A Report for the
Real Medicine Foundation
On Combating Malnutrition in
MADHYA PRADESH, INDIA

Contributions by
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# Table of Contents

**TABLE OF CONTENTS** ........................................................................................................................................... I  
**LIST OF ACRONYMS** ................................................................................................................................. III  
**EXECUTIVE SUMMARY** ........................................................................................................................... IV  
**THE CAPSTONE TEAM AND PROJECT** ...................................................................................................... VII  
**THE REAL MEDICINE FOUNDATION TEAM IN INDIA** ........................................................................... VIII  
**ACKNOWLEDGEMENTS** ........................................................................................................................... IX  
**INTRODUCTION** ........................................................................................................................................ 1  
  
  **OVERVIEW OF CHILD MALNUTRITION IN INDIA AND MADHYA PRADESH** ............................................. 1  
  **UNDERSTANDING SEVERE ACUTE MALNUTRITION (SAM) AND MODERATE ACUTE MALNUTRITION (MAM)** ...... 2  
  **INTEGRATED CHILD DEVELOPMENT SERVICES (ICDS) EFFORTS** ............................................................ 4  
**REAL MEDICINE FOUNDATION IN INDIA** ................................................................................................. 5  
  
  **CURRENT RMF PROJECTS** ..................................................................................................................... 5  
   - **HIV/AIDS Care & Treatment** ................................................................................................................ 5  
   - **Bhil Academy** .................................................................................................................................... 6  
  **“ERADICATE MALNUTRITION” PROGRAM** .......................................................................................... 6  
   - **Overview** ......................................................................................................................................... 6  
   - **Project Objectives** .......................................................................................................................... 7  
   - **Accomplishments** .......................................................................................................................... 8  
**CAPSTONE FIELD VISIT – JANUARY 2010** ............................................................................................... 8  
**METHODOLOGY** ....................................................................................................................................... 9  
  
  **Purpose** .................................................................................................................................................. 9  
  **Interview Method** .................................................................................................................................. 9  
  **Interview Process** .................................................................................................................................. 9  
  **Limitations on Data Collection and Survey** ............................................................................................ 10  
**DATA ANALYSIS: ASSESSING MALNUTRITION IN JHABUA THROUGH ANGANWADI WORKERS AND NRC STAFF** .... 10  
  
  **Understanding Malnutrition** .................................................................................................................. 10  
  **Perception of Malnutrition Prevalence** .................................................................................................... 10  
  **Prevention of Malnutrition** .................................................................................................................... 11  
  **Diagnosis and Treatment of Malnutrition** .............................................................................................. 12  
  **Reoccurring Cases of Malnutrition** ....................................................................................................... 13  
**SUMMARY OF RESULTS** ......................................................................................................................... 13  
  
  **Outreach: Local Information and Counseling Support Networks** ......................................................... 14  
  **Educational Programs: Understanding and Adoption** .......................................................................... 15  
  **Resource Deficiency** .......................................................................................................................... 16  
**NEXT STEPS** ............................................................................................................................................. 17  
  
  **IDENTIFICATION** .................................................................................................................................. 17  
  **TREATMENT** ....................................................................................................................................... 19  
  **PREVENTION** ...................................................................................................................................... 22  
  **NUTRITIONAL REHABILITATION CENTRE: PUBLIC PRIVATE PARTNERSHIP** ........................................... 25  
  **CONCLUSION** ..................................................................................................................................... 25  
**REFERENCES** .......................................................................................................................................... R-1  
**APPENDICES** .......................................................................................................................................... A-1  
**CATALOG: PROGRAMS ADDRESSING CHILD MALNUTRITION** ............................................................... C-1
Figures

FIGURE 1: CAUSES OF MORTALITY IN CHILDREN UNDER FIVE YEARS OLD (2004) ........................1
FIGURE 2: ESSENTIAL NUTRITION INTERVENTION DURING THE LIFE CYCLE ..........................1
FIGURE 3: GLOBAL HUNGER INDEX IN RELATION TO GDP PER CAPITA ................................2
FIGURE 4: CONTRIBUTION OF COMPONENTS OF THE INDIA STATE HUNGER INDEX ................3
FIGURE 5: MAP OF THE DISTRICT OF JHABUA ........................................................................8
FIGURE 6: CURRENT IAP PROTOCOL ON SAM ADAPTED FROM THE WHO GUIDELINES ........13
FIGURE 7: LESSONS FROM THE VILLAGE HEALTH COMMITTEES PROJECT .............................18

Tables

TABLE 1: MALNUTRITION INDICES FOR CHILDREN BETWEEN SIX AND 59 MONTHS OF AGE ....3
TABLE 2: SUMMARY OF ICDS SERVICES FOR WOMEN AND CHILDREN .................................4
TABLE 3: NRCS AND CORRESPONDING ANGANWADI WORKER LOCATIONS IN JHABUA DISTRICT ..9
TABLE 4: RESPONSES FOR MALNUTRITION RATES BY NRC AREA AND CORRESPONDING ANGANWADI VILLAGES .................................................................11
TABLE 5: SUMMARY OF NEXT STEPS AND POTENTIAL IMPACT AREA FOR THE PPP-NRC ..........25
TABLE 6: SUMMARY OF NEXT STEPS AND POTENTIAL IMPACT AREA FOR RMF TO CONSIDER ......26

Case Studies

CASE STUDY 1: ICDS COMMUNITY-BASED EDUCATION PROGRAM ........................................14
CASE STUDY 2: EFFICACY OF NUTRITION COUNSELING ON THE KNOWLEDGE, ATTITUDE AND PRACTICES OF WORKING WOMEN KAMLA-RAJ .......................................................15
CASE STUDY 3: TREATING SEVERELY MALNOURISHED CHILDREN IN ETHIOPIA ..................20
CASE STUDY 4: COST-EFFECTIVENESS OF COMMUNITY-BASED THERAPEUTIC CARE FOR CHILDREN WITH SAM IN ZAMBIA .................................................................21
CASE STUDY 5: TREATING SEVERE ACUTE MALNUTRITION IN MALAWI ...........................23
CASE STUDY 6: A LARGE-SCALE DISTRIBUTION OF MILK-BASED FORTIFIED SPREADS: EVIDENCE FOR A NEW APPROACH IN REGIONS WITH HIGH BURDEN OF ACUTE MALNUTRITION ............24
List of Acronyms

ART Anti-Retroviral Therapy
ANM Auxiliary Nurse Midwife
ASHA Accredited Social Health Activist
CDPO Child Development Project Officers
CTC Community-Based Therapeutic Care
DFID UK Department For International Development
DPO District Program Officers
GHI Global Hunger Index
IAP Indian Academy Of Pediatrics
ICDS Integrated Child Development Services
ICTC Integrated Counseling And Testing Centre
JJHSS Jeevan Jyoti Health Service Society
MAM Moderate Acute Malnutrition
MDG Millennium Development Goals
MOHFW Ministry Of Health And Family Welfare, Government Of India
MOWCD Ministry of Women and Child Development
MSF Médecins Sans Frontières (Doctors Without Borders)
MUAC Mid-Upper Arm Circumference
NGO Non-Governmental Organization
NORAD The Norwegian Agency For Development Cooperation
NRC Nutrition Rehabilitation Centre
NRU Nutritional Rehabilitation Unit
PPP-NRC Public-Private Partnership Nutrition Rehabilitation Centre
RMF Real Medicine Foundation
RUTF Ready-To-Use Therapeutic Foods
SAM Severe Acute Malnutrition
SIDA Swedish International Development Cooperation Agency
UNICEF United Nations Children’s Fund
VHC Village Health Committees
WFP World Food Programme
WHO World Health Organization
Executive Summary

The number one Millennium Development Goal (MDG) is to “reduce by half the proportion of people who suffer from hunger.” According to the United Nation’s International Children’s Emergency Fund (UNICEF) monitoring data, India is on track to meet this target; however, despite significant progress in reaching this goal, there are still over 221 million people in India that are malnourished.

In April 2009, the Real Medicine Foundation (RMF) launched the “Eradicate Malnutrition” program in Madhya Pradesh, India in response to the high rates of malnutrition in the region. With the malnutrition rate in children under the age of five at 60 percent, Madhya Pradesh represents the largest burden of malnutrition for the country.

The objective of this document is to serve as an evaluative tool for RMF in regards to the “Eradicate Malnutrition” Program, from the perspective of the New York University Capstone team. This document works to accomplish the following:

- Discuss the accomplishments and challenges of the RMF program as well as state-run programs responding to the nutrition crisis in Madhya Pradesh.
- Evaluate the current situation in the region based on a two-week basic field assessment of Anganwadi Workers and Nutritional Rehabilitation Centres in the district of Jhabua.
- Identify opportunities for RMF-program development based on an evaluative survey of the region.
- Provide a catalog of nutrition programs on the continents of Asia and Africa for RMF to utilize to develop future programs and interventions.

RMF’s program targets children under the age of five with moderate-acute-malnutrition (MAM) and uncomplicated cases of severe-acute-malnutrition (SAM). RMF staff utilizes the UNICEF tool for measuring mid-upper-arm-circumference (MUAC) to diagnose undernutrition in children under five. While many cases of MAM can be treated through diet and observation, children with SAM must be treated with micronutrient dense supplements as well as medication. In order to access this form of medical care, the children are referred by local health workers, Anganwadi workers, to Nutritional Rehabilitation Centres (NRC) for a 14-day course of treatment.

Two separate government run agencies provide programs in response to childhood nutrition: Ministry of Women and Child Development (MOWCD) and the Ministry of Health and Family Welfare (MOHFW). The Integrated Child Development Service (ICDS) is a program run by the MOWCD that coordinates the Anganwadi workers. The MOHFW operates NRCs. Due to the separate nature of these two vital entities, the gaps within the system with providing necessary care for malnourished children are inevitable.

In cooperation with the Jeevan Jyoti Health Service Society (JJHSS) and government partners, RMF works under the objective of closing the gaps of service provision. The “Eradicate
Malnutrition” Program is expected to identify, treat and/or prevent malnutrition for at least 100,000 children. Having received a grant from Merck & Co. Inc. and authorization to open the first Public-Private-Partnership (PPP) NRC, RMF is well on its way to decrease the malnutrition burden of Madhya Pradesh.

In January 2010, the Capstone team conducted field-assessment interviews with 13 Anganwadi workers and five NRCs to gain a deeper understanding of the community-level knowledge of nutrition with the following results:

• In general, interviewees responded with qualitative data in diagnosing malnutrition, despite the state-based quantitative system of weight-to-height growth tracking.

• Interviewees reported low occurrences of malnutrition, stipulating a larger number of cases to be found within migrant populations.

• All interviewees state the importance of preventing malnutrition, and emphasized the necessity of in-village community based education and counseling programs.

• Reoccurrence of malnutrition is reported to be low; migrant populations are most at-risk for reoccurrence.

• “Superstitious” medicine was discussed in several interviews, referring to the practices of the more rural village communities in addressing malnutrition and other health issues.

• A large complaint of interviewees referred to resource deficiency in terms of food and medicine, infrastructure and funding.

Overall, field interviews displayed the significant similarities in protocol followed by Anganwadi workers, and the similarities in protocol followed by NRCs. Additionally, while the MOHFW regulates the protocol of the NRCs, the field data highlights key areas requiring additional support. These areas include: outreach in the form of local information and counseling support networks, the understanding and adoption of educational programs and resource deficiency.

Based on the field assessment and research of best practices in the treatment of child malnutrition, the Capstone team provides key recommendations to RMF to enhance the identification, treatment and prevention of malnutrition. Key recommendations are to integrate the following methods of practice into the “Eradicate Malnutrition” Program:

• Community-based therapeutic care (CTC) programs

• Mobile-health care initiatives

• Education on locally available food

• Migrant family initiatives

Additional detailed information regarding these recommendations is provided in the figure on the next page.

To enhance the operation of the PPP-NRC, a focus on quality improvement of pre-existing NRC protocol is highly recommended with emphasis on the following:

• Identification of malnutrition can be instructed to NRC staff and local community members utilizing the MUAC tool.

• Educational programs should be developed with the goal of creating in-village camps, outreach programs and local on-campus courses.

• Anganwadi centres under NRC jurisdiction should be evaluated and assessed for capacity building.
• The use of supplementary food in the community and for migrant families can also be promoted through this NRC.

<table>
<thead>
<tr>
<th>Identification</th>
<th>Prevention</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Community-based therapeutic care</td>
<td>• Community-based therapeutic care</td>
<td>• Community-based therapeutic care</td>
</tr>
<tr>
<td>• In-village educational camps</td>
<td>• In-village educational camps</td>
<td>• Communication processes between Anganwadi workers and NRCs</td>
</tr>
<tr>
<td>• MUAC tools for Anganwadi workers</td>
<td>• Improvement of quality and availability of local food</td>
<td>• Training of Anganwadi workers focused on treatment, not just referrals</td>
</tr>
<tr>
<td>• Health worker adherence to charting growth, weight and height for children</td>
<td>• At-home treatment methods</td>
<td>• Transportation to and from NRCs</td>
</tr>
<tr>
<td>• Mobile clinic for the Anganwadi system to reach remote areas</td>
<td>• Regulation and accountability of Anganwadi workers</td>
<td>• At-home treatment methods</td>
</tr>
<tr>
<td>• Regulation and accountability of Anganwadi workers</td>
<td>• Awareness of proper nutrition</td>
<td>• Uptake of services by parents</td>
</tr>
<tr>
<td>• Comprehensive study of “superstitious medicine”</td>
<td>• Interventions targeting migration patterns, including provision of supplementary food</td>
<td>• Mobile clinic for the Anganwadi system to reach remote areas</td>
</tr>
<tr>
<td>• Initiatives using information technology to improve quality of identification and treatment of NRCs</td>
<td>• Monitoring and evaluation</td>
<td>• Comprehensive study of “superstitious medicine”</td>
</tr>
<tr>
<td>• Monitoring and evaluation</td>
<td></td>
<td>• Interventions targeting migration patterns, including provision of supplementary food</td>
</tr>
</tbody>
</table>

To conclude, the Capstone team believes that there is great need and opportunity for RMF to create programs to both supplement and enhance existing government programs. The PPP-NRC provides the ability to pilot program ideas, with the goal of development and expansion of successful initiatives. By focusing on community based initiatives and utilizing the suggestions provided by the Anganwadi workers and NRCs themselves, RMF can create effective interventions. The need to address child malnutrition in Madhya Pradesh is evident—RMF has the ability to attain success.
The Capstone Team and Project

The Capstone team is comprised of four graduate students at New York University’s Robert F. Wagner School of Public Service. Each team member brings unique experience to the project, and brief introductions are provided below for each.

Jenny Hsieh

Jenny is a third-year dual degree student, pursuing her MBA and MPA at New York University. Her prior professional experiences include: consulting for the public healthcare sector at Navigant Consulting, providing technical assistance to the Clinton Foundation on its HIV/AIDS Initiative, as well as working in corporate strategy at Pfizer. Jenny is a graduate from the University of Pennsylvania, with a Bachelor’s degree in Economics and Political Science.

Hyein Lee

Hyein Lee is currently a 2010 MPA candidate at the Wagner School of Public Service, New York University. She is specializing in international health and environmental policy. Her prior professional experiences include: project management as a civil engineer at Samsung construction, substantive research and program management at the Division for Sustainable Development, Department of Economic Social Affairs at the United Nations Headquarters in New York and UN Environmental Programme in Bangkok. Hyein holds a Bachelor’s degree in Civil, Urban and Environmental Engineering from Seoul National University. She was born and raised in Republic of Korea.

Eyiwunmi Salako

Eyiwunmi is a second year student pursuing a degree in MPA International Management at NYU’s Robert Wagner Graduate School of Public Service. She is interested in the private sector approach to development specifically corporate social responsibility. She has her undergraduate degree from Lincoln University, in Pennsylvania, where she majored in International Relations and Spanish. Her professional experiences prior to her Wagner career include: Working as an Associate at an executive staffing company, serving as a English tutor in Burgos, Spain and Oxford, Pennsylvania as well as working as a youth officer in Chestrad International, a’ non-governmental organization (NGO) in Ibadan, Nigeria.

Jaimie Shaff

Jaimie is an MPA candidate at New York University. With prior professional experience working with marginalized HIV/AIDS populations in Ghana through USAID and underprivileged families in New York City with a variety of NGOs, Jaimie plans to work in non-profit administration around the world, providing assistance to those in emergency and/or marginalized environments. Jaimie is a graduate of New York University, with a Bachelor’s degree in Metropolitan Studies and Psychology.

At the onset of Real Medicine Foundation (RMF) India’s “Eradicate Malnutrition” initiative, the RMF program directors identified the resource constraints with evaluating the project work and with consolidating ideas for future program expansion. The Capstone team was engaged to assist RMF identify opportunities for eradicating malnutrition in Madhya Pradesh, while providing additional tools and information to assess program effectiveness. The project started in September 2009, and will continue through until May 2010. The following report summarizes the Capstone team’s findings, and identifies next steps for RMF to consider.
The Real Medicine Foundation Team in India

Caitlin McQuilling

Caitlin is the Director of the “Eradicate Malnutrition” Program in India. Her previous experiences including working with the national Indian government on improving supply chain, forecasting, quality assurance testing, trainings and advocacy for new technologies and best practices. Originally from New York, she graduated from Georgetown University’s School of Foreign Service with a BS degree in International Politics, focusing on international law institutions and ethics.

Fabian Toegel, M.D.

Fabian is the Country Director of RMF in India. He earned the Albert Schweitzer Award from Harvard University for his groundbreaking work in the field of education and healthcare in Jhabua, where he also founded the Bhil Health Initiative and Literacy Society. Originally from Germany, he obtained his medical degree from Munich University and Master’s of Public Health in International Health from Harvard University’s School of Public Health.

Michael Matheke-Fischer

Michael is the Regional Manager of the RMF program in Jhabua. He moved to India in 2006 to work on sustainable development throughout the country, following in the footsteps of his grandfather, who ran a surgical field hospital in Arrunachal, a remote state in the northeast of India. Originally based in Delhi, he has worked with tribal populations along the border of Myanmar on sustainable livelihood initiatives, and trained timber smugglers in North Kashmir to become mountain guides. Originally from Washington DC, he attended the University of Maryland and studied Government and Politics, and has become an expert wading through the bureaucracy in India.

Jimmy Nirmal

Jimmy is the HIV/AIDS Programs Coordinator in Madhya Pradesh since 2006. He has 15 years of experience working on different social projects, such as HIV/AIDS, watershed projects and livelihood generation. Jimmy speaks English, Hindi, Bhili (the local tribal language) and Marati, and his skills as a counselor and communicator transcend language.
Acknowledgements

A special thanks to the Real Medicine Foundation staff – Caitlin McQuilling, Michael Matheke-Fischer, Dr. Fabian Toegel, Jimmy Nirmal, Nyamat Bindra and Anjana Chouhan – whose passion and dedication to combating malnutrition in Madhya Pradesh has inspired our team and the work behind this project.

We would also like to thank Steven Schall and Beth Fredrick, who have given us guidance and feedback on the project and report throughout the year. We are also thankful for Jennifer Dodge, who helped us immensely in the development and preparation of the field visit interviews.
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Introduction

Overview of Child Malnutrition in India and Madhya Pradesh

Constituting 22 percent of the country’s disease burden, malnutrition is one of the most serious problems facing India today. The prevalence of under-nutrition among children in India is one of the highest in the world – nearly double that of Sub-Saharan Africa. Not only does malnutrition raise a child’s chances of mortality from common diseases such as pneumonia and malaria, it also has lasting effects for the children who survive (see Figure 1).

![Figure 1: Causes of Mortality in Children Under Five Years Old (2004)](image)

Figure 1: Causes of Mortality in Children Under Five Years Old (2004)

- Globally, undernutrition contributes to more than one-third of child deaths
- Malaria 7%
- Injuries 46%
- Measles 4%
- Diarrhea 16%
- HIV/AIDS 2%
- Other 13%
- Neonatal 37%

Children malnourished in the first five years of life may have limited mental and physical growth capacity compared to well-nourished children. Nutrition interventions need to be delivered during the mother’s pregnancy and the first two years of the child’s life to improve his or her survival, improve development and prevent stunting, according to the United Nation’s International Children’s Emergency Fund (UNICEF) intervention during life cycle data, as shown in Figure 2.

![Figure 2: Essential Nutrition Intervention During the Life Cycle](image)

<table>
<thead>
<tr>
<th>Pregnancy</th>
<th>Birth</th>
<th>0 to 5 Months</th>
<th>6 to 23 Months</th>
<th>24 to 59 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of iron-folic acid supplements</td>
<td>Early initiation of breastfeeding (within one hour of birth)</td>
<td>International Code of Marketing of Breastmilk Substitutes</td>
<td>Maternity protection in accordance with ILO Convention 185</td>
<td>Yes</td>
</tr>
<tr>
<td>Household consumption of adequately iodized salt</td>
<td>Infants not weighed at birth</td>
<td>Exclusive breastfeeding (&lt;6 months)</td>
<td>Timely introduction of complementary foods (with continued breastfeeding)</td>
<td>No</td>
</tr>
<tr>
<td>23%</td>
<td>25%</td>
<td>66%</td>
<td>46%</td>
<td>57%</td>
</tr>
</tbody>
</table>

- Full coverage of Vitamin A supplementation 53%
- National guidelines for management of SAM incorporating the community-based approach No
- Policy on new ORS formula and zinc for management of diarrhea Yes
- Policy on community treatment of pneumonia with antibiotics Yes

Children malnourished in the first five years of life may have limited mental and physical growth capacity compared to well-nourished children. Nutrition interventions need to be delivered during the mother’s pregnancy and the first two years of the child’s life to improve his or her survival, improve development and prevent stunting, according to the United Nation’s International Children’s Emergency Fund (UNICEF) intervention during life cycle data, as shown in Figure 2.
Currently, a staggering 46 percent of India’s children under-five are malnourished. With 48 percent of the population living with stunted growth, India has the greatest number of stunted children in the world (estimated 61 million), accounting for more than three out of every 10 stunted children in the developing world.

Furthermore, although the gross domestic product (GDP) per capita for India is higher than other countries, its Global Hunger Index (GHI) is higher than other countries in sub-Saharan Africa, as shown in Figure 3.

**Figure 3: Global Hunger Index in Relation to GDP Per Capita**

The central state of Madhya Pradesh carries the country’s highest malnutrition burden: 60 percent of children under the age of five are malnourished, and the under-five mortality rate is 9.4 deaths per hundred. In 2008, Madhya Pradesh ranked 82nd in the GHI, and is at an “extremely alarming” level of hunger, placing the state between Chad and Ethiopia in the GHI. Madhya Pradesh’s tribal districts are the worst hit in the country, due to their cultural, geographic and economic isolation, with up to 100 percent malnutrition rates in some villages.

The India State Hunger Index is determined by three measurement components: prevalence of calorie-undernourishment, proportion of underweight children under the age of five years and under-five mortality rate. Figure 4 shows the contribution of each of these components to the India State Hunger Index. Appendix A provides additional breakdowns of the India State Hunger Index.

**Understanding Severe Acute Malnutrition (SAM) and Moderate Acute Malnutrition (MAM)**

There are about six million malnourished children in Madhya Pradesh. Of those, 1.3 million (22 percent) have severe acute
malnutrition (SAM) and another one million (17 percent) have moderate acute malnutrition (MAM). Table 1 explains how SAM and MAM are measured.

**Table 1: Malnutrition Indices for Children between Six and 59 Months of Age**

<table>
<thead>
<tr>
<th></th>
<th>Moderate Acute Malnutrition (MAM)</th>
<th>Severe Acute Malnutrition (SAM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight-for-height</td>
<td>Between -2 and -3 standard deviations from median WHO growth standards or between the 70th to 79th percentile</td>
<td>Less than -3 standard deviations from median WHO growth standards or below the 70th percentile</td>
</tr>
<tr>
<td>MUAC</td>
<td>Less than 12.5 cm</td>
<td>Less than 11 cm</td>
</tr>
<tr>
<td>Nutritional oedema</td>
<td>n/a</td>
<td>Bipedal</td>
</tr>
</tbody>
</table>

Although some Indian states have a higher prevalence of calorie undernourishment than in Madhya Pradesh, children are affected disproportionately by malnourishment in Madhya Pradesh, where the proportion of underweight children under age five is the highest.

In Madhya Pradesh, the Real Medicine Foundation (RMF) uses a low-cost, simple measurement tool that measures mid-upper arm circumference (MUAC) to identify cases of SAM and MAM. When the upper arm circumference measures in the red section of the tool, then the health worker, parent or whoever measures the arm can easily identify the child with a case of SAM. In some settings, it is difficult to assess a child’s age; therefore, MUAC is a good alternative nutritional status index for children under the age of five. UNICEF, Médecins Sans Frontières (MSF) and other organizations that work with children in field settings use this...
approach, which was approved by the World Health Organization (WHO).

Children with SAM have a high mortality rate of 20 to 30 percent, about 20 times higher than that of well-nourished children. Malnutrition is closely tied to Madhya Pradesh’s infant mortality, one of the highest in India, with 72 out of 1,000 children dying each year.\textsuperscript{vvi}

Children with MAM can recover with careful diet regulation and nutritional supplements, and generally do not require hospitalization; however, the treatment of children with SAM calls for facility-based treatment by admitting children to a health facility or a therapeutic feeding centre. SAM presents itself in two general forms: complicated and uncomplicated. Complicated SAM entails outlying medical complications such as hypothermia and pneumonia. Uncomplicated SAM cases can be treated with government regulated F75/F100 (per WHO protocol) or ready-to-use therapeutic foods (RUTF). Both forms of SAM require a minimum in-patient stay of 14 days.

**Integrated Child Development Services (ICDS) Efforts**

India’s primary program in response to child malnutrition, the Integrated Child Development Service (ICDS), is designed to address the major causes of child under-nutrition in India. The Ministry of Women and Child Development (MOWCD) provides key services through ICDS, including: health checkups and referrals, supplementary feeding, micronutrient supplements, health and nutrition education to women and preschool education for three to six year olds. UNICEF, the Swedish International Development Cooperation Agency (SIDA), World Food Programme (WFP), CARE International, the Norwegian Agency for Development Cooperation (NORAD) and other donors help to support the program. Table 2 summarizes the range of services that ICDS provides to women and children.

**Table 2: Summary of ICDS Services for Women and Children**\textsuperscript{xvii}

<table>
<thead>
<tr>
<th>Health Check-Ups and Treatment</th>
<th>Children Under the Age of Six</th>
<th>Pregnant or Lactating Women</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Growth Monitoring</strong></td>
<td>Monthly weighing of under-threes</td>
<td>Antenatal or postnatal check-ups</td>
</tr>
<tr>
<td></td>
<td>Quarterly weighing of three to six year olds</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>Weight recorded on growth cards</td>
<td>Tetanus toxoid immunization</td>
</tr>
<tr>
<td><strong>Immunizations</strong></td>
<td>Immunization against poliomyelitis, diphtheria, pertussis, tetanus, tuberculosis and measles</td>
<td>IFA and Vitamin A supplements</td>
</tr>
<tr>
<td><strong>Micronutrient Supplements</strong></td>
<td>IFA and Vitamin A supplements</td>
<td>IFA supplementation</td>
</tr>
<tr>
<td><strong>Health and Nutrition Education</strong></td>
<td>Not applicable</td>
<td>Infant feeding practices, child care and development, utilization of health services, family planning and sanitation</td>
</tr>
<tr>
<td><strong>Supplementary Nutrition</strong></td>
<td>Hot meal or ready-to-eat snack providing 300 calories and eight to 10 grams of protein</td>
<td>Hot meal or ready-to-eat snack providing 500 calories and 20 to 25 grams of protein</td>
</tr>
<tr>
<td></td>
<td>Double rations for malnourished children</td>
<td></td>
</tr>
<tr>
<td><strong>Preschool Education</strong></td>
<td>Early Childhood Care and Preschool</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>Education using “early stimulation” for children under three and education “through the medium of play” for children aged three to six years</td>
<td></td>
</tr>
</tbody>
</table>
The program adopts a multi-sectoral approach to a child’s wellness that combines health, education and nutrition interventions implemented through a network of Anganwadi centres at the community level. The ICDS team is made up of Anganwadi workers, Anganwadi Helpers, Supervisors, Child Development Project Officers (CDPO) and District Program Officers (DPO). Under the umbrella of the ICDS program, medical officers, Auxiliary Nurse Midwife (ANM) and Accredited Social Health Activist (ASHA) from Ministry of Health and Family Welfare (MOHFW) collaborate on different initiatives to develop a comprehensive and thorough approach to improving community health.

The ICDS program operates through partnerships with various international agencies. UNICEF supports ICDS by providing technical support for the development of training plans, organizing regional workshops and sharing best practices with the ICDS staff. Outside of ICDS, UNICEF conducts early-childhood impact assessments, organizes micronutrient supplementation and other medical interventions. In 1997, the WHO began developing New International Standards for assessing the physical growth, nutritional status and motor development of children between birth and five years of age. In August 2008, the MOWCD and MOHFW adopted the New WHO Child Growth Standard into the ICDS protocol to monitor the growth of children, protocol that involves the utilization of the MUAC to test for malnutrition.

According to program guidelines, Anganwadi workers are to monitor the weight and height of the children under their jurisdiction. Children found to be malnourished are to be referred to Nutrition Rehabilitation Centres (NRCs) for treatment. NRCs operate under the MOHFW and have the support of the UK Department for International Development (DFID), European Commission and UNICEF. At the NRC, children under the age of six are assessed and admitted for a 14-day course of treatment. Treatment involves medication, nutritional supplements and family counseling.

The ICDS has expanded tremendously over its 30 years of operations and now covers the majority of development blocks in India. ICDS recognizes that more attention has been given to increasing coverage than to improving the quality of service delivery. Additionally, it focuses on food distribution and the immediate and emergency needs of the community, rather than working towards long-term, sustainable solutions. According to a 2005 World Bank report, service delivery is insufficiently focused on children under age three, the group of children that could benefit the most from nutrition interventions.

**Real Medicine Foundation in India**

RMF provides humanitarian support to people living in disaster, post-war and poverty stricken areas. RMF believes that "real" medicine is focused on the person as a whole by providing physical, emotional, economic and social support. By using a personal approach, RMF forms partnerships with individuals and existing organizations throughout the world to create effective models and sustainable solutions that can be applied globally.

**Current RMF Projects**

RMF is currently working on several initiatives in Madhya Pradesh, including HIV/AIDS Care and Treatment and educational opportunities for tribal children.

**HIV/AIDS Care & Treatment**

In 2005, RMF began working in India with Jeevan Jyoti Health Service Society (JJHSS), a local non-governmental organization (NGO) running a 100-bed hospital and community health programs in Jhabua district. Together
with JIHSS, RMF launched a program focusing on HIV/AIDS prevention, treatment, and care and support for the tribal community in the district. The Integrated Counseling and Testing Centre (ICTC) and link-Anti-Retroviral Treatment (ART) Centre in the Meghanagar district were launched on July 25th, 2009 on the hospital compound. The link-ART centre was created to provide a more accessible centre for people living with HIV to receive their medication. Prior to the creation of this centre, patients had to travel approximately five hours to the nearest ART centre in Indore. Currently, about 150 locales are benefiting from the establishment of these facilities. To be able to scale up this program, Jeevan Jyoti Hospital and RMF are in the process of applying for a Community Care Centre so that the hospital can provide comprehensive services to people living with HIV/AIDS in the community.

**Bhil Academy**

Dr. Fabial Toegal, the RMF-India Country Director, has worked in Jhabua for 12 years, and developed the idea for the Bhil Academy following his national military service. The academy is a coeducational boarding school that provides educational opportunities for impoverished tribal children in the surrounding community. Currently, the Bhil Academy provides classes up to the 7th grade, and is hoping to expand in the near future. While the Bhil Academy awaits the completion of the other building structure, boys sleep in their classrooms at night and the girls have a dorm. The curriculum includes studies in mathematics, English and the sciences.

**“Eradicate Malnutrition” Program**

**OVERVIEW**

RMF began the “Eradicate Malnutrition” Program with the objective of working with individuals, self-help groups, government, NGOs, the United Nations, corporations, local businesses and civil society organizations in Madhya Pradesh to identify, treat and prevent malnutrition at community levels. While the goals of the “Eradicate Malnutrition” program are clear, RMF’s progress in eradicating malnutrition is hindered by limited manpower and skeletal support structure. The program would benefit from a comprehensive understanding of its overall impact in eradicating malnutrition, as well as increased room for future capacity expansion.

An RMF staff member conducts a MUAC assessment on a child.

RMF aims to tackle malnutrition by closing the gap between the available resources and the families who need them by focusing its program on the basics of malnutrition identification, treatment and prevention while inserting simple and innovative technologies and practices. RMF works to strengthen existing systems, structures and management capacity of government and NGO partners at the local levels. The tribal communities in Madhya Pradesh are the most
rural and marginalized communities in the country, having almost zero access to regular health services.

The pilot phase of this project in Madhya Pradesh is expected to reach 100,000 malnourished children ages under 15 years old by treating the cases of severe malnutrition, bringing the children back to normal growth patterns and ensuring that there are no relapses by educating the children’s families on proper nutrition and hygiene. By building the capacity at local health centres and dispensaries to identify acute malnutrition and treat uncomplicated cases, RMF will be able to reach a larger portion of the target population.

The project is based on the premise that treating malnutrition earlier is not only more effective and less risky to patients; early treatment is also more cost-effective when combined with a community-based approach. This catalytic activity will strengthen existing systems, structures, and management capacity of partners at the most local and grassroots levels to address the issues of the most marginalized and vulnerable populations in India.

To date, Merck & Co., Inc has awarded the largest funding source for malnutrition programs to RMF.

**PROJECT OBJECTIVES**

The first step to eradicating malnutrition is to treat all children in Madhya Pradesh who are suffering from malnutrition, while working simultaneously to prevent malnutrition through community tailored trainings and other prevention activities. RMF’s goal is to identify and treat SAM within the community before the onset of complications and growth stunting through its project components by:

- Involving multiple partners and coordinating activities with other organizations working to curb malnutrition
- Integrating RMF’s project with existing preventative initiatives and tailor interventions to each individual community
- Increasing coverage of intervention and community mobilization and case finding through extensive local networks
- Using RMF’s technical expertise in the areas of medicine, supply chain management and politics of the region
- Conducting trainings at multiple health care and community levels in best malnutrition prevention and treatment practices

RMF staff conducting an in-village educational program on child nutrition.
ACCOMPLISHMENTS

Since April 2009, RMF has made considerable progress through the “Eradicate Malnutrition” Program. Key accomplishments include:

- Receiving authorization to set up a Public-Private-Partnership NRC (PPP-NRC) in conjunction with Jeevan Jyoti Hospital and the Health Department
- Educating people in approximately 500 villages in Southwest Madhya Pradesh on how to detect malnutrition
- Developing counseling and training sessions for local communities and local health workers on the identification, treatment, and prevention of malnutrition
- Scaling up the program to 500 villages in four additional districts, where RMF hired 55 community nutrition educators for the expansion

Capstone Field Visit – January 2010

Members of the Capstone team visited the district of Jhabua in the state of Madhya Pradesh, India from January 3, 2010 to January 14, 2010.

Figure 5: Map of the District of Jhabua
The team conducted qualitative interviews with nutrition workers in five NRCs and thirteen Anganwadi centres. Anganwadi workers are trained, community-based health workers that screen and identify malnourished children in local villages; cases of SAM are referred to the corresponding NRC. At the NRC, NRC workers assess children referred with malnutrition and if necessary, treat them at an inpatient facility for up to 14 days. Anganwadi workers refer children with severe illnesses and/or cases of MAM and SAM to the corresponding designated NRC (see Table 3).

**TABLE 3: NRC AND CORRESPONDING ANGANWADI WORKER LOCATIONS IN JHABUA DISTRICT**

<table>
<thead>
<tr>
<th>NRC Locations</th>
<th>Anganwadi Worker Locations</th>
</tr>
</thead>
</table>
| Thandla NRC         | • Nawapadahnya Village  
|                     | • Nehagoan Village            
|                     | • Naharpurabada Village       
|                     | • Talei Village, Meghnagar Block  
|                     | • Goari Khadan                |
| Petlawad NRC        | Petlawad – Gulri Walea             |
| Alirajpur District NRC – Jobat Block | Ban |
| Alirajpur District Town Hospital NRC | Badhi Sardi Village  
|                     | Kuowa Village                  |
| Jhabua NRC          | • Barod Village                  
|                     | • Thaleo Sulia Village Meghnagar |

**Methodology**

**PURPOSE**

The team collected information through structured interviews with program staff, beneficiaries and other stakeholders regarding nutrition in Madhya Pradesh. The interviews provided the team with a more comprehensive understanding about the perceptions of nutrition, government and NGO run nutrition programs, and behavior patterns of the homes and communities in Madhya Pradesh. The overarching goal of the interview process was to highlight areas that are lacking between Anganwadi and NRC collaboration, as well as identify areas ideal for RMF programs. The interview questions are provided in Appendix B.

The team consolidated the field data to provide a qualitative summary of existing nutrition protocol and identify challenges and opportunities faced by Anganwadi and NRC workers in the region. The team then analyzed the data to present potential areas for additional RMF involvement.

**INTERVIEW METHOD**

Separate interviews were designed for Anganwadi workers and NRC workers, respectively. Half of Anganwadi workers were informed of the interview in advance, and half were not informed of the interview. All NRC workers were informed of interviews in advance. The interviews were designed to gather qualitative and personal data regarding the knowledge of the workers regarding nutrition and prevention of malnutrition. Specific results and interview details were kept confidential and available only to immediate RMF staff and the Capstone members. Interviews were recorded through notes taken by each Capstone member and through a voice-recording device.

**INTERVIEW PROCESS**

The Capstone team conducted the interviews with an RMF Hindi-English translator for each interview. Participants were asked to respond with answers outside of the specific protocol-based training they received in preparation for their job and encouraged to recount specific cases or instances regarding malnutrition. Non-English interviews were translated into English on-site, and some details may have been lost in translation. The Capstone team asked for consent before recording interview responses, and emphasized that specific responses used in
LIMICTIONS ON DATA COLLECTION AND SURVEY

Translation greatly limited the Capstone team’s ability to ensure accurate and appropriate data. Issues encountered include translator bias, emotional displays in regard to interview questions and responses and language issues. In some areas, interviewees spoke a dialect other than Hindi and as a result, the Capstone team had to work with the translator to simplify questions in order to gather the most information possible given the circumstances. Complex medical terminology and specific village-related cases were difficult to translate, and therefore, were excluded from both the interview questions and the data received.

Data Analysis: Assessing Malnutrition in Jhabua through Anganwadi Workers and NRC Staff

Field interviews were consolidated into a single database. This database was then qualitatively analyzed on two gradients. First, an overall assessment was conducted to gain a general comparative understanding of the Anganwadi and NRC workers’ responses to interview questions. Substantial differences and similarities were then further explored with an assessment of interviews by geographic area, referral NRC and Anganwadi site.

UNDERSTANDING MALNUTRITION

Anganwadi workers and NRC workers have similar diagnoses and definitions of malnutrition. In most cases, malnutrition was described as having symptoms of weakness, low weight to height ratios (weight to age ratios), distended stomachs and other body parts, as well as changes in hair color and elasticity of skin. One Anganwadi worker described malnutrition as a virus, although potential translation issues deem it unclear if the response meant that the malnutrition was “similar to” or “caused by” a virus.

PERCEPTION OF MALNUTRITION PREVALENCE

When asked to discuss the prevalence of malnutrition in the areas that they serve, Anganwadi workers typically responded anywhere between zero and five percent malnutrition rates for children. According to interviewees, the low rates were due to
successful treatment and recovery, often times by visiting an NRC by Anganwadi referral; however, it was also possible that the workers were unable to identify each case of child malnutrition. The NRC workers described significantly higher rates of malnutrition, citing rates between 40 to 65 percent, highlighting the higher prevalence rates to be in tribal populations. In the Thandla NRC, the interviewees reported a 40 percent malnutrition rate; in the same district the Anganwadi workers reported one to two children out of the 32 in the village to have been malnourished in recent months. Similarly, the workers at the Petlawad NRC reported about 20 children per month to be suffering from malnutrition; the corresponding Anganwadi workers reported two children out of 50. Similar trends occurred for the rest of the areas surveyed, as shown in the following table:

**TABLE 4: RESPONSES FOR MALNUTRITION RATES BY NRC AREA AND CORRESPONDING ANGANWADI VILLAGES**

<table>
<thead>
<tr>
<th>Area</th>
<th>NRC</th>
<th>Corresponding Anganwadi Worker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thandla</td>
<td>40 percent of children</td>
<td>One to two children of 32 in the village</td>
</tr>
<tr>
<td>Petlawad</td>
<td>20 children per month</td>
<td>About two children of 50</td>
</tr>
<tr>
<td>Jobat</td>
<td>50 percent of children (since NRC opened)</td>
<td>Two children of 154</td>
</tr>
<tr>
<td>Jhabua</td>
<td>65 percent of children</td>
<td>One out of 60 children</td>
</tr>
<tr>
<td>Alirajpur</td>
<td>60 to 65 percent of children</td>
<td>Zero or one child</td>
</tr>
</tbody>
</table>

Malnutrition rates reported by the workers can be affected by the community’s understanding of nutrition. Parents or guardians who do not recognize the symptoms of malnutrition may not seek help for their children through the local Anganwadi. Anganwadi workers explain how people understand malnutrition because they learn about it when visiting NRCs or Anganwadi workers for other services like vaccinations, but may not follow instructions of how to recognize and/or seek help for their malnourished children. NRC workers explain how they believe people actually do not have much of an understanding of malnutrition, but think that some people do receive some information from the Anganwadi workers. In some cases, the NRC workers indicated that people believe malnutrition is tied to religion. Rather than seek help at the NRCs, people go to temples to pray. As shown in interview response data, the majority of malnutrition cases are diagnosed when the child is brought in for another illness, such as diarrhea or malaria.

**PREVENTION OF MALNUTRITION**

In understanding how to prevent malnutrition, both Anganwadi workers and NRC workers emphasized the importance in the education of and communication with mothers. Another important element cited was adhering to routine vaccinations and seeking regular checkups and weigh-ins with the Anganwadi workers. Other factors that were discussed regarding prevention of malnutrition included supplementary foods, proper breastfeeding practices, provision of medicines and ability to access necessary medical treatment.

In terms of breastfeeding, the interview results show that NRC and Anganwadi workers believe that most mothers provide their children with supplementary food in addition to breast milk after six months, while others will breastfeed for...
two to three years without supplementary foods. Along with infections, delayed introduction of semi-solid foods is an important trigger of malnutrition. Children are most vulnerable between six months and two years of age. More of the cases in which mothers breastfed without providing supplementary food lead to higher instances of malnutrition, and can be prevented through counseling and educational support.

Overall, the data show that Anganwadi workers and NRC staff believe that malnutrition can be prevented. Both groups appear to have a basic understanding of the different measures necessary to tackle multiple forms of malnutrition; however, there are specific areas of existing protocol, such as supply distribution and term of inpatient care, that have been proven to be ineffective during the implementation stages of identifying, treating and preventing malnutrition.

**Diagnosis and Treatment of Malnutrition**

The treatment of MAM is most representative of the differences between Anganwadi and NRC training. Anganwadi workers generally responded that they provide moderately malnourished children with locally available food (e.g., kichiri, wheat, oats, daal) and special attention. NRC workers follow the Indian Academy of Pediatrics (IAP) protocol to treat MAM as SAM, and are currently implementing IAP-modified WHO guidelines for inpatient care for children suffering from SAM. As the programming developed along WHO guidelines lacked reading materials in different languages and had limited availability of trained staff and resources, the IAP has published a modified WHO protocol keeping in mind the local feeding practices. According to a pilot study conducted by Dr. Ankit Parakh et al, in New Delhi, India on the efficacy of modified WHO feeding protocol for management of SAM in children, the modified WHO guidelines are “feasible, efficacious and cost-effective in resource-limited settings of India.”  

Exclusive breastfeeding for the first six months and adding semi-solid complementary food three to four times a day in appropriate quantities thereafter should be encouraged. According to protocol, NRC workers admit the children into the centre and apply an appetite test to the child to gauge his or her ability to eat. Based on the appetite test, a diet is developed and followed to feed the child, including regular doses of F75/F100 and additional micronutrients. Workers in both NRCs and Anganwadi centres report to counseling mothers on importance of good nutrition and proper sanitation.

The MUAC is an important indicator to help identify and prevent malnutrition.

A recurring issue cited by interviewees is the reliance of the families on “superstitious”
medicine to treat malnourished children. The Anganwadi workers in the more rural villages indicated a higher prevalence of “superstitious” medicine, and the NRC workers mentioned “superstitious” medicine occurring in the more rural populations. Rather than take the child for the 14-day course of treatment at the NRC, parents would take the child to medicine men that treated the child with methods such as repeated superficial burns, herbs and prayers. When the tendency towards “superstitious” medicine occurs while a child’s health is most vulnerable, the chances of an effective recovery are reduced.

**Figure 6: Current IAP Protocol on SAM Adapted from the WHO Guidelines**

<table>
<thead>
<tr>
<th>1. Treat/prevent hypoglycemia</th>
<th>6. Correct micronutrient deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Treat/prevent hypothermia</td>
<td>7. Start cautious feeding</td>
</tr>
<tr>
<td>3. Treat/prevent dehydration</td>
<td>8. Achieve catch-up growth</td>
</tr>
<tr>
<td>5. Treat/prevent infections</td>
<td>10. Prepare for follow-up after recovery</td>
</tr>
</tbody>
</table>

**Reoccurring Cases of Malnutrition**

Children treated for malnutrition at an NRC have follow-up appointments scheduled every 15 days for six months. On average, NRC workers report to see approximately 10 to 15 percent of cases of malnutrition reoccurring within six months. While many workers indicated that reoccurring rates were low, the reported cases of reoccurrence generally involved a migrant family where the child was unable to go to follow-up appointments. Anganwadi workers are responsible for accompanying the child and family to the NRC for follow up appointments, and can receive cash incentives for the efforts.

**Summary of Results**

Immediate assessment of survey data yielded a baseline assessment survey to be incorporated into family-counseling initiatives that RMF will begin in villages mid-2010. The nutrition portion of the baseline was written with closed-questions in a “yes” or “no” format (Appendix C). The interviews gathered information regarding in-village educational camps, NRC and Anganwadi access, food supply and migration. See Appendix B for the interview questions. Information gathered from this particular baseline assessment can be used to highlight immediate and future community needs, while reinforcing targeted interventions.

Overall, the interviews showed significant similarities in Anganwadi worker and NRC worker protocol. With some exceptions, the protocol and guidelines given to Anganwadi workers and NRC workers is equivalent across the board. Additionally, while the protocol of the NRCs is regulated, the data analysis highlights key areas requiring additional
support, including: in-village outreach, efficacy of the translation of knowledge, financial resources, supplies and transportation for villagers. For details, see Appendix D.

**Outreach: Local Information and Counseling Support Networks**

Obstacles involving transportation, prior responsibilities with the family and at work, migration and miscommunication inhibit families from accessing the existing network of nutritional support. Our interviews indicate the lack of training of Anganwadi workers in dealing with specific nutritional matters, such as providing medical care or counseling. The protocol followed by Anganwadi workers is to refer cases of SAM or MAM to the nearest NRC; however, due to the aforementioned obstacles, many families are unable to access the NRCs. Even if families are able to reach an NRC, both Anganwadi and NRC workers believe that the 14-day course of in-patient treatment is impossible for most families because most mothers have other children to tend to and livelihood responsibilities.

An overwhelming response from NRC and Anganwadi workers indicates the importance of reaching out to the village communities on a local level. While camps are supposed to be arranged by the NRCs to go into the villages to provide information and nutritional assessments, the majority of interviewees indicated the absence of these programs. While further research must be conducted to detail the mandate for these programs and reasons for their absence in the community, the situation at present is that outreach into the communities is thought of by both Anganwadi and NRC workers as the most effective method to identify, prevent and treat malnutrition. Case Study 1 summarizes a long-term community-based education program that has been successful in improving the nutrition of children.

**CASE STUDY 1: ICDS COMMUNITY-BASED EDUCATION PROGRAM**

**The Dular Strategy**

Two state governments in Bihar and Jharkhand developed the Dular Strategy with UNICEF’s assistance. The purpose was to develop innovative approaches to improving early childhood nutrition, care and development by focusing on improving ICDS operations. The strategy included the Anganwadi workers in every targeted village to work with a small group of local people and provide them with basic nutrition training, as well as childcare and hygiene. After the training, the team would visit pregnant women and new mothers at home to educate them about safe deliveries, breastfeeding, immunizations and other essential care.

One of the main reasons why this strategy was successful was because the team, comprised of local community members, were trusted by parents. In a sample of 450 households, the results show that after one year of the intervention, there was an eight percent decline in the prevalence of underweight children under the age of three, a 20 percent increase in the use of colostrum feeding within one hour of birth, a 20 percent decrease in the episodes of diarrhea in children under age three and a 30 percent increase in the consumption of adequately iodized salt by participating families.
**EDUCATIONAL PROGRAMS: UNDERSTANDING AND ADOPTION**

As mentioned, educational programs exist in the region to deal with the malnutrition by providing mothers with nutrition and hygiene information. One major issue with these educational programs is that they become ineffective when information is not translated into working knowledge. Interviewees, both Anganwadi workers and NRC workers, stated that they have presented nutrition information to people in the villages, but often times the people either do not understand or do not follow the instructions given.

Anganwadi workers emphasized education about hygiene, the importance of routine weighing of the children and better feeding practices. NRC workers highlighted the importance of incorporating supplementary foods and micronutrients into children’s diets.

Educational programs must be developed around the expertise of the audience, while creating a better-rounded educational component for the workers themselves. Several educational programs have been successful in India and other countries. For example, in Kamla-Raj, a study was done and showed that nutritional counseling improved diets and adoption of desirable eating patterns. For information on this nutritional education program, see Case Study 2.

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**CASE STUDY 2: EFFICACY OF NUTRITION COUNSELING ON THE KNOWLEDGE, ATTITUDE AND PRACTICES OF WORKING WOMEN KAMLA-RAJ**

**The Study**

Seventy working women between 35 and 45 years old in the middle income group were selected randomly and divided into experimental and control groups. Nutrition counseling was provided to the experimental group for three months, and included nutrition modules, lectures, participatory discussions and demonstrations. They were also educated about nutrient requirements and functions of different nutrients. They also learned simple tools to plan meals and about cooking practices.

**The Results**

The results of this study indicated that there was positive effect of nutritional counseling, measured by improvements in gain in scores and adoption of desirable eating pattern.

**Considerations for RMF**

There should be greater emphasis placed on the proper selection of foods in the daily diet, which can be successfully implemented by educating the women to change their attitudes regarding nutrition and health through nutrition counseling. Also, nutritional counseling interactions should be for longer durations to bring about behavior changes. This case study suggests a minimum of six months.
Regarding education, Anganwadi workers thought that they should be able to provide necessary information and emergency medicines, while NRC workers thought that they should be able to counsel and support mothers and families living in rural areas of local food and recipes. Ideally, while it would be important to educate and train the Anganwadi workers to provide emergency care, in reality, they should focus on providing food counseling and utilizing local foods. The NRC workers have access to medical professionals and treatment, and therefore should be the ones providing medical opinions.

Collaborating with community members, the program provided educational activities during home visits, demonstrations and various women's groups meetings, where participants would learn how to properly feed and weigh children. Similar demonstration programs in Haiti and Bangladesh have also been highly successful in helping mothers rehabilitate their malnourished children and provide them with proper knowledge regarding feeding and childcare practices. In India, vegetarian and vegan diets often lead to nutrient deficiencies that can be effectively addressed during prenatal nutritional counseling. Nutritional counseling for vegetarians during pregnancy and breastfeeding can improve women’s nutritional health and as a result, directly impact the outcome of the pregnancy and the quality of breast milk after birth. Clinicians who provide prenatal care have an important role in assessing the nutritional status of women and directing them to appropriate resources while respecting their choices.

**RESOURCE DEFICIENCY**

In each location visited, a main complaint by the Anganwadi and NRC workers included issues regarding the lack of resources, including everything from building infrastructure for the care centres to the supply of government distributed food. Additionally, they mentioned that medicinal supply was insufficient, and thus, prevented the health workers from being able to provide the proper treatment to malnourished children.

Some of the visited Anganwadi centres did not have an operational building, while other Anganwadi centres have been converted into homes for the Anganwadi worker or other village inhabitants. The Anganwadi centres that were operational had been converted into daycare centres without proper supplies, such as toys and clothing. The NRC workers at three of the five visited NRCs were provided with physical infrastructure that needed to be restored and two NRCs operated out of buildings that were not suitable for seriously ill children. None of the visited NRCs had enough beds for high seasons of malnutrition.

![Channa, a form of chickpea grown in many villages.](image)

The government-regulated supplies of food and medicine for the both Anganwadi and NRC
workers were considered insufficient and irregular. Interviewees indicated that some or all of the supplies had been discontinued, reduced or were late in arriving. Anganwadi workers consistently commented that the amount of grain allotted to Anganwadi centres had been reduced. Also, grain that was provided was of such poor quality that people did not want it or children refused to eat. The supply of necessary and essential medicines for the children was consistently reported as tardy, missing or insufficient, which impeded the proper and effective care of malnourished children.

Next Steps

The results from the field assessment and the research conducted by the Capstone Team demonstrate the many opportunities for RMF to create and implement programs to fill the gaps of government service delivery addressing malnutrition in children under five. We recommend a focus be placed on the following program and intervention methods, in the areas of identification, treatment and prevention of malnutrition per RMF program guidelines.

Identification

Identification of malnutrition is essential in the battle to reduce the number of children in the world suffering from under-nutrition. Despite the government regulated protocol through which Anganwadi workers are to chart the weight and height of each child under her jurisdiction, rapid MUAC assessments conducted during the two-week field visit prove that cases of malnutrition are continuing to go unnoticed in Jhabua. Current protocol for identifying malnutrition must be re-evaluated and improved to decrease the number of invisible children suffering from malnutrition.

The tool currently used by Anganwadi workers is that of a weight-to-height scale system: Anganwadi workers are to monitor the children under their jurisdiction and keep records of growth in terms of weight to height. Although this is, in fact, and appropriate tool for identification of malnutrition, data show that the system is not implemented properly. Anganwadi workers do not keep regular charts of each child’s growth and many scales are rarely used. Additionally, this method is ineffective for migrant populations.

It is our recommendation that Anganwadi workers utilize the MUAC tool for malnutrition assessments. Although the MUAC does not have the capacity for early identification of malnutrition, it is able to indicate both MAM and SAM immediately and accurately, thereby eliminating inaccuracies created by ineffective monitoring of the upkeep of the growth charts, as well as providing for migrant populations.

While the use of the MUAC does decrease the
necessity of Anganwadi workers to meticulously track children’s growth and weight, it is essential that a top down monitoring and evaluation system be put in place to improve health-worker accountability. It is unacceptable for Anganwadi workers to step back in caring for the community’s children. The use of the MUAC can be leveraged as a method of re-defining time management and obligations of the Anganwadi, and the efforts saved by implementing MUAC use must be recognized by both MOCFW and the Anganwadi workers.

Community-Based Therapeutic Care (CTC) is one of the most successful identification and intervention strategies of malnutrition. CTC programs are useful in positioning and equipping both Anganwadi workers and NRC workers to be able to pinpoint early detection. A review of Village Health Committees (VHC) funded by USAID showed significant success in utilizing VHCs in improving the health and nutrition of people within the village. Not only was awareness of health and nutrition significantly enhanced due to the community-based integration, but the monitoring and evaluation of the effect the programs had within the community and on the village was accurate and effective. USAID also recognized that the VHCs worked best when working in partnership or under government organizations, showing an opportunity for enhanced partnerships and relationships between NGOs and the government run institutions. Figure 7 displays the lessons learned from the study, and more details of the project are provided in Appendix E.

**Figure 7: Lessons from the Village Health Committees Project**

| **Community Orientation to the Role of VHCs** | • Establishing a VHC is a long and formal process, requiring time to gain acceptance and to generate community participation and ownership  
• Many complex local socio-political issues exist and may need to be addressed |
| **Community representation in the VHCs** | • VHCs should be represented from different sections of the villages, including women, different castes and class and different age groups to ensure responsiveness to various health needs  
• It is important to have gender-sensitive leadership of the VHCs |
| **Civic Society Participation and Support to VHCs** | • It is important to have the support of civil society agencies to help the VHCs get set up, while meeting the program objectives |
| **Village Ownership of the VHCs** | • Facilitation & communication are crucial to the village’s understanding and ownership of VHCs  
• VHCs can help improve government service delivery at both primary & community health centres  
• VHCs should be established and able to select their own health and nutrition functionaries to operate effectively and improve government service delivery |
| **Development of the Village Health Plan** | • The VHC should identify local health problems and gaps on both the supply and demand side  
• Gathering information is necessary to prepare a Village Health Plan, and requires a considerable, sustained effort |
| **Implementing & Monitoring of Village Health Plan** | • VHCs should start with simple Village Health Plans with clear objectives and measurable targets  
• VHCs should develop a monitoring & evaluation plan, with simple indicators to monitor progress  
• When the VHCs have linked with the government for service providers support and have linked with block level officials, outcomes have improved |
| **Linking VHCs with Government Systems & Services** | • The VHCs can establish linkages with government systems & institutions, in addition to health services (e.g., transportation and referrals)  
• The VHCs appear to work better while serving as an ally with the health system (e.g. supporting the community-level health and nutrition workers), rather than as external critics or activist groups |
The health workers and general population must have the knowledge necessary to identify malnutrition. One method mentioned during the field assessments was the use of educational camps. Local and government healthcare workers go to villages to provide the communities with little or no access to medical care the opportunity to learn about nutrition and understand the warning signs. While NRCs are responsible for developing and conducting these educational camps, they are currently inconsistent and unreliable. It is our recommendation that these camps be monitored and regulated by an outside entity, and supplemented with resources and educational materials. This is an opportunity for RMF to partner with the existing program, recognize its importance, and work to refocus resources and energies to reform, refine and redevelop the presence of educational camps in the villages.

Branching off from the NRC-based camps is the idea of a mobile-Anganwadi system. As mentioned by RMF staff in the field, a mobile Anganwadi system can be most beneficial to the most rural villages, or areas with low ratios of Anganwadi workers to population. Due to the large issue regarding a lack of transportation opportunities for villagers, the presence of a bi-weekly or monthly mobile clinic targeting the most rural and vulnerable populations is imperative.

Madhya Pradesh’s large tribal population implies a significant reliance on “superstitious” medicine. To accommodate and respect the cultural value placed on this form of medicine, it is recommended that RMF investigate the principles of the forms of medicine used in the region. In order to create educational programs and intervene within a community, it is obligatory to enter with a firm understanding of the culture representing the people. “Superstitious” medicine is not taken lightly by the people, and should not be taken lightly by NGO programs targeting such populations.

**Treatment**

There is no simple course of treatment for child-malnutrition. If not treated correctly the risk of reoccurrence increases, as does the danger of developmental problems. Research and field observations indicate RMF’s “whole health” method of programming to be the most appropriate in MP. Medical care, education, intervention and community action must combine to create a whole health method of treatment for child malnutrition.

The current 14-day inpatient method for treating uncomplicated cases of malnutrition, using F75/F100, is not working. While the treatment is effective, families cannot remain at an NRC for 14 days. Families who are unable or unwilling to take their children to an NRC bear the brunt of the malnutrition burden, and the children suffer as a result. New courses of treatment do exist.
and have been shown to be effective. RUTF does not require preparation and can be administered at home.\textsuperscript{xxviii} Water is not necessary to prepare RUTF, eliminating the risk of water-borne infection.

The Anganwadi system can be used to facilitate in-village treatment plans. With safe treatment methods such as RUTF, Anganwadi workers can play a role beyond food provider and referral system. Through simple treatment options, Anganwadi workers can care for cases of MAM and uncomplicated SAM, removing the burden of inpatient treatment on the parents and enhancing the community awareness of nutritional issues. Anganwadi workers should be trained on how to treat moderate and uncomplicated cases of malnutrition and provided with simple tools necessary to administer course of treatment. This form of training and simplified treatment options can be effective for migrant populations. Tools such as a MUAC and RUTF are portable, and easy to use by people of all levels of literacy. Treatment options for migrant families should be explored.

The adoption of Anganwadi workers in the administration of treatment protocol is an opportunity for CTC programs. The case study below describes a successful treatment program in Ethiopia, where high rates of severely malnourished children resulted from years of consecutive droughts, failed harvests and poor food security.

### CASE STUDY 3: TREATING SEVERELY MALNOURISHED CHILDREN IN ETHIOPIA\textsuperscript{xxix}

#### Intervention

Severely malnourished children were identified, and then registered in an outpatient therapeutic feeding program, and attended the nearest distribution site every week for medical examinations and a ration of RUTF and blended food. Between visits, community nutrition workers followed up with patients at home once or twice per week. Patients were released from the outpatient therapeutic feeding program once the field staff assessed that their weight-for-height was greater than 75 percent of the median weight-for-height for two consecutive weeks and also free from infectious diseases.

#### Results

Of the 170 patients between the ages of two and 120 months, 144 (85 percent) recovered, seven (4.1 percent) died and eight (4.7 percent) failed to attend two consecutive treatments. The mortality, recovery and default rates appeared better than internationally accepted minimum standards for therapeutic feeding centres.

#### Considerations for RMF

The results suggest that SAM can be treated effectively on an outpatient basis and is acceptable to participants.
In providing opportunities for community involvement in the treatment of malnutrition, villages are able to come together as a community to care for the children. This both improves efficacy of the treatment and assists the community to understand the disease, developing a capacity for early detection and prevention. CTC also allows for more rural populations to improve access to treatment and education. Community based programs can also be a cost-effective method of treatment. Case Study 4 demonstrates the results of a cost-effectiveness study conducted on a CTC program in Zambia, where CTC was shown to be relatively cost-effective as compared to other health interventions addressing malnutrition.

Naturally, the monitoring and evaluation of such a program is important: providing the responsibility of treatment must be observed until understood by all parties, and adapted accordingly. Due to literacy levels of many Anganwadi workers, monitoring and evaluation style should be suited to the population, and regulated rigorously. Treatment of malnutrition cannot go unobserved.

**Case Study 4: Cost-Effectiveness of Community-Based Therapeutic Care for Children with SAM in Zambia**

Children under the age of five years with SAM in Africa and Asia have high mortality relates, and while primary care treatment of SAM has good outcomes, the cost-effectiveness of such treatment is still unknown. A study done in Lusaka, Zambia estimated the treatment and cost-effectiveness of community-based therapeutic care for children with SAM, as compared to no treatment. The study showed that the mean cost of community-based therapeutic care was $203 per child, which included the following breakdown of costs:

<table>
<thead>
<tr>
<th>Mean Costs of Community-Based Therapeutic Care per Child</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost Item</strong></td>
</tr>
<tr>
<td>Ready-to-use therapeutic food</td>
</tr>
<tr>
<td>Technical support</td>
</tr>
<tr>
<td>Hospital per day</td>
</tr>
<tr>
<td>Health centre visit</td>
</tr>
<tr>
<td>Community mobilization</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Additionally, the death rates within one year were 9.2 percent with community-based therapeutic care and 20.8 percent without treatment. The community-based therapeutic care was shown to be relatively cost-effective compared to other priority health care interventions.
CTC programs working to enhance the capacity of Anganwadi workers are essential to circumvent the transportation barriers faced by residents of MP. Many families are unable to reach NRCs due to the lack of public transportation and long distances faced. Treating malnutrition at home is absolutely essential, as many children have no other choice. Traditions must be both respected and understood by all courses of treatment, particularly those within the villages themselves. Through a respect and understanding for the actions of a community, programs can be better prepared to effectively offer alternative solutions and improve the transmission of educational information.

Prevention

Prevention of malnutrition is the only way to eliminate the disease from afflicting the world’s population. To effectively prevent malnutrition, the problem must be assessed and addressed at its roots. CTC and in-village educational programs are invaluable methods of prevention. Community involvement in understanding malnutrition is absolutely imperative to create effective and well-heeded programming. With the community actively working to develop courses of care, treatment and educational resources, the concept of nutrition will manifest itself in a deeper form, entrenching itself into the community’s value system. In so doing, the nutritional quality and capacity of locally available foods will be paramount in addressing the needs of a community. People will begin to understand how knowledge of food itself can prevent under nutrition, and RMF will have concrete knowledge of the food supply and needs of a particular area.

While we recognize that cases of complicated and uncomplicated SAM must be treated inpatient, we also recognize the difficulty families face in accessing treatment. In-village treatment, mobile clinics, and nutritional camps must be prepared to treat cases of malnutrition: this can reduce the number of cases requiring inpatient care, and eliminate the burden accessing medical care can be.

Complementary to the Anganwadi system and CTC program initiatives, is the value of “superstitious” medicine to a community. Complementary to the Anganwadi system and CTC program initiatives, is the value of “superstitious” medicine to a community.
Case Study 5 describes an intervention to treat SAM in Malawi through trainings and community-based interventions using pre-existing nutrition rehabilitation units, a country where food insecurity and malnutrition have run rampant for many years.

**CASE STUDY 5: TREATING SEVERE ACUTE MALNUTRITION IN MALAWI**

**Problem**

Malawi has had a long time problem with food insecurity and malnutrition, where about five percent of children under five years of age are malnourished. Growth monitoring programs identified malnutrition at the community level, and children with SAM were referred to nutritional rehabilitation units (NRUs). These units were often overcrowded and understaffed, resource-deficient and commonly used outdated protocols and showed high mortality rates of over 20 percent. NRUs had only a few staff members with no training in modern techniques of screening or treating malnutrition.

**Intervention**

In response to the food crisis, the Ministry of Health and Population upgraded the 115 NRUs across the country, with the goal of providing centre-based therapeutic treatment through existing NRUs and health centres to achieve coverage of the dispersed rural population in Malawi. Government workers received training on the treatment of SAM and outreach workers were trained to work at the community level. As part of their community-based activities, the workers learned how to use MUAC to screen and refer children to the nearest NRU or health centre. A message sheet in the local language was used by leaders to help explain signs of SAM to village leaders, enabling them to get involved with referring children at risk at the community level. Those referred to NRUs or health centres, were measured for weight, height and MUAC and examined for pedal oedema.

Children were admitted to the program based on screening criteria from the National Centre for Health Statistics. When the conditions of children improved and steadied for two consecutive weeks, they were discharged from the outpatient therapeutic program into a supplementary feeding program. Children were provided with RUTF to transition from F75 feeding, and had follow-up visits. Basic education messages focused on the mother and to promote the recovery of the child. They prioritized RUTF over blended flour or local foods and the continuation of breastfeeding when appropriate.

**Results**

Overall 74.2 percent of the children recovered, with a median time to recovery of 42 days. About seven percent of children died with a median time to death of 11 days.

**Considerations for RMF**

This study suggests that an integrated inpatient and outpatient program approach that adopts the principles of the CTC can improve the nutritional status of rural areas where prevalence of malnutrition is high.
By involving the community in the active prevention of malnutrition, at-home treatment methods, such as food supplements, can develop into natural and logical options for families. Families will understand the need for such at-home treatments, and will be more knowledgeable about protocol regarding the administration of treatment. This will also benefit migrant populations—educational materials developed for the use of at-home care treatments can be passed along to migrant workers; as the treatment method is meant for at-home use, migrant families can potentially take the supplies with them.

To maintain successful in-village programs, regulation and accountability of Anganwadi workers is imperative. Anganwadi workers should be expected to keep records, reach out to families in need and provide basic educational counseling. As the front-line health worker in the village, Anganwadi workers have the responsibility to prevent malnutrition to the best of their capacity. The monitoring and evaluation systems pertaining to both Anganwadi staff and the records they are to keep must be assessed for effectiveness and adjusted accordingly. Prevention is difficult when staff or faulty records overlook warning signs.

Despite the current government regulations prohibiting the use of RUTF in India, we recommend that alternatives be actively developed and used to treat malnutrition with a reduced or eliminated in-patient time. As Case Study 6 shows, blanket distribution of RUTF into a community can help prevent complicated SAM, and diminishes the cases of malnutrition, thereby decreasing the need for in-patient care.

CASE STUDY 6: A LARGE-SCALE DISTRIBUTION OF MILK-BASED FORTIFIED SPREADS: EVIDENCE FOR A NEW APPROACH IN REGIONS WITH HIGH BURDEN OF ACUTE MALNUTRITION

Niger has one of the highest under-five mortality rates in the world, at 198 per 1,000 live births. For children under the age of three, a new RUTF, an energy-dense, nutrient-enriched pasted made of milk powder, peanuts, oil and sugar with higher levels of vitamin and mineral fortification than F100 and Plumpy’nut, was developed as a diet supplement (Plumpy’doz). It was designed for consumption in smaller amounts as a supplement to the daily diet of breast milk and family foods.

A study was done to study this type of intervention in Niger. During this intervention, the MUAC was recorded, and overall the trends show that from 2002 to 2005, there was an increase in severe wasting each year. In 2007, during the period of distribution, the incidence of SAM remained at extremely low levels.

The study showed that the blanket distribution had a positive effect on malnutrition Niger. During each monthly distribution, children were screened for SAM and referred to therapeutic treatment if necessary. The study demonstrated the potential for reducing incidence of SAM in children six months to three years of age. The distribution of fortified spreads was associated with a reduction in the prevalence of SAM, as measured by the MUAC. Those who were part of the distribution could be admitted into therapeutic feeding programs with non-complicated malnutrition, and therefore, less likely to require hospitalization.
Nutritional Rehabilitation Centre: Public Private Partnership

RMF has the opportunity to operate a successful NRC, with the ability to pilot program ideas and improve service care. Table 5 summarizes potential next steps and the potential related impact area for the PPP-NRC. To enhance the operation of the PPP-NRC, a focus on quality improvement of pre-existing NRC protocol is highly recommended. Identification of malnutrition can be instructed to NRC staff and local community members utilizing the MUAC tool as well as revised charting methods. Educational programs should be developed with the goal of creating in-village camps and outreach programs, as well as local on-campus courses. Such programs should be created with a rigorous monitoring and evaluation component, so as to attain the maximum amount of informational absorption. Anganwadi workers under the NRCs jurisdiction can assist piloting programs and interventions RMF wishes to utilize on the broad spectrum. This will both improve the capacity of the Anganwadi workers and aid RMF to create the most effective programming. The use of supplementary food within the community and for migrant families can also be used through this NRC. Migrant families who are known to come back to the area can provide the most useful feedback on success of supplementary food distribution and mobile-education. Finally, the opportunity for Anganwadi workers and NRCs to be used as a day care for working parents should be explored and evaluated for both capacity and efficacy.

Table 5: Summary of Next Steps and Potential Impact Area for the PPP-NRC

<table>
<thead>
<tr>
<th>Suggested Intervention</th>
<th>Identification</th>
<th>Treatment</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational programs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Provision of supplementary food</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MUAC tools for NRC workers</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-village camps and outreach programs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Day care opportunities</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Training programs for local Anganwadi workers</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Conclusion

Based on the recommendations provided, it is our suggestion that RMF and its NGO partners continue to work in a complementary fashion with existing government programs. Programs and interventions should be developed to highlight and supplement the existing programs of both the MOWCD and the MOHFW in the areas of identification, treatment and prevention. Based on the data collected in Madhya Pradesh, the protocol and basic functions of the NRC and Anganwadi system serve as an appropriate framework for partner-based collaboration. Organizations can be most effective if they are able to utilize resources to enhance the existing networks of MOWCD and MOHFW and, through collaborative efforts, support any areas weakened by the overwhelming burden of malnutrition in the area. Table 6 summarizes the possible interventions and potential impact area of RMF’s work in Madhya Pradesh.
**Table 6: Summary of Next Steps and Potential Impact Area For RMF to Consider**

<table>
<thead>
<tr>
<th>Suggested Intervention</th>
<th>Potential Impact Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community-based therapeutic care</td>
<td>✓</td>
</tr>
<tr>
<td>In-village educational camps</td>
<td>✓</td>
</tr>
<tr>
<td>Communication processes between Anganwadi workers and NRCs</td>
<td>✓</td>
</tr>
<tr>
<td>Training for Anganwadi workers focused on treatment, not just referrals</td>
<td>✓</td>
</tr>
<tr>
<td>Improvement of quality and availability of local food</td>
<td>✓</td>
</tr>
<tr>
<td>MUAC tools for Anganwadi workers</td>
<td>✓</td>
</tr>
<tr>
<td>Health worker adherence to charting growth, weight and height for children</td>
<td>✓</td>
</tr>
<tr>
<td>Transportation to and from NRCs</td>
<td>✓</td>
</tr>
<tr>
<td>At-home treatment methods (e.g., RUTF)</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Uptake of services by parents</td>
<td>✓</td>
</tr>
<tr>
<td>Mobile clinic for the Anganwadi system to reach remote areas</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Regulation and accountability of Anganwadi workers</td>
<td>✓</td>
</tr>
<tr>
<td>Awareness of proper nutrition</td>
<td>✓</td>
</tr>
<tr>
<td>Comprehensive study to provide a better understanding of “superstitious” medicine</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Interventions targeting migration patterns, including provision of supplementary food</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Initiatives using information technology to improve quality of identification and treatment of NRCs</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Monitoring and evaluation</td>
<td>✓ ✓ ✓</td>
</tr>
</tbody>
</table>
References

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xx Internal RMF documents

Sadler, Kate, “Community-Based Therapeutic Care: Treating Severe Acute Malnutrition in Sub-Saharan Africa,” Centre for International Health & Development.


Sadler, Kate, “Community-Based Therapeutic Care: Treating Severe Acute Malnutrition in Sub-Saharan Africa,” Centre for International Health & Development.

Appendix
Appendix A

Figure 1: The Proportion of Underweight Children Five Years and Under

![Graph showing the proportion of underweight children five years and under across different states in India.](image-url)
**Figure 2: Under-Five Mortality Rate (Deaths Per Hundred)**

![Bar chart showing under-five mortality rate across different states in India.](image-url)
FIGURE 3: PREVALENCE OF CALORIE UNDER-NOURISHMENT\textsuperscript{iii}
Appendix B: Field Visit Survey Interview Questions (Hindi and English Translations)

1. कुपोषण क्या है?
   What is malnutrition?

2. तुम्हारे आर्य में कितने % बच्चों को कुपोषण है?
   What percentage of your community is affected by malnutrition?

3. क्या तुम्हारे आर्य में लोगों को कुपोषण के बारे में जानकारी से?
   Do people in your district have a good understanding of malnutrition?

4. कुपोषण को हटाने के सबसे बेहतर तरीका क्या है अप्पके हिसाब से?
   What do you think is the most effective way to prevent malnutrition?

5. यहाँ पर कितने समय तक बच्चे मान का दूध पिटे है?
   How long do women breastfeed children?

6. कुपोषण बच्चों का इलाज कैसे करते हैं?
   What is the treatment protocol for malnourished children?

7. आप कैसे जानते हैं की वह बच्चा कुपोषित है किसको देखर?
   Why is a child diagnosed with malnutrition?

8. आप कौनसे program में काम करते हैं? वहां पे सबसे सफल program क्या है?
   What is the most effective part of the malnutrition program you are working with? What works?
9. और कैसे program असफल हैं?
   What part of the program doesn’t work?

10. यहाँ पर किस चीज़ की कमी है? इस जगह को बढ़ाएं कैसे किया जा सकता है? पैसे लोग?
    What program areas require more resources, i.e., funding, facilities, staff?

11. क्या कुपोषण हटाना जरूरी है? क्या कुपोषण रोका जा सकता है?
    Is it possible to prevent malnutrition? How important is it?

12. कुपोषण से बचने का सबसे बेहतर तरीका क्या है?
    What is the best way to prevent malnutrition?

13. ऐसे कॉन्स चीज़ या program है जो की नहीं चलता?
    What does not help or prevent malnutrition?

14. बहुत ज्यादा कुपोषित बच्चे को आप कैसे treat करते हैं?
    How do you treat “severe acute malnutrition”?

15. कम कुपोषित बच्चे यान Stage Two मिडल बच्चे का इलाज आप कैसे करते हैं?
    How do you treat “moderate acute malnutrition”?

16. कुपोषण program यान treatment को हम बेहतर कैसे बना सकते हैं?
    How can we improve treatment of malnutrition?

17. क्या आपने देखा है की कोई बच्चा यहाँ से 14 देर रहकर फिर वापस आ जाता है? और कितने समय में?
    Do you see recurring cases of malnutrition?
18. क्या यहाँ कोई follow-up यान record रखते हैं?
   What do you do to follow up with cases of malnutrition?

19. PDS system चलता है क्या?
   How effective is the public distribution system?
### Appendix C: Baseline Survey

#### Basic Information

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Father</td>
<td></td>
</tr>
<tr>
<td>Name of Mother</td>
<td></td>
</tr>
<tr>
<td>Does family have BPL?</td>
<td>Y/N</td>
</tr>
<tr>
<td>Does the family have a PDS ration card?</td>
<td>Y/N</td>
</tr>
<tr>
<td>Number of children in family</td>
<td></td>
</tr>
<tr>
<td>Village:</td>
<td></td>
</tr>
</tbody>
</table>

#### Anganwadi-NRC

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your child go to an Anganwadi?</td>
<td>Y/N</td>
</tr>
<tr>
<td>Have you heard of the NRC?</td>
<td>Y/N</td>
</tr>
<tr>
<td>Have you been referred to an NRC?</td>
<td>Y/N</td>
</tr>
<tr>
<td>If yes, did you go and stay the full 14 days?</td>
<td>Y/N</td>
</tr>
<tr>
<td>Have you had a camp, or group of people, come to speak to your village about nutrition?</td>
<td>Y/N</td>
</tr>
<tr>
<td>If yes, did they give helpful information?</td>
<td>Y/N</td>
</tr>
<tr>
<td>If no, would you want to have a group of people come speak about nutrition?</td>
<td>Y/N</td>
</tr>
<tr>
<td>Nutrition-Based Assessment</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td></td>
</tr>
<tr>
<td>Do you have enough food for the year?</td>
<td>Y/N</td>
</tr>
<tr>
<td>What kind of food do you store?</td>
<td></td>
</tr>
<tr>
<td>A. Pulses</td>
<td></td>
</tr>
<tr>
<td>B. Grains</td>
<td></td>
</tr>
<tr>
<td>C. Fruits &amp; vegetables</td>
<td></td>
</tr>
<tr>
<td>D. Other</td>
<td></td>
</tr>
<tr>
<td>Do your children eat when you are working?</td>
<td></td>
</tr>
<tr>
<td>If yes, who feeds them?</td>
<td></td>
</tr>
<tr>
<td>If no, do you come home in the middle of the day?</td>
<td></td>
</tr>
<tr>
<td>Seasonal migration</td>
<td>Y/N</td>
</tr>
<tr>
<td>If yes to seasonal migration, then:</td>
<td></td>
</tr>
<tr>
<td>Where?</td>
<td></td>
</tr>
<tr>
<td>Which months?</td>
<td></td>
</tr>
<tr>
<td>Members of household who migrate:</td>
<td></td>
</tr>
<tr>
<td>A. Whole family</td>
<td></td>
</tr>
<tr>
<td>B. Just father</td>
<td></td>
</tr>
<tr>
<td>C. Older siblings</td>
<td></td>
</tr>
<tr>
<td>D. Other</td>
<td></td>
</tr>
<tr>
<td>Do you carry food with you when you migrate?</td>
<td>Y/N</td>
</tr>
<tr>
<td>A. Pulses</td>
<td></td>
</tr>
<tr>
<td>B. Grains</td>
<td></td>
</tr>
<tr>
<td>C. Fruits &amp; vegetables</td>
<td></td>
</tr>
<tr>
<td>D. Other</td>
<td></td>
</tr>
<tr>
<td>Do you get food at the place you will work?</td>
<td>Y/N</td>
</tr>
<tr>
<td>Do you have enough room to carry extra food (RUTF or supplement) specifically for your children?</td>
<td>Y/N</td>
</tr>
</tbody>
</table>
### Appendix D: January 2010 Field Visit Interview Responses by Anganwadi Workers and NRC Workers

<table>
<thead>
<tr>
<th>Anganwadi Workers</th>
<th>NRC</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What is malnutrition?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Weakness</td>
<td>• Low weight</td>
<td>• The two groups have very similar diagnosis and definitions of malnutrition</td>
</tr>
<tr>
<td>• Susceptibility to fevers and other illnesses (typhoid, fever, diarrhea)</td>
<td>• Low hemoglobin</td>
<td>• The only difference was that one Anganwadi worker described malnutrition as a virus (not sure if this was described as ‘similar to’ or actually ‘caused by’ a virus</td>
</tr>
<tr>
<td>• Distended stomach and other swelled body parts</td>
<td>• Swelling</td>
<td></td>
</tr>
<tr>
<td>• Low weight/height</td>
<td>• Weakness</td>
<td></td>
</tr>
<tr>
<td>• Caused by a virus</td>
<td>• Low ratios: weight/height, weight/age</td>
<td></td>
</tr>
<tr>
<td>• Change in hair color</td>
<td>• Lack of nutrition (despite food consumption)</td>
<td></td>
</tr>
<tr>
<td>• Lack of nutritious food</td>
<td>• Changes in color and dryness of skin, hair, lips, eyes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>What percentage of your community (your village) is affected by malnutrition?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Anywhere from 0% to 5% malnutrition rate for children</td>
<td>• Anywhere between 40% to 65%</td>
<td>• Although Anganwadi workers report a low incidence of malnutrition, need to consider what percentage of malnourished children is actually going to see them</td>
</tr>
<tr>
<td>• Not a lot of malnourished children</td>
<td>• Higher prevalence in the tribal populations</td>
<td>• Some parents might not seek help if they do not think something is wrong</td>
</tr>
<tr>
<td>• If there was a malnourished child, he/she was treated and got better (mostly by going to the NRC)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Do people in your district have a good understanding of malnutrition?

<table>
<thead>
<tr>
<th>Anganwadi Workers</th>
<th>NRC</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>People understand malnutrition (learn about it when they go to NRCs or Anganwadi workers for other services like vaccinations)</td>
<td>People do not have much of an understanding of malnutrition</td>
<td>There is a large difference between NRCs and Anganwadi workers for this question. Anganwadi workers report that most people understand what malnutrition is, as compared to NRCs who say people do not understand</td>
</tr>
<tr>
<td>In Ban, they know about malnutrition, but do not understand it. Often, they do not follow instructions of Anganwadi workers</td>
<td>Nutrition knowledge is obtained primarily through Anganwadi workers</td>
<td>Anganwadi workers report people in Ban know, but do not understand or follow directions</td>
</tr>
<tr>
<td>People do not have much of an understanding of malnutrition</td>
<td>People do not go for treatment, instead go to temples to pray</td>
<td>NRCs report that people seek religious help</td>
</tr>
</tbody>
</table>

### What do you think is the most effective way to prevent malnutrition?

<table>
<thead>
<tr>
<th></th>
<th>Anganwadi Workers</th>
<th>NRC</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educate mothers on SAM, and send to hospital if necessary</td>
<td>Education and communication with mothers, including literacy, proper diet and easy recipes</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Supplementary foods</td>
<td>Getting vaccinations on time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaccinations</td>
<td>Supplementary feeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutritious foods provided at the Anganwadi</td>
<td>Proper breastfeeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide medicines</td>
<td>Higher household incomes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Send to NRC if situation persists</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anganwadi Workers</td>
<td>NRC</td>
<td>Comparison</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>-----</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td><strong>How long do women breastfeed children?</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Approximately six months (with supplementary foods) to two to three years (without supplementary foods)</td>
<td>• Approximately six months (with supplementary foods) to about two years</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>What is the treatment protocol for malnourished children? How do you treat a malnourished child?</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Some provide more service than others (weigh child/give home-take/educate mothers), but the general consensus is to refer to NRC</td>
<td>• Follow protocol as given by UNICEF or ICDS</td>
<td>• Anganwadi workers consistently cite NRC referral</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Some do not mention F100 (essential…)</td>
<td>• Anganwadi workers also claim to provide education for the parents more-so than the NRCs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Diet and appetite test common</td>
<td>• NRCs (and Anganwadi workers) that only use weight-based measures of malnutrition, and those that use MUAC also</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Some do not mention MUAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Why is a child diagnosed with malnutrition? Why do people come into the Anganwadi?</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• If child looks ill (vomit, diarrhea, etc)</td>
<td>• Anemia</td>
<td>• Children rarely go in for treatment for “malnutrition” but for other illnesses</td>
<td></td>
</tr>
<tr>
<td>• If child looks malnourished</td>
<td>• Swollen limbs</td>
<td>• Some Anganwadi workers act more as a daycare centre</td>
<td></td>
</tr>
<tr>
<td>• To eat and play</td>
<td>• Other illnesses</td>
<td>• No one goes to NRCs for food or for playing</td>
<td></td>
</tr>
</tbody>
</table>
| • Migrants/post-migration malnourishment | • Anganwadi workers’ referrals | | }

---

**Anganwadi Workers**

- If child looks ill (vomit, diarrhea, etc)
- If child looks malnourished
- To eat and play
- Migrants/post-migration malnourishment
- Food
- Weigh child if child looks ill to gauge for malnutrition

**NRC**

- Follow protocol as given by UNICEF or ICDS
- Some do not mention F100 (essential…)
- Diet and appetite test common
- Some do not mention MUAC

**Comparison**

- Anganwadi workers consistently cite NRC referral
- Anganwadi workers also claim to provide education for the parents more-so than the NRCs
- NRCs (and Anganwadi workers) that only use weight-based measures of malnutrition, and those that use MUAC also
- Children rarely go in for treatment for “malnutrition” but for other illnesses
- Some Anganwadi workers act more as a daycare centre
- No one goes to NRCs for food or for playing
### Anganwadi Workers

What is the most effective part of the malnutrition program you are working with? What works? What part of the program doesn’t work?

- Some believe home-take is most effective, some believe it’s the most ineffective
- Some believe mothers need to be educated, others don’t think it works at all
- Referral to NRC is best option, but many mothers will not go
- Some complain of workload
- Reasons for not going to NRC: superstition & cannot stay 14 days

### NRC

- Follow up doesn’t work too well
- Need more home-visits
- Parents can’t stay full 14 days
- Counseling is important, especially in the field
- Treatment protocol is good

### Comparison

- People don’t go to NRCs for full course
- Some—counseling of mothers
- Efficacy of counseling/importance of field-level counseling
- Anganwadi workers Complain about workload.
- NRC follow up mentioned and is an issue

### What program areas require more resources? (i.e., funding, facilities, staff)

<table>
<thead>
<tr>
<th>Anganwadi Workers</th>
<th>NRC</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings</td>
<td>Clothing</td>
<td>Facilities, transportation, and regularity of government provided supplies are necessary resources for all</td>
</tr>
<tr>
<td>Transportation</td>
<td>Staff</td>
<td>Anganwadi workers emphasize water and educational programs for families</td>
</tr>
<tr>
<td>Water</td>
<td>Better facilities</td>
<td></td>
</tr>
<tr>
<td>Proper nutrients</td>
<td>Regular supply of essential medicines</td>
<td></td>
</tr>
<tr>
<td>Toys &amp; desks</td>
<td>Transportation</td>
<td></td>
</tr>
<tr>
<td>Mattresses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food does not come properly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational programs about hygiene</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anganwadi Workers</td>
<td>NRC</td>
<td>Comparison</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----</td>
<td>------------</td>
</tr>
<tr>
<td><strong>What are ways to improve health in the home?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Educational programs on hygiene</td>
<td>• Cooking instructions (easy)</td>
<td>• Important things that can be done in the homes: cooking instructions, awareness of what is good/nutritious for children, and education on hygiene</td>
</tr>
<tr>
<td>• Give good, nutritious, food to families</td>
<td>• Education on hygiene</td>
<td>• NRCs spoke of superstitious medicine (not Anganwadi workers)</td>
</tr>
<tr>
<td>• Cooking instructions</td>
<td>• Play centres at Anganwadi workers</td>
<td></td>
</tr>
<tr>
<td>• Referrals to the NRC</td>
<td>• Education on danger of “superstitious” medicine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Good, nutritious, food awareness</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Is it possible to prevent malnutrition? How important is it?</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• It is important; showing the women how to cook</td>
<td>• It is possible but feeding habits is not good in big families. Breastfeed without supplements</td>
<td>• Both groups agree that counseling of mothers and encouraging better breastfeeding practices can will prevent malnutrition</td>
</tr>
<tr>
<td>• Cleaning and education programs</td>
<td>• Yes it is but feed habits are poor. Breastfeed without supplements</td>
<td></td>
</tr>
<tr>
<td>• Follow the guidelines, treatment and medication</td>
<td>• Village level workers do not know about malnutrition</td>
<td></td>
</tr>
<tr>
<td>• People do not support the program, superstitious reasons</td>
<td>• Village workers do no know about malnutrition</td>
<td></td>
</tr>
<tr>
<td>• Feed child Khichiri and home-take</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• No present cases of malnutrition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Yes, by weighing properly and send to NRC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Yes it is important, refer to NRC and check up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Yes, train mothers and encourage pregnancy gaps</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### What is the best way to prevent malnutrition? What does not help/work to prevent malnutrition?

<table>
<thead>
<tr>
<th>Anganwadi Workers</th>
<th>NRC</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Correct guidance to mothers</td>
<td>• Unwilling of parents to stay for 14 days</td>
<td>• NRC’s are unwilling to comment on the effectiveness because of political reasons while Anganwadi worker’s responses indicate that the system is not effective.</td>
</tr>
<tr>
<td>• Give maximum attention to child</td>
<td>• Counseling for mothers</td>
<td></td>
</tr>
<tr>
<td>• Give proper food and hygiene</td>
<td>• Superstition</td>
<td></td>
</tr>
<tr>
<td>• Encourage intervals during pregnancy</td>
<td>• Poor breastfeeding practices</td>
<td></td>
</tr>
<tr>
<td>• Medicine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Functional Anganwadi centres</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Parents do no remain for 14 days</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### How effective is the Public Distribution System (PDS)?

<table>
<thead>
<tr>
<th>Anganwadi Workers</th>
<th>NRC</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Not effective</td>
<td>• Unwilling to comment</td>
<td>• It appears that Anganwadi workers are not very knowledgeable about supplements</td>
</tr>
<tr>
<td>• No consistency in food</td>
<td>• Lots of corruption</td>
<td></td>
</tr>
<tr>
<td>• Only get 50% of allotment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Only for people with BPL card</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Not regular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Yes it works properly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Only works for people who have the BPL card</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Anganwadi Workers

**Do you do any of the following?** Supplementary feeding programs, Micronutrients, Ready to use therapeutic foods (RUTF), Spirulina, Probiotic, Food fortification, In-home intervention, Educational programs, Maternal health, Breastfeeding counseling, Nutritional counseling, Behavior change, Sanitation, Community-based care, Oral rehydration salts (ORS)

- No answer from Anganwadi workers

### NRC

- Micronutrients
- Oral rehydration salts
- F75/F100
- Intervention Programs
- Sanitation
- ReSoMal

### Comparison

N/A

### How do you treat severe acute malnutrition?

- Properly administer food and milk
- Refer to NRC
- Give medicine
- Give mother information on nutrition

- Weight-to-height criteria
- MUAC
- WHO treatment standards
- 14-day inpatient care
- Refer to better equipped NRC Indore

- Answers are quite different
- NRC workers take malnourished children to the NRC and follow the guidelines of UNICEF, but not all
- Anganwadi workers firstly provide children food and special care
## How do you treat moderate acute malnutrition?

<table>
<thead>
<tr>
<th>Anganwadi Workers</th>
<th>NRC</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>• First child is malnourished: tell them to feed the children well</td>
<td>• The child is kept for 14 days and is given zinc, iron F75/ F100 and other absent nutrients.</td>
<td>• Two groups share the measurement of weight and height.</td>
</tr>
<tr>
<td>• Give local food with local methods (khichiri, wheat, oats, daal)</td>
<td>• Giving proper care (per UNICEF guidelines) F75/ F100</td>
<td>• NRCs are using MUAC, oedema</td>
</tr>
<tr>
<td>• Give food to be made in house and send to hospital if necessary</td>
<td>• Borderline after a few days: keep admitted and monitor</td>
<td>• Also they take the complicated malnourished children from the patients having another illness such as pneumonia, fever, diarrhea, low HB</td>
</tr>
<tr>
<td>• Poor people don’t have money or time to go to the hospital: food needs to be available</td>
<td>• Admit at this NRC, and feed them what is available</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Use UNICEF criteria, feed, give micronutrients (zinc, folic acid, magnesium, syrup and calcium)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Counsel mothers on importance of good nutrition and sanitation. Make homes visits to continue counseling.</td>
<td></td>
</tr>
</tbody>
</table>

## How do you determine if the child is malnourished?

<table>
<thead>
<tr>
<th>Anganwadi Workers</th>
<th>NRC</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Check weight-to-height</td>
<td>• Check weight-to-height</td>
<td>• Difference: NRC emphasizes training of Anganwadi workers and villagers about nourishment. Proper pregnancy and check-up is important</td>
</tr>
<tr>
<td>• Examine for other symptoms</td>
<td>• MUAC</td>
<td>• Similarities: They all said improvement of facilities is also important</td>
</tr>
<tr>
<td></td>
<td>• Oedema</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If coming into the NRC w/o a referral, the children generally have another illness such as pneumonia, fever, diarrhea, low HB</td>
<td></td>
</tr>
</tbody>
</table>
## How can we improve treatment of malnutrition? What are your ideas to improve treatment of malnutrition?

<table>
<thead>
<tr>
<th>Anganwadi Workers</th>
<th>NRC</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>We have to give more information to the mother, father, and family about health and hygiene</td>
<td>Proper pregnancy and check-up</td>
<td>• Anganwadi centre data and NRC data are different with the village</td>
</tr>
<tr>
<td>Awareness of the proper care must be given</td>
<td>Children need antibiotics, de-worming and need to be seen by pediatricians</td>
<td></td>
</tr>
<tr>
<td>Scale/measurement of the child should be improved</td>
<td>Pictures and posters should be put in the village areas to demonstrate proper habits for families that are not literate</td>
<td></td>
</tr>
<tr>
<td>Monitoring must be conducted to children that are in 1st or 2nd grade of weight to age</td>
<td>Anganwadi training is very important</td>
<td></td>
</tr>
<tr>
<td>There are many facilities that need to work properly: PDS, vaccination, etc.</td>
<td>Children do not have clothes</td>
<td></td>
</tr>
<tr>
<td>The Anganwadi has no place to keep proper records or store food: the Anganwadi is dirty and oftentimes rats get into her supplies</td>
<td>More milk powder (and other supplementary foods) for children at home</td>
<td></td>
</tr>
<tr>
<td>The government does not assist the Anganwadi workers in cleaning or performing tasks: the building needs maintenance and the children don’t even want to sit there</td>
<td>Need a generator</td>
<td></td>
</tr>
<tr>
<td>It is not possible in the village. Disease-send them to hospital in Thandla CHC (or CSC)</td>
<td>Counseling of mother</td>
<td></td>
</tr>
<tr>
<td>• Prevention of early marriages and multiple pregnancies</td>
<td>• NRCs have to use the medicines that are given to them by the government, but the quality of these medicines is poor. NRCs need more higher quality medicines</td>
<td></td>
</tr>
<tr>
<td>• Provide pictures, photos to explain easily malnutrition to villagers</td>
<td>• Bring villagers to NRC and show the centre for them and explain what they are doing</td>
<td></td>
</tr>
<tr>
<td>• Train Anganwadi workers</td>
<td>• Provide pictures, photos to explain easily malnutrition to villagers</td>
<td></td>
</tr>
</tbody>
</table>
### Anganwadi Workers vs. NRC: Comparison on Malnutrition Management

<table>
<thead>
<tr>
<th><strong>Do you see reoccurring cases of malnutrition?</strong></th>
<th><strong>NRC</strong></th>
<th><strong>Comparison</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Numeric numbers in different Anganwadi village</td>
<td>• Numeric numbers in different Anganwadi village</td>
<td>• Anganwadi workers stick to recording system, which keep track of weights of every child in the village</td>
</tr>
<tr>
<td>• Normally two children for last 6 months</td>
<td>• Normally, 10 to 15 percent of reoccurring cases</td>
<td>• NRC workers talk about four-time follow-ups after they release the malnourished children every 15 days</td>
</tr>
<tr>
<td>• No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>What do you do to follow up with cases of malnutrition? Do you follow up with children that have been treated or referred?</strong></th>
<th><strong>NRC</strong></th>
<th><strong>Comparison</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Recording system (New System)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>• &quot;Now there is a new documentation system. Guidelines to weigh children in the villages, and record. In the next months, we’ll follow the new guidelines, but there is no place to keep the records.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• List the children in the village and every record is sent to their supervisors. They don’t give any record and data back to Anganwadi.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix E: Evidence Review of Village Health Committees from the Vistaar Project

In March 2008, the USAID funded the Vistaar Project, which facilitated an evidence review of the efficacy of Village Health Committees (VHCs). See below for more information regarding the interventions, agencies and initiatives of this project.

<table>
<thead>
<tr>
<th>Intervention Name</th>
<th>Leading Agency</th>
<th>Focus Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community-Led Initiatives for Child Survival (CLICS)</td>
<td>Led by the Department of Community Medicine, Mahatma Gandhi Institute of Medical Sciences</td>
<td>Fostering partnerships between “Village Coordination Committees” and the Dept. of Community Medicine, using a social franchising model in Wardha, Maharashtra</td>
</tr>
<tr>
<td>Improving Community Participation in Decentralized Planning of RCH services</td>
<td>Led by the Foundation for Research in Health System and Dept. of Health &amp; Family Welfare (Government of Karnataka)</td>
<td>Supporting community involvement and decentralized planning in Mysore, Karnataka</td>
</tr>
<tr>
<td>Integrated Village Planning Model</td>
<td>Led by the Government of Uttar Pradesh and UNICEF</td>
<td>Establishing mechanisms to foster collaboration between the community and Government service providers in Lalitpur, Uttar Pradesh</td>
</tr>
<tr>
<td>Communitization of Grassroot Health Services</td>
<td>Led by the Government of Nagaland</td>
<td>Supporting and promoting community ownership of public resources and assets and decentralizing authority over service delivery in Nagaland</td>
</tr>
<tr>
<td>Community Mobilization for Improving Mother and Child Health through Life Cycle Approach</td>
<td>Led by the Child in Need Institute (CINI) and Government of Jharkhand</td>
<td>Promoting community level social mobilization networks in Ranchi, Hazaribagh and Gumla districts of Jharkhand</td>
</tr>
<tr>
<td>“Swajal” Project (Village Water and Sanitation Committee component)</td>
<td>Led by the Government of Uttar Pradesh, Government of Uttarakhand and World Bank</td>
<td>Supporting demand driven community participation in seven districts of Uttar Pradesh and 12 districts of Uttarakhand</td>
</tr>
<tr>
<td>Community Health Activist (Mitanin) Program</td>
<td>Led by the Government of Chhattisgarh</td>
<td>Introducing and supporting a cadre of village health activists to increase demand for health services and improve health service delivery in Chhattisgarh</td>
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</table>
Appendix References

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Catalog: Programs Addressing Child Malnutrition

The following document contains the abstracts and sources of key global projects addressing child malnutrition. The regions of focus of this research are the continents of Africa and Asia. Best practices cited fall under categories such as community-based therapeutic care, education, supplementary feeding and policy reform.

**COMMUNITY-BASED THERAPEUTIC CARE**

“Management of Severe Acute Malnutrition in Children”

“Cost effectiveness of community-based therapeutic care for children with severe acute malnutrition in Zambia: decision tree model”

“Understanding Child Malnutrition in the Sahel: A Case Study from Goundam Cercle, Timbuktu Region, Mali”

“Effectiveness of a Community-Based Intervention to Improve Nutrition in Young Children in Senegal: A Difference in Difference Analysis”

“Community-Based Therapeutic: Treating Severe Acute Malnutrition in Sub-Saharan Africa”

“Integrating health interventions for women, newborn babies, and children: a framework for action”

“What works? A review of the efficacy and effectiveness of nutrition interventions”

“Community-based nutrition education for improving infant growth in rural Karnataka – does it work?”

“Linking Community-based Programs and Service Delivery for Improving Maternal and Child Nutrition”

“Combating malnutrition in India through community efforts”

“Malnutrition Is Still a Major Contributor to Child Deaths”

"Impact of supplementing newborn infants with vitamin A on early infant mortality: community based randomised trial in southern India"

"Role of Village Health Committees in Improving Health and Nutrition Outcomes: A Review of Evidence from India."

**EDUCATION**

“Maternal and Child Nutrition in Sub-Saharan Africa: Challenges and Interventions”

“FAO Food and Nutrition Papers -The double burden of malnutrition Case studies from six developing countries (The double burden of malnutrition in India)”

“Efficacy of Nutrition Counseling on the Knowledge, Attitude and Practices of Working Women Kamla-Raj”

“Efficacy of nutrition counseling of punjabi rural mothers on the anthropometry and hematological profile of their pre-school children.”
## Education (Continued)

“Community-based nutrition education for improving infant growth in rural Karnataka – does it work?”


“National Institute of Nutrition Indian Council of Medical Research Community based training in nutrition for health Professionals”


“India’s Tamil Nadu Nutrition Program: Lessons and issues in management and capacity”

“Should any nutritional counseling, supplementation or diet restriction be used during pregnancy?”

“Women’s Education Can Improve Child Nutrition in India”

## Supplementary Feeding

“Probiotics and Prebiotics for Severe Acute Malnutrition (PRONUT study): A Double-Blind Efficacy Randomised Controlled Trial in Malawi”

“A Supply Chain Analysis of Ready-to-Use Therapeutic Foods for the Horn of Africa: The Nutrition Articulation Project”

“Improved Appetite After Multi-Micronutrient Supplementation for Six Months in HIV-Infected South African Children”

“Malawian Mothers’ Attitudes Towards the Use of Supplementary Foods for Moderately Malnourished Children”

“Effects of Multivitamin-Multimineral Supplementation on Appetite of Stunted Young Beninese Children”

“Supplementary feeding with either ready-to-use fortified spread or corn-soy blend in wasted adults starting antiretroviral therapy in Malawi: randomised, investigator blinded, controlled trial”

“A Large-Scale Distribution of Milk-Based Fortified Spreads: Evidence for a new Approach in Regions with High Buren of Acute Malnutrition”

“Ready-to-Use Therapeutic Food for the Prevention of Wasting in Children”

“The Peanut Butter Debate”

“Mortality Risk Among Children Admitted in a Large-Scale Nutritional Program in Niger, 2006”

“Ready to Use Therapeutic Food (RUTF) in the Management of Severe Acute Malnutrition in India”

“Africa: Fortified Flour & Chewing Gum – New Approaches to Malnutrition”

“Improving Child Nutrition? The Integrated Child Development Services in India”

"Effectiveness of Weekly Supplementation of Iron to Control Anaemia Among Adolescent Girls of Nashik, Maharashtra, India"
**SUPPLEMENTARY FEEDING (CONTINUED)**

<table>
<thead>
<tr>
<th>Title</th>
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<tbody>
<tr>
<td>&quot;Relative importance of micronutrient deficiencies in iron deficiency anemia&quot;</td>
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<tr>
<td>&quot;Maternal and child undernutrition&quot;</td>
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<tr>
<td>&quot;Multi-micronutrient Supplementation for Undernourished Pregnant Women and the Birth Size of Their Offspring&quot;</td>
</tr>
<tr>
<td>&quot;Effects of fortified milk on morbidity in young children in north India: community-based, randomised, double masked placebo controlled trial&quot;</td>
</tr>
<tr>
<td>&quot;Substantial Reduction in Severe Diarrheal Morbidity by Daily Zinc Supplementation in Young North Indian Children&quot;</td>
</tr>
<tr>
<td>&quot;Low dose &quot;Sprinkles&quot;-An innovative Approach to Treat Iron Deficiency Anemia in infants and Young Children&quot;</td>
</tr>
<tr>
<td>&quot;Nutrition Rehabilitation of the HIV-Infected and Negative Undernourished Children Utilizing Spiruline&quot;</td>
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<tr>
<td>&quot;Short-Term Effect of Oil Supplementation of complementary Food on Total Ad Libitum Consumption in 6-to 10-month-old Breastfed Indian Infants&quot;</td>
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</table>

**INTERNATIONAL GUIDELINES**

<table>
<thead>
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<tr>
<td>“WHO Guidelines for Management of Severe Malnutrition in Rural South African Hospitals: Effect on Case Fatality and the Influence of Operational Factors”</td>
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**ADDITIONAL**

<table>
<thead>
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<tr>
<td>“Malnutrition Among Women In Sub-Saharan Africa: Rural-Urban Disparity”</td>
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<tr>
<td>“Guatemala’s Malnutrition Crisis”</td>
</tr>
<tr>
<td>“Fighting Fe Deficiency Malnutrition in West Africa: An Interdisciplinary Programme on a Food Chain Approach”</td>
</tr>
<tr>
<td>“AIDS, Drought and Child Malnutrition in Southern Africa”</td>
</tr>
<tr>
<td>“Inequities in Under-Five Child Malnutrition in South Africa”</td>
</tr>
<tr>
<td>“Implementing an Integrated Package of Nutrition and Health Interventions”</td>
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<tr>
<td>&quot;Small-Scale Production and Marketing of Spirulina&quot;</td>
</tr>
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</table>
COMMUNITY-BASED THERAPEUTIC CARE (CTC)

1. “Management of Severe Acute Malnutrition in Children”

Severe acute malnutrition (SAM) is defined as a weight-for-height measurement of 70% or less below the median, or three SD or more below the mean National Centre for Health Statistics reference values, the presence of bilateral pitting oedema of nutritional origin, or a mid-upper-arm circumference of less than 110 mm in children age 1–5 years. 13 million children under age 5 years have SAM, and the disorder is associated with 1 million to 2 million preventable child deaths each year. Despite this global importance, child-survival programmes have ignored SAM, and WHO does not recognise the term “acute malnutrition”. Inpatient treatment is resource intensive and requires many skilled and motivated staff. Where SAM is common, the number of cases exceeds available inpatient capacity, which limits the effect of treatment; case-fatality rates are 20–30% and coverage is commonly under 10%. Programmes of community-based therapeutic care substantially reduce case-fatality rates and increase coverage rates. These programmes use new, ready-to-use, therapeutic foods and are designed to increase access to services, reduce opportunity costs, encourage early presentation and compliance, and thereby increase coverage and recovery rates. In community-based therapeutic care, all patients with SAM without complications are treated as outpatients. This approach promises to be a successful and cost-effective treatment strategy.


Children aged under five years with severe acute malnutrition (SAM) in Africa and Asia have high mortality rates without effective treatment. Primary care-based treatment of SAM can have good outcomes but its cost effectiveness is largely unknown. This study estimated the cost effectiveness of community-based therapeutic care (CTC) for children with severe acute malnutrition in government primary health care centres in Lusaka, Zambia, compared to no care. A decision tree model compared the costs (in year 2008 international dollars) and outcomes of CTC to a hypothetical ‘do-nothing’ alternative. The primary outcomes were mortality within one year, and disability adjusted life years (DALYs) after surviving one year. Outcomes and health service costs of CTC were obtained from the CTC programme, local health services and World Health Organization (WHO) estimates of unit costs. Outcomes of doing nothing were estimated from published African cohort studies. Probabilistic and deterministic sensitivity analyses were done. The mean cost of CTC per child was $203 (95% confidence interval (CI) $139–$274), of which ready to use therapeutic food (RUTF) cost 36%, health centre visits cost 13%, hospital admissions cost 17% and technical support while establishing the programme cost 34%. Expected death rates within one year of presentation were 9.2% with CTC and 20.8% with no treatment (risk difference 11.5% (95% CI 0.4–23.0%)). CTC cost $1760 (95% CI $592–$10142) per life saved and $ 53 (95% CI $18–$306) per DALY
gained. CTC was at least 80% likely to be cost effective if society was willing to pay at least $88 per DALY gained. Analyses were most sensitive to assumptions about mortality rates with no treatment, weeks of CTC per child and costs of purchasing RUTF. CTC is relatively cost effective compared to other priority health care interventions in developing countries, for a wide range of assumptions.


3. “Understanding Child Malnutrition in the Sahel: A Case Study from Goundam Cercle, Timbuktu Region, Mali”

Many recent studies indicate that current interventions aiming to reduce the prevailing above normal rates of child malnutrition in the West African region have had little impact. These studies suggest that the causality of these problems has been misunderstood and inappropriate actions have been implemented. It studied the issue by the regional context, conducting on Mali, Burkina, Niger, Mauritania and Chad. The project surveyed and assessed child malnutrition indicators, wasting or acute malnutrition – weight for height ratio, stunting (delay growth) or chronic malnutrition – height/age ratio, underweight expressed by weight/height ratio.

The findings imply that reduction of child malnutrition in the Sahel is a long term development issue that the international community should understand and address. It cannot be solved by sporadic emergency interventions as it is a multidimensional issue that can be treated only with the allocation of adequate and reliable development resources.


4. “Effectiveness of a Community-Based Intervention to Improve Nutrition in Young Children in Senegal: A Difference in Difference Analysis”

There are few studies of community growth promotion as a means of addressing malnutrition that are based on longitudinal analysis of large-scale programmes with adequate controls to construct a counterfactual. The current study uses a difference in difference comparison of cohorts to assess the impact on the proportion of underweight children who lived in villages receiving services provided by the Senegal Nutrition Enhancement Project between 2004 and 2006. The project, designed to extend nutrition and growth promotion intervention into rural areas through non-governmental organisation service providers, significantly lowered the risk of a child having a weight more than 2 sd below international norms. The odds ratio of being underweight for children in programme villages after introduction of the intervention was 0.83 (95% CI 0.686, 1.000), after controlling for regional trends and village and household characteristics. Most measured aspects of health care and health seeking behaviour improved in
the treatment relative to the control.

Child nutrition is important both to reduce mortality and to reduce the transmittal of poverty across generations by preventing the impairment of cognitive functions and loss of schooling. There is substantial consensus regarding what interventions work to improve child nutrition. Many, albeit not all, of these promising interventions lie within the responsibility of the health sector, and target the ‘window of opportunity’ between pre-pregnancy and 24 months of age. Key interventions that have been proven to be effective in reducing infant mortality, underweight rates and micronutrient deficiencies include the following:

- Promotion of exclusive breast-feeding
- Promotion of adequate and timely complementary feeding (at about 6 months of age)
- Promotion of key hygiene behaviors (e.g. hand-washing with soap)
- Micronutrient interventions such as vitamin A and iron supplements for pregnant and lactating women and young children
- Presumptive treatment for malaria for pregnant women in endemic malarial regions and promotion of long-lasting insecticide-treated bed nets
- De-worming in endemic parasitic areas and oral rehydration in high-diarrhea regions.

Such evidence on what works, however, begs the question on how to deliver these services at in a full-scale project. Community growth promotion is one widely advocated approach to promoting these recommended practices. Growth promotion has been endorsed in various reports, see for example Allen and Gillespie, and in numerous case studies. Similarly, when asked whether they agree with the statement that ‘growth monitoring and promotion is ineffective’, 63.8% of 529 operational and research professional working in nutrition stated that they disagreed. In contrast, published reviews of trials have uncovered little supportive evidence. This reflects, in part, the fact that there are few studies of community growth promotion in peer-reviewed publications that use longitudinal analysis of large-scale programmes with adequate controls to construct a counterfactual. The current study addresses that gap by reporting on an assessment of the impact of a large-scale community growth promotion programme in Senegal using a difference in difference comparison of cohorts two years after a baseline survey.


5. “Community-Based Therapeutic: Treating Severe Acute Malnutrition in Sub-Saharan Africa”

Severe acute malnutrition (SAM) affects approximately 13 million children under-five and is associated with over 1.5 million preventable child deaths each year. Case fatality rates in hospitals treating SAM remain at 20-30%, and coverage of those affected remains low. Training and support to improve centre-based management can reduce case fatality rates. However, an
exclusive inpatient approach does not consider the many barriers to accessing treatment that exist for poor people in the developing world. Community-based therapeutic care (CTC) is a new approach for the management of SAM that uses Ready-to-Use Therapeutic Foods (RUTF) and triage to refer cases without complications to outpatient care and those with complications to inpatient treatment. This thesis aims to test the hypotheses that a CTC strategy can treat children with SAM effectively and can achieve better population treatment coverage than a centre-based approach. Five studies, using primary data, are presented. The first 3 studies evaluate the clinical effectiveness of CTC through examination of individual outcome data from research programmes in Ethiopia and Malawi. The fourth study examines the coverage of a CTC programme for SAM in Malawi and compares this with coverage of a centre-based programme. The final study is a multi-country evaluation of 17 CTC programmes implemented across Africa. Results from all studies that use the CTC treatment model show that outcomes can meet the international Sphere standard indicators of < 10% mortality and > 50% coverage. Coverage of a CTC programme in Malawi was three times that of a centre-based programme in the same region (73.64% (95% C.I. 66.0%, 81.3%) vs. 24.5% (95% C.I. 17.8%, 31.4%). A number of factors were vital to achieving low mortality and high coverage in these programmes. These included decentralisation of outpatient treatment services and community mobilisation techniques to encourage early presentation, and the use of appropriate triage criteria, to identify children suffering from SAM with no complications that could be treated safely as outpatients. The use of triage did not appear to increase mortality (OR 0.51 95% CI 0.28, 0.94). This thesis suggests that CTC does not increase case fatality rates associated with SAM and could reduce them, and that it could increase the number of children receiving treatment.

Sadler, Kate. Centre for International Health & Development, University of London. Available online at: http://eprints.ucl.ac.uk/16480/


For women and children, especially those who are poor and disadvantaged, to benefit from primary health care, they need to access and use cost-effective interventions for maternal, newborn, and child health. The challenge facing weak health systems is how to deliver such packages. Experiences from countries such as Iran, Malaysia, Sri Lanka, and China, and from projects in countries like Tanzania and India, show that outcomes in maternal, newborn, and child health can be improved through integrated packages of cost-effective health-care interventions that are implemented incrementally in accordance with the capacity of health systems. Such packages should include community-based interventions that act in combination with social protection and inter-sectoral action in education, infrastructure, and poverty reduction. Interventions need to be planned and implemented at the district level, which requires strengthening of district planning and management skills. Furthermore, districts need to be supported by national strategies and policies, and, in the case of the least developed countries, also by international donors and other partners. If packages for maternal, newborn and child health care can be integrated within a gradually strengthened primary health-care
system, continuity of care will be improved, including access to basic referral care before and during pregnancy, birth, the postpartum period, and throughout childhood.


Most large scale nutrition interventions can potentially affect most of these problems, though there is an extraordinary dearth of well designed evaluations of community-based nutrition interventions. The key strategies discussed are growth monitoring and promotion, integrated care and nutrition, communications for behavioural change, supplementary feeding for women and young children, school feeding, health-related services, micronutrient supplementation, and food-based strategies.


8. “Community-based nutrition education for improving infant growth in rural Karnataka – does it work?”

The purpose of this paper was to evaluate a nutrition education intervention designed to improve infant growth and feeding practices. An intervention study using monthly nutrition education delivered by locally trained counselors targeted at caregivers of infants aged 5-11 months. Families were administered a monthly questionnaire on feeding and child care behaviour, and study infants were weighed at this time, using the SECA solar scales, developed for UNICEF. Logistic regression was used to examine differences between intervention and non- intervention infants in infant feeding behavior outcomes. Nutrition education and counselling was significantly associated with increased weight velocity among girls and improved feeding behaviour among both boys and girls. These results are promising and provide further evidence that community-based nutrition programmes that emphasise appropriate feeding and care behaviour can be used to prevent and address early childhood malnutrition in poor households.

Kilaru A, Griffiths PL, Ganapathy S, Ghosh S “Community-based nutrition education for improving infant growth in rural Karnataka – does it work?”


Generic lessons from past experience with community-based nutrition programming relate more to processes adopted than to specific actions implemented — more “how” than “what” — with proactive community participation being a sine qua non for success. Progress has been made where community-based programs are linked operationally to service delivery structures. Government employees at such levels may be oriented to act as facilitators of nutrition-relevant
actions that are coordinated by locally elected community-based mobilizers. This mobilizer-facilitator nexus should be supported and managed by a series of organizational structures from the grassroots to national levels. Community-government partnerships need to be forged through broad-based social mobilization and communication strategies.

Policymakers should be more open to learning from community-based success so as to know how best to enable and sustain it. This paper describes the ingredients and dynamics of successful community-based nutrition programs including consideration of social mobilization strategies, project planning and design, management structures, implementation mechanisms, issues of monitoring, sustainability, replicability, and the nature of supportive policy.


10. “Combating malnutrition in India through community efforts”

Building capacity of women in the household relying on good traditional dietary practices will have more impact in improving malnutrition as also self-reliance with ownership and responsibility resting with people. In the experience, the result yields more results than depending on nutrition supplements such as Iron and Folic Acid, Vitamin A and supplementary nutrition as advocated by so called ‘external experts on nutrition.’ Best nutrition experts are in the community, the mothers, the parents and the women.

Sunder Lal, “Combating malnutrition in India through community efforts” Indian Journal of Community Medicine Jul-Sep 2003 28 (3)

11. “Malnutrition Is Still a Major Contributor to Child Deaths”

The following interventions, however, can significantly accelerate progress in reducing global malnutrition. Growth monitoring and promotion programs involve the regular weighing of young children to identify growth faltering—an early sign of malnutrition—before it becomes serious. Effective programs depend on a mother’s understanding of the importance of adequate growth and initiation of improved feeding and care practices. These programs identify deleterious caring and feeding practices and sensitively help caretakers improve such practices expeditiously in ways that do not require additional food or resource investments. Improved practices can include six months of exclusive breastfeeding and continued breastfeeding during bouts of infant diarrhea and other illnesses. Behavior change communication programs emphasize the benefits of new practices and help people overcome the practical, social, and cultural constraints that limit the adoption of these practices. Community-based nutrition programs such as Honduras’ flagship program, Atención Integral a la Niñez-Comunitaria, and similar efforts in Madagascar, Indonesia, Bangladesh, India, Senegal, and elsewhere, have combined growth monitoring and behavior change activities with preventive health and in some cases food supplements at a cost ranging from US$11 to $18 per child per year.

F. James Levinson and Lucy Bassett, “Malnutrition Is Still a Major Contributor to Child Deaths,” 2007,
Population Reference Bureau

12. "Impact of supplementing newborn infants with vitamin A on early infant mortality: community based randomised trial in southern India"

The paper aimed to assess the impact of supplementing newborn infants with vitamin A on mortality at age 6 months. The study was designed through community-based, randomized, double blind, placebo controlled trial. 11,619 newborn infants allocated 24,000 IU oral vitamin A or placebo on days 1 and 2 after delivery. Primary outcome measure was mortality at age 6 months. Infants in the vitamin A group had a 22% reduction in total mortality (95% confidence interval 4% to 37%) compared with those in the placebo group. Vitamin A had an impact on mortality between two weeks and three months after treatment, with no additional impact after three months. Supplementing newborn infants with vitamin A can significantly reduce early infant mortality.


The evidence review process is a useful approach to build consensus among experts and program leaders, inform program planning, and assist with decision-making. The Vistaar Project experience shows that this process is most valuable when:

- It is conducted in an open, inclusive and participatory manner
- The focus is on learning lessons, not identifying the “best model”
- The audience is clear, and the evidence is reviewed from their perspective (ie in this case, the evidence was reviewed for application in Government programming)

The Vistaar Project greatly appreciated the opportunity to be a part of this evidence review and is honored to join with the technical experts, implementing agencies, and Government program leaders and implementers who are using evidence to improve MNCHN program impact.


EDUCATION


The article focuses on the major four nutrition and malnutrition interventions:

Improving maternal nutritional status: Special emphasis encouraged to be placed on adolescent
girls at the dawn of adulthood who take on the role reproductive roles. Addressing the needs of this group prepares them to move in adulthood ready to take on reproductive roles. Women in general should have a adequate nutritional status before and during pregnancy to provide a good intrauterine environment for the developing child. Many Sub-Saharan African countries have instituted supplementary feeding programs to improve nutritional status of school children. The window of opportunity is advised for this to begin prenatally and should be for both mother and child. Additionally, education should be a strong component to the pre-natal and antenatal care and should emphasize the use of fortified staples, animal-source foods, dietary diversification and the use of supplements to improve the quality of diet.

**Sustaining exclusive breastfeeding:** The promotion of exclusive breastfeeding is ranked at #5 most effective intervention for reducing mortality of <5 year olds. Since access to knowledge does not necessarily increase the exclusive breastfeeding rates, you need consistent and concerted effort to ensure this practice till at least 6 month of age. A Ghananian community based randomized intervention assessed the effect of lactation counseling on exclusive-breastfeeding practices. The results showed 100 % increase in exclusive breastfeeding amongst mother that received support compared with the control group who received only health education information without breastfeeding support.

**Improving complementary feeding practice:** Intervention technologies such as roasting, malting, drying, fermentation and grinding to process locally - available ingredients have a high likelihood of success. To this end the uses of multi-mixes of cereal legumes have also been explored and studied. Direct addition of micronutrients like sprinkles powder, crushable nutritabs nutributter to home-prepared complementary food is gaining ground as a new strategy for improving the micronutrient quality of children’s diet as it does not require the care-giver to prepare new foods.

**Nutrition Education:** Studies using the positive deviant approach show that the in the midst of poverty good caregivers practices can substantially improve the growth for children in urban and rural settings. Nutrition education linked with regular monitoring and intervention should be made an integral part of the healthcare delivery system.


2. “FAO Food and Nutrition Papers -The double burden of malnutrition Case studies from six developing countries (The double burden of malnutrition in India)”

Data suggest that there has not been much change in the predominantly cereal-based dietary intake in India over the last three decades, except among affluent segments of the population. In spite of increasing per capita income and reduced poverty, dietary diversity is seen mainly among the affluent. Undernutrition rates remain high; starting before birth, they are aggravated throughout infancy by poor infant feeding practices and perpetuated in childhood by poor intra-family distribution of food and poor access to health care. There has been a substantial
reduction in severe undernutrition, most of which is due to improved access to health care. India can achieve substantial improvement in nutritional status through health and nutrition education and improved access to health and nutrition services. Prevention of intrauterine growth retardation through antenatal care, and early detection and correction of undernutrition so that children attain appropriate weight for height are essential to promoting linear growth; they can be achieved through the effective implementation of ongoing intervention programmes utilizing the available infrastructure.

Low intakes of vegetables and fruit, poor bioavailability of iron and limited use of iodized salt are responsible for micronutrient deficiencies’ being major public health problems even today. Dietary diversification, better coverage under the national anaemia control programme, massive-dose vitamin A administration and universal access to iodized, and later iron and iodine-fortified, salt are some of the interventions that could help the country to achieve rapid reductions in micronutrient deficiencies.


Seventy working women aged between 35-45 yrs belonging to middle income group were selected randomly and divided equally into two groups - Experimental (E) and Control (C). Nutrition counselling (NC) was imparted to group E for a period of three months by nine individual and three group contacts through nutrition module, lectures, participatory, discussions, demonstrations etc. The subjects of group E were educated about various nutrient requirements, functions of different nutrients; nutritional disorders their control and prevention, meal planning and cooking practices etc. Results of the present study indicated that there was positive effect of NC in group E in terms of improvement in gain in scores and adoption of desirable eating pattern. It is suggested that there is great need of proper selection of foods in the daily dietaries which can be imparted by educating the women by changing their attitudes regarding nutrition and health through nutrition counseling and the interaction needs to be for longer duration i.e. minimum for six months to bring about desirable changes.


4. “Efficacy of nutrition counselling of punjabi rural mothers on the anthropometry and haematological profile of their pre-school children.”

One hundred rural pre-school children (2-6 yrs.) were selected from Ludhiana district and divided equally into experimental and control groups. Nutrition counselling in the form of lectures, demonstrations and discussions was imparted to the mothers of the experimental
group (NEG) for three months. Body height, weight, mid-upper arm circumference (MUA), head circumference and skin-fold thickness of the children were recorded in the beginning (T1) and after the experimental period (T2). The boys and girls were shorter and lighter in height and the anthropometry was observed in NEF at T2 as compared to CG. In addition Hb,PCV,RBC was assessed in both groups at T1 and T2. Better picture of haematological profile was seen in NEG as compared to CG at T2.

Sachdeva R; Purnay; Puri R; Sangha J “Efficacy of nutrition counselling of punjabi rural mothers on the anthropometry and haematological profile of their pre-school children.” Indian Journal of Maternal and Child Health 1996 Apr-June; 7(2): 53-6 Available online at: http://medind.nic.in/imvw/imvw12098.html

5. “Community-based nutrition education for improving infant growth in rural Karnataka - does it work?”

The purpose of this paper was to evaluate a nutrition education intervention designed to improve infant growth and feeding practices. An intervention study using monthly nutrition education delivered by locally trained counselors targeted at caregivers of infants aged 5-11 months. Families were administered a monthly questionnaire on feeding and child care behaviour, and study infants were weighed at this time, using the SECA solar scales, developed for UNICEF. Logistic regression was used to examine differences between intervention and non-intervention infants in infant feeding behavior outcomes. Nutrition education and counselling was significantly associated with increased weight velocity among girls and improved feeding behaviour among both boys and girls. These results are promising and provide further evidence that community-based nutrition programmes that emphasise appropriate feeding and care behaviour can be used to prevent and address early childhood malnutrition in poor households.

Kilaru A, Griffiths PL, Ganapathy S, Ghosh S “Community-based nutrition education for improving infant growth in rural Karnataka – does it work?”

6. “Nutritional Counseling for Vegetarians During Pregnancy and Lactation”

A woman’s nutritional status directly affects pregnancy outcome and the quality of breast milk after birth. Clinicians who provide prenatal care have an important role in assessing the nutritional status of women and directing them to appropriate resources while respecting their choices. Vegetarian and vegan diets may present with unique nutrient deficiencies that can be addressed during prenatal nutritional counseling.

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6W6R-4RFK1DT-D&_user=10&_coverDate=02/29/2008&_rdoc=1&_fmt=high&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=00d6afe45c57bc7ee7967061f8409358
7. “National Institute of Nutrition Indian Council of Medical Research Community based training in nutrition for health Professionals”

Need-oriented education of health professionals to meet the national health goals is now well recognized. Community-based education (CBE) is accepted as an effective and efficient means of formal and continuing education based on innovative experiments in some Western countries. The experience of National Institute of Nutrition (NIN), Hyderabad, India, with their international training programmes confirms the applicability of the CBE approach to training of health professionals in developing regions.

Ramadasmurthy V; Mohanram M. “National Institute of Nutrition Indian Council of Medical Research Community based training in nutrition for health Professionals” Indian Journal of Community Medicine. 1991 Oct-Dec; 16(4): 167-70


Drawing from the lessons learnt in the dietary management of Diarrhea in India, we have highlighted the importance of investing resources towards involvement and capacity development of existing key personnel like physicians and policy makers to play leadership role for implementing nutrition agenda. Using Pemba trial as a case-study, we have highlighted the role of nutritional research in capacity development at all levels in a community setting. Finally, we present ideas for linking the high quality nutrition research and nutritional education as a means of developing capacity among physicians and graduate level students.


9. “India’s Tamil Nadu Nutrition Program: Lessons and issues in management and capacity”

The Tamil Nadu Nutrition Program is one of very few around the world, which have reduced malnutrition on a large scale, and over a long period. It did well because it coupled good strategies and strong commitment at the sectoral level with good micro-design at the field level. Success factors included:

- Intensive sector analysis prior to the program’s design, which helped build political and financial commitment to nutrition, as well as a sound technical basis for the program
- Careful choice of committed managers, at least during the first ten years
- Using paid village level workers, resulting in low drop-outs and high motivation
- Well designed recruitment criteria, ensuring that field workers were competent and acceptable to clients
- A carefully planned training and supervision system, which was entirely field rather institution based—a model worth testing in other countries
• A focus on a small number of interventions, tightly targeted on high risk clients, which made field workers’ jobs feasible
• An efficient management information system, which provided rapid feedback to clients at the local level, as well as program managers
• Involving local communities through information campaigns before the program began, and using women’s and children’s groups to help with implementation.

But TINP was not an unqualified success, and much can be learned from its weaknesses:

• The commitment and integrity of program management declined substantially after the first ten years; program performance might have suffered less if local communities had been empowered to play a greater role in worker supervision and quality control
• The health referral system never worked well, and more could have been done to identify food insecure families, and enroll them in existing food security programs
• TINP’s support systems in nutrition communications, operational research and program evaluation remained weak, because capacity strengthening plans were not developed for them the Bank failed to carry out analytical work on management and capacity development issues, despite continuing capacity constraints in the nutrition program.


10. “Should any nutritional counseling, supplementation or diet restriction be used during pregnancy?”

The consequences of poor nutritional status and inadequate nutritional intake for women during pregnancy not only directly affects women’s health status, but may also have a negative impact on birth weight and early development. Animal studies show that both maternal undernutrition and overnutrition reduce placental fetal blood flow and stunt fetal growth. Promoting optimal nutrition in humans could optimise fetal development and may also reduce the risk of chronic diseases in adults.

Centro Rosarino de Estudios Perinatales “Should any nutritional counseling, supplementation or diet restriction be used during pregnancy?” November 2008 – Support Summary of a systematic review

11. “Women’s Education Can Improve Child Nutrition in India”

This issue of the NFHS Bulletin estimates levels of child malnutrition and examines the effects of mother’s education and other demographic and socioeconomic factors on the nutritional status of children. Results indicate that more than half of all children under age four are malnourished. Children whose mothers have little or no education tend to have a lower nutritional status than do children of more-educated mothers, even after controlling for a number of other—potentially confounding— demographic and socioeconomic variables. This finding suggests that women’s education and literacy programmes could play an important role in improving children’s nutritional status.
Supplementary Feeding

1. “Probiotics and Prebiotics for Severe Acute Malnutrition (PRONUT study): A Double-Blind Efficacy Randomised Controlled Trial in Malawi”

Severe acute malnutrition affects 13 million children worldwide and causes 1-2 million deaths every year. The aim was to assess the clinical and nutritional efficacy of a probiotic and prebiotic functional food for the treatment of severe acute malnutrition in a HIV-prevalent setting. We recruited 795 Malawian children (age range 5 to 168 months [median 22, IQR 15 to 32]) from July 12, 2006, to March 7, 2007, into a double blind, randomized, placebo-controlled efficacy trial. For generalisability, all admissions for severe acute malnutrition treatment were eligible for recruitment. After stabilization with milk feeds, children were randomly assigned to ready-to-use therapeutic food either with (n=399) or without (n=396) Synbiotic2000 Forte. Average prescribed Synbiotic dose was 101 colony-forming units or more of lactic acid bacteria per day for the duration of treatment (median 33 days). Primary outcome was nutritional cure (weight-for-height >80% of National Center for Health Statistics median on two consecutive outpatient visits). Secondary outcomes included death, weight gain, time to cure, and prevalence of clinical symptoms (diarrhoea, fever, and respiratory problems). Analysis was on an intention-to-treat basis. This trial is registered as an International Standard Randomized Controlled Trial, number ISRCTN19364765. Nutritional cure was similar in both Synbiotic and control groups (53.9% [215 of 399] and 51.3% [203 of 396]; p=0.40). Secondary outcomes were also similar between groups. HIV seropositivity was associated with worse outcomes overall, but did not modify or confound the negative results. Subgroup analyses showed possible trends towards reduced outpatient mortality in the Synbiotic group (p=0.06). In Malawi, Synbiotic2000 Forte did not improve severe acute malnutrition outcomes. The observation of reduced outpatient mortality might be caused by bias, confounding, or chance, but is biologically plausible, has potential for public health impact, and should be explored in future studies.


2. “A Supply Chain Analysis of Ready-to-Use Therapeutic Foods for the Horn of Africa: The Nutrition Articulation Project”

In May 2007, leading international agencies including the WHO, World Food Program, UNICEF and SCN signaled a shift from hospital-based to community-based treatment for severe acute malnutrition (SAM) with ready-to-use therapeutic food (RUTF). Demand for RUTF, which had been growing steadily throughout the decade, more than doubled in the year following the joint statement. Production capacity of RUTF also increased, but at times has not been able to keep
pace with rising demand. Given the trend towards RUTF as the preferred treatment for SAM, demand and production will continue to increase. An effective and efficient supply chain for RUTF will be critical in the fight against malnutrition and the achievement of the Millennium Development Goals with respect to child mortality. As the leading global procurer of RUTF, UNICEF commissioned this study of the RUTF supply chain.

The objectives of the study included documenting the current RUTF supply chain, identifying opportunities for supply chain improvement, recommending key performance indicators to monitor supply chain performance, and creating an articulation guideline to aid future studies of nutrition supply chains. On the supply side, the study focused on Plumpy’Nut, a specific RUTF produced by the French company Nutriset, which is the primary RUTF purchased by UNICEF. On the demand side, this study focused on countries in the Horn of Africa (Kenya, Somalia and Ethiopia), where malnutrition has been a persistent concern. Analysis of the current RUTF supply chain focused on the flows of product, funding, and information throughout the Plan-Procure- Produce-Deliver cycle for RUTF. As each UNICEF Country Office identifies need and obtains funding for RUTF, a purchase order is processed through the UNICEF Supply Division and released to Nutriset, initiating the production and transportation of Plumpy’Nut to Africa. This entire cycle, using surface transportation, averages approximately 80 days, with a range of 40-120 days. Using air transportation, as has been done extensively over the past year for the hunger crisis in Ethiopia, can reduce this time. Air transportation, however, raises the transportation cost per kilogram from $0.17 to $2.40, increasing the percent of landed cost incurred for transportation from 4% to 39%. The ability to quickly respond to hunger crises is further hampered by the availability of funding, as each country office must obtain commitments from funding agencies for financial resources to cover the purchase, transportation, and program delivery of RUTF before purchase orders can be released. The lack of clarity in two vital flows of information also impedes performance of the RUTF supply chain: accurate assessment of the need and demand for RUTF, and shared information throughout the RUTF supply chain regarding order, in-transit and warehouse levels of RUTF. Investigating the structure of the supply chain that UNICEF currently uses to plan, procure, produce and deliver RUTF into the Horn of Africa revealed a complex network of organizations that must work together to ensure timely, cost-effective delivery of RUTF into countries plagued with severe acute malnutrition. Analyzing the performance of the RUTF supply chain and discussing this analysis with key participants helped document the challenges that plague the RUTF supply chain and identify several opportunities for reconfiguring the supply chain. With many potential supply chain configurations to consider, appraising the outcome of changes to the supply chain is a complicated task. A dynamic modeling tool was developed to test the impact on a wide variety of performance measures of changes to both the underlying data of the RUTF supply chain and the configuration decisions that dictate how RUTF is supplied to treat severe acute malnutrition in the Horn of Africa.


The aim of the study was to assess the effect of multi-micronutrient supplementation on the appetite of HIV-infected children. HIV-infected children (6–24 months) who had previously been hospitalized were enrolled into a double-blind randomized trial, and given daily multi-micronutrient supplements or placebos for six months. Appetite tests were performed at enrolment and after three and six months. Appetite was measured as ad libitum take of a commercial cereal test food served after an overnight fast according to standardized procedures. Bodyweights and total amount of test food eaten were measured. In total, 99 children completed the study (50 on supplements and 49 on placebos).


4. “Malawian Mothers’ Attitudes Towards the Use of Supplementary Foods for Moderately Malnourished Children”

The efficacy of lipid-based nutrient supplements (LNS) versus corn-soy blend (CSB) in promoting the growth of moderately malnourished children is currently being tested, but information about maternal attitudes towards the two supplements is lacking. This research studied 504 Malawian mothers’ attitudes about LNS and CSB through exit interviews completed at the end of three 12-week clinical trials and compared differences between the groups. Exploratory analyses of factors associated with withholding of supplements during fever, diarrhea, and cough were performed using logistic regression. Mothers generally had similar, positive attitudes towards LNS and CSB. Both supplements were said to be highly acceptable, children learned to eat them within two weeks, and mothers were willing to use them again. Mothers in the LNS group were reportedly more likely to withhold supplements from their children during cough, due to its sweetness, and were willing to pay more for a one-week supply of supplement than mothers in the CSB group. Maternal literacy was negatively and child’s weight-for-height z-score was positively associated with withholding of supplements during illness. Our results indicate that the sweetness in LNS should be reduced, and programs using supplements in Malawi could include advice on appropriate feeding of supplements during illness.


5. “Effects of Multivitamin-Multimineral Supplementation on Appetite of Stunted Young Beninese Children”

In the developing world, food intake of young children is often insufficient for growth. Reduced appetite due to several factors including micronutrient deficiencies might be an explanation. We hypothesized that a multivitamin-multimineral supplementation will improve appetite of
stunted children in south of Benin. Multivitamin-multimineral supplements (VITALIA-tablets) contain 11 vitamins and 8 minerals. Knee-heel length, length, weight, arm circumference and appetite were assessed once a week for the three weeks preceding and the three weeks following the six-week intervention period. Growth was additionally assessed 4 months after intervention. Each appetite test day, morbidity data and mother's report on child's appetite throughout the preceding day were recorded. Reported appetite, intake of test food and knee-heel length increased after supplementation in both groups (p<0.05), but were not different between groups. Growth was similar 4 months after the intervention. Morbidity was comparable in both groups before as well as after supplementation. We conclude that 6-week multivitamin-multimineral supplementation alone failed to improve appetite and growth of stunted young children.


6. “Supplementary feeding with either ready-to-use fortified spread or corn-soy blend in wasted adults starting antiretroviral therapy in Malawi: randomised, investigator blinded, controlled trial”

The purpose of the paper was to investigate the effect of two different food supplements on body mass index (BMI) in wasted Malawian adults with HIV who were starting antiretroviral therapy. The design of the study was randomized, investigator blinded, controlled trial. Setting Large, public clinic associated with a referral hospital in Blantyre, Malawi. Participants 491 adults with BMI <18.5. Interventions Ready-to-use fortified spread (n=245) or corn-soy blend (n=246). Main outcome measures Primary outcomes: changes in BMI and fat-free body mass after 3.5 months. Secondary outcomes: survival, CD4 count, HIV viral load, assessment of quality of life, and adherence to antiretroviral therapy.

The mean BMI at enrolment was 16.5. After 14 weeks, patients receiving fortified spread had a greater increase in BMI and fat-free body mass than those receiving corn-soy blend: 2.2 (SD 1.9) v 1.7 (SD 1.6) (difference 0.5, 95% confidence interval 0.2 to 0.8), and 2.9 (SD 3.2) v 2.2 (SD 3.0) kg (difference 0.7 kg, 0.2 to 1.2 kg), respectively. The mortality rate was 27% for those receiving fortified spread and 26% for those receiving corn-soy blend. No significant differences in the CD4 count, HIV viral load, assessment of quality of life, or adherence to antiretroviral therapy were noted between the two groups. Supplementary feeding with fortified spread resulted in a greater increase in BMI and lean body mass than feeding with corn-soy blend.


7. “A Large-Scale Distribution of Milk-Based Fortified Spreads: Evidence for a new Approach in Regions with High Buren of Acute Malnutrition”
There are 146 million underweight children in the developing world, which contribute to up to half of the world’s child deaths. In high burden regions for malnutrition, the treatment of individual children is limited by available resources. Here, we evaluate a large-scale distribution of a nutritional supplement on the prevention of wasting. A new ready-to-use food (RUF) was developed as a diet supplement for children under three. The intervention consisted of six monthly distributions of RUF during the 2007 hunger gap in a district of Maradi region, Niger, for approximately 60,000 children (length: 60–85 cm). At each distribution, all children over 65 cm had their Mid-Upper Arm Circumference (MUAC) recorded. Admission trends for severe wasting (WFH, 70% NCHS) in Maradi, 2002–2005 show an increase every year during the hunger gap. In contrast, in 2007, throughout the period of the distribution, the incidence of severe acute malnutrition (MUAC, 110 mm) remained at extremely low levels. Comparison of year-over-year admissions to the therapeutic feeding program shows that the 2007 blanket distribution had essentially the same flattening effect on the seasonal rise in admissions as the 2006 individualized treatment of almost 60,000 children moderately wasted. These results demonstrate the potential for distribution of fortified spreads to reduce the incidence of severe wasting in large population of children 6–36 months of age. Although further information is needed on the cost-effectiveness of such distributions, these results highlight the importance of re-evaluating current nutritional strategies and international recommendations for high burden areas of childhood malnutrition.


8. “Ready-to-Use Therapeutic Food for the Prevention of Wasting in Children”

The efficacy and effectiveness of ready-to-use therapeutic food (RUTF) for the treatment of wasting have been previously documented, and its use as part of community-based treatment of severe acute malnutrition in children is now recommended. The article by Isanaka and colleagues provides evidence that RUTF distributed for a 3-month period was efficacious in preventing wasting and severe wasting in children aged 6 to 60 months. In this cluster randomized controlled trial of 12 villages in Niger, all families with children aged 6 to 60 months with weight-for-height 80% or more of the National Center for Health Statistics reference standard received 92 g (providing 500 kcal) of RUTF daily for 3 months. The distribution of RUTF during the period of the year with documented food shortages improved weight maintenance among children and reduced wasting by 36% and severe wasting by 58%. This well-designed and implemented study extends current knowledge of RUTF from therapeutic use to the prevention of wasting in a population-based sample. However, whether untargeted distribution of RUTF would be a cost-effective, sustainable intervention compared with other approaches to prevent malnutrition remains to be determined.


A new type of ready-to-use food is changing the way severe malnutrition is treated. But questions remain about how far to push its introduction, and science has a hard time providing the answer. Plumpy’nut is one serving and has 500 calories and plenty of proteins, vitamins and minerals. Aid organizations like MSF say the RUTF has revolutionized care for malnourished children. Skeptics, however, say that adding RUTFs to the regular diet of millions of children is too complicated and costly.


10. “Mortality Risk Among Children Admitted in a Large-Scale Nutritional Program in Niger, 2006”

In 2006, the Médecins Sans Frontières nutritional program in the region of Maradi (Niger) included 68,001 children 6–59 months of age with either moderate or severe malnutrition, according to the NCHS reference (weight-for-height, 80% of the NCHS median, and/or mid-upper arm circumference, 110 mm for children taller than 65 cm and/or presence of bipedal edema). Our objective was to identify baseline risk factors for death among children diagnosed with severe malnutrition using the newly introduced WHO growth standards. As the release of WHO growth standards changed the definition of severe malnutrition, which now includes many children formerly identified as moderately malnourished with the NCHS reference, studying this new category of children is crucial. Program monitoring data were collected from the medical records of all children admitted in the program. Data included age, sex, height, weight, MUAC, clinical signs on admission including edema, and type of discharge (recovery, death, and default/loss to follow up). Additional data included results of a malaria rapid diagnostic test due to Plasmodium falciparum (ParacheckH) and whether the child was a resident of the region of Maradi or came from bordering Nigeria to seek treatment. In the first model including only weight, height, sex and presence of edema, the risk factors retained were the weight/height1.84 ratio (OR: 5.774; 95% CI: [2.284; 14.594]) and presence of edema (7.51 [5.12; 11.0]). A second model, taking into account supplementary data from perfunctory clinical examination, identified other risk factors for death: apathy (9.71 [6.92; 13.6]), pallor (2.25 [1.25; 4.05]), anorexia (1.89 [1.35; 2.66]), fever38.5uC (1.83 [1.25; 2.69]), and age below 1 year (1.42 [1.01; 1.99]). Although clinicians will continue to perform screening using clinical signs and anthropometry, these risk indicators may provide additional criteria for the assessment of absolute and relative risk of death. Better appraisal of the child’s risk of death may help orientate the child towards either hospitalization or ambulatory care. As the transition from the NCHS growth reference to the WHO standards will increase the number of children classified as severely malnourished, further studies should explore means to identify children at highest risk of death within this group using simple and standardized indicators.

11. “Ready to Use Therapeutic Food (RUTF) in the Management of Severe Acute Malnutrition in India”

RUTF is an effective intervention because it promotes home-based management, which has many advantages as the children have reduced exposure to hospital-acquired infections and receive continuity of care after discharge. It also benefits by increasing the time available to mothers to spend with family and reduces the risk of possible neglect of siblings. Also, mothers are able to look after other family responsibilities simultaneously. An essential component of home-based management for children with severe acute malnutrition is administration of RUTF, to meet their routine nutritional requirements and support catch-up growth. WHO has recommended that such RUTF should be produced locally by each county.


Some of the most widespread forms of malnutrition can best be reduced by delivering micronutrients and fortifying food in new, cost-effective ways, in combination with community outreach work. Approaches could range from the obvious - adding iron to flour - to the novel, such as vitamin-enriched chewing gum. Vitamin A, iron and iodine are the most important micronutrients in global public health terms, according to the World Health Organization (WHO), particularly for children and pregnant women in poor countries. Supplements are not only the answer, Community] outreach is important in remote areas and among migratory groups. Outreach can be particularly cost-effective when Vitamin A supplementation is combined with the delivery of other services such as deworming, distribution of bed nets.

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Levels of child malnutrition in India have fallen only slowly during the 1990s, despite significant economic growth and considerable expenditure on the Integrated Child Development Services (ICDS) programme, of which the major component is supplementary feeding for malnourished children. To begin to unravel this puzzle, this article assesses the programme’s placement and its outcomes, using NFHS data from 1992 and 1998. The authors find that programme placement is clearly regressive across states. The states with the greatest need for the programme – the poor Northern states which account for nearly half of India’s population and which suffer from high levels of child malnutrition – have the lowest programme coverage and the lowest budgetary allocations from the central government. Programme placement within states is more progressive: poorer and larger villages have a higher probability of having an ICDS centre, as do those with other development programmes or community associations. In terms of outcomes, the authors find little evidence of programme impact on child nutrition status in villages with ICDS centres.

14. "Effectiveness of Weekly Supplementation of Iron to Control Anaemia Among Adolescent Girls of Nashik, Maharashtra, India"

A national nutritional anemia-control programme in India, focusing on supplementation of iron to pregnant women after the first trimester of pregnancy, failed to make an impact. It is prudent to recommend the correction of iron stores before the woman becomes pregnant. 'Efficacy' of weekly supplementation of iron has been proved to improve iron stores in adolescence in many studies abroad and in India. The objective was to study the 'effectiveness' of a weekly iron-supplementation regimen among urban-slum, rural, and tribal girls of Nashik district, Maharashtra, India. A baseline and the mid-term assessments were done using the cluster-sampling techniques. In each stratum, 30 clusters were identified. Twelve and 10 adolescent girls from each cluster were identified in the baseline and mid-term surveys respectively. The hemoglobin estimation was done using the HemoCue system. Data were analyzed using the Epi Info software (version 6.04). The overall prevalence of anemia came down significantly to 54.3% from 65.3%. The decline was statistically significant (p<0.001) in tribal girls (48.6% from 68.9%) and among rural girls (51.6% from 62.8%). But the decline was not statistically significant among urban slum girls. Similarly, a significant rise in the mean hemoglobin levels was seen among tribal and rural girls. However, it did not increase significantly among urban slum girls. The program had performed poorly in urban-slum areas, as the mean number of tablets consumed in urban-slum areas was only 5.6±3.3, as against 6.7±2.6 tablets in tribal girls and 7.2±2.2 tablets in rural girls. Considering the biological and operational feasibility and the effectiveness of the intervention, weekly supplementation of iron to adolescent girls should be universally started to correct the iron stores of a woman before she becomes pregnant.


15. "Relative importance of micronutrient deficiencies in iron deficiency anemia"

To examine influence of micronutrient status in recently diagnosed anemic patients, a cross-sectional survey on adults from rural and urban parts of Western India was undertaken. Iron deficiency anemia (IDA) patients (81 men, 102 women) and age-sex matched healthy controls (80 men, 100 women) (32.85 ± 8.9 yr) were studied for their blood status of iron and seven micronutrients and nutrient intakes. Median levels of serum iron (647 µg/L), serum ceruloplasmin (192 mg/L), ascorbic acid (2.3 mg/L) and B12 (368 ng/L) were significantly lower in anemic subjects than the control group (750 µg/L, 251 mg/L, 3.2mg/L, 416 ng/L respectively, p < 0.01). Differences in plasma folic acid and erythrocyte membrane zinc of anemic and control groups were not significant (p > 0.05). Prevalence of riboflavin deficiency (EGRAC: erythrocyte glutathione reductase activity coefficient > 1.2) was more in anemic group than control (p = 0.038). A positive correlation of plasma retinol was observed with serum
transferrin \(r = 0.42, p < 0.05\) and hemoglobin \(r = 0.15, p < 0.05\). Logistic regression analyses of the blood levels of seven micronutrients with hemoglobin status indicated that risk of IDA was equal with low levels of ceruloplasmin (odds ratio = 0.92, \(p < 0.05\)) and 7 times higher with riboflavin deficiency (EGRAC, odds ratio = 7.2, \(p < 0.01\)).


16. "Maternal and child undernutrition"

The paper aims to assess the effect of multiple micronutrient supplementation during pregnancy, we did a systematic review and meta-analysis. Supplementation with three or more micronutrients was associated with a 39% reduction in maternal anemia compared with placebo or with two micronutrients or fewer (relative risk 0.61, 95% CI 0.52-0.71). Multiple micronutrient supplementation also resulted in a decrease in the risk of low-birth weight babies (0.83, 0.76-0.91) and small-for-gestational-age babies (0.92, 0.86-0.99). However, multiple micronutrient supplementation did not differ from iron and folic acid supplementation in terms of rates of low birth weight babies (0.94, 0.8-1.06), or of those who were small for gestational age (1.04, 0.93-1.17). A meta-analysis of trials of supplementation with a specific multiple micronutrient formulation for pregnant women150 compared with iron and folic acid reported a small increase in birth weight (pooled effect 21.2 g, 95% CI 8.0-34.5). A recent study from Indonesia that compared multiple micronutrients with iron-folate tablets in more than 31000 women showed that they reduced infant mortality by 22% (relative risk 0.78, 95% CI 0.64-0.95). Two additional trials of multiple micronutrient supplements in pregnancy in India and Tanzania also showed that this intervention reduced the rate of low-birth weight babies. A pooled analysis of these data with the results of the Cochrane review showed that multiple micronutrient supplements in pregnancy can reduce the risk of low birth weight by 0.84 (0.74-0.95).


17. "Multi-micronutrient Supplementation for Undernourished Pregnant Women and the Birth Size of Their Offspring"

The purpose of the study is to evaluate the effect of multi-micronutrient supplementation for undernourished pregnant women on the birth size of their offspring, incidence of low-birth weight infants (2500 g), and early neonatal morbidity. The design of the paper is randomized, double blind, placebo controlled trial in tertiary care hospital. Two hundred pregnant women (of 13 465 approached) with a body mass index (calculated as weight in kilograms divided by the square of height in meters) of less than 18.5 and/or a hemoglobin level of 7 to 9 g/dL were enrolled at 24 to 32 weeks of gestation. One hundred forty-six neonates (73.0%) were available for analysis of birth size and 170 (85.0%) for analysis of morbidity in the 7 days after delivery. The micronutrient supplementation group \(n = 99\) received a multi-micronutrient supplement containing 29 vitamins and minerals once a day, from enrollment until delivery (median duration, 58 days; interquartile range, 37-77 days; compliance, 87%). The comparison group \(n = \)
101) received placebo for 52 (15-66) days, with 85% compliance. All subjects also received supplements of iron (given in the form of ferrous sulfate, containing 60 mg of elemental iron), 60 mg/d, and folic acid, 500 g/d. The identification of nutrition includes birth weight, length, mid-arm circumference, incidence of low birth weight, and early neonatal morbidity.

Infants in the micronutrient group were heavier by 98 g (95% confidence interval [CI], 16 to 213 g) and measured 0.80 cm (95% CI, 0.03-1.57 cm) longer and 0.20 cm (95% CI, 0.04-0.36 cm) larger in mid-arm circumference compared with the placebo group. Incidence of low birth weight declined from 43.1% to 16.2% with multimicronutrient supplementation a (a 70% decrease; relative risk, 0.30; 95% CI, 0.13-0.71; P=.006), and that of early neonatal morbidity declined from 28.0% to 14.8% (a 58% decrease; relative risk, 0.42; 95% CI, 0.19-0.94; P=.04). Compared with iron and folic acid supplementation, the administration of multimicronutrients to undernourished pregnant women may reduce the incidence of low birth weight and early neonatal morbidity.


18. "Effects of fortified milk on morbidity in young children in north India: community-based, randomised, double masked placebo controlled trial"

The purpose of the paper is to evaluate the efficacy of milk fortified with specific multiple micronutrients on morbidity in children compared with the same milk without fortification. The study uses community-based, double masked, and individually randomized trial in peri-urban settlement in north India. Participants Children (n = 633) aged 1-3 randomly allocated to receive fortified milk (n = 316) or control milk (n = 317). Intervention One year of fortified milk providing additional 7.8 mg zinc, 9.6 mg iron, 4.2 g selenium, 0.27 mg copper, 156 g vitamin A, 40.2 mg vitamin C, 7.5 mg vitamin E per day (three feeds). Main outcome measures Days with severe illnesses, incidence and prevalence of diarrhea, and acute lower respiratory illness. Results Study groups were comparable at baseline; compliance in the groups was similar. Mean number of episodes of diarrhea per child was 4.46 (SD 3.8) in the intervention (fortified milk) group and 5.36 (SD4.1) in the control group. Mean number of episodes of acute lower respiratory illness was 0.62 (SD 1.1) and 0.83 (SD 1.4), respectively. The fortified milk reduced the odds for days with severe illnesses by 15% (95% confidence interval 5% to 24%), the incidence of diarrhea by 18% (7% to 27%), and the incidence of acute lower respiratory illness by 26% (3% to 43%). Consistently greater beneficial effects were observed in children aged ≤24 months than in older children. Conclusion Milk is well accepted as a means of delivery of micronutrients. Consumption of milk fortified with specific micronutrients can significantly reduce the burden of common morbidities among preschool children, especially in the first two years of life.

19. "Substantial Reduction in Severe Diarrheal Morbidity by Daily Zinc Supplementation in Young North Indian Children"

The purpose of the paper is to evaluate the impact of 4 months of daily zinc supplementation on the incidence of severe and recurrent diarrhea in children 6 to 30 months of age. A double-blind, randomized, placebo-con- trolled trial was conducted on children who were identified by a door-to-door survey to be aged 6 to 30 months and residing in the urban slum of Dakshinpuri, New Delhi. They were randomized to receive daily zinc gluconate (elemental zinc 10 mg to infants and 20 mg to older children) or placebo. A field attendant administered the syrup daily at home for 4 months except on Sundays, when the mother did so. One bottle that contained 250 mL was kept in the child’s home and replaced monthly. Field workers visited households every seventh day during the 4-month follow-up period. At each visit, information was obtained for the previous 7 days on history of fever, number and consistency of stools, and presence of cough. When the child was ill, illness characteristics and treatment seeking outside the home were determined. If the child had diarrhea or vomiting, then dehydration was assessed. At household visits, 2 packets of oral rehydration salts were given when a child had diarrhea. Children who visited the study clinic spontaneously for illness or were referred by the field workers were treated according to the standard national program guidelines. Antibiotics were advised only for diarrhea with bloody stools or for associated illnesses. For using generalized estimating equations for longitudinal analysis of a recurring event such as diarrhea, the follow-up data for each child was divided into 17 child-periods of 7 days each and presence or absence of an incident episode of diarrhea or severe diarrhea within each 7-day period was coded. This method of analysis does not assume independence of events and therefore prevents underestimation of variance that results because of correlation of morbidity within the same child. A logistic generalized estimating equations model with exchangeable correlation covariance-variance matrix was then used to estimate the effect size. Zinc or placebo doses were administered on 88.8% and 91.2%, respectively, of study days during the 4 months of follow-up. There was a small but significant increase in the average number of days with vomiting in the zinc group (4.3 [standard deviation (SD): 5.8] vs 2.6 [SD 3.9] days; difference in means: 1.7 [95% confidence interval (CI): 1.3–2.1] days). At the baseline, mean plasma zinc was 62.0 g/dL (SD: 14.3 g/dL) in the zinc and 62.0 g/dL (SD: 11.2 g/dL) in the placebo group; 45.8% and 42%, respectively, had low plasma zinc levels below 60 g/dL. At the end of the study, plasma zinc levels were substantially higher in the zinc group (ratio of geometric means: 1.94 [95% CI: 1.86–2.03]) and the proportion with low plasma zinc was lower (difference in proportions: 46.7% [95% CI: 41.8% to 51.4%]). The incidence of diarrhea during follow-up was lower in the zinc-supplemented as compared with the placebo group (odds ratio [OR]: 0.88; 95% CI: 0.82–0.95). The beneficial impact of zinc was greater on the incidence of diarrhea with progressively increasing duration: episodes of diarrhea that lasted 1 to 6 days (OR: 0.92; 95% CI: 0.85–1.00), 7 to 13 days (OR: 0.79; 95% CI: 0.65–0.95), and >14 days (OR: 0.69; 95% CI: 0.48–0.98). The impact was also greater on the incidence of episodes with progressively higher stool frequency: 3 to 5 stools per day (OR: 0.90; 95% CI: 0.83–0.98), 6 to 9 stools per day (OR: 0.87; 95% CI: 0.77–0.98), and >10 per day (OR: 0.77; 95% CI: 0.63–0.94). In the zinc group, significantly more children experienced no diarrheal episode during the study period (risk ratio [RR]: 1.22; 95% CI: 1.02–1.44). Furthermore, substantially fewer children (RR: 0.51; 95% CI: 0.36–0.73) experienced recurrent diarrhea, defined as >6 diarrheal episodes in the follow-up period as compared with
children in the placebo group. The number of children who were hospitalized for any cause tended to be lower in the zinc group, but the difference was not statistically significant (1.79% vs 2.43%; RR: 0.74; 95% CI: 0.43–1.27). The baseline mean plasma copper (g/dL) was similar in the 2 groups (difference in means: 1.6; 95% CI: 2.9 to 6.1). The end study plasma copper levels were significantly lower in the zinc group (difference in means: 15.5; 95% CI: 19.9 to 11.1).

Zinc supplementation substantially reduced the incidence of severe and prolonged diarrhea, the 2 important determinants of diarrhea-related mortality and malnutrition. This intervention also substantially reduced the proportion of children who experienced recurrent diarrhea. Prompt measures to improve zinc status of deficient populations are warranted. The potential approaches to achieve this goal include food fortification, dietary diversification, cultivation of plants that are zinc dense or have a decreased concentration of zinc absorption inhibitors, and supplementation of selected groups of children. Future studies should assess the impact of increased zinc intakes on childhood mortality in developing countries. For facilitating intervention, there is a need to obtain reliable estimates of zinc deficiency, particularly in developing countries. The functional consequences of the effect of various doses of zinc on plasma copper levels merits additional study.


20. "Low dose "Sprinkles"-An innovative Approach to Treat Iron Deficiency Anemia in infants and Young Children"

Iron supplementation programs using pediatric tablets or drops have not been successful in the control of anemia amongst infants and children in India. ‘Sprinkles’ is an innovative multi-micronutrient home fortification strategy to control iron deficiency and anemia. The paper aimed to determine the hematologic response to different doses and forms of iron in Sprinkles and iron drops. The method uses double blind clustered randomized community-based trial in twenty two villages of Vadu Rural Health Program, KEM Hospital in Pune. Children (n = 432) aged 6-18 mo age with Hb between 70-100 g/L were enrolled. Selected villages were randomized into 5 groups: Sprinkles 12.5, 20 or 30 mg ferrous fumarate (FF), Sprinkles 20 mg micronized ferric pyrophosphate (MFP) or drops 20 mg ferrous glycine sulphate (DROPS) for 8 weeks. Household socio-demographic information was collected at baseline. Side effects and compliance were monitored through weekly visits. Hemoglobin was estimated at baseline, 3 and 8 week. Ferritin was assessed at baseline and 8 week. Baseline characteristics were similar across all groups. Hemoglobin increased significantly (P <0.0001) in all groups at 8 weeks with no difference between groups. Ferritin increased (P <0.0001) significantly in all groups with no difference across the groups. Compliance (overall range: 42-62%) was lowest for DROPS. Side effects were significantly higher among DROPS compared to Sprinkles (p>0.05). Sprinkles 12.5 mg FF dose is as efficacious as higher doses of iron in Sprinkles or DROPS in increasing hemoglobin. Sprinkles FF12.5 mg is recommended as it has fewer reported side effects and better compliance compared to DROPS.

21. "Nutrition Rehabilitation of the HIV-Infected and Negative Undernourished Children Utilizing Spiruline"

The objective of the study was to assess the impact of an alimentary integrator composed by Spiruline, produced at the Centre Medical St. Camille (CMSC) of Ouagadougou, Burkina Faso, on the nutritional status of undernourished HIV-infected and HIV-negative children. We compared two groups of children: 84 children HIV-infected and 86 HIV-negative. The duration of this study was eight weeks. Anthropometrics and haematological parameters allowed us to appreciate both the nutritional and biological effects of Spiruline supplement to traditional meals. The rehabilitation with Spiruline shows on average a weight gain of 15 and 25 g/day in HIV-infected and in HIV negative children, respectively. The level of anaemia decreased during the study in all the children, but the recuperation was less efficient among the HIV-infected children (Z: 1.70 (95% CI: -.366, -.002, p=.088)). Present results allow to confirm that Spiruline seems to correct the anaemia and the weight loss also in HIV-infected, but more quickly in HIV negative undernourished children.


22. "Short-Term Effect of Oil Supplementation of complementary Food on Total Ad Libitum Consumption in 6-to 10-month-old Breastfed Indian Infants"

This paper purposed to evaluate the short-term effect of oil supplementation of complementary food on total ad libitum consumption in breastfed infants. Twenty infants between 6 to 10 months of age were studied in a tertiary hospital in New Delhi for 48 hours. They were given three semi-solid complementary feeds per day and ad libitum breastfeeding. No other food or fluid was allowed during the study period. A traditional gruel made of rice and pulses with high energy density (oil added; caloric density = 35 kcal/100 g) or low energy density (without oil; caloric density = 20 kcal/100 g) was offered in a randomized manner on consecutive days to all infants. Total caloric intake from breast milk and semi-solids was computed for each day. Infants consumed an equivalent amount of semi-solid (mean difference, 10.75 g/day; 95% confidence interval, 10.56 to 32.06; P = 0.304) and a lower amount of breast milk (mean difference, 121.1 g/day; 95% confidence interval, 35.13 to 207.16; P = 0.008) when high energy density feeds were offered. Although the caloric intake from semi-solids increased significantly (18.9 kcal/day; 95% confidence interval, 12.9 to 24.8; P , 0.001) with the high density diet, the total caloric intake (breast milk and study feeds) decreased (mean difference = 59.6 kcal/day; 95% confidence interval, 5.95 to 113.34; P = 0.031). An inverse relationship was found between caloric density of semi-solids and breast milk intake (r = 0.34, r2 = 0.12, P = 0.032). In the short term, oil supplementation of complementary food in breastfed infants does not translate into enhanced total caloric intake, primarily as a result of breast milk displacement.

INTERNATIONAL GUIDELINES


WHO case-management guidelines for severe malnutrition aim to improving the quality of hospital care and reduce mortality. We aimed to assess whether these guidelines are feasible and effective in under-resourced hospitals. All children admitted with a diagnosis of severe malnutrition to two rural hospitals in Eastern Cape Province from April, 2000 to April, 2001, were studied and their case fatality rates were compared with the rates in a period before guidelines were implemented (March, 1997 to February, 1998). Quality of care was assessed by observation of medical and nursing practices, review of medical records, and interviews with staff. A mortality audit was used to identify cause of death and avoidable contributory factors. Findings At Mary Theresa Hospital, case-fatality rates fell from 46% before implementation to 21% after implementation. At Sipetu Hospital, the rates fell from 25% pre-implementation to 18% during 2000, but then rose to 38% during 2001, when inexperienced doctors who were not trained in the treatment of malnutrition were deployed. This rise coincided with less frequent prescribing of potassium (13% vs 77%, p<0.0001), antibiotics with gram-negative cover (15% vs 46%, p=0.0003), and vitamin A (76% vs 91%, p=0.018). Most deaths were attributed to sepsis. For the two hospitals combined, 50% of deaths in 2000-01 were due to doctor error and 28% to nurse error. Weaknesses within the health system—especially doctor training, and nurse supervision and support—compromised quality of care. Interpretation Quality of care improved with implementation of the WHO guidelines and case-fatality rates fell. Although major changes in medical and nursing practice were achieved in these under-resourced hospitals, not all tasks were done with adequate care and errors led to unnecessary deaths.


ADDITIONAL

1. “Malnutrition Among Women In Sub-Saharan Africa: Rural-Urban Disparity”

Malnutrition is a serious public health problem, particularly in developing countries, linked to a substantial increase in the risk of mortality and morbidity. Women and young children are most often affected. Rural disadvantage is a known factor, but little attention has been paid to rural-urban disparity among women. To provide a reliable source of information for policymakers, the current study used nationally representative data from 26 countries in sub-Saharan Africa to
update knowledge about the prevalence malnutrition and its rural-urban disparities among women. The data sources were the demographic and health surveys of 26 countries conducted between 1995 and 2006. The methods included meta-analysis, meta-regression, sub-group and sensitivity. Overall, rural women were 68% more likely to be malnourished compared with their urban counterparts. In the metaregression analysis, sub-region, sample size, and the year the study was conducted explained the observed heterogeneity. This meta-analysis provided usable data for women in sub-Saharan Africa. The magnitude of rural-urban malnutrition disparity revealed provides a baseline that will be of assistance to clinicians, researchers, and policy-makers in the detection, prevention and treatment of malnutrition among rural women.


2. “Guatemala’s Malnutrition Crisis”

Guatemala has stark divisions between its rich and poor communities. The populations affected by malnutrition are largely the Indigenous Mayan communities that make up most of the country’s rural farmers, mostly sharecroppers, who have twice the rates of stunting of the non-Indigenous population. The government, working with the World Food Programme (WFP), has a programme to distribute supplementary food to undernourished children. The supplement, called VitaCereal, arrives once a month at the far-flung villages. The monthly distributions of the enriched cornsoya blend are an event for the remote communities. It is also the only time that the children see a doctor.


3. “Fighting Fe Deficiency Malnutrition in West Africa: An Interdisciplinary Programme on a Food Chain Approach”

About 2 billion people, mainly women and young children, suffer from iron deficiency. The supply of iron (Fe) falls short when consumed foods have a low Fe content or when absorption of Fe is inhibited by the presence of phytic acid and polyphenols in the diet. Current interventions are dietary diversification, supplementation, fortification and biofortification. In West Africa these interventions have only moderate chances of success due to low purchasing power of households, lack of elementary logistics, lack of central processing of food and the high heterogeneity in production and consumption conditions. A staple food chain approach, integrating parts of current interventions was proposed as an alternative. The research was carried out in several villages in Benin and Burkina Faso to take ecological, cultural and socio-economic diversity into account. The interdisciplinary approach aimed at elaborating interventions in soil fertility management, improvement and choice of sorghum varieties and food processing, to increase Fe and decrease the phytic acid-Fe molar ratio in sorghum-based foods. The preliminary results suggest that a feasible chain solution consists of breeding for high Fe and moderate phytic acid contents and using soil organic amendments and P fertilization to increase yields but that this needs to be followed by improved food processing to
remove phytic acid. Further research on timing of application of phosphate, Fe fertilizer and soil organic amendments is needed to improve phytic acid-Fe molar ratios in the grain. Research on the exact distribution of Fe, phosphate, phytic acid and tannins within the sorghum grain is needed to enable the development of more effective combinations of food processing methods aiming for more favourable phytic acid-Fe molar ratios in sorghum-based food.


This paper plans to investigate trends in child malnutrition in six countries in southern Africa, in relation to the HIV epidemic and drought in crop years 2001/2 and 2002/3. Under UNICEF auspices, data was compiled and analyzed from Lesotho, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe. Epidemiological analysis of sub-national and national surveys of the related data: children 0–5 years for weight-for-age; HIV prevalence data from various sources especially antenatal clinic surveillance.

Child nutritional status as measured by prevalence of underweight deteriorated from 2001 onwards in all countries except Lesotho, with very substantial increases in some provinces/districts (e.g. from 5 to 20% in Maputo (Mozambique, 1997–2002), 17 to 32% in Copperbelt (Zambia, 1999–2001/2) and 11 to 26% in Midlands province (Zimbabwe, 1999–2002)). Greater deterioration in underweight occurred in better-off areas. Areas with higher HIV/AIDS prevalence had (so far) lower malnutrition rates (and infant mortality rates), presumably because more modern areas - with greater reliance on trade and wage employment have more HIV/AIDS. Areas with higher HIV/AIDS showed more deterioration in child nutrition. A significant area-level interaction was found of HIV/AIDS with the drought period, associated with particularly rapid deterioration in nutritional status.

First, the most vulnerable may be households in more modern areas, nearer towns, to whom resources need to be directed. Second, the causes of this vulnerability need to be investigated. Third, HIV/AIDS amplifies the effect of drought on nutrition, so rapid and effective response will be crucial if drought strikes again. Fourth, expanded nutritional surveillance is now needed to monitor and respond to deteriorating trends. Finally, with or without drought, new means are needed of bringing help, comfort and assistance to the child population.


The purpose of the study was to assess and quantify the magnitude of inequities in under-five child malnutrition, particularly those ascribable to socio-economic status and to consider the
policy implications of these findings. Data on 3765 under-five children were derived from the Living Standards and Development Survey. Household income, proxied by per capita household expenditure, was used as the main indicator of socio-economic status. Socio-economic inequality in malnutrition (stunting, underweight and wasting) was measured using the illness concentration index. The concentration index was calculated for the whole sample, as well as for different population groups, areas of residence (rural, urban and metropolitan) and for each province.

Stunting was found to be the most prevalent form of malnutrition in South Africa. Consistent with expectation, the rate of stunting is observed to be the highest in the Eastern Cape and the Northern Province – provinces with the highest concentration of poverty. There are considerable pro-rich inequalities in the distribution of stunting and underweight. However, wasting does not manifest gradients related to socio-economic position. Among White children, no inequities are observed in all three forms of malnutrition. The highest pro-rich inequalities in stunting and underweight are found among coloured children and metropolitan areas. There is a tendency for high pro-rich concentration indices in those provinces with relatively lower rates of stunting and underweight (Gauteng and the Western Cape).

There are significant differences in under-five child malnutrition (stunting and underweight) that favour the richest of society. These are unnecessary, avoidable and unjust. It is demonstrated that addressing such socio-economic gradients in ill-health, which perpetuate inequalities in the future adult population requires a sound evidence base. Reliance on global averages alone can be misleading. Thus there is a need for evaluating policies not only in terms of improvements in averages, but also improvements in distribution. Furthermore, addressing problems of stunting and underweight, which are found to be responsive to improvements in household income status, requires initiatives that transcend the medical arena.

Eyob Zere and Diane McIntyre. International Journal for Equity in Health, 2:7, 19 May 2003, Available online at: http://www.equityhealthj.com/content/2/1/7


Most developing countries have experienced important decreases in child mortality rates over the last three decades. As greater numbers of children survive, it becomes critical to pay closer attention to the strong relationship between nutritional status and children ability to achieve optimal physical growth and psychological development. Impaired growth and development in children can affect the rest of their lives and compromise academic performance and the ability to contribute to society. Investment in interventions aimed at improving physical growth and mental development in children can be expected not only to decrease the prevalence of stunting but also to prevent its negative functional consequences throughout the life cycle. There is a great need to focus the attention of policy-makers on the nutritional status of children as one of the main indicators of development and as a precondition for the socioeconomic advancement of societies in the long term.

The prevalence of child undernutrition in India is among the highest in the world; nearly double that of Sub-Saharan Africa, with dire consequences for morbidity, mortality, productivity and economic growth. Drawing on qualitative studies and quantitative evidence from large household surveys, this book explores the dimensions of child undernutrition in India and examines the effectiveness of the Integrated Child Development Services (ICDS) program, India’s main early child development.

These include an increasing emphasis on the provision of supplementary feeding and preschool education to children aged four to six years, at the expense of other program components that are crucial for combating persistent undernutrition; a failure to effectively reach children under three — the age window during which nutrition interventions can have the most effect; and, ineffective targeting of vulnerable children such as poorer households and lower castes. Moreover, the poorest states and those with the highest levels of undernutrition still have the lowest levels of program funding and coverage. In addition, ICDS faces substantial operational challenges and suffers from a lack of high-level commitment.

The dominant focus on food supplementation is to the detriment of other tasks envisaged in the program which are crucial for improving child nutritional outcomes. For example, not enough attention is given to improving child-care behaviors, and on educating parents how to improve nutrition using the family food budget.

In addition to these mismatches, the program faces substantial operational challenges. Inadequate worker skills, shortage of equipment, poor supervision and weak M&E detract from the program’s potential impact. Community workers are overburdened, because they are expected to provide preschool education to four to six year olds as well as nutrition services to all children under six, with the consequence that most children under three—the group that suffers most from malnutrition—do not get micronutrient supplements, and most of their parents are not reached with counseling on better feeding and child care practices.


8. “Implementing an Integrated Package of Nutrition and Health Interventions”

The purpose of this report is to record the process of implementing Integrated Nutrition and Health Project II (INHP II) approaches and tools as designed in the INHP II Operational Strategy (CARE/India, 2002a) in the Early Learning Phase (ELP) of INHP II. Its focus is village-level processes in selected early learning sites (ELS) that were especially chosen for this
purpose. It also involved a review of implementation at the state level using INHP II’s Health Management Information System (HMIS).

The number of different indicators showing better results in ELS than in RS indicated that INHP II approaches and tools are beginning to work in their local settings. INHP II’s early results reflect not only the inputs of the April 2002–August 2003 period but also the foundation laid during INHP I (several of the ELS sites were demonstration sites in INHP I) and activities of other stakeholders as well. It is also notable that the same areas identified in the final evaluation report as needing strengthening at the end of INHP I (Stinson, Bailey, et al. 2001) remain the weaker elements of the program. Almost absent BCC and lack of attention to nutrition outcomes and impact are striking. Clearly, there is room for improvement. By carrying out this documentation, INHP II has been able to diagnose the problem at an early enough stage to implement changes. Even greater improvements could be obtained through actions taken at this early stage of implementation.


9. "Small-Scale Production and Marketing of Spirulina"

Let us go back to the situation in India, where the disastrous burden of child malnutrition, undernutrition and low birth weight children will require time to be overcome. Even if all the States have enough food to provide to the BPL population, and particularly to children and lactating women, the political will to implement adequate schemes through a midday meal programme is not demonstrated and is not operational. These are the main reasons why NGOs are urgently requested to reduce mass-scale nutrition insecurity by asking the Union of India to ensure that the SC Orders are implemented.

- To act politically in obtaining adequate funds available from the States to combat child malnutrition.
- To improve the nutritional status of children in the range of 0-6 years by providing supplementary food and particularly micronutrients.
- To provide pregnant and lactating women with adequate food and micronutrients.
- To facilitate access to Spirulina to all Anganwadi Centres (AWCS). Many of the Centres are not operational, as in the case of Bihar, Uttar Pradesh and Jharkhand. The SC recommended that one Centre should be provided for each 1,000 people. It seems that only 600,000 out of 1,400,000 have been sanctioned. The Order (August 2004) also directed the Government of India to revise the supply of nutritious food worth 1 rupee to 2 rupees per child per day.

There is no point in recognizing the importance of eliminating micronutrient malnutrition without promoting the evidence of optimal breastfeeding and infant feeding practices. Whatever micronutrient policy or health care system is implemented, breastfeeding practices have to be made an integral part of all nutrition interventions. In addition to children, the integration of pregnant and lactating women in Spirulina programmes should be considered.
The concept of these interventions – breastfeeding and improvement in nutritional status with micronutrient supply – should be community-based. In India, we should make use of the great advantage of distribution through existing services such as ICDS, AWCS or mobile créches (city working women on construction sites). Such centres should first be approached to encourage the adoption of a balanced mix with Spirulina. These centres could also be a platform for nutrition education and demonstration. It needs qualified NGOs to collaborate in these efforts of nutrition training and pedagogy. Finally, we cannot overlook the most difficult handicap of all in achieving such a role in slums: safe drinking water, and the difficult improvement of environmental sanitation and hygiene.

Antenna does not envisage any other role for Spirulina than as a food complement. In our programmes it is added to traditional meals as a source of essential nutrients such as iron or vitamin A. These elements are frequently lacking in available food, even though populations often have 'enough' to eat. Nonetheless, defeating malnutrition depends not only on supplementation programmes such as Spirulina production, but local autonomy and proper structural agriculture policies too. The strengths of Spirulina-based complementation programmes are several. First of all, Spirulina brings a 'cocktail' of essential nutrients. Second, it is very well accepted by the population for several reasons, mainly due to improvements in health and well being. Thirdly, Spirulina production can be local; it requires a low-cost technology, warm temperatures and sufficient light and is thus very suitable for tropical countries. A minimum of knowledge is required to manage a production unit, whereas adaptations or improvements are possible.

While the positive effects on immunity and physical growth are starting to be well documented, more clinical and scientific studies are necessary to further investigate the benefits of Spirulina on cognition. We expect that consumption of Spirulina-enriched meals by young infants and pregnant/lactating mothers will lead to:

- Decreasing the incidence of mental diseases due to severe micronutrients deficiencies
- Improving children’s performances at school
- Enhancing cognition of adults as workers and citizens.