not possible to establish the minimum level of cash required to have a significant effect; we can only say that this threshold falls somewhere between the amounts allocated in the SC and the DC interventions.

Regarding mean WHZ, it appears that children in the FFV arm were getting fatter but not taller, especially if interpreted with the lack of improvement in being wasted. As well as this, the Hb levels of children and mothers in the FFV arm were significantly lower compared to the control group. We had hypothesised that the FFV would impact growth and micronutrient status through increasing dietary diversity. However, while all three arms showed a significant improvement in mother and child dietary diversity, this improvement was lowest in the FFV arm (highest in the DC arm). These results suggest that something unplanned was occurring in the FFV arm. It is pos-

sible that the vouchers themselves were too restricted, being dependent on what vendors stocked (such as chicken being the only available meat). There were also anecdotal reports regarding vendors overcharging for food items redeemed against the vouchers as a way to cover their own administration fees in recovering the voucher costs. In this respect, the actual transfer amount given may have been lower.

Another question that needs to be addressed was the lack of improvement in Hb status in light of the improvements in ponderal growth and prevalence of being wasted as seen in the DC arm. The explanation for this will also be attempted through a pathway analysis.

The study setting presented a number of difficulties affecting data collection. The baseline survey took longer than expected, since recruitment of female enumerators was difficult and the data collection coincided with Ramadan and reduced

working hours. Added to this, temperatures reached 52oC, which not only affected research team working ability but also had an effect on the haemocues (this was managed).

Conclusion

The results illustrate the impacts of different CBIs on nutrition status. However, the theory of change regarding 'how' CBIs may influence nutrition outcomes in children is complex. In the RE-FANI Pakistan study, we show that it is not a straightforward task to simply interpret impact results as working or not; understanding the pathways and processes through which CBIs are implemented is essential to understand how best to implement them. Such analyses will be completed mid-2017.

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Risk factors for severe acute malnutrition in infants <6 months old in semi-urban Bangladesh:
a prospective cohort study to inform future assessment/treatment tools

Summary of conference abstract[i]

By M Munirul Islam, Yasir Arafat, Nicki Connell, Golam Mothabbir, Marie McGrath, James Berkley, Tahmeed Ahmed, and Marko Kerac

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Video footage of the conference presentation is available at: http://bit.ly/2kA6B33

Location: *Bangladesh*

What we know: The burden of acute malnutrition in infants < 6 months varies by country. Community-based case management for uncomplicated cases is lacking.

What this article adds: A recent study investigated the prevalence of acute malnutrition in infants<6m in semi-urban Bangladesh (two seasons) and undertook a prospective cohort study to describe current outcomes of identified cases at six months (180 days) of age. Prevalence of acute malnutrition was low post-harvest but increased pre-harvest; from 0.4% to 5.9% for severe acute malnutrition (SAM) and 2.8% to 10.1% for global acute malnutrition. At age six months, 24% of identified SAM cases (by eight weeks of age) and referred for available treatment (inpatient), remained severely malnourished. A range of infant and maternal risk factors for infant SAM were identified, involving breastfeeding status, the nutrition and mental health of the mother, infectious disease and water/sanitation/hygiene. A package of care is warranted in this age group.

Current WHO guidelines on severe acute malnutrition (SAM) management recommend outpatient management of uncomplicated acute malnutrition in infants under six months of age (infants <6m), in line with the now-established treatment approach for older children (WHO, 2013). However, there is a lack of practical guidance on how to identify those infants <6m at risk

and how to manage them. Current WHO case definition for SAM in infants <6m is weight-for-length of less than -3 Z-score (WLZ); visible severe wasting; and/or bilateral pitting oedema.

To inform the development of assessment tools and treatment approaches for SAM in infants <6m, a

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i   Presented at the ACF research conference, November 9th, 2016.

study was conducted in semi-urban Bangladesh in 2015/2016 with the following objectives:

1. To estimate the prevalence of infants <6m with acute malnutrition in the community;
2. To develop an assessment tool/case definition checklist for infants <6m with acute malnutrition; and
3. To describe current outcomes following infant <6m with acute malnutrition.

The study involved two prevalence surveys (in distinct seasons) and a prospective cohort study of three infant groups (77 in each group), followed from 4-8 weeks to 180 days post-partum. The groups comprised:

Standard SAM:
WLZ <-3 and/or bipedal oedema;

Normal:
WLZ ≥-2 to <+2 z-scores, no oedema;

Expanded SAM:
MUAC <115mm but WLZ ≥-2, no oedema.

MUAC case definition does not exist for infants <6m; data were collected for research purposes only. Mother/caregiver interviews at enrolment assessed potential risk factors. Infants with 'Standard SAM' were referred to existing services for treatment (inpatient care) according to existing protocols. The primary outcome was nutritional status at age completion of 180 days.

Preliminary results
Prevalence survey
The prevalence of GAM and SAM were low in the post-harvest period but increased pre-harvest; from 0.4% to 5.9% for SAM and 2.8% to 10.1% for GAM. Severe underweight (weight for age < -3 Z-score (WAZ)) slightly increased (severe: 5% to 6.1% and severe/moderate combined, from 14.4% and 16.3%).

Cohort study
At enrolment, 'Standard SAM' and 'Expanded SAM' were younger than 'Normal' infants (5.1, 5.5, 6.5 weeks respectively, p<0.001). A selection of characteristics that differed between these

Table 1	Differentiating characteristics between cohorts			
	Standard SAM	**Normal**	**Expanded SAM**	
Non-exclusive breastfeeding	34%	13%	23%	p=0.01
Duration of exclusive breastfeeding	3.9 weeks	5.7 weeks	4.5 weeks	p<0.001
Dissatisfaction with breastfeeding	22%	10%	7%	p<0.001
Mothers educated beyond school year five	56%	71%	77%	p<0.023
Maternal mental health/distress score (max score is 20)*	8.4	6.8	7.5	p<0.008
Maternal mid-upper-arm circumference	233mm	246mm	241mm	p<0.012
Infant illness episodes requiring hospitalisation	21%	6%	9%	p<0.001
Household income/month	$89	$114	$114	p=0.007

* WHO Self Reporting Questionnaire 20. World Health Organization (WHO). A User's Guide to the Self Reporting Questionnaire. WHO/MNH/PSF/94.8. http://apps.who.int/iris/bitstream/10665/61113/1/WHO_MNH_PSF_94.8.pdf

groups at enrolment is shown in Table 1. Type of toilet was significantly different among the groups; Standard SAM had more people with a pit latrine vs. a flushing toilet compared to the other two groups. Handwashing and source of water were not significantly different among the groups. Duration of breastfeeding was not significantly different among the groups.

At age six months, ~24% of 'Standard SAM', 1% of the "Normal", and 5% of 'expanded SAM' infants had SAM (p≤0.001). Three infants with 'Standard SAM' died; compared to none in the 'Normal' group and one in the 'Expanded SAM' group. In the Standard and Expanded SAM groups, significantly fewer infants were still being breastfed, more infants were fed anything other than breastmilk at enrolment and endline, and more infants were given animal milk at an earlier age, compared to the Normal group. Duration of exclusive breastfeeding was also shorter in both groups, mothers breastfed less often, had higher mental health/distress score and were significantly less satisfied when asked how breastfeed-

ing was going. Maternal Body Mass Index (BMI) and MUAC were lower in the Standard SAM group. More infants in the Standard SAM group had at least one episode of illness that required hospitalisation at enrolment; this proportion (21%) had increased to 40% by endline.

Challenges to implementing the research included:

- Access to villages in the rainy season; surveyors had to cross many bodies of water with equipment including motorbikes.
- Randomly selected villages were geographically spread out, so travel time was high.
- Measuring anthropometry in infants <6m is difficult, especially length.
- The number of questions in the questionnaire was a challenge as many were necessary to ensure comprehensiveness.

Discussion and conclusions
A range of maternal, infant and environmental risk factors are associated with SAM among infants <6m. Successful future treatments should focus on a package of care rather than single interventions that include breastfeeding support; the nutrition, physical and mental health of mothers; infectious disease management; and water/sanitation/hygiene conditions. Over one quarter of the infants identified with SAM at the outset remained severely malnourished at six months of age; this suggests inadequate provision and/or access to treatment of SAM and a risky environment. It is necessary to distinguish these vulnerable infants from those who had recovered by six months; indicators in addition to anthropometry are probably necessary.

For more information, contact: Nicki Connell, email: nconnell@savechildren.org

References
WHO. Guideline: Updates on the management of severe acute malnutrition in infants and children. Geneva: World Health Organization; 2013.

MUAC case definition does not exist for infants <6m; data were collected for research purposes only

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