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Citation	Severe malnutrition in children presenting to health facilities in an urban slum in Bangladesh 2012, 2 (4):107 Public Health Action
DOI	10.5588/pha.12.0039
Publisher	TB Union
Journal	Public Health Action
Rights	Archived with thanks to Public Health Action
Download date	03/10/2021 18:27:49
Link to Item	http://hdl.handle.net/10144/269534



Severe malnutrition in children presenting to health facilities in an urban slum in Bangladesh

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<http://dx.doi.org/10.5588/pha.12.0039>

Setting: An urban slum in Kamrangirchar, Bangladesh.

Objectives: Among children aged 6–59 months seeking medical care from the two Médecins Sans Frontières-supported primary health centres, to determine 1) the prevalence of severe acute malnutrition (SAM) and severe chronic malnutrition (SCM), and 2) the extent of overlap between SAM and SCM.

Design: In a retrospective record review, data were analysed from out-patient registers on age, sex, height, weight and mid-upper arm circumference (MUAC) of children attending for medical care from April to September 2011. SAM was defined as weight for height < -3 Z scores of the median and/or MUAC < 115 mm. SCM was defined as height for age < -3 Z scores of the median. World Health Organization growth standards were used as reference.

Results: Data were complete in the records of 7318 (98%) children, of whom 322 (4%) had SAM and 1698 (23%) had SCM. Among the 322 children with SAM, 162 (50%) also had SCM.

Conclusion: In an urban Bangladesh slum, SAM and SCM co-exist, with a predominance of SCM. The current national guidelines for severe malnutrition, which focus on identification and management only for SAM, urgently need to be expanded to include SCM if substantial childhood morbidity and mortality are to be reduced.

Severe malnutrition among children, and particularly acute malnutrition, is a life-threatening condition that requires urgent intervention. The condition can also be chronic. The World Health Organization (WHO) defines severe acute malnutrition (SAM) as 'a very low weight for height, by visible severe wasting, or by the presence of nutritional oedema'.¹ Wasting in children aged 6–59 months is defined as weight for height < -3 Z scores of the median, according to WHO growth standards, and/or a mid-upper arm circumference (MUAC) < 115 mm. On the other hand, severe chronic malnutrition (SCM) in children is characterised by stunted growth and defined as child's height for age < -3 Z scores of the median, according to WHO growth standards.²

If it is untreated, the median under-five case-fatality rate for SAM ranges from 30% to 50%. SAM kills one million children each year worldwide, an average of one child every thirty seconds.^{1,3} Malnutrition alone is one of the leading causes of about 10% (140 million disability adjusted life-years) of the global burden of

disease.⁴ It usually occurs in areas affected by natural disasters and conflict, and requires immediate action if children's lives are to be saved. Children with SAM need to be recognised rapidly and provided with nutritional and appropriate medical support. To reduce the mortality rate, community and facility-based health services are thus principally focused on identifying and treating children with SAM. In case of moderate acute malnutrition (MAM, diagnosed as weight for height > -3 but < -2 Z scores of the median according to WHO growth standards, and/or a mid-upper arm circumference (MUAC) of > 115 mm), associated medical complications are prioritised to provide nutritional rehabilitation.

Children with SCM are considered to have a potentially less serious, continual form of malnutrition. However, the health status of such children may drop quickly in the presence of acute episodes of non-bloody diarrhoea, respiratory tract infections or measles.² In limited-resource areas, continuous poor food intake with repeated illness or infection can result in a change from acute to chronic malnutrition. This mostly occurs if there is a history of wasting before 18 months of age.⁵

Bangladesh has the world's fourth highest burden of children suffering from SAM ($n = 600000$).⁶ Although the trend of the severity of malnutrition in Bangladesh is decreasing over time, the rate of improvement has slowed significantly in the last few years. The latest Demographic and Health Survey has shown a prevalence of SAM and SCM of respectively 2% and 15%.⁷ The Bangladesh Government's guidelines for severe malnourished children provide management procedures for SAM with or without medical complications at both community and facility level.⁸

Following a cyclone in 2007, the Médecins Sans Frontières (MSF) project in Dhaka, Bangladesh, began to target malnutrition among children. The project's focus is case finding and management of SAM among children; children with MAM with medical complications are also admitted to the nutrition programme. A proportion of SAM children were observed to also have SCM. Empiric observations suggested that there were many such children. However, during the planning stage of developing a nutrition rehabilitation service for such a group of children, a lack of knowledge about the overlap between SAM and SCM among children in Bangladesh was noted. SAM and SCM comorbidity may require specific management, and estimations of the prevalence of SAM, SCM and SAM/SCM

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KEY WORDS

operational research; severe acute malnutrition; severe chronic malnutrition; Bangladesh; children; urban slum

Received 13 July 2012

Accepted 20 September 2012

co-morbidity are required for programme planning and resource allocation.

Studies have been published on the prevalence of combined stunting and wasting in other contexts.⁹ However, to generate crucial data on combined severe forms of malnutrition in the Bangladesh urban slum context, which has not been discussed in the scientific literature to date, we undertook a study to determine 1) the prevalence of SAM and SCM among children aged 6–59 months presenting for medical care in the two MSF-supported primary health care facilities, and 2) the extent of overlap between SAM and SCM in these children.

METHODS

Study design

This was a retrospective study using routinely collected facility-based programme data.

Setting

With a population of 160 million, of which around 20 million are children <5 years of age, Bangladesh is one of the most densely populated areas in the world.¹⁰ Dhaka, the capital city, is host to over 13 million people. The current study focuses on the sub-district, Kamrangirchar, to the west of Dhaka City, with a surface area of 3.68 km² on the bank of the Buriganga River and home to an estimated population of 400 000. The majority of the population are migrants. Kamrangirchar provides a temporary abode for this population, as the cost of living is cheaper than in the other slums of Dhaka. Kamrangirchar is divided into nine wards and 39 villages. In a population-based survey in Kamrangirchar in 2011, the prevalence of SCM was 22.7% (95% confidence interval [CI] 19.7–25.7) whereas that of SAM was 2.2% (95%CI 1.3–3.1; unpublished data, MSF Bangladesh).

Study setting

The MSF project in Kamrangirchar started its activity in 2010, providing primary health care (PHC) services for children <5 years of age. The health services are provided free of charge through two clinics. Since the beginning of the project, over 1000 paediatric consultations per month have been conducted in these health facilities. All children attending the PHC clinics for curative or preventive care are screened for SAM by evaluation of height, weight and MUAC. Anthropometric measurements and data on age and sex are recorded in a register.

Children found to have SAM without complications and MAM with medical complications are admitted to the ambulatory therapeutic feeding centre. To address medical complications, children are admitted to an in-patient therapeutic feeding centre in an assigned private hospital. No routine screening for SCM is done at the PHC clinics.

Study population and sampling

All children aged 6–59 months who attended an MSF PHC with any ailment for the first time from April to September 2011 were eligible for inclusion in the study.

Data collection

Data were single-entered from the out-patient registers into a central database using EpiData (EpiData Association, Odense, Denmark). Children were identified by coded numbers from the register for validation of data.

Data analysis

Weight for height and height for age Z-scores were calculated using the 2006 WHO growth standard charts.¹¹ Children were classified by presence or absence of SAM and/or SCM. Prevalence of SAM and SCM was compared by age group and sex. The χ^2 test was used to compare differences in proportions. $P < 0.05$ was taken as statistically significant. Risk ratios (RR) and corresponding 95%CIs were calculated where differences were statistically significant.

Ethics approval

The nutritional programme in Kamrangirchar has received formal approval by the Ministry of Health of Bangladesh. This study met MSF Ethics Review Board-approved criteria for analysis of routinely collected programme data. The study was also reviewed and approved by the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease, Paris, France.

RESULTS

During the study period, 7481 children meeting the inclusion criteria presented for care at the two MSF-supported health facilities. All records were reviewed. Of these, 163 (2%) were excluded as one or more anthropometric measurements were missing. Among the remaining 7318 patients, 52% were males, 25% were aged between 6 and 12 months, 27% were aged between 12 and 24 months and half were aged between 24 and 59 months (Table 1).

Of the children who sought care, 322 (4%) had SAM and 1698 (23%) had SCM (Table 1). There was no significant association of age or sex with SAM. The proportion of children with SCM was higher among males than females (RR 1.7, 95%CI 1.5–1.8) and the prevalence was significantly different between age groups,

TABLE 1 SAM and SCM among children aged 6–59 months attending health care facilities in Kamrangirchar slum, Dhaka, Bangladesh, April–September 2011

Demographic characteristics	Total n (%)	SAM n (%)	SCM n (%)
Total	7318	322 (4)	1698 (23)
Age, months			
6–12	1793 (25)	98 (6)	297 (17)
>12–24	1988 (27)	92 (5)	592 (30)*
>24–59	3537 (48)	132 (4)	809 (23)*
Sex			
Male	3785 (52)	154 (4)	1015 (27)*
Female	3533 (48)	168 (5)	683 (19)*

* χ^2 $P < 0.05$.

SAM = severe acute malnutrition; SCM = severe chronic malnutrition.

ACKNOWLEDGEMENTS

The authors thank the Médecins Sans Frontières (MSF) team working in the Kamrangirchar project for their support in implementing this study, the public health care registrar who dealt with the daily registration and the data entry operator for their hard work and efforts, and the children's care givers who accepted MSF services in Kamrangirchar. This research was supported through an operational research course jointly developed and run by the Centre for Operational Research, International Union Against Tuberculosis and Lung Disease, Paris, France, and the Operational Research Unit, MSF, Brussels-Luxembourg. Funding for the course was from an anonymous donor and the Department for International Development, London, UK. Additional support for running the course was provided by the Centre for International Health, University of Bergen, Bergen, Norway. The study was funded by MSF-OCB (Operational Centre Brussels). Conflict of interest: none declared.

TABLE 2 Association between SAM and SCM among children aged 6–59 months attending health care facilities in Kamrangirchar slum, Dhaka, Bangladesh, April–September 2011

Demographic characteristics	Total n	SAM+SCM n (%)	SAM only n (%)	SCM only n (%)	Neither SAM nor SCM n (%)	Risk of SAM among SCM RR (95%CI)	P value
Total	7318	162 (2)	160 (2)	1536 (21)	5460 (75)	3.4 (2.7–4.1)	<0.0001
Age, months							
6–12	1793	53 (3)	45 (3)	244 (14)	1451 (81)	5.9 (4.1–8.7)	<0.0001
>12–24	1988	66 (3)	26 (1)*	526 (26)*	1370 (69)*	6.0 (3.8–9.3)	<0.0001
>24–59	3537	43 (1)*	89 (3)	766 (22)*	2639 (75)*	1.6 (1.1–2.3)	0.007
Sex							
Male	3785	87 (2)	67 (2)	928 (25)	2703 (71)	3.5 (2.6–4.8)	<0.0001
Female	3533	75 (2)	93 (3)	608 (17)*	2757 (78)*	3.4 (2.5–4.5)	<0.0001

* χ^2 P < 0.05.

SAM = severe acute malnutrition; SCM = severe chronic malnutrition; RR = relative risk; CI = confidence interval.

with the highest prevalence in those aged 13–24 months compared with those aged 6–12 months (RR 1.8, 95%CI 1.6–2.0).

The overlap between SAM and SCM is shown in Table 2. Nearly half of the children with SAM also had SCM, as compared with only one fifth of those without SAM (RR 3.4, 95%CI 2.7–4.1). The proportion of children with both SAM and SCM was higher among children aged ≤ 24 months compared to those aged >24 months (RR 1.6, 95%CI 1.1–2.3). This overlap was not associated with sex.

DISCUSSION

This first report on the extent of overlap between SAM and SCM in children in an urban slum setting in Bangladesh indicates a high prevalence of SCM among children with SAM. Our data confirmed the proportion of SAM and SCM prevalence in Bangladesh documented in an earlier report.⁷ Among children attending a basic health unit situated in another Asian slum, in Pakistan, about 6.4% had SAM, resulting in severe wasting, and 43.6% had severe stunting.¹² Another nutritional study in the slums of Kenya reported a prevalence of SAM and severe stunting of about 2% and 11% respectively, without mentioning an overlap between these conditions.¹³ In a study from a rural PHC in India, however, 29% of children accompanied by their mothers presented with both wasting and stunting (<−2 Z scores).¹⁴ Similarly, in the Paediatric Department of the Civil Hospital of Pakistan, 42% of admitted SAM children were identified with SCM.⁹ Our study thus represents a first step in offering an adapted package of care to children suffering from SAM and SCM co-morbidity in a Bangladeshi urban slum.

The results of our study have the following policy and management implications for slums and other similar settings. First, large numbers of children in slum-based health facilities have SCM. Despite the acknowledged relatively high risk of having concurrent SAM, and its adverse consequences among these children, the presence of SCM is not routinely assessed in such health care services. The affected children had a treatable condition that, if undetected, would lead to chronic and irreversible health problems. The child's growth would be impaired and the child would be at risk of disability and death. The failure to identify and manage SCM at this stage represents a clearly missed opportunity for prevention of childhood morbidity and mortality. A study from Bangladesh shows that the lives of 160 000 children could be improved if a steady reduction in stunting were achieved through increased investment; we could also save 150 000 lives by reducing wasting gradually between 2011 and 2021.¹⁵

Second, a large proportion of children with SAM require additional management for SCM. Management of these children under the current nutrition rehabilitation programme focuses predominantly on nutritional support of acute malnutrition, which urgently needs to be assessed for its adequacy in ensuring survival in these children in the long term.

Third, there appear to be substantial proportions of children with both SAM and SCM in this urban slum of Bangladesh, indicating a period of insecurity of quality food locally among these children. A joint survey in 2009 by UNICEF, the World Food Programme and the Institute of Public Health Nutrition also revealed that severe malnutrition in Bangladesh is associated with food insecurity due to increases in food prices.¹⁶ According to Richard et al., inadequate and sustained poor dietary intake is responsible for both wasting and stunting.⁵ SCM is usually the consequence of long-term nutritional deficiency due to poverty, poor housing conditions, inadequate water and sanitation, unemployment, illiteracy, social problems and/or poor awareness about malnutrition.² Children with low birth weight are vulnerable to SCM, particularly in the case of a stunted mother and poor nutritional status.⁹ Management of SCM requires recognition and correction of both medical and other socio-economic problems. If these problems are not addressed, the child is unlikely to improve and may relapse. Optimal nutritional care of sick children should be promoted, and over time this may contribute to considerable improvement in the management of severe malnutrition among children in the under-five age group.

There is an urgent need for investment to improve housing conditions, water and sanitation, education, income generation and provision of health facilities aimed at improving quality of life. The National Nutrition Services (NNS) of the Bangladesh Government plan to improve food safety, quality and food control, and at the same time, to oversee actions to prevent duplication of efforts to improve public health and nutrition through raising awareness about food safety and hygiene practices, complementary feeding, supplementary vitamin A, micronutrients, iron/folic acid and de-worming. Mainstreaming of nutrition programmes with all the other health services is expected to be implemented nationally.¹⁷

More education, both formal and informal, about the nutritional value of different local foods is very important in the slum context. A comprehensive approach is needed in such a context to address the problem adequately. There are wide opportunities to establish linkages between the relevant government bodies and implementing non-governmental organisations.

Although sufficient information was available due to well-trained

health staff using standardised anthropometric instruments for inclusion in the study, there were some potential weaknesses. The data were collected retrospectively from regular clinical assessment, and the records of about 163 children were incomplete in the registrar book. These data may not be representative of all the children in the community, as the study took place in a facility. However, the findings are relevant in the context of an urban slum.

In conclusion, this study shows that among children presenting to the health facilities in an urban slum in Bangladesh, nearly one in every 20 children had SAM and one in 5 had SCM; half of the children with SAM also had SCM. There is an urgent need to prioritise SCM in addition to SAM, and to develop effective interventions aiming to improve the overall nutritional status of children in such contexts in Bangladesh.

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Contexte : Un bidonville à Kamrangirchar, Bangladesh.

Objectifs : Déterminer 1) la prévalence de la malnutrition aiguë et grave (SAM) et de la malnutrition chronique et grave (SCM) ainsi que 2) l'étendue du chevauchement de SAM et de SCM chez les enfants âgés de 6 à 59 mois recourant aux soins médicaux dans deux centres de santé primaire soutenus par Médecins Sans Frontières.

Schéma : Etude rétrospective des dossiers. On utilisé les données provenant des registres des patients externes concernant l'âge, le sexe, la taille, le poids et la circonférence de la partie moyenne-supérieure du bras (MUAC) chez les enfants recourant aux soins médicaux entre avril et septembre 2011. On a défini SAM comme un poids sur taille inférieur au score $-3 Z$ de la médiane et/ou un MUAC < 115 mm. SCM a été défini comme une taille pour l'âge inférieure

au score $-3 Z$ de la médiane. Les standards de croissance de l'Organisation Mondiale de la Santé ont été utilisés comme référence.

Résultats : Les données sont complètes dans les dossiers de 7.318 enfants (98%). Parmi ceux-ci, 322 (4%) souffraient de SAM et 1.698 (23%) de SCM. Parmi les 322 enfants atteints de SAM, 162 (50%) souffraient également de SCM.

Conclusion : Dans un quartier urbain pauvre du Bangladesh, la SAM et la SCM coexistent, avec une prédominance de SCM. La directive nationale actuelle pour la malnutrition grave se focalisant sur l'identification et la prise en charge de la seule SAM doit être étendue d'urgence afin d'inclure la SCM si l'on veut réduire de façon substantielle la morbidité et la mortalité infantiles.

de consulta externa de los niños que acudieron entre abril y septiembre del 2011 con respecto a la edad, el sexo, la estatura, el peso y la circunferencia de la parte superior del brazo en su punto medio (MUAC). La SAM se definió por un indicador del peso por la estatura inferior a $-3 Z$ escalas de la media o una MUAC < 115 mm. SCM se definió por una estatura por la edad inferior a $-3 Z$ escalas de la media. Se utilizaron como criterio referencia las normas de crecimiento de la Organización Mundial de la Salud.

Resultados: Se obtuvieron datos completos en los registros sobre

Marco de referencia: Kamrangirchar, un barrio marginal de Dhaka, en Bangladesh.

Objetivos: En los niños entre 6 meses y 59 meses de edad que acudieron a los dos centros de atención primaria de salud dirigidos por Médicos Sin Fronteras, se buscó 1) determinar la prevalencia de desnutrición grave aguda (SAM) y de desnutrición grave crónica (SCM) y 2) calcular la magnitud de la superposición de ambas afecciones.

Método: Se llevó a cabo un análisis retrospectivo de los expedientes médicos. Se analizaron los datos clínicos provenientes de los registros

7318 niños (98%). De estos, 322 (4%) presentaban SAM y 1698 (23%) SCM. Del primer grupo de 322 niños, en 162 (50%) coexistían SAM y SCM.

Conclusión: En este barrio marginal urbano de Bangladesh coexisten SAM y SCM, con predominio de la SCM. Las directrices vigentes sobre

la desnutrición grave se centran en la detección y el tratamiento de la SAM y es urgente ampliarlas de manera que abarquen a la SCM, con el fin de disminuir de manera radical las tasas de morbilidad y mortalidad en la infancia.