

The Case for Preventing Malnutrition Through Improved Infant Feeding and Management of Childhood Illness

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Introduction

The advent of ready-to-use therapeutic food (RUTF) products has greatly improved the coverage and effectiveness treatment for severe acute malnutrition (SAM). The excitement surrounding this development has led to rapid expansion of SAM treatment activities, often without regard to the prevalence of SAM, the capacity of local health systems to absorb expansion, or the contribution of SAM to overall child mortality. In the context of limited health budgets, on epidemiological and ethical grounds treatment approaches are in most situations a less rational public health investment than approaches that prevent SAM and other types of malnutrition.

AIMS

To consider various approaches for addressing SAM and highlight the most rational approach in constrained funding environments.

METHODS

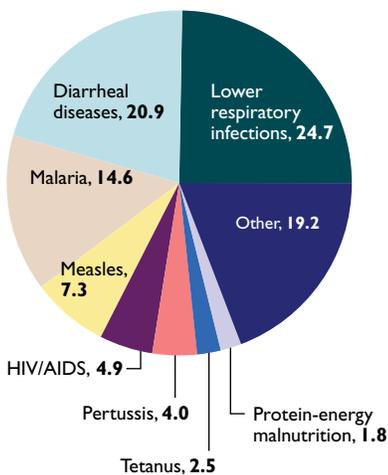
Literature search on causes and consequences of SAM, and cost-effectiveness in relation to SAM treatment of interventions addressing those causes.

The epidemiological argument

Other preventable diseases account for more deaths than SAM

While SAM is responsible for 2% of child deaths, other preventable and treatable diseases account for far more deaths: together measles, malaria, and diarrhea account for more than 40% of all deaths.

Direct Causes of Child Deaths

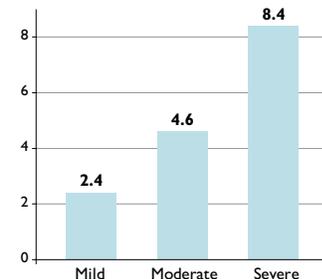


Source: WHO, 2003

Reducing child deaths due to malnutrition requires addressing mild and moderate malnutrition

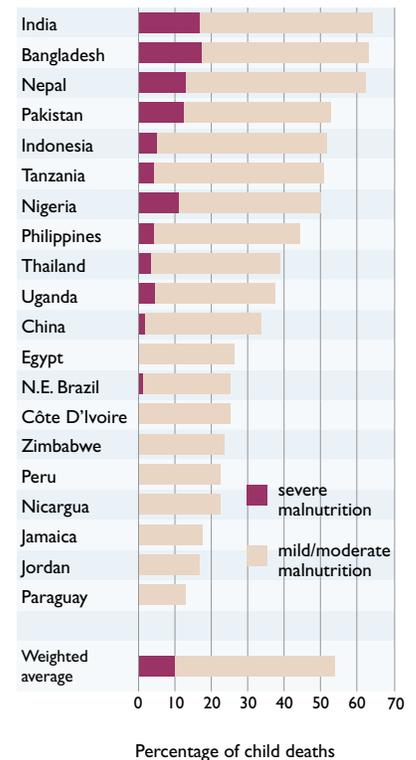
While the risk of death due to severe malnutrition is eight times greater than normal, the number of children who die due to an association with malnutrition is much greater for moderate and mild malnutrition. That is, a smaller risk applied to a much larger number gives more events. To reduce child deaths due to malnutrition necessarily requires addressing mild and moderate malnutrition.

Individual Risk of Death by Malnutrition Severity



Source: Pelletier et al., 1995

Total Child Deaths by Malnutrition Severity



Source: Reddy et al., 1986

This analysis was originally presented as a poster at the 10th Commonwealth Association of Paediatric Gastroenterology and Nutrition (CAPGAN) Congress on Diarrhoea & Malnutrition in Blantyre, Malawi in August 2009.

SAM often results from illness

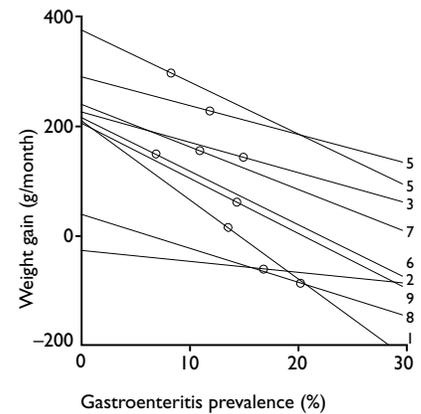
Importantly, SAM has a different etiology than chronic malnutrition. SAM often results from illness rather than lack of food—even though its treatment always involves child feeding. The findings of Yip and Sharp (1993) underscore this fact, as high rates of severe wasting occurred in a refugee situation where aid activities ensured adequate food for the population. Diarrhea, not lack of food, was the main cause of SAM.

- “In this crisis, severe and acute ‘malnutrition’ or wasting... was primarily a consequence of prolonged diarrhea and can be regarded as secondary malnutrition. There was no evidence of primary malnutrition or starvation resulting from a prolonged shortage of food.”
- “This tragic experience reinforces the importance of the basic public health concept of prevention in the management of disaster situations.”
- Critical prevention interventions include safe water supply, sanitation measures, and effective diarrhea control programs.

Diarrhea precipitates SAM

- As shown by Rowland et al. (1977), where diarrhea prevalence is high, infants and children do not gain weight adequately and actually may lose weight. Weight loss leads to SAM.
- Weight gain slows, even becomes *negative*.
- For a moderately wasted child, rapid weight loss during diarrhea precipitates severe wasting.
- Sanitation and hygiene and management of diarrhea thus contribute to SAM prevention.

Mean monthly weight gain (regression line) versus gastroenteritis prevalence (%) for nine 2-month periods

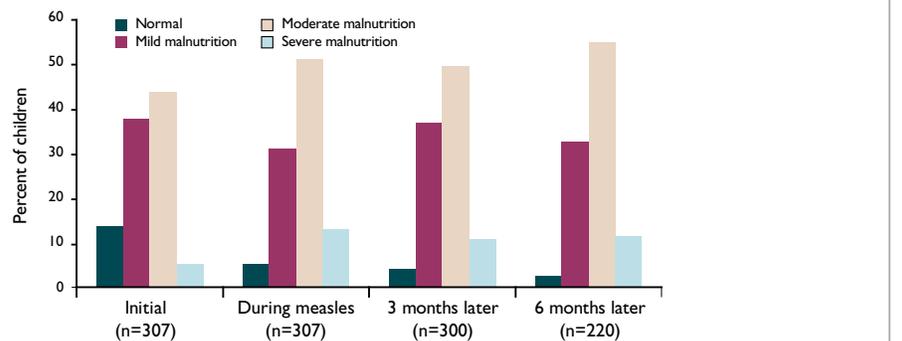


Source: Rowland et al., 1977

Measles precipitates SAM

- Like diarrhea, measles has been associated with abrupt deterioration of nutritional status. Abrupt deterioration predisposes an already malnourished child to SAM. Successful immunization against measles, coupled with interventions to improve overall malnutrition, thus can prevent SAM.
- A Reddy et al. prospective study of the relationship between measles, malnutrition, and blindness found that severe underweight doubles during measles and remains at a doubled level for six months post measles.
- Preventing measles translates into the prevention of SAM.

Nutritional status (underweight) before and after measles infection in India



Source: Reddy et al., 1986



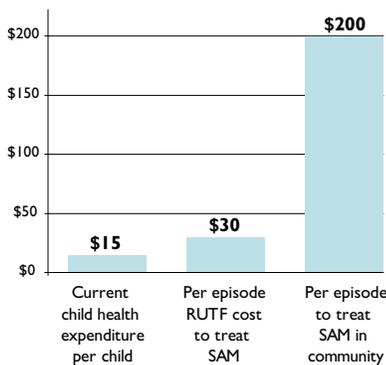
Richard Lord

The economic argument

How much does it cost to treat SAM in Malawi?

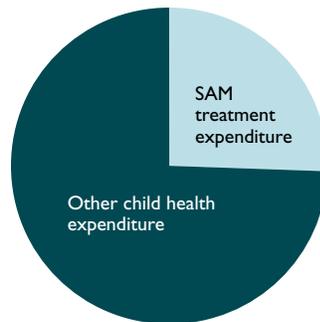
According to the World Health Organization (WHO) (Malawi National Health Accounts, 2007), current child health expenditure is \$15/child. The food costs for treatment of SAM are double that amount (WHO/WFP/UNSCN/UNICEF, 2007). The total costs of treatment, even in the community, have been estimated at \$200/child (Horton, 2009).

Cost of SAM treatment per child in Malawi



Source: WHO, 2007; WHO/WFP/UNSCN/UNICEF, 2007; Horton, 2009

Cost of SAM Treatment in Relation to Total Child Health Expenditures in Malawi



Source: WHO, 2007

- These per episode costs translate to a total national SAM treatment cost that represents approximately 25% of all child health expenditure.
- Is it rational to spend 25% of all child health funds for less than 2% of the population?
- Is it rational to spend 25% of child health funds to treat a condition responsible for < 2% of child deaths?

Addressing illnesses that cause SAM is more cost-effective than treatment

- The World Health Organization's Choosing Interventions that are Cost Effective (CHOICE) project team ranked these "highly cost-effective" interventions (below) all more cost-effective than treatment of SAM (2005).
- Any of them would contribute to reductions in SAM.
- Any of them would eliminate more child deaths than would universal SAM treatment, regardless of the effect on SAM.
- Priority should be given to interventions proven to be cost-effective and to save more lives.

Importantly, these same cost-effective interventions could substantially lower the incidence of SAM at the same time.

Intervention (coverage) presented in order of decreasing cost-effectiveness

Case management of malaria with artemisinin-based combination treatment (95%)
Measles vaccination (80%)
Measles vaccination (expanded to 95%)
Case management for childhood pneumonia (80%)
Oral rehydration therapy for diarrhea (80%)

Source: Evans et al., 2005

The ethical argument

SAM has a high case-fatality rate

The high mortality risk associated with SAM is usually cited as a reason for universal introduction of treatment services. However, children die from SAM even while undergoing treatment.

Severe malnutrition is associated with permanent developmental consequences

Even with successful rehabilitation, severe malnutrition is associated with lower IQ, lower cognitive function, lower school achievement, and greater behavioral problems (Grantham-McGregor, 1995).

Reliance on treatment is unethical

If effective and affordable interventions exist for preventing SAM and protecting infants from the elevated risk it carries and the risk of lifelong developmental consequences, then it is unethical to focus only on treatment.



Do preventive nutrition interventions exist?

National community-based programs establishing a low ratio of households to local community worker (e.g., 10:1) have achieved rapid reductions in malnutrition (Mason, et al. 1999).

- These programs typically nearly eliminate severe cases rapidly.
- A supportive policy environment improves success through improved status for women, reduced social exclusion, consistent political commitment, sustainable community organization, and improved literacy.

With appropriate training and supervision, nutrition counseling delivered through facility-based case management of childhood illness (i.e., Integrated Management of Childhood Illness) has been shown to reduce wasting by approximately 0.25 weight for height Z-score (Santos, et al. 2001).



Christine Demmelmaier

Mamorena Namane, a community health worker in Lesotho, works with the Infant & Young Child Nutrition Project to support mothers to learn good infant feeding practices and ensure that their babies grow up healthy.

Conclusions

When SAM prevalence is low, introduction of universal SAM treatment is not rational in epidemiological, cost, or ethical terms. Investment in more cost-effective interventions that reach more children, save more lives, protect children from death and developmental delay, and also prevent SAM is a better use of public funds.

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