

## Evolution of nutritional status in children aged 6-59 months with moderate acute malnutrition in India: a prospective longitudinal cohort study

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### Introduction

Limited data exist to inform community management of children with moderate acute malnutrition (MAM), who are normally excluded from severe acute malnutrition (SAM) treatment programmes. This study was conducted to generate evidence of longitudinal outcomes in children aged 6-59 months with MAM (defined as mid-upper arm circumference, MUAC, 115-124mm), without interventional supplementary feeding. In this study, children in India with MAM were followed up for six months to better understand their long-term nutritional outcomes.

### Methods

We carried out a multicentre prospective longitudinal observational study, nested within a randomized trial, in Jharkhand, India. Children with MAM were enrolled over a 12-month period in 46 centres in Jharkhand state, and followed up for six months while attending government integrated child development services. Anthropometric, clinical and socio-demographic characteristics were recorded at enrolment. The primary outcome was deterioration to SAM (MUAC <115 or bilateral pitting oedema) or death within six months. Risk factors for this outcome were investigated.

### Ethics

This study was approved by the MSF Ethical Review Board and by the ethics review boards of the Rajendra Institute of Medical Sciences, Ranchi and Jawaharlal Nehru University, New Delhi, India, and London School of Hygiene & Tropical Medicine, UK. Clinical Trial Registry-India number, CTRI/2017/12/010743.

### Results

Of 971 children enrolled, 98 (10.0%) were lost to follow-up, mainly linked with seasonal migration; 12 were seen outside of the six-month window (three before day 168 and nine after day 210). Of 861 children included in the analysis, 595 (61.3%) were female, with a mean age of 16.0 months (standard deviation 9.7). At enrolment 333 (34.3%) had MUAC 115-119mm, 430 (44.3%) had weight-for-height z-score (WHZ) <-3 and 431 (44%) had a WHZ of -2 to -3. Within six months, 133 (15.5%) deteriorated to SAM or died (95% confidence interval, CI: 13.1-18.0%; five deaths), of whom 97 children deteriorated to poor outcome (SAM or death) by three months (11.3%, with one death; representing over two thirds of those deteriorating to poor outcome by six months). In an adjusted logistic regression model, with an interaction between MUAC at enrolment (115-119, 120-124mm) and age (6-11, 12-23, ≥24 months), significantly increased odds of deterioration to SAM or death were seen amongst those with MUAC 115-119mm in all age groups ( $p \leq 0.02$ ) and in those under one year with MUAC <125mm. After adjustment, there was no evidence of associations with socio-demographic factors, breastfeeding or WHZ <-3.

### Conclusions

Children aged under 1 year and children with MUAC 115-119mm should be closely monitored, considering high MAM burdens in India. Increasing the MUAC admission criterion and/or targeted interventions for MAM children at higher risk could be considered. WHZ <-3 not already MUAC <115mm does not appear to be a risk factor for deterioration.

### Conflicts of interest

None declared.



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Raman Mahajan is an epidemiologist with over 10 years of research experience. He has completed his Master's in Public Health with a specialization in Epidemiology, and is currently pursuing a Ph.D. at Maastricht University, the Netherlands. He has been involved in several operational research projects and clinical trials in the fields of visceral leishmaniasis (a neglected tropical disease), malnutrition, Covid-19, HIV, tuberculosis, and other infectious diseases. He has contributed to multiple research publications in national and international peer-reviewed scientific journals. He is currently working with MSF's Operational Centre Barcelona projects in India, as an operational research coordinator.