outfit statistic can be inflated by only one or two highly unexpected responses in a sample of several hundred. Thus, as long as infit for the item was reasonable, high outfit was not usually grounds to drop the item [Nord et al., 2012].

Based on item severity and infit values, we conducted the Rasch analysis using two models (first using all eight items and second using the first seven items) as the eighth question in the scale, "if the household went without eating a whole day and night due to lack of food", was excluded from analysis owing to highly unexpected responses.

Regression analysis was carried out between anthropometric indicators of children and mothers and food security of the household. The p values and β coefficient of regression are reported. All analysis were conducted using the IBM Statistical Package for Social Science, Version 23 [IBM Corp., 2013]. Statistical significance was set at $p < 0.05$.

RESULTS

The results presented here are from the analytical sample of 377 mother-child dyads.

Nutrition status of children

Close to one third (30 per cent) of children 6-59 months were stunted and 17 per cent were severely stunted. Using weight-for-height Z scores as the criterion, Global Acute Malnutrition (GAM)[1] was 26 per cent and Severe Acute Malnutrition (SAM) was 4 per cent (see Table 1). Using MUAC as the criterion, GAM was 7 per cent and SAM was 1 per cent. From the sample, 14 per cent of the children were both stunted and wasted while 1 per cent was severely stunted and severely wasted.

Nutrition status of mothers

In our sample, one in 10 mothers (11 per cent) was stunted. Based on BMI, 36 per cent mothers had a BMI <18.5kg/m^2, while 6 per cent had a BMI of <16 kg/m^2. Almost a third (31 per cent) of mothers had a MUAC of <230 mm and 13 per cent had a MUAC of <210 mm (see Table 1).

Household food security situation

Table 2 shows that 36 per cent of households were food insecure, of which 28 per cent were moderately food insecure and 8 per cent were severely food insecure. In total, 65 per cent of households stated that they were worried about not getting enough food to eat and 61 per cent replaced staple/ nutritious foods with cheaper varieties. Cutting down meal size was done by 61 per cent of families while 58 per cent stated that they skipped meals. More than half (53 per cent) households reported not having food and over a fifth (22 per cent) reported they slept hungry. April, May, June and July were periods of recurrent droughts.

Reliability and validity of FIES

Table 3 reports on the internal reliability, item severity and internal validity of the eight-item and seven-item scale. For the eight-item scale, item severity parameters ranged from 1.48 (SE 0.20) for the 'hungry all day and night' to -1.44 (SE 0.18) for the 'worried about not getting enough food in households' item. Infit values ranged from 0.73 to 1.40 and outfit from 0.47 to 2.28. Cronbach's alpha was 0.72.

For the seven-item scale, item severity parameters ranged from 1.20 (SE 0.19) for the 'slept hungry' item to -1.17 (SE 0.18) for the 'worried about not getting food in the households' item. Infit statistics ranged from 0.79 to 1.35 and outfit statistics ranged from 0.62 to 1.73. Cronbach's alpha was 0.67.

Determinants of wasting in children 6-59 months

The risk of wasting reduced as the age of the child increased. Odds ratio (OR) of a child being wasted between 6-11 months was 1.39 (95% CI 0.69, 2.77) while at 24-59 months it was 0.72 (95% CI 0.36, 1.44). Male children were more likely to be wasted (OR 1.78; 95% CI 1.10, 2.85) as compared to females. There was a 1.3-fold risk of a child being wasted when the child was stunted (95% CI 0.82, 2.06) and severely stunted (95% CI 0.75, 2.42).

Maternal wasting (MUAC <230 mm) was associated with a 1.1-fold risk of child wasting (95% CI 0.57, 2.42) and severe maternal wasting (MUAC <210mm) with a 1.6-fold risk (95% CI 0.83, 3.35). Severe household food insecurity related to a 1.4-fold higher chance of child wasting (95% CI 0.64, 3.23) (see Table 4).

[1] Global Acute Malnutrition = Severe Acute Malnutrition + Moderate Acute Malnutrition

Determinants of severe wasting in children 6-59 months

Determinants of severe wasting were age of the child, male gender, maternal stunting and maternal wasting (see Table 3). At 6-11 months, the child had a 3.6 higher chance of being wasted (95% CI 1.02, 13.01) compared to 24-59 months (OR 0.28; 95% CI 0.08, 0.98). Male children were at a 1.9 higher risk of being wasted (95% CI 0.67, 5.81) than female children.

A stunted child had a 1.1-fold risk of being severely wasted (95% CI 0.42, 3.13), while the risk was 2.3-fold when the child was severely stunted (95% CI 0.78, 6.94). The risk for severe wasting was 3-fold when the mother had a BMI of <16 kg/m^2 (95% CI 0.82, 16.44). Severe maternal wasting (MUAC <210 mm) doubled the risk of child wasting (95% CI 0.54, 9.24).

DISCUSSION

Five inferences can be drawn with implications for programmes.

1. Critical GAM situation requires therapeutic feeding programmes

The GAM prevalence of 26 per cent in children aged 6-59 months indicates a 'critical' situation, which requires to be treated as an emergency, as per WHO classification [WHO, 2010]. It would be critical to set up outpatient therapeutic feeding programmes for children with GAM, which is presently absent in drought management procedures.

2. Multi-pronged approach needed to tackle multiple deprivations

The co-existence of stunting and wasting was also seen in 14 per cent of children and it is known that wasting and stunting share direct and underlying causal factors. Preventive services tackling these causes are likely to impact both conditions. Drought intensifies these conditions and a multi-pronged approach is needed to tackle multiple deprivations. Hence, identifying and addressing underlying determinants of stunting should also be included in drought mitigation procedures.

3. Special strategies to cope with food insecurity should be part of drought mitigation

In the food-insecure households, over half (54 per cent) the children were stunted and the prevalence of GAM (with WHZ <-2SD) was 27 per cent. One of the proposed pathways by which food security affects growth is through dietary diversity, with food-secure households consuming a greater variety of foods [Ali et al., 2013]. During the period of drought, households often reduce their intake of cereals (rice/wheat), proteins (pulses/flesh foods), fruits and vegetables, influencing their dietary diversity and impacting their nutritional status [Devereux, 2000; WFP, 2016], which is reported in this study.

Although the Indian National Food Security Act (2013) covers food security for all citizens it does not account for food security during disasters, such as drought [Desai and Vanneman, 2015]. This suggests a need to integrate special strategies for coping with food insecurity in drought either in the operational manuals associated with the aforesaid Act or as part of drought mitigation.

There has been evidence of involving Self Help Groups (SHGs) to form grain banks at village level to help provide a buffer for lean times [UNICEF, 2016], and studying and adopting coping strategies adopted by positive deviant families [Agarwal et al., 2009].

4. Couple programmes for mothers to therapeutic child feeding programmes to tackle maternal SAM

Maternal SAM is also high (13 per cent) indicating the need to tap the missed opportunity to couple programmes for mothers to outpatient therapeutic child feeding programmes, including both preventive services and curative services for those at risk.

To measure maternal GAM, we also found MUAC (value) as a simple method with good diagnostic accuracy when compared to BMI Z-scores (as gold standard). The sensitivity of the test was 82.3 per cent, specificity was 83.6 per cent. The test had a positive predictive value of 78.3 per cent and negative predictive value of 86.7 per cent.

In rural settings with limited human resource capacity to collect accurate data on women's age and weight gain and with poor access to equipment (stadiometer, weighing scale, BMI chart), MUAC <230 mm for adult women is the most viable screening tool for identifying nutritionally at-risk women. However, additional research is required involving representative population for generalizing the results.

5. FIES may be used in the Indian context and should be included in drought assessment surveys

Responses to the items in the seven-item scale were found to be reliably associated with the trait of food insecurity based on the point bi-serial (item-score) correlations and the acceptable value of Cronbach's alpha (0.67). Even though, the eight-item FIES scale was used to collect responses, the item severity and infit values for the 'hungry all day and night' variable led to its exclusion from analysis. Thus, the HFI scores are based on the seven-item scale.

A review by Sethi et al. (2016) found the eight-item FIES used in the Indian context to be internally reliable but reviewers made recommendations to improve its validation. Choosing the most suitable recall period in the scale is also critical, as differences between 30-day and 12-month recall may be considerable among those already food insecure. Our study used a 12-month recall period as it was appropriate to average out seasonal differences.

Very few studies have used FIES in the Indian context, it is suggested to include these scales in drought assessment surveys. This achieves two goals: (i) to adjust the HFI scale to the Indian setting; and (ii) to generate data to inform policy and programmes aimed at integration of food security and acute malnutrition programmes [Sethi et al., 2016].

LIMITATIONS

The sample size was purposively selected. Our study had a sample size of 377, infit statistics calculated from small samples (<1000) should be interpreted cautiously, as sampling errors for the statistic are substantial in samples less than 1,000 cases [Nord, 2014].

CONCLUSION

The prevalence of maternal and child undernutrition in drought-prone states is high and drought and drought-like conditions compound this issue further. The Government of India should develop Standard Operating Procedures (SOP) for food security and nutrition assessment, mitigation and management plans within drought management and mitigation SOPs.

This SOP should also include food security assessment in addition to GAM, both for women and children. The plan should include coping strategies for food insecure situations, food and nutrition entitlement access and special programmes targeting the management of severe acute undernutrition in both mothers and children.

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TABLES

Table 1 Nutritional status of children 6-59 months and their mothers

Characteristic	n (%)
Nutritional status of children	
Stunting	
Moderate (HAZ <-2 SD – >=-3 SD)	112 (29.7)
Severe (HAZ <-3SD)	64 (17.0)
Wasting (using weight-for-height)	
Moderate (WHZ <-2 SD – >=-3 SD)	83 (22.0)
Severe (WHZ <-3 SD)	16 (4.2)
Wasting (using MUAC)	
MUAC (115 to <125 mm)	25 (6.6)
MUAC(<115 mm)	3 (0.8)
Underweight	
Moderate (WAZ <-2SD – >=-3 SD)	130 (34.5)
Severe (WAZ <-3SD)	66 (17.5)
Multiple deprivations	
Stunted and wasted both	51 (13.5)
Stunted and severely wasted both	8 (2.1)
Severely stunted and severely wasted	5 (1.3)
Nutritional status of mothers	
Height less than 145 cm	40 (10.6)
Body mass index less than 18.5 kg/m^2	137 (36.3)
Body mass index less than 16 kg/m^2	21 (5.6)
MUAC <230 mm	117 (31.0)
MUAC <210 mm	49 (13.0)

Table 2 Responses to individual items on the FIES scale

Items (prefaced with 'in the last 12 months')	n (%)
a) Affirmative responses to individual items (often/sometimes)	
1. Were you worried you might not be able to get enough food to eat	118 (65.2)
2. Were unable to eat foods considered nutritious	113 (64.2)
3. Replaced nutritious/staple foods with cheaper varieties	74 (61.7)
4. Cut meal size/ate less per meal than normal days	89 (61.4)
5. Skipped a meal	66 (57.9)
6. No food in household at all	41 (53.3)
7. Slept hungry (yes)	83 (22.0)
8. Hungry all day and night (yes)	69 (18.3)
b) Summed affirmative responses (raw score)	
0	137 (36.3)
1	32 (8.5)
2	37 (9.8)
3	34 (9.0)
4	38 (10.1)
5	28 (7.4)
6	15 (4.0)
7	32 (8.5)
8	24 (6.4)
Food insecure households (>4 affirmative responses)	
Moderately food insecure (4-6 affirmative responses)	107 (28.4)
Severely food insecure (7 responses)	30 (8.0)

Table 3 Internal reliability, item severity and internal validity of eight-item and seven-item FIES

Items (prefaced with 'in last 12 months')	Item Severity (SE)[a]	Infit	Outfit
Eight-item FIES scale			
1. Worried about not getting enough food	-1.44 (0.18)	1.40	2.28
2. Unable to eat nutritious food	-1.47 (0.18)	1.13	2.61
3. Replaced food with cheaper staple	-0.3 (0.17)	1.37	1.82
4. Cut meal size/ate less per meal	-0.60 (0.17)	0.78	0.86
5. Skipped a meal	0.17 (1.17)	0.73	0.64
6. No food in household at all	1.16 (0.19)	0.77	0.77
7. Slept hungry (yes)	1.06 (0.19)	0.62	0.45
8. Hungry all day and night (yes)	1.48 (0.20)	0.73	0.47
Cronbach's alpha for eight-item scale (scale reliability coefficient)	0.72		
Seven-item FIES scale			
1. Worried about not getting enough food	-1.17 (0.18)	1.35	1.73
2. Unable to eat nutritious food	-1.23 (0.18)	1.10	1.87
3. Replace food with cheaper varieties	-0.16 (0.17)	1.27	1.27
4. Cut meal size/ate less per meal	-0.34 (0.17)	0.75	0.74
5. Skipped a meal	0.39 (0.17)	0.69	0.59
6. No food in household at all	1.32 (0.19)	0.83	0.79
7. Slept hungry (yes)	1.20 (0.19)	0.79	0.62
Cronbach's alpha for seven-item scale (scale reliability coefficient)	0.67		

[a] under Rasch model convention thresholds are scaled so arithmetic mean is zero

Table 4 Determinants of child wasting and severe wasting in the sample

Independent variable	Wasting in children 6-59 months			
	Wasted (%)	Adj. Odds Ratio (95%CI)	Severely wasted (%)	Adj. Odds Ratio (95%CI)
Age of child (months)				
6-11	31.8	1.39 (0.69, 2.77)	9.1	3.64 (1.02,13.01)*
11-23	26.8	0.79 (0.34, 1,78)	7.0	0.76 (0.19, 2.99)
24-59	25.2	0.72 (0.36, 1.44)	2.7	0.28 (0.08, 0.98)*
Gender				
Male	31.3	1.78 (1.10, 2.85)*	5.5	1.98 (0.67, 5.81)
Female	20.5	0.56 (0.35, 0.90)*	2.8	0.51 (0.17, 1.48)
Child stunting				
HAZ (<-2 SD)	13.5	1.30 (0.82, 2.06)	2.1	1.15 (0.42, 3.13)
HAZ (<-3 SD)	5.3	1.35 (0.75, 2.42)	1.3	2.33 (0.78, 6.94)
Maternal thinness (kg/m^2)				
BMI >=18.5	21.0	0.85 (0.30, 2.45)	3.2	0.31 (0.06, 1.62)
<18.5	35.0	1.73 (0.60, 5.00)	5.1	0.51 (0.10, 2.65)
<16	23.8	1.18 (0.41, 3.37)	9.5	3.19 (0.82, 16.44)
Maternal low stature				
No	27.0	1.48 (0.66, 3.33)	4.2	0.82 (0.18, 3.76)
Yes	20.0	0.68 (0.30, 1.52)	5.0	1.21 (0.27, 5.55)
Maternal wasting (cm)				
>=230	20.9	0.60 (0.30, 1.20)	2.8	0.45 (0.11, 1.86)
<230	34.2	1.18 (0.57, 2.42)	6.0	0.98 (0.24, 3.94)
<210	30.6	1.67 (0.83, 3.35)	6.1	2.23 (0.54, 9.24)
Household food insecurity				
None	25.8	0.70 (0.31, 1.57)	6.2	**
Moderate	25.2	0.97 (0.57, 1.64)	0.9	**
Severe	33.3	1.44 (0.64, 3.23)	0	**

* Significant at p<0.05

** Adjusted for states

*** Odds ratio not calculated since the number of cases were very small

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