

# A prospective study of psychological distress among mothers of children admitted to a nutritional rehabilitation unit in Malawi

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## Abstract

**Objectives** Accompanying guardians (usually the mother) have a pivotal role in promoting recovery from childhood severe acute malnutrition on Nutritional Rehabilitation Units (NRUs). We describe the prevalence of maternal distress at an NRU in Malawi and identify factors associated with this. We tested the hypothesis that maternal distress during admission would be associated with reduced child weight gain over the 4-week post-discharge period.

**Methods** Maternal distress was measured using the Self Reporting Questionnaire (SRQ) administered to mothers of consecutive children during NRU admission. Repeat SRQ was administered to mothers attending a follow-up clinic 4 weeks post discharge. Maternal, child and psychosocial variables were also measured. Child weight change from discharge to follow-up was compared between children of mothers scoring  $SRQ \geq 8$  and those scoring  $SRQ < 8$ .

**Findings** A total of 244 mothers and their children were recruited. In total, 71% of mothers scored  $SRQ \geq 8$  during admission. In all, 155 of 222 mothers eligible to complete repeat SRQ did so, and 33.5% scored  $SRQ \geq 8$ . Maternal distress at recruitment was associated with older child age, no confiding relationship with spouse, having had a previous child die, and the child having diarrhoea. Maternal distress at follow-up was associated with older child age, the child having diarrhoea or fever since discharge, and the child being HIV sero-positive. Maternal distress during admission was not associated with child weight gain at 4-week post-discharge follow-up.

**Conclusion** Levels of maternal distress are very high during child admission to an NRU. Persistent distress is associated with child health factors including HIV. Nutritional rehabilitation programmes should pay increased attention to carer psychological wellbeing using targeted evidence-based interventions.

## Keywords

developing country, maternal mental health, prospective study, severe childhood malnutrition

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## Introduction

Childhood malnutrition remains a critical health concern in many low-and-middle-income countries (Black *et al.* 2008). Established risk factors include poverty and co-morbid disease

(including HIV/AIDS). There is also increasing recognition of the impact of the psychological wellbeing of the caregiver (usually the mother), and of the caregiver-child interaction, upon the processes mediating childhood malnutrition (Tomlinson & Landman 2007).

Maternal depression/distress is a risk factor for child stunting and underweight (Patel *et al.* 2003; Rahman *et al.* 2004a; Adewuya *et al.* 2008), frequency of diarrhoeal episodes (Rahman *et al.* 2007; Adewuya *et al.* 2008), early cessation of breastfeeding (Patel *et al.* 2002; Adewuya *et al.* 2008) and incomplete childhood immunization (Rahman *et al.* 2004a). In an earlier study in rural Malawi, we found that maternal common mental disorder was associated with lower length-for-age among children brought by their mothers to a child health clinic (Stewart *et al.* 2008).

Malawi is a low-income sub-Saharan country with a prevalence of childhood underweight of 22% and stunting of 48% [NSO (Malawi) and Macro ORC 2005; NSO (Malawi) 2006]. Acutely severely malnourished children are usually admitted to Nutritional Rehabilitation Units (NRUs) for therapeutic feeding and treatment of co-morbid disease (Government of Malawi, Ministry of Health 2005). No previous studies have systematically investigated the psychological wellbeing of mothers of children admitted to an NRU, or the impact of maternal distress upon child recovery.

In this study, we sought to investigate the prevalence of psychological distress among mothers of severely malnourished children during inpatient NRU admission and at 4-week post-discharge follow-up, and to identify the factors significantly associated with distress at both time points.

On discharge from an NRU, it is the responsibility of the mother/carer to feed her child with a high-energy ready-to-use therapeutic food (RUTF) provided by the hospital. If given successfully, this promotes rapid weight gain. Mothers who are distressed may find it more difficult to provide appropriate care to the child, or to ensure the prescribed amount of RUTF is eaten. Therefore, we also sought to test the hypothesis that high levels of maternal distress would be associated with reduced child weight gain over the 4-week post-discharge follow-up period.

## Method

The study took place in Moyo House Nutritional Rehabilitation Unit, Queen Elizabeth Hospital, Blantyre, Malawi from January to March 2006. Moyo House receives admissions from Blantyre (population: 1.3 million) and surrounding districts. Criteria for admission are severe acute malnutrition defined as weight for length <70% of median, mid-upper arm circumference (MUAC) less than 11 cm (in children 12–59 months old), or nutritional oedema (kwashiorkor) (Government of Malawi, Ministry of Health 2005; WHO 1999). Over the 3 months

during which the study took place there were a total of 654 admissions and an inpatient mortality rate of 20.8%.

Each child is accompanied throughout admission by his or her mother or other guardian. He or she is first admitted to the acute ward and is commenced on phase 1 milk-based feeds (WHO 1999). The mother of any child whose HIV status is unknown is invited to have her child tested. When a child's condition begins to stabilize he or she is switched to transition and then phase 2 feeds. When clinically well, he or she is prepared for discharge home to complete nutritional therapy with a high-energy RUTF given at 175 kcal/kg/day sufficient for catch-up growth of >10 g/kg/day. The mother/guardian is taught how to feed this to her child, and asked to return at 2 and 4 weeks post discharge for review.

In the study, mothers were recruited when their children were commenced on phase 2 feeds. Recruitment took place at this time to lessen its coincidence with the period when the children are most acutely ill and when risk of inpatient death is highest. The purpose of the study was explained to the mothers and written informed consent was obtained (signature or thumbprint). Interviews were conducted either by an experienced nurse (TN) or a trainee psychologist (MW), both of whom had been trained by a psychiatrist (RS). Maternal anthropometry was carried out by either TN or RS. Children were weighed to the nearest 10 grams (Tanita 1582 scale, calibrated daily), and length measured (to the nearest 0.1 cm) using locally made length boards. MUAC was measured using UNICEF procured insertion tapes to the nearest 0.1 cm. Child anthropometry and other data were copied from clinical admission notes. Child anthropometry was performed by trained staff supervised by a paediatrician (JB). These staff had taken part in previous reliability testing for research studies on the NRU (Kerac *et al.* 2009), and anthropometry was performed as the mean of two measurements for weight, height and MUAC, and repeated if the difference was outside acceptable limits.

Only children attended by their mothers were included in the study. Mothers of children with severe pre-existing physical or mental disability were excluded, as were mothers who were not fluent in Chichewa (the official and most-widely spoken language in Malawi).

The following data were collected from maternal interview and anthropometry, and from the child's admission notes.

### Maternal psychological distress

We used a validated Chichewa version of the WHO-designed Self Reporting Questionnaire (SRQ) to measure symptoms of psychological distress. It consists of 20 questions with yes/no

answers exploring symptoms of depression, anxiety and somatic manifestations of distress. Full details of the translation and validation process are reported elsewhere (Stewart *et al.* 2009). In primary care settings, depressive symptoms frequently co-occur with anxiety and non-specific somatic symptoms. Total symptom counts have been shown to have a unimodal population distribution (Melzer *et al.* 2002; Goldberg & Goodyer 2005). The SRQ has been used in several previous studies exploring the relationship between maternal psychological wellbeing and infant health (Rahman *et al.* 2004b; Harpham *et al.* 2005; Hanlon *et al.* 2009). In this study, to allow comparison with existing data, we report the proportion of women scoring SRQ  $\geq 8$  to indicate significant distress. However, to minimize loss of statistical information (Altman & Royston 2006) we used the mean SRQ score as the dependent variable when investigating the association between distress and possible risk factors. The SRQ enquires about symptoms occurring in the *last 4 weeks*. Recruitment interviews were conducted a few days following admission, therefore reported symptoms may have occurred in the run up to admission and/or while on the ward. Similarly, follow-up SRQ enquired about symptoms experienced from discharge to follow up.

### Maternal physical health

- 1 Weight, length, MUAC.
- 2 HIV status. Women were asked if they had ever been tested and whether they knew their HIV status.

### Other maternal and psychosocial factors

- 1 Maternal age.
- 2 Maternal educational level, grouped into attendance at school to Standard 6 and above, or below that level. Schooling in Malawi consists of primary (Standard 1 to 8) and secondary (Form 1 to 4) education.
- 3 Maternal marital status.
- 4 Maternal occupation.
- 5 Access to a confiding relationship with spouse.
- 6 Four or more of own living children.
- 7 Previous death of one of the mother's own children.
- 8 Wealth. This was measured using the WHO-designed assets questionnaire as used in the Demographics and Health Survey (DHS) [NSO (Malawi) and Macro ORC 2005]. This records information on the presence of various household items, type of water supply, toilet, building materials and number of persons per sleeping room. A weighting for each

item is given based on the distribution of the item in the Malawian population, and a validated wealth score generated.

### Child factors

- 1 Age and sex.
- 2 Admission weight and length. These were converted into weight-for-age, length-for-age and weight-for-height z-scores based on WHO standardized growth data (1978) using Epi-Info.
- 3 Presence of nutritional oedema on admission.
- 4 HIV serostatus. This was usually ascertained during the admission, after voluntary testing (and prior counselling), by ELISA rapid test (Determine™ and Uni-Gold™).
- 5 Other inpatient co-morbid diagnoses: diarrhoea, pneumonia, tuberculosis and oral thrush.

### Post-discharge follow-up

All children discharged from the NRU are routinely followed up at 2 weeks and 4 weeks post discharge. Child discharge date and discharge weight were recorded from routine records. At the 4-week appointment, child weight (measured on the same Tanita 1582 scales as at admission and discharge) was again recorded from routine records and weight change per kg (of discharge weight) per day was calculated. Mothers were re-administered the SRQ and asked whether the child had had diarrhoea or fever since admission.

### Sample size

We assumed that the prevalence of distress among the mothers would be 35%. We predicted that 60% of the infants of distressed mothers would fail to gain weight at 5 g/kg/day between discharge and follow-up, vs. 30% of the infants of non-distressed mothers. To detect this difference with 95% confidence and 80% power, a total of 107 infants was required.

### Statistical analysis

Variables associated with recruitment SRQ score and follow-up SRQ score were identified using Pearson correlation coefficients for continuous variables (except for DHS index score which was not normally distributed and for which Spearman correlation coefficient was used), and Student's *t*-test for categorical variables. Those variables associated at the  $P < 0.1$  level were entered

into linear regression analyses, with mean substitution for occasional missing data in the independent variables.

The proportion of children gaining less than 5 g/kg/day was compared between mothers distressed vs. non-distressed at recruitment (Fisher's exact test). Bi-variate correlations (Pearson Correlation Coefficients) between weight change per kg per day and SRQ scores as continuous variables were calculated for (1) recruitment SRQ; (2) follow-up SRQ; (3) change in SRQ score between recruitment and follow-up.

Analyses were conducted using SPSS 15.0 (SPSS Inc. 2008).

### Ethical approval

Ethical Approval for the study was given by the College of Medicine Research Ethics Committee, Malawi.

## Results

### Recruitment sample characteristics

A total of 255 mothers/children were eligible to join the study. Four refused, five were discharged or absconded without having been recruited, and follow-up data was missing for two subjects, giving a final dataset of 244 mothers/children (95.7% response rate). Mean total length of admission was 9.2 days (SD 5.5) and mean duration of admission prior to recruitment was 5.3 days (SD 2.7). Child and maternal characteristics are shown in Table 1.

### HIV status

Regarding testing for HIV, 14 (5.7%) of the children had been tested prior to admission, 171 (70.1%) were tested during the admission but prior to recruitment to the study, 45 (18.4%) were tested during the admission after study recruitment, six (2.5%) mothers refused or were not offered child testing, and data on when HIV testing occurred was missing for eight (3.3%). Regarding HIV sero-status, 74 (30.3%) of the children were HIV sero-positive, 161 (66.0%) HIV sero-negative and status was unknown for nine (3.7%).

In total, 109 (44.7%) of the mothers said they had been tested for HIV and knew their status. Of these, 71 (65.1%) said they had been tested prior to their child's admission, 36 (33%) during the admission and two (1.8%) had missing data. In total, 37 of the 109 (33.9%) self-reported that they were HIV-infected.

**Table 1.** Recruitment characteristics of the children and mothers ( $n = 244$ )

<b>Child characteristics</b>	
Male	118 (48.4%)
Mean age	24.6 months (SD 14.7)
Median age	22.0 months (min 5, max 93)
Mean weight-for-age z-score on admission	-3.68 (SD 1.15)
Mean length-for-age z-score on admission	-2.95 (SD 1.41)
Mean weight-for-height z-score on admission	-2.58 (SD 1.14)
Oedematous malnutrition (kwashiorkor)	174 (71.3%)
Diarrhoea on admission	78 (32%)
Pneumonia on admission	35 (14.3%)
Tuberculosis on admission	10 (4.1%)
Oral thrush on admission	39 (16%)
<b>Maternal characteristics</b>	
Mean maternal age	25.5 years (SD 5.5)
Mean maternal MUAC	24.62 (SD 2.51)
Pregnant	42 (17.2%)
Married	189 (77.5%)
In paid employment	7 (2.9%)
Completed Standard 6 schooling or above	98 (40.2%)
Able to confide in their spouse	46 (18.9%)
Four or more living children	64 (26.2%)
Had a previous child die	91 (37.3%)
Mean DHS wealth index	0.30 (SD 0.92)

DHS, Demographics and Health Survey; MUAC, mid-upper arm circumference.

### Maternal distress preceding/during child inpatient admission

Maternal SRQ score at recruitment was normally distributed with a mean score of 9.88 (SD 4.13). A total of 173 (70.9%) mothers scored SRQ  $\geq 8$ . In total, 38 (15.6%) reported suicidal thoughts in the previous 4 weeks.

On univariate analysis, variables positively associated with recruitment SRQ score at the  $P < 0.1$  level were older child age (Pearson correlation coefficient 0.151,  $P = 0.018$ ), child diarrhoea on admission [mean SRQ score 11.13 (SD 4.09) vs. 9.30 (4.03),  $P = 0.001$ ], child oral thrush on admission [10.95 (3.65) vs. 9.68 (4.20),  $P = 0.078$ ], mother in paid employment [6.71 (4.39) vs. 9.96 (4.08),  $P = 0.040$ ], mother unable to confide in spouse [10.21 (3.98) vs. 8.48 (4.50),  $P = 0.010$ ], previous child died [11.00 (4.00) vs. 9.22 (4.08),  $P = 0.001$ ] and having four or more living children [10.67 (4.06) vs. 9.60 (4.13),  $P = 0.075$ ].

On multivariate analysis (Table 2) variables positively associated with SRQ score at the  $P < 0.05$  level were older child age, diarrhoea on admission, mother being unable to confide in spouse and having had a previous child die.

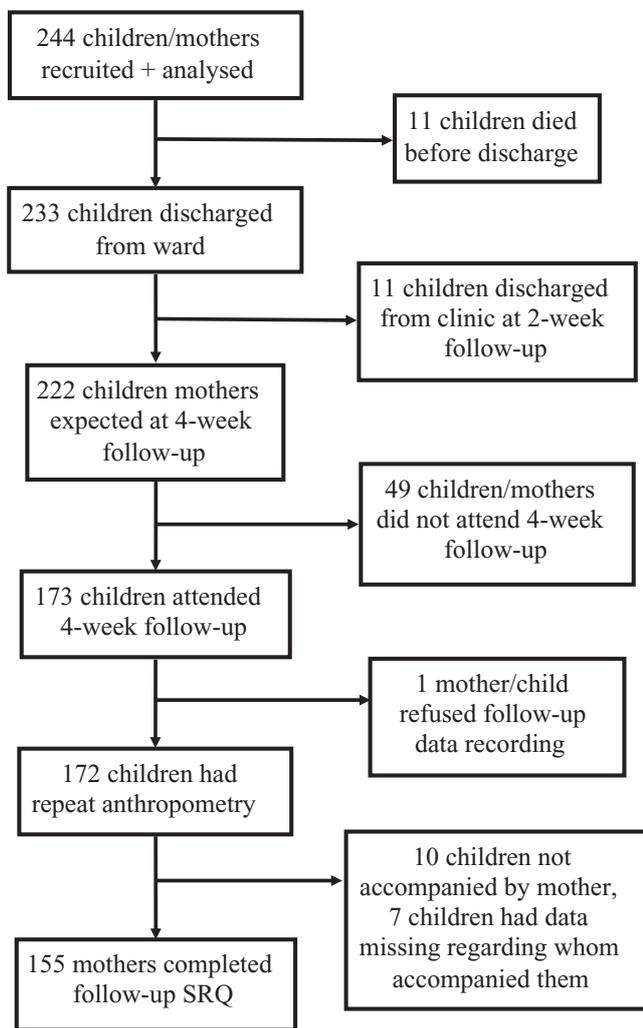
### Follow-up sample characteristics

The flow of the sample from recruitment to follow-up is shown in Fig. 1. There was no significant difference in mother or child

**Table 2.** Linear regression with recruitment SRQ score as dependent variable

	Unstandardized coefficients		P-value	95% confidence interval for B	
	B	Standard error		Lower bound	Upper bound
In paid employment	-2.653	1.509	0.080	-5.626	0.321
Able to confide in spouse	-1.846	0.640	0.004	-3.106	-0.586
Four or more living children	0.454	0.579	0.433	-0.686	1.595
Previous death of a child	1.197	0.534	0.026	0.145	2.250
Child age	0.037	0.017	0.032	0.003	0.071
Child diarrhoea on admission	1.647	0.536	0.002	0.590	2.704
Child oral thrush on admission	1.155	0.682	0.092	-0.188	2.497

$n = 244$ , mean substitution of missing data, R square 0.148, adjusted R square 0.123, standard error of estimate 3.871.  
SRQ, Self Reporting Questionnaire.

**Figure 1.** Flow of sample from recruitment to follow-up. SRQ, Self Reporting Questionnaire.

characteristics between those mothers completing a follow-up SRQ and the remainder of the recruitment sample, except that the mothers were slightly older (26.08 years (SD 5.79) vs. 24.55 (SD 4.87), Student's *t*-test:  $P = 0.028$  (equal variance not assumed)).

Among those mothers asked to return for 4-week follow-up ( $n = 222$ ), there was no association between SRQ score at recruitment and likelihood of attendance (173 (78%) attended, mean recruitment SRQ 9.76 (SD 4.07) vs. 49 (22%) did not attend, mean recruitment SRQ 9.80 (SD 4.63), Student's *t*-test:  $P = 0.955$ ).

Of those children discharged ( $n = 233$ ), mean discharge weight-for-age z-score was  $-3.80$  (SD 1.00), mean discharge height-for-age z-score  $-3.00$  (SD 1.41) and mean discharge weight-for-height z-score  $-2.71$  (SD 1.01). Mean no. of days between discharge and 4-week clinic visit was 30.3 (SD 5.3) days. Mean child weight change per kg (of discharge weight) per day between discharge and 4-week clinic visit was a gain of 4.57 (SD 3.45) g/kg/day.

#### Maternal distress at 4-week post-discharge follow-up

Mean follow-up SRQ score was 5.90 (SD 4.79) with 52 (33.5%) scoring 8 or above. Thirteen (8.4%) reported suicidal ideation since discharge. The mean change in SRQ score from that at recruitment was  $-3.85$  (SD 4.20). In total, 43 (27.7%) of these mothers reported that their child had had diarrhoea since discharge, 73 (47.1%) had had fever and 151 (97.4%) described their child as feeding well.

On univariate analysis, variables positively associated with follow-up SRQ score at the  $P < 0.1$  level were recruitment SRQ score (Pearson correlation coefficient 0.560,  $P < 0.0005$ ), older child age (Pearson correlation coefficient 0.212,  $P = 0.008$ ), DHS wealth index (Spearman correlation coefficient  $-0.134$ ,  $P = 0.097$ ), child diarrhoea since discharge (mean SRQ score 7.67 (5.28), vs. 5.22 (4.43),  $P = 0.004$ ), child fever since discharge

**Table 3.** Linear regression with follow-up SRQ as dependent variable

	Unstandardized coefficients		P-value	95% confidence interval for B	
	B	Standard error		Lower bound	Upper bound
Recruitment SRQ	0.622	0.078	<0.0005	0.467	0.776
DHS wealth index	-0.414	0.331	0.213	-1.069	0.241
Previous death of a child	-1.057	0.671	0.118	-2.383	0.270
Child age	0.042	0.021	0.049	0.000	0.084
Child diarrhoea since discharge	1.859	0.696	0.008	0.483	3.235
Child fever since discharge	1.521	0.629	0.017	0.279	2.764
Child HIV sero-positive	1.765	0.677	0.010	0.427	3.104

$n = 155$ , mean substitution of missing data, R square 0.423, adjusted R square 0.395, standard error of estimate 3.725.

DHS, Demographics and Health Survey; SRQ, Self Reporting Questionnaire.

(7.11(4.82), vs. 4.83 (4.53),  $P = 0.003$ ), child being HIV sero-positive (7.11 (4.54) vs. 5.44 (4.87),  $P = 0.049$ ) and mother having had a previous child die (6.73 (4.94), vs. 5.38 (4.64),  $P = 0.086$ ).

On multivariate analysis (Table 3) variables positively associated with SRQ score at the  $P < 0.05$  level were recruitment SRQ score, child age, child diarrhoea since discharge, child fever since discharge and child being HIV sero-positive.

### SRQ and child weight change between discharge and follow-up

There was no significant difference in the proportion of children gaining less than 5 g/kg/day from discharge to follow-up between mothers scoring SRQ  $\geq 8$  at recruitment vs. those scoring SRQ  $< 8$  (66/123 (53.7%) vs. 30/49 (61.2%), Fisher's exact test,  $P = 0.399$ ). Analysing child weight change as a continuous variable, no association was found between child weight change/kg/day and recruitment SRQ ( $n = 172$ , Pearson Correlation Coefficient 0.064,  $P = 0.405$ ), follow-up SRQ ( $n = 154$ , Pearson Correlation Coefficient  $-0.079$ ,  $P = 0.329$ ) or change in SRQ score between recruitment and follow-up ( $n = 154$ , Pearson Correlation Coefficient  $-0.132$ ,  $P = 0.103$ ).

### Discussion

This is the first study to describe the extent of psychological distress among mothers of children admitted to an NRU with acute severe malnutrition. Study strengths were the sample size, low refusal rate, use of a locally validated measure of distress and the prospective testing of the main hypothesis. In total, 71% of the mothers scored SRQ  $\geq 8$  at recruitment. This compares with a rate of 30% found among mothers attending with their children to an under-fives' health clinic in rural Malawi (Stewart *et al.* 2008). (It should be noted that this comparison

data is from a clinic-based sample and may not reflect the community prevalence of distress among mothers of young children in Malawi.)

The severity of the distress experienced by some mothers in the NRU is reflected in the finding that 15.6% reported having had suicidal ideation in the previous 4 weeks. Among those completing the follow-up SRQ, the rate of significant distress fell to 33.5%, which is similar to that found in the child health clinic study, although the prevalence of suicidal thoughts (8.4%) was higher than in that study (3.2%).

The reduction in maternal distress from the very high rates prior to and during admission to those at follow-up supports the hypothesis that having a severely ill child is the primary cause of the distress. Distress occurring during the 4 weeks of follow-up was associated with maternal report of child diarrhoea or fever since discharge. This suggests that ongoing care burden contributes to persistent distress. (Because recruitment SRQ score was included in the multivariate analysis, the variables associated with follow-up SRQ were those that predicted change in distress levels).

The study was able to identify particular aspects of child illness that were associated with both admission distress and persistence of distress after discharge. During admission, distress was not associated with severity of underweight, wasting or the presence of nutritional oedema, possibly because *all* the children were severely malnourished. It was diarrhoea in the child that was associated with a high level of distress at recruitment perhaps because this is an additional major care burden on the mother (e.g. maintaining child hydration, repeatedly washing clothing, additional fear of poor outcome). It should be noted that several prospective studies have found maternal depression itself to be a risk factor for frequency of child diarrheal episodes (Rahman *et al.* 2007; Adewuya *et al.* 2008). Therefore it is also possible that more longstanding maternal distress or depression may have increased the risk of child diar-

rhoea thus leading to NRU admission. However, this study did not measure distress/depression in the months prior to admission and so is unable to differentiate between these potential mechanisms of association. We also did not compare the prevalence of distress among the mothers of children admitted to the NRU with that among mothers of children admitted to the general paediatric ward. Such a study could help to elucidate whether the high levels of distress among the NRU mothers reflected typical anxiety associated with having a sick child, or have a more specific relationship with child malnutrition.

Other variables associated with maternal distress on admission were being unable to confide in a spouse, having had a previous child die, and older child age. Lack of a confiding relationship is a well-established risk factor for common mental disorder (Goldberg & Goodyer 2005). Having experienced the death of a child previously may act as a risk factor for pre-existing maternal depression, or may act to increase the mother's fears for the outcome of the current child's admission. The association between distress and older child age might be explained by the mother having a greater emotional investment in an older child, or might reflect additional burden of having to cope both with this child's illness and care for any younger children. We did not find an association between DHS wealth index and maternal distress. This contrasts with our study of mothers of infants attending a child health clinic (Stewart *et al.* 2008). It may be that, in the current study, the acute stress of the child's illness swamps the effect of longstanding socio-economic stressors.

We measured a range of maternal and child health factors, and psychosocial factors including socioeconomic status. However, the variables included in the multiple regression only explain 12.3% of the variance of SRQ score. A limitation of the study was the failure to measure other psychosocial factors (including domestic violence, recent life events and emotional and practical support in more detail), history of depression/anxiety and trait neuroticism.

The interpretation of results from the 4-week follow-up is limited because outcome data were not available on those mothers who failed to attend clinical follow-up. However, 70% of those mothers/children remaining eligible to attend at 4 weeks completed a follow-up SRQ, and there were no significant differences on baseline characteristics between those completing the follow-up SRQ and those who did not, other than that those who did so were slightly older. Our hypothesis, that maternal psychological distress during admission would be associated with impaired child weight gain over the 4 weeks post discharge, was not supported. We had formulated the original hypothesis based on the evidence that maternal depression is a risk factor for poor child growth in prospective community studies in low-

income settings (Stewart 2007). We predicted that mothers who are distressed may find it more difficult to succeed with RUTF feeding particularly to a sickly child. The absence of an association in this study may be because administering the free, high-energy RUTF is not affected by maternal distress in the same way that obtaining and preparing adequate food on a longterm day-to-day basis may be. Second, the length of follow-up in this study may have been too short. The impact of maternal psychological wellbeing on child growth appears to be a chronic effect with a greater impact on stunting than underweight. A study limitation was the lack of data on practical support available to the mothers at home after child discharge. It may be that for some mothers the extended family provide support with childcare and feeding. This would be likely to mitigate any detrimental effect of maternal functional impairment.

Distress occurring during the 4 weeks of follow-up was associated with maternal report of child diarrhoea or fever since discharge. This suggests that ongoing care burden contributes to persistent distress. Maternal distress at follow-up was predicted by her child being HIV sero-positive. Most of the mothers discovered the sero-status of their children during the admission. If the child was seropositive the mother would also have been informed that she were almost certainly infected and should have testing. Thus these mothers were in the early period of psychological adjustment having learned about their child's and own HIV status. At the time of the study all HIV seropositive children were started on cotrimoxazole, and staged for eligibility for ARVs, provided locally for free. HIV-infected mothers and children were referred for routine HIV care to their local health centre; however, this would not have usually included psychosocial support.

The findings of this study have a number of clinical implications. High levels of distress may make it more difficult for mothers to take on board advice regarding feeding, etc., and may impact upon the mother-child interaction. We would argue that the high prevalence of maternal distress during admission suggests that generic psychological support measures should be provided for all mothers/carers during NRU admission. These might include enhancement of the physical ward environment, and facilitated support groups. However, it is also clear that much of the distress resolves following the child's discharge and recovery, and therefore it is important that any more intensive interventions are appropriately targeted to ensure efficient use of resources. This study found that a group clearly at risk of persistent distress are the mothers of children diagnosed as HIV sero-positive during admission. Increased attempts should be made to provide ongoing psychological support and appropriate referral for these women, including

access to ARVs, which offers the hope of reduced morbidity in both mother and child. The follow-up period of this study was short, and further studies are required to investigate the longer term impact of maternal distress/depression upon child health outcomes following NRU admission.

This study reinforces recent calls for maternal psychological wellbeing to be given higher priority within research and implementation programmes aimed at reducing the global impact of childhood malnutrition (Rahman *et al.* 2008).

### Key messages

- Levels of maternal distress are very high during child admission to an NRU in Malawi, Africa.
- Persistent distress following child discharge is associated with child health factors including HIV.
- Maternal distress during admission is not associated with child weight gain at 4-week post-discharge follow-up.
- The follow-up period of this study was short. Further studies are required to investigate the long-term impact of maternal distress upon child health outcomes following NRU admission.

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