Accelerating Progress in Reducing Maternal and Child Undernutrition in Nepal

A review of global evidence of essential nutrition interventions for the Nepal Health Sector Plan II and Multisectoral Plan of Action for Nutrition

THE WORLD BANK
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February 2012
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<tr>
<td>AAMA</td>
<td>Action Against Malnutrition through Agriculture</td>
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<td>ACF</td>
<td>Action Contre la Faim</td>
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<td>ADB</td>
<td>Asian Development Bank</td>
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<td>ANC</td>
<td>Antenatal Care</td>
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<td>ARI</td>
<td>Acute Respiratory Infections</td>
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<td>BCC</td>
<td>Behavior Change Communication</td>
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<td>BCG</td>
<td>Bacillus Calmette-Guérin - vaccine against tuberculosis</td>
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<td>BMI</td>
<td>Body Mass Index</td>
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<td>BMS</td>
<td>Breastmilk Substitutes</td>
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<td>BPP</td>
<td>Birth Preparedness Program</td>
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<td>CAP</td>
<td>Community Action Process</td>
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<td>CB IMCI</td>
<td>Community-Based Integrated Management of Childhood Illness</td>
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<td>CB-NCP</td>
<td>Community-Based Neonatal Care Package</td>
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<tr>
<td>CBO</td>
<td>Community-Based Organization</td>
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<tr>
<td>CCT</td>
<td>Conditional Cash Transfer</td>
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<td>CHD</td>
<td>Child Health Division</td>
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<td>CIDA</td>
<td>Canadian International Development Agency</td>
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<tr>
<td>CIHD</td>
<td>Centre for International Health and Development</td>
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<tr>
<td>CMAM</td>
<td>Community-Based Management of Acute Malnutrition</td>
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<tr>
<td>DACAW</td>
<td>Decentralized Action for Children and Women</td>
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<tr>
<td>DALY</td>
<td>Disability-Adjusted Life Year</td>
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<tr>
<td>DFID</td>
<td>UK Department for International Development</td>
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<td>DHO</td>
<td>District Health Office</td>
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<td>DHS</td>
<td>Demographic Health Survey</td>
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<td>EBF</td>
<td>Exclusive Breastfeeding</td>
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<td>EHCS</td>
<td>Essential Health Care Services</td>
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<td>ENA</td>
<td>Essential Nutrition Actions</td>
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<td>F/CA</td>
<td>Food/cash for Assets</td>
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<td>FCHV</td>
<td>Female Community Health Volunteer</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GMP</td>
<td>Growth Monitoring and Promotion</td>
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<td>GoN</td>
<td>Government of Nepal</td>
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<td>HFA</td>
<td>Homestead Food Production</td>
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<td>HKI</td>
<td>Helen Keller International</td>
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<td>HMIS</td>
<td>Health Management Information System</td>
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<td>ICDS</td>
<td>Integrated Child Development Services</td>
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<td>IFA</td>
<td>Iron and Folic Acid</td>
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<td>IMCI</td>
<td>Integrated Management of Childhood Illness</td>
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<td>IMNMP</td>
<td>Intensification of Maternal and Neonatal Micronutrient Program</td>
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<td>IYCF</td>
<td>Infant and Young Child Feeding</td>
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<td>LNS</td>
<td>Lancet Nutrition Series</td>
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<td>LBW</td>
<td>Low Birth Weight</td>
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<td>MAM</td>
<td>Moderate Acute Malnutrition</td>
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<td>Acronym</td>
<td>Description</td>
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<tr>
<td>MCH</td>
<td>Maternal and Child Health</td>
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<td>MCHC</td>
<td>Maternal and Child Health Care</td>
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<td>MI</td>
<td>Micronutrient Initiative</td>
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<td>MIRA</td>
<td>Mother and Infant Research Activities</td>
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<td>Multiple Micronutrient Powders</td>
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<td>MNSs</td>
<td>Multiple Micronutrient Supplements</td>
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<tr>
<td>MOHP</td>
<td>Ministry of Health and Population</td>
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<tr>
<td>MOLD</td>
<td>Ministry of Local Development</td>
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<tr>
<td>MUAC</td>
<td>Mid-Upper Arm Circumference</td>
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<td>NAGA</td>
<td>Nutrition Assessment and Gap Analysis</td>
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<td>NCHS</td>
<td>National Center for Health Statistics, US Centers for Disease Control</td>
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<td>NFHP</td>
<td>Nepal Family Health Program</td>
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<tr>
<td>NGO</td>
<td>Nongovernment Organization</td>
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<td>NHSP II</td>
<td>Nepal Health Sector Program II (2010-2015)</td>
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<td>NNCC</td>
<td>National Nutrition Coordinating Committee</td>
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<td>NPC</td>
<td>National Planning Commission</td>
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<td>NTAG</td>
<td>National Technical Assistance Group</td>
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<tr>
<td>NTDs</td>
<td>Neural Tube Defects</td>
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<td>OR</td>
<td>Odds Ratio</td>
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<tr>
<td>ORS</td>
<td>Oral Rehydration Solution</td>
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<td>ORT</td>
<td>Oral Rehydration Treatment</td>
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<tr>
<td>OTP</td>
<td>Outpatient Treatment Post</td>
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<td>PHCR</td>
<td>Poverty Headcount Ratio</td>
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<tr>
<td>PNC</td>
<td>Post Natal Care</td>
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<td>PP</td>
<td>Postpartum (woman)</td>
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<tr>
<td>PPM</td>
<td>Parts Per Million</td>
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<td>PSI</td>
<td>Population Services International</td>
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<td>RUSFs</td>
<td>Ready-to-Use-Supplementary Foods</td>
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<tr>
<td>RUTFs</td>
<td>Ready-to-Use Therapeutic Foods</td>
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<tr>
<td>SAM</td>
<td>Severe Acute Malnutrition</td>
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<tr>
<td>SD</td>
<td>Standard Deviation</td>
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<tr>
<td>SC</td>
<td>Stabilization Center</td>
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<tr>
<td>SGA</td>
<td>Small for Gestational Age</td>
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<tr>
<td>SLC</td>
<td>School Leaving Certificate</td>
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<tr>
<td>STC</td>
<td>Salt Trading Corporation</td>
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<td>SUN</td>
<td>Scaling Up Nutrition</td>
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<tr>
<td>UCL</td>
<td>University College London</td>
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<td>UIE</td>
<td>Urinary Iodine Excretion</td>
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<td>UNHCR</td>
<td>United Nations High Commission for Refugees</td>
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<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>VAS</td>
<td>Vitamin A Supplementation</td>
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<td>VDCs</td>
<td>Village Development Committee</td>
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<td>WB</td>
<td>World Bank</td>
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<td>World Food Program</td>
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<td>World Health Organization</td>
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<td>WIFS</td>
<td>Weekly Iron Folate Supplements</td>
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Acknowledgements

The South Asia Human Development Department undertook this review of nutrition interventions to provide evidence-based recommendations to the Government of Nepal to accelerate the reduction of malnutrition through the health sector. The Japan Trust Fund to Scale Up Nutrition and the World Bank provided financial support for this review. The task manager for this project was Luc Laviolette, and Karen Codling, consultant, was the report’s main author. The design and review of this study benefited from valuable guidance provided by Julie McLaughlin and Albertus Voetberg. Jaya Karki and Mohammad Khalid Khan provided much-appreciated logistical assistance. Thanks are also due to the many colleagues at the World Bank’s office in Kathmandu, Nepal, who supported this work and responded to queries with helpful information. The report benefited from valuable comments during the peer review from Ashok Bhurtyal, Leslie Elder, Menno Mulder-Sibanda, Anirudra Sharma, Nastu Sharma, Marion Michaud, Roger Shrimpton, and Sophiya Upreti.

The dedicated efforts and valuable support of the nutrition community in Nepal helped to make this work possible. Special thanks are due to officials from the Ministry of Health and Population. They were very generous with their time and greatly enriched this report. In addition to those named above, the following individuals contributed input at various stages of the report’s development through consultations and during the review process: Debendra Adhikari, Ramesh Kant Adhikari, Mark Arnoldy, Bhagwan Aryal, Amit Bandhari, Tekabe Belay, Chop Lal Bhusal, Dr. Bichha, Padam Chand, Pradhumna Dahal, Maureen Dariang, Madhu Dixit Devkota, Amrit Guring, Siti Halati, Jolanda Hogenkamp, Robin Houston, Marina Kalisky, Han Kang, Neena Khadka, Hari Koirala, Macha Maharjan, Baburam Marasini, Anne McCauley, Saba Mebratu, Natasha Mesko, Atma Ram Pandey, Tej Prasad Panthi, Naveen Paudyal, Anne Peniston, Rajkumar Pokharel, Latika Pradhan, Y.V. Pradhan, Naresh Pratap, Amy Prevatt, K.K. Rai, Mandip Rai, Pooja Pandey Rana, Tirtha Rana, Sheila Reed, Kiran Regmi, Naomi Saville, Gourav Sharma, Jaganath Sharma, Neera Sharma, And Tshering Sherpa, Arjun Bahadur Singh, David Spiro, B.K. Subedi, Stephanie Suhowatsky, Shyam Raj Upreti, and Beth Verhey.

Finally, we owe a debt of gratitude to our dear late colleague Pankaj Mehta. He was a great champion for improving the Nepalis nutrition, and he “sparked” the idea of undertaking this evidence-based review. Pankaj provided invaluable guidance to this review and created the sense of urgency for reducing malnutrition in Nepal through a sustainable multisectoral approach.
Executive Summary

Maternal and child mortality have declined in Nepal to the extent that the country is on track to meet the Millennium Development Goals for maternal and child mortality. Significant improvements have also been made in nutrition, particularly in the last five years. Nevertheless, undernutrition rates remain high in Nepal. Child stunting has fallen from 57.1% in 2001 to 40.5% in 2011.1 Wasting rates actually rose from 11.3% to 12.7% between 2001 and 2006, and then fell by 1.8 points between 2006 and 2011, resulting in an overall minor improvement from 11.3% to 10.9%. Underweight prevalence has also declined by 0.85 percentage points per year between 2001 and 2006, and by 2 percentage points per year between 2006 and 2011. However, improvements in maternal undernutrition2 have been disappointing. Rates declined by only 4 percentage points in the ten years between 1996 and 2006 (2011 data are not yet available). In contrast, available information on vitamin A status, urinary iodine excretion rate as a measure of iodine status, and anemia prevalence all suggest significant improvements in micronutrient status, but more work is required to expand and consolidate those gains.

The basic causes of maternal and child undernutrition in Nepal include poverty, low maternal education, and food security. Underlying causes include low access to health care and a healthy environment (such as sanitation), poor caring behaviors, including poor infant and young child feeding behaviors, and inadequate household food access to a diverse and quality diet. In terms of the life cycle, maternal undernutrition is a cause of child undernutrition. It is also important to note that DHS 2006 figures indicate that 40.7% of 19-year-old girls had already started childbearing. The young age of these mothers, and the fact that 26.3% of girls aged 15-19 years had low BMI, were important contributors to the high rates of low birth weight and childhood stunting. It remains to be seen if the pattern remains the same in 2011.

In view of these high malnutrition rates, the second Nepal Health Sector Program (NHSP II, 2010-2015) prioritizes nutrition. In addition, a Multisectoral Plan for Nutrition has been developed, following a Nutrition Assessment and Gap Analysis in 2009, which highlighted the need for nutrition interventions in other sectors besides health.

This review was undertaken to identify effective, evidenced-based nutrition interventions in the health sector, which could be implemented at scale to address the priority causes of maternal and child undernutrition in Nepal. The review categorizes the selected interventions into three categories: (i) those being implemented in Nepal that should be maintained or strengthened, (ii) those that should be expanded or scaled up, and (iii) those that require more evaluation. It is envisaged that these interventions will be implemented within the NHSP II and the Multisectoral Plan for Nutrition.

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1 2011 malnutrition rate data are from the preliminary report of Nepal’s Demographic and Health Survey (DHS) 2011. The full report was not available when this report was published.

2 As measured by maternal body mass index (BMI) <18.5. BMI is the weight in kilograms divided by the height squared in meters (kg/m²). A cut-off of 18.5 is used to define thinness or acute undernutrition and a BMI of 25 or above usually indicates overweight or obesity.
This review was undertaken by a World Bank consultant in close collaboration with the MOHP and all external development partners supporting nutrition activities through the health sector. As a first step, the consultant reviewed reports and documentation of all health-sector nutrition interventions being implemented in Nepal. The consultant also interviewed relevant departments of the MOHP and all relevant development partners. The review examined proven nutrition interventions, as specified by The Lancet Nutrition Series and the Scaling Up Nutrition initiative and compared the global evidence and experience with that of Nepal. The conclusions of the review were presented at a meeting of government and external development stakeholders in March 2011. A second presentation of the review results, with particular focus on implementation of the chosen interventions, was made to all relevant stakeholders in June 2011, and a second draft of the review report was developed and shared for comments. In October 2011, the report was updated with preliminary data from the Demographic Health Survey 2011. Finally, the review report was also peer reviewed in November 2011. This process led to categorizing the nutrition interventions in Nepal as follows:

a) Interventions Under Implementation and Needing to be Maintained/Strengthened
- Vitamin A supplementation and deworming for children under five years of age
- Zinc supplementation with ORS for treatment of diarrhea
- Supplementation of pregnant and lactating women with iron and folate and deworming
- Salt iodization

b) Interventions to Scale Up or Expand
- Behavior change for good infant and young child feeding (IYCF)
- Hand washing and hygiene counseling
- Multiple micronutrient powders for complementary feeding
- Treatment of severe acute malnutrition (SAM)
- Wheat flour fortification in roller mills

c) Interventions Needing More Research
- Multiple micronutrient supplementation for women during pregnancy
- Iron and folate supplementation for adolescent girls
- Mothers’ groups for nutrition
- Calcium supplementation for women during pregnancy
- Food supplementation for women during pregnancy
- Prevention/treatment of moderate acute malnutrition (MAM)
- Child grant with IYCF counseling and birth registration
- Community-based growth monitoring and promotion
- Commercial fortified complementary food
- Small mill fortification
- Delayed cord clamping
ACCELERATING PROGRESS IN REDUCING MATERNAL AND CHILD UNDERNUTRITION IN NEPAL
The Problem of Undernutrition in Nepal

Nepal has made impressive gains in health and nutrition, despite being one of the poorest countries in the world. The Ministry of Health and Population’s (MOHP) first National Health Sector Program (NHSP I, 2004-2010), successfully reached or surpassed nearly all of its objectives. As a result, Nepal is on track to meet Millennium Development Goals (MDGs) 4 and 5 related to maternal and child mortality. The country has also made similar improvements in nutrition, particularly in the last five years. Nevertheless, undernutrition rates in Nepal remain high. Therefore, the second Nepal Health Sector Program (NHSP II, 2010-2015) prioritizes nutrition.

In late 2009, the World Bank and other development partners commissioned a Nutrition Assessment and Gap Analysis (NAGA) on behalf of the MOHP, Government of Nepal. The review was undertaken to synthesize the necessary information to develop a detailed five-year Multisectoral Nutrition Plan. The NAGA reviewed and recommended evidence-based and feasible interventions for the health, agriculture, education, and welfare sectors. Creating a multisectoral nutrition architecture also was proposed comprising a National Nutrition Coordinating Committee (NNCC) under the auspices of the National Planning Commission (NPC). The NNCC and the NPC will oversee the development of a Multisectoral Plan for Nutrition with sector-specific interventions. The synergized combined effects of the sector interventions will improve maternal and child nutrition during the critical developmental period from conception to 24 months of age.

This review, which was commissioned by the World Bank, on behalf of the MOHP, Government of Nepal and the Nepal Nutrition Group of the external development partners working in Nepal, aims to provide suggestions for the government on effective, feasible, and essential nutrition interventions for the health sector. These interventions act on the main causes of maternal and child undernutrition in Nepal. Health sector interventions are those entirely implemented by the health sector, e.g., by health workers through the health system and/or through interventions led by the health sector, but which may require input from other sectors to be effective or sustainable. This review envisages that these interventions will be implemented within the NHSP II and the Multisectoral Plan for Nutrition. A similar review has been undertaken for nutrition interventions in other sectors, such as agriculture, social protection, environment, and education. The recommended interventions for these sectors—like the health sector interventions—also will be implemented under the Multisectoral Plan for Nutrition.

Review Methodology
A World Bank consultant undertook this review in close collaboration with the MOHP and all the external development partners that support nutrition activities through the health sector. The consultant first reviewed all the health sector reports and documentation for nutrition interventions in Nepal. The consultant also interviewed relevant MOHP department staff and all relevant development partners. The review also
ACCELERATING PROGRESS IN REDUCING MATERNAL AND CHILD UNDERNUTRITION IN NEPAL


DHS 2011 Preliminary Report – Figure 4.

2011 malnutrition rate data are from the preliminary report of Nepal’s Demographic and Health Survey (DHS) 2011. The full report was not available when this report was published.

Maternal and Child Mortality and Nutrition in Nepal

Nepal has achieved impressive reductions in poverty, all forms of child and maternal mortality and in child undernutrition.

All forms of child and maternal mortality rates have decreased by approximately half over the last 10 years, according to Demographic Health Surveys (DHS) in 1996, 2001, 2006, and 2011. For example, maternal mortality declined from 530 in 1996 to 281 in 2006 and under five mortality has declined from 118 to 54 between 1996 and 2011. However, the rate of decline has slowed considerably since 2006, and neonatal mortality actually is unchanged between 2006 and 2011.

As shown in Figure 1, child stunting has fallen from 57.1% in 2001 to 40.5% in 2011, an impressive decrease of 1.7 percentage points per year (1.56 points/year between 2001 and 2006 and 1.76 points/year between 2006 and 2011). Wasting rates actually rose from 11.3% to 12.7% between 2001-2006 and then fell by 1.8 points between 2006 and 2011, resulting in an overall minor improvement from 11.3% to 10.9%. Underweight prevalence, which is essentially a composite indicator of stunting and wasting, has also declined by 0.85 percentage points per year between 2001 and 2006 and by 2 percentage points per year between 2006 and 2011. Child nutritional status improved faster from 2006-2011 compared to 2001-2006, according to this data. Those achievements stand in contrast to slower improvements in child mortality rates over the last five years. Improvements in maternal undernutrition have been disappointing. Rates declined by only 4...
percentage points in the ten years between 1996 and 2006. Data for 2011 are not yet available.

Despite the country’s impressive reductions in stunting levels, prevalence remains high at 40% (considered “very high”). Moreover, although there are some geographical and regional differences, stunting prevalence is consistently high throughout the country. In 2006, when national prevalence was 49.3%, prevalence was above 40% in all rural areas—where 85% of the population lives—in all three ecological zones, in all five regions, and in all sub-regions, except one. In 2011, national prevalence fell to 40.5%—still a level considered “very high”7 by the WHO cut-offs—but declining prevalence has occurred equally across the country as shown in Figure 2.

Currently, the stunting prevalence in the terai—the savannah and grasslands region—has fallen below 40%, and the prevalence in rural areas and the hills is only slightly above 40%. Data on the sub-regions is not yet available for 2011, but the pattern likely remains. However, on an economic basis, it appears that disparities are widening. An analysis of 1996, 2001, and 2006 DHS data illustrated that prevalence of severe stunting in the lowest quintile was almost triple that of prevalence in the highest quintile in 2006. Whereas, there was little difference in stunting prevalence between economic quintiles in 1996 and 2001. Nevertheless, according to the 2006 DHS, 31% of children in the highest wealth quintile are moderately or severely stunted.

In contrast to stunting, changes in wasting prevalence have been very inconsistent. Prevalence in urban areas, although relatively low, actually increased between 2006 and 2011, after declining between 2001 and 2006. Wasting in rural areas followed the opposite pattern, rising between 2001 and 2006 and declining in the last five years. In the ecological regions, a dramatic reduction in wasting prevalence in the terai, from 17% to 11% has been counteracted by increases in prevalence in the mountains and hills. As Figure 3 demonstrates, disparities across the different regions are decreasing and converging at just above 10%, and prevalence in the most populous areas, rural areas, and the terai has fallen significantly. However, the rising trend in urban areas, the hills, and the mountains is cause for concern.

As noted above, maternal nutritional status has not improved in line with child nutritional status or reductions in maternal mortality. The proportion of women with low body mass index (BMI) has remained virtually unchanged between 1996 and 2006, having fallen from 28% to 24% (data for 2011 is not yet available). Rural prevalence rates have declined at an even slower rate, by only 3 percentage points from 29% to 26%. Thus in 2006, almost a quarter of all Nepali women were undernourished. Nepal’s BMI rate of 24.4% compares to 20% in Cambodia in 2006, 34% in Bangladesh in 2004, and 36% in India in 2005/6.

Low birth weight (LBW) is an important measure of child undernutrition and is an outcome of maternal undernutrition. LBW is a significant problem in Nepal. Overall, the prevalence of LBW in Nepal seems to be in the range of 15%-30%. According to the DHS 2006, of the babies weighed at birth 17.2% had a reported LBW and 14.3% were below 2.5kg, the World Health Organization’s (WHO) definition of LBW. This data is unlikely to reflect the true situation because (i) so few babies are weighed at birth; (ii) few births take place in health facilities; and, (iii) the babies who were weighed are likely to be from more educated and/or higher wealth quintile families. The DHS 2006 also found that 19.2% of mothers reported that at birth, their babies were “very small” or “smaller than average.”

The National Plan of Action on Nutrition 2007 cited studies indicating that LBW prevalence was between 20%-32% based on hospital-based studies and 14%-19% in community-based studies. A study of more than 3,500 mother-infant pairs from four major hospitals in different regions of Nepal was cited as reporting a LBW prevalence of 27% and a mean birth weight of 2.8 kg. The majority of these babies (70%) were small for date, indicating intrauterine growth retardation. In an analysis on birth weight by UNICEF, which included adjustments to account for biases in the data, an estimated prevalence of 21% for 2001 and 2006 was suggested for Nepal. This compares to a rate of 28% in India in 2005 and 21.6% in Bangladesh in 2006. South Asia suffers from some of the highest rates of LBW in the world.

Nepali women and children also suffer from some forms of micronutrient malnutrition. Currently, almost half of all children under five (46%), and just over a third of reproductive age women (35%) are anemic. Unfortunately, a dramatic decline in anemia reduction between 2001 and 2006 did not continue into 2011 (Figure 4). How Nepal made these significant achievements and the implications for the slowdown in improvements will be discussed below. Iron deficiency in young children can lead to losses of up to 25 IQ points.

The most recent data on vitamin A status is from the 1998 Nepal Micronutrient Status Survey. This survey found that 4.7% of women were night blind (16.7% in their last pregnancy), and 0.27% and 0.33% of preschool age children had night blindness and Bitot’s spots respectively. Respectively, 16.6% and 32.3% of women and preschool aged children had subclinical vitamin A
deficiency as measured by serum retinol rates <0.70µmol/l. The WHO categorizes a level of night blindness above 5% as “moderate” and a prevalence of low serum retinol >10% as moderate and > 20% as severe. By these definitions, therefore, Nepal had moderate vitamin A deficiency in women and severe deficiency in pregnant women and young children in 1998. In contrast, the DHS 2006 reports that only 5.2% of women had night blindness in their last pregnancy. The vitamin A status of under five children is also believed to have improved due to a successful program of vitamin A supplementation (see later discussion).

Nepal has also managed to address the problem of iodine deficiency through salt iodization. Median urinary iodine levels in school age children were found to be 188 µg/L and 202.9 µg/L in 2005 and 2007, respectively. This is slightly above the targeted population range for children of 100-199 µg/L, but suggests that the iodine status of women may be deficient. Iodine deficiency during pregnancy leads to an average loss of 13 IQ points in children.

Unfortunately, no national data is available on zinc or folic acid deficiency. In 2000, a small study in Bhaktapur found high levels of zinc deficiency in otherwise healthy women. The deficiency was associated with intake of phytate but not with deficiencies in dietary zinc intake, implying that although women may consume zinc through their foods, high levels of phytate in the food, which bind with zinc, were causing the zinc to be unavailable and thereby contributing to deficiency. Zinc deficiency often coexists with iron deficiency. Levels of folate deficiency in Nepal are also unknown, but deficiency is likely to be widespread. Pregnant Nepali women have benefited from combined supplementation with iron and folic acid, however, as will be discussed further.

The Causes of Maternal and Child Undernutrition

A conceptual framework developed by UNICEF in the 1990s is widely accepted as the best way to understand the different causes and levels of undernutrition. As Figure 5 illustrates, the immediate causes of maternal and child undernutrition are inadequate dietary intake and disease. At the household/family level, inadequate dietary intake and disease are themselves caused by inadequate access to food, care practices (such as feeding), and access to water, sanitation and health services – commonly referred to as FOOD, CARE and HEALTH. These underlying causes at the household level are themselves affected by basic causes at the societal level such as inadequate food supply, income and poverty, maternal education, investment in health services, infrastructure (roads

![FIGURE 5: Conceptual Framework for Analyzing the Causes of Malnutrition](Ref: UNICEF)
ACCELERATING PROGRESS IN REDUCING MATERNAL AND CHILD UNDERNUTRITION IN NEPAL

and water supply), social protection schemes, and so on. Thus, for example, access to food at the household level is affected by food availability and access by the community, such as proximity to markets, availability of roads or purchasing power.

To determine the causes of malnutrition in a given context, and where to intervene in the hierarchy, each nutrition “requirement” needs to be considered systematically in a decision tree, as shown in Annex 1. While many of the basic causes of undernutrition may be important, their impact is influenced by the proximate causes. Reducing poverty, for example, will not automatically improve nutrition if the causes of undernutrition higher up the hierarchy are not also addressed. Likewise, it is possible to improve nutrition particularly in the short term without significantly improving all the basic causes. For example, improving access to health services and improving care behaviors can improve nutrition even before poverty is reduced.\(^\text{13}\)

The UNICEF causality framework does not reflect the inter-generational cause of undernutrition well. Small adult women, i.e., undernourished women are more likely to have LBW babies, in part because maternal size has an important influence on birth weight. Children born with LBW are more likely to have growth failure during childhood. In turn, girls born with LBW are more likely to become small adult women. This cycle is exacerbated if girls start childbearing while they are adolescents. Breaking the cycle requires improving maternal nutrition and delaying pregnancy until girls are fully grown, such that the distribution of birth weights shifts to the right so that mean birth weight is increased.\(^\text{14}\)

In this conceptual framework for the causes of malnutrition, improving birth weight is extremely important because birth weight has an enormous impact on child growth faltering, child development, and final adult height. The causes of stunting are rooted in inadequate fetal growth, which is strongly influenced by maternal nutrition and health. About half of the growth failure accrued by two years of age occurs in utero.\(^\text{15}\) Comparison of child growth patterns with the new WHO growth standards reveals that children are born with weights, and particular lengths, well below the WHO standard, particularly in South Asia.\(^\text{16}\)

Moreover, growth faltering after birth is believed to be caused by a combination of the trajectory of growth established in utero and sub-optimal post-natal nutrition.\(^\text{17}\) Therefore, there are three potential routes to becoming stunted: (i) being born small and not catching up, (ii) being born with a trajectory for constrained growth that has been set in


\(^\text{17}\) Dewey K. and Huffman S. Maternal, infant and young child nutrition: combining efforts to maximize impacts on child growth and micronutrient status. FNB 2009 (supplement).
utero, and (iii) suffering sub-optimal post-natal nutrition, which constrains growth. Maternal nutrition strongly influences the first two of these routes, which appear to occur together; with the result that poor maternal nutrition may be as important as inadequate infant and young child feeding practices in determining height at two years of age, depending on the country setting. Thus, as poor maternal status is manifested in low birth weight, birth weight is a strong predictor of height in early childhood.18

As noted above, an added dimension is the impact of starting childbearing during adolescence. Adolescent girls, in particular undernourished adolescent girls, are at high risk of delivering low birth weight babies. Dewey and Huffman use the following illustration (Figure 7). In Malawian children, by two years of age, there is already a 9cm difference in height from the WHO standards. Two centimeters of the deficit (20%) is already present at birth, 4 cm (40%) occurs between birth and 12 months, and another 3 cm (30%) occurs between 12 and 24 months. By six months of age, the infants are already 4cm below the WHO standard; half of the deficit is attributable to low birth length and half to growth faltering in the six months after birth. In Cambodian children, the total deficit by 24-35 months of age is much less – 6cm compared to 10cm in Malawian children. Moreover, there is no deficit at birth and only a loss of 1 cm by six months compared to 4 cm in Malawian children. Thus in Malawi, growth faltering during the 6-24 month period makes up about half of the total deficit; whereas in Cambodia, it makes up the majority (83%) of the total 6 cm lost. The authors attribute this difference to the high rate of teenage pregnancy in Malawi, even though maternal undernutrition is much higher in Cambodian women. In both countries, interventions before and after pregnancy are needed. In Malawi, one necessary prenatal intervention is to prevent teenage pregnancies. Whereas in Cambodia, poor maternal nutrition is likely contributing to growth faltering in children under two years of age.19

For these reasons, the “window of opportunity” for addressing child undernutrition is from pre-conception through pregnancy, the period of exclusive breastfeeding (0-6 months), and the target age for complementary feeding (6-24 months). Integrated actions are required to improve maternal, infant and young child health and nutrition simultaneously.

The Causes of Maternal and Child Undernutrition in Nepal

The following section briefly discusses the potential causes of maternal and child undernutrition in Nepal using the UNICEF conceptual framework and the intergenerational cycle of growth faltering.

In Nepal, as in many other countries, stunting prevalence is closely correlated with maternal education. As shown in

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19 Dewey K. and Huffman S. Maternal, infant and young child nutrition: combining efforts to maximize impacts on child growth and micronutrient status. FNB 2009 (supplement).
Figure 8, there is a systematically higher rate of stunting in children of mothers with less education. In 2006, the rate of stunting in children of women with no education was almost four times that of women with school leaving certificate (SLC) and above, and in 2011, it was almost double. However, Figure 8 also shows that the rate of child stunting has declined fastest in the children of women with less education, and the disparity in stunting rates thus has declined significantly in the last five years. Worryingly, the rate of stunting in children of women with higher education appears to be rising. The pattern of systematically higher rates of stunting in children of women with no education also exists for wasting. Although, in Nepal for some reason, the prevalence of wasting in children of mothers with some secondary education rose and fell dramatically before and after 2006, and the rates of wasting in children of women with primary education and SLC and above are rising quite rapidly. Overall, for both stunting and wasting, rates are systematically higher in children of women with lower education, but paradoxically, women with higher education in Nepal appear to have a disproportionate prevalence of child undernutrition.

Maternal undernutrition is also closely correlated with maternal education. DHS 2006 data indicate that mothers with no education were 2.3 times more likely to have low BMI as mothers with SLC or higher. Looking at prevalence over the years, there is a dramatic difference between the decline in undernutrition prevalence seen in women with some education versus none. The prevalence of low BMI in women with no education has essentially not changed since 1996, whereas for all women with some education, prevalence as fallen by approximately 10 percentage points over the ten-year period. As a result, contrary to child stunting, disparities in maternal nutrition—i.e., the difference in undernutrition prevalence between women with no education compared to SLC or higher—are widening rather than declining.

Improvements in maternal education have occurred in line with other social developments in Nepal. In 2011, 39.7% of Nepali women aged 15-49 had no education, compared to more than half (53.1%) in 2006, and 73% in 2001. Although the correlation between maternal education and poor child and maternal nutrition is certainly confounded by socioeconomic status, i.e., better off mothers are more likely to be better educated. Maternal education is well accepted as one of the long-route interventions to improve child nutrition. In Brazil for example, the prevalence of stunting fell from 37.1% in 1974/5 to 7.1% in 2006/7, a decline of more than 80%. Two-thirds of the decline was attributed to improvements in four factors: maternal schooling, family purchasing power, maternal and child health care, and coverage of water supply and sanitation services.

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20 DHS 1996 (Table 2.4.2), DHS 2006 (Table 3.2.1) and DHS 2011 Preliminary Report (Table 2).
Nepal has also been relatively successful in reducing poverty. In the period 1995-96 to 2009-10, the Nepal poverty headcount ratio (PHCR) fell from 41.8% to 25.2%. The reduction in poverty levels has been attributed to the rise in remittance inflow, improvements in common Nepalis’ access to basic facilities, and the government’s significant investment in the social sector. Nevertheless, a quarter of all Nepalis are poor, meaning they do not have enough money to purchase 2,200 calories per day and essential non-food items. Not surprisingly, the household’s wealth quintile correlates closely with stunting prevalence. The association is less pronounced for wasting but maternal undernutrition is also higher in the lower wealth quintiles compared to the highest. The data in Figure 9 are from the DHS 2006, because child and maternal nutrition rates by economic quintile for 2011 were not available when this report was written. It is notable, however, that even amongst the richest quintiles, child stunting still affects almost a third of all children, and more than 10% of women are undernourished.

The poor nutritional situation in Nepal is often attributed to poor food security. There are a number of definitions of food security but one commonly used in Nepal is that of the World Food Programme (WFP). The WFP defines food security as having three core elements: availability, access, and utilization of food. By this definition, there is an overlap with the conceptual framework for the causes of poor nutrition (because utilization includes what is called “care” in the conceptual framework), which often makes it hard to tease out the extent to which poor household’s food availability and access is contributing to undernutrition compared to the other very important causes of health and care. Moreover, food security needs to be considered at national, community, and household level. At a national level, since the 1980s, Nepal’s population growth rate has outstripped cereal production growth, and domestic cereal supply is reportedly insufficient to meet national needs. Information from the Department of Agriculture indicates that since 2006, Nepal nationally has been in a food deficit state based on local production, and historically, the mountain and hill eco zones have always been deficit. Data from the Statistical Year Book of Nepal 2007 indicates that 49 out of the 75 districts in the country were considered “food deficit” in 2005/2006, based on production data, and the Food Security Atlas of Nepal reports that 44 districts were marginally to severely food deficit in the period 2007-2009. As shown in Figure 10, the main problem, therefore, is that the terai—the traditional breadbasket of Nepal—has had declining production vis-à-vis requirements since 2004. However, Figure 10 also notably shows that production has significantly improved since 2008, and Nepal is no longer in food deficit.

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22 First and Third Nepal Living Standards Survey. (Results of Third Nepal Living Standards Survey are preliminary).
24 Utilization of food includes the household’s use of the food to which they have access and an individual’s ability to absorb and utilize the nutrients. This dimension of food security is affected by the “care” and “health” components of the nutrition conceptual framework.
The reasons for the insufficient domestic production of food include the small proportion of total land under agriculture (16%), and low yields per hectare, which are the result of insufficient inputs (irrigation, improved seeds, fertilizer, pesticides, and mechanization), the preponderance of small landholdings, and value chain complexities. In addition, the share of public investment in agriculture and infrastructure has been declining. The shortfall in domestic production therefore has been offset by an increase in food imports, primarily from India. As a result, in terms of absolute availability, Nepal actually compares favorably to other South Asian countries. Nepal’s per capita cereal availability (kg/capita/year) is second only to Bangladesh amongst the five South Asian countries; per capita fruits and vegetables availability is highest, and milk is third highest (Figure 12).

By all accounts, however, a significant proportion of the Nepali population has problems with food access because of prevailing high levels of poverty, as noted above. Even though food may be available, they are unable to purchase adequate amounts of food or an adequate diversity of foods. High rates of poverty are compounded by poor physical access due to insufficient markets and roads, and high transport costs for food shipped to remote areas. In addition, although the agriculture sector employs nearly 70% of the workforce, poverty is concentrated in this sector, and many farmers are not able to rely on their own production for food supply or income. Once again, lack of markets and roads contribute to this, as well as the low yields, small size of landholdings, and low prices caused by competition with subsidized foods imported from India. Agricultural productivity, income, and poverty are

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26 Production and yield have fallen or remained stagnant for both paddy and wheat over the last ten years, though both have increased significantly for maize in the same period due to use of hybrid maize seed.
27 For example, lack of transport infrastructure limits access to markets, while food trade across the open border with India may affect competitiveness of domestically produced commodities through the subsidies on agriculture and government administered minimum support prices in India. Although Nepal has some natural advantages in producing high-value agriculture, such as fruits and vegetables, to exploit this potential the marketing system requires grading, processing, and packaging facilities to deal with the seasonality of produce and fluctuations in market prices. S.S Acharya. Agricultural marketing in Asia and the Pacific: issues and priorities. http://fao.org/docrep/ad639e/ad639e05.htm.
linked inextricably, and nutritional status is significantly lower for the poor than the rich, and for rural populations. Therefore, apparently, absolute food availability is not always a primary cause of undernutrition, especially in young children—considering the small amounts that they eat. Rather, food access is likely to be constrained for significant proportions of families. The Living Standards Survey data indicates that some 25% of Nepalis are not able to purchase 2,200 calories of food per day. Further studies on the cost of a nutritious diet, using a methodology developed by Save the Children, could provide information on the extent to which poverty is a constraint to good nutrition.

Although data is very limited, some amount of child, and certainly maternal nutrition, is likely related to cultural practices associated with intra-household food utilization. In patriarchal societies, women commonly eat last and men eat the highest quality food. If there is a food shortage, women are more likely to go without eating. Meanwhile, in developing countries, it is common to feed children, even young children, from the family pot. These communal and cultural practices stymy data collection on exactly how much children are eating and whether special foods are prepared for young children. An annotated bibliography of Food Utilization Practices, Beliefs and Taboos in Nepal refers to the following practices: a hierarchy in the distribution of food with a detrimental effect on maternal nutrition, child plate sharing leading to poor intake of micronutrients, lower consumption of food by women compared to other members of the family, particularly during pregnancy, eating down and taboos during pregnancy, and food taboos during lactation.

Access to health care, another underlying cause of undernutrition, has improved by most indicators. Although coverage of antenatal care by a skilled provider and skilled delivery are still relatively low, they have been increasing significantly, in particular between 2006 and 2011. Coverage of child immunization is near universal, as is vitamin A supplementation. Treatment of child illness, as demonstrated by treatment figures for acute respiratory infections (ARI), has also been improving although it

FIGURE 12: Per Capita Availability of Foods in South Asian Countries (kg/capita/year)


Ref: National Family Health Survey 1996, DHS 2001, 2006, and 2011 (Preliminary Report); Skilled ANC – antenatal care by doctor, nurse or midwife, SBA – skilled birth attendant i.e., doctor, nurse or midwife; *2001 figure includes treatment for ARI AND fever; ** VAS – vitamin A supplementation - 2001 figure is for VAS “during most recent distribution,” whereas 2006 figure is “in last six months.”

remains low (Figure 13). The Government of Nepal has established free essential health services at the health post and sub-health post levels, and targeted free health care in Primary Health Centers and District Hospitals, with plans to expand these interventions up to regional and national health facilities.\textsuperscript{32}

More Nepalis had a healthier living environment in 2006 than they did in 2001. Access to an improved water source increased from 72.8\% to 82.5\% and access to a toilet facility from 30.5\% to 48\%. More people also have electricity in their homes – 49.5\% in 2006 compared to 24.6\% in 2001, and whereas 85.7\% of people had homes with an earth/mud or dung floor in 2001, this percentage has fallen to 76.6\% in 2006. Nevertheless, large proportions of the Nepali population still have no access to these basic standards of living. For access to electricity, toilet facilities, and floor material, a large difference exists between rural and urban areas. For example, 72.1\% of urban residents have water on their premises compared to 44.4\% of rural inhabitants, and only 42.2\% of rural residents have electricity compared to 89.7\% of urban dwellers. Access to improved water is similar in urban (90\%) and rural (81.1\%) areas.

The incidence of disease is another important cause of undernutrition. The percentage of children under five with ARI, fever or diarrhea in the two weeks prior to the DHS 2006 data collection was 5.3\%, 16.9\%, and 11.9\% respectively. This compares favorably to 22.8\%, 32\%, and 20.4\% respectively in 2001. However, 2011 data suggest small increases in the incidence of fever and diarrhea to 19\% and 14\% respectively, and no change in ARI (5\%). Thus, although the incidence of common childhood illnesses, which are also the major causes of mortality, declined significantly between 2001 and 2006, with the most significant declines in ARI prevalence, the latest data suggests a reversal in the situation. The initial declines could be attributed to improved living conditions and access to, and quality of, health care. The reason for the apparent recent increases in child illness incidence needs further investigation.

A third underlying cause of undernutrition is care of women and children. A comparison of selected indicators from DHS 2001, 2006, and 2011,\textsuperscript{33} shown in the table below, indicate the following:

- Overall care of women improved between 2001 and 2006 and apparently continued to improve between 2006 and 2011. Significantly, more women are accessing health services related to pregnancy and delivery, and there were small but positive changes in teenage pregnancies and birth intervals between 2001 and 2006. The majority of women reported being able to access contraception and eating vitamin A rich foods. Consumption of iron rich foods remains low, however. Although maternal care has improved in many areas, the situation is still far from optimal.

- Care of sick children, as illustrated by care of children with diarrhea, has improved but remains inadequate, with only about a third of all children being taken to a health facility or being given oral rehydration solution (ORS) and a similar proportion get no treatment at all. Treatment of children with diarrhea will be discussed further in the following chapter.

- Hygiene care practices are also inadequate. More caregivers correctly disposed of child feces in 2006 compared to 2001, but still, only half


\textsuperscript{33} At the time of the report, only the Preliminary Report for DHS 2011 was available. Therefore, 2011 data for many of the indicators was unavailable.
### Care of women

<table>
<thead>
<tr>
<th>Indicator</th>
<th>DHS 2001 (%)</th>
<th>DHS 2006 (%)</th>
<th>% improvement</th>
<th>DHS 2011 (%)</th>
<th>% improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage receiving ANC from skilled birth attendant</td>
<td>28</td>
<td>43.7</td>
<td>56%</td>
<td>58</td>
<td>32%</td>
</tr>
<tr>
<td>Percentage with 4+ ANC visits</td>
<td>14.3</td>
<td>29.4</td>
<td>106%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Average birth interval in months</td>
<td>31.8</td>
<td>33.6</td>
<td>6%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Percentage delivered in a health facility</td>
<td>9.1</td>
<td>17.7</td>
<td>55%</td>
<td>28.1</td>
<td>59%</td>
</tr>
<tr>
<td>Percentage of men who made specific preparations before delivery</td>
<td>-</td>
<td>70.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Percentage with post natal check up</td>
<td>20.7</td>
<td>33</td>
<td>59%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Median age at first birth (women 25-49)</td>
<td>19.9</td>
<td>19.9</td>
<td>0%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Adolescents (15-19 yrs) started childbearing</td>
<td>21.4</td>
<td>18.5</td>
<td>14%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Unmet need for family planning</td>
<td>27.8</td>
<td>24.6</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Consumption of vitamin A rich foods</td>
<td>-</td>
<td>76.4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Consumption of iron rich foods</td>
<td>-</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Women not using tobacco</td>
<td>71.2</td>
<td>80.4</td>
<td>13%</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Care of sick children

<table>
<thead>
<tr>
<th>Indicator</th>
<th>DHS 2001 (%)</th>
<th>DHS 2006 (%)</th>
<th>% improvement</th>
<th>DHS 2011 (%)</th>
<th>% improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taken to health facility or provider</td>
<td>21</td>
<td>26.9</td>
<td>28%</td>
<td>38</td>
<td>41%</td>
</tr>
<tr>
<td>Received ORS</td>
<td>32</td>
<td>29.3</td>
<td>-8%</td>
<td>39</td>
<td>33%</td>
</tr>
<tr>
<td>No treatment</td>
<td>35</td>
<td>34</td>
<td>-3%</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Hygiene practices

<table>
<thead>
<tr>
<th>Indicator</th>
<th>DHS 2001 (%)</th>
<th>DHS 2006 (%)</th>
<th>% improvement</th>
<th>DHS 2011 (%)</th>
<th>% improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe disposal of child feces</td>
<td>17.5</td>
<td>26</td>
<td>49%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hand washing with soap (women)</td>
<td>-</td>
<td>64.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Infant feeding

<table>
<thead>
<tr>
<th>Indicator</th>
<th>DHS 2001 (%)</th>
<th>DHS 2006 (%)</th>
<th>% improvement</th>
<th>DHS 2011 (%)</th>
<th>% improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation of breastfeeding within 1 hour</td>
<td>31.1</td>
<td>35.4</td>
<td>14%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Initiation of breastfeeding within 24 hours</td>
<td>64.9</td>
<td>85</td>
<td>31%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Exclusive breastfeeding &lt;6 months children</td>
<td>68.3</td>
<td>53</td>
<td>-22%</td>
<td>69.6</td>
<td>31%</td>
</tr>
<tr>
<td>Complementary feeding in children 6-9 months</td>
<td>66.2</td>
<td>75</td>
<td>13%</td>
<td>70.4</td>
<td>-6%</td>
</tr>
<tr>
<td>Complementary feeding in children &lt;6 months (early CF)</td>
<td>10.1</td>
<td>13</td>
<td>-29%</td>
<td>9.5</td>
<td>27%</td>
</tr>
<tr>
<td>Bottle feeding in children &lt; 6 months</td>
<td>3.9</td>
<td>4</td>
<td>-3%</td>
<td>5.8</td>
<td>-45%</td>
</tr>
<tr>
<td>Consumption of vitamin A rich foods</td>
<td>-</td>
<td>64</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Consumption of iron rich foods</td>
<td>-</td>
<td>24.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Color code: improvement

- >50%
- 25-50%
- <25%
- <0%

It is however encouraging that almost two-thirds of women reported washing their hands with soap the previous day, according to the 2006 DHS.

Overall, infant feeding practices in Nepal are poor, and some complementary feeding practices are generally worsening. Although initiation of breastfeeding improved slightly between 2001 and 2006, and exclusive breastfeeding increased substantially between 2006 and 2011, the current level of exclusive breastfeeding is similar to what it was in 2001. A modest improvement in the proportion of children 6-9 months receiving complementary feeding between 2001 and 2006 has been counteracted by a greater decrease between 2006 and 2011. Since 2006, there has been a reduction in the proportion of children receiving complementary food before six months, essentially off-setting an increase between 2001 and 2006. The proportion of children <6 months fed with a bottle has almost doubled, although the rates remain very low.

Overall, the above snapshot of selected care practices for women and children suggest that inadequate care is potentially contributing to the poor nutritional status,
and only care for women appears to be improving in a comprehensive way. There is significant room for improvement in all areas. Moreover, care practices, particularly in relation to care of women, are much lower in rural areas than urban areas, for women with no education and for the poorest women. Differences in care of children with diarrhea are significantly less in relation to residence, education and poverty.

The WHO categorizes Nepal’s level of maternal undernutrition of 24.4% in 2006 as “high prevalence” and a “serious situation.” Nepal also had a high rate of teenage pregnancies in the same year - 28.7% of girls 18 years old and 40.7% of girls 19 years old had started childbearing. Moreover, 26.3% of girls 15-19 years old had low BMI, the highest percentage of any age group except for women over 40. This would suggest that a significant amount of growth faltering in Nepali children could be attributed to maternal undernutrition and adolescent pregnancies, including a combination of both undernutrition in Nepali adolescent girls. The limited data on low birth weight supports this. LBW prevalence was higher amongst mothers less than 20 years (19.2% in <20 years compared to 12.4% in mothers 20-34 years), and “small babies” were also slightly more common in mothers <20 years (21.6% compared to 18% in women 20-34 years old). Unrelated to the intergenerational cycle of growth failure, but important in considering ways to reduce low birth weight, it is notable that 31.3% of mothers who smoke had a LBW baby compared to only 13.3% of non-smokers, according to the 2006 DHS. Smoking is a known risk factor for LBW.

In summary, despite improvements, child undernutrition remains a significant problem in Nepal, including amongst the most well off and in urban areas. It appears to be caused by poor infant and young child feeding practices, high rates of illness, and poor care practices during illness. A major cause also appears to be poor maternal nutrition and adolescent pregnancy leading to low birth weight and constrained growth postpartum. Approximately a quarter of Nepali women are undernourished and almost half of all adolescents have already started childbearing. A major focus of a future nutrition program must be to improve maternal nutrition through improved care of women and to reduce teenage pregnancies. By all accounts, Nepal has invested heavily in the social sector, the results of which can be seen in increasing health care coverage, reductions in mortality, and improvements in child nutrition. The “missing piece” appears to be care and nutrition of women and young girls. Although care of women has improved, judging by the snapshot of information presented, optimal care and adequate nutrition, still eludes most Nepali women, particularly the poor, those in rural areas, and those with less education.

35 DHS 2006. Table 11.1.
Improving Nutrition in Nepal: A Review of the Evidence for Essential Interventions in the Health Sector

Despite significant improvements in several aspects of child nutrition, the overall nutritional status of Nepalese women and children remains poor, and additional efforts are needed to maintain and accelerate improvements. The objective of this review is to identify effective and feasible interventions within the health sector to reduce the causes of undernutrition in Nepal.

In 2008, The Lancet journal commissioned an analysis of the prevalence and impact of undernutrition and reviewed the state of the evidence for interventions with proven effectiveness. The Lancet Nutrition Series (LNS) selected interventions to review based on the conceptual framework presented earlier. The LNS focused on “short-route” interventions and those for which there were controlled trials—although they also considered non-randomized and observational studies. The team excluded several important interventions that might have broad and long-term benefits, such as education, untargeted economic strategies or those for poverty alleviation, agricultural modifications, farming subsidies, structural adjustments, social and political changes, and land reform.

The LNS calculated that 90% of the world’s undernourished children live in just 36 countries. Nepal is one of those countries. The review identified 14 interventions for which they found sufficient evidence to implement the interventions effectively in all 36 countries, and an additional 11 interventions, which should be implemented in specific situational contexts, e.g., areas of food insecurity or high malaria burden. The LNS authors estimated that universal coverage with the full package of proven interventions could prevent one quarter of child deaths under 36 months of age and reduce the prevalence of stunting at 36 months of age by about one-third, averting some 60 million disability-adjusted-life-years (DALYs). To eliminate stunting in the long term, the selected interventions need to be supplemented by improvements in the underlying determinants of undernutrition, such as poverty, poor education, disease burden and lack of women’s empowerment.

### Nutrition Interventions with Sufficient Evidence to Implement in Specific Situational Contexts

#### Maternal and Birth Outcomes
- Maternal supplements of balanced energy and protein
- Maternal iodine supplements
- Maternal deworming in pregnancy
- Intermittent preventative treatment for malaria
- Insecticide-treated bednets

#### Newborn Babies
- Neonatal vitamin A supplementation
- Delayed cord clamping

#### Infants and Children
- Conditional cash transfer programs (with nutritional education)
- Deworming
- Iron fortification and supplementation program
- Insecticide-treated bednets

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A major message of the LNS was that, while nutrition is complex and multifaceted, significant and important reductions can be made relatively quickly through interventions that are cost-effective and feasible to implement in low-resource countries. In addition to identifying “essential interventions,” the series identified seven challenges to addressing undernutrition, including the importance of “doing the right things,” and “not doing the wrong things,” acting at scale and reaching those in need. Cross-cutting all of these findings was the core message that “pregnancy to age 24 months is the critical window of opportunity for the delivery of nutrition interventions.”

The LNS helped to galvanize international nutrition efforts. One outcome of the series was the formation of a “movement” called Scaling Up Nutrition (SUN), which

Updated List of Effective Nutrition Interventions

<table>
<thead>
<tr>
<th>SUN INTERVENTIONS</th>
<th>LNS INTERVENTIONS</th>
<th>REASON FOR DEVIATION FROM THE LANCET (IF ANY)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behavior change interventions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breastfeeding promotion</td>
<td>Yes (individual and group counseling) CORE</td>
<td></td>
</tr>
<tr>
<td>Promotion of appropriate and timely complementary feeding (excluding provision of complementary food)</td>
<td>Yes (including additional food supplements in food-insecure populations) CORE</td>
<td></td>
</tr>
<tr>
<td>Promotion of hand washing</td>
<td>Yes – hand washing or hygiene interventions CORE</td>
<td></td>
</tr>
<tr>
<td><strong>Micronutrient and deworming interventions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A supplements</td>
<td>Yes – vitamin A fortification or supplementation CORE</td>
<td>Only vitamin A supplementation, not fortification</td>
</tr>
<tr>
<td>Therapeutic zinc supplements for treatment of diarrhea</td>
<td>Yes – zinc in management of diarrhea CORE</td>
<td></td>
</tr>
<tr>
<td>Multiple micronutrient powders for children &lt; 2 years</td>
<td>No</td>
<td>Added as an evidence-based intervention to reduce anemia</td>
</tr>
<tr>
<td><strong>Deworming</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron and folic acid supplements for pregnant women</td>
<td>Yes CORE</td>
<td></td>
</tr>
<tr>
<td>Iron fortification of staple foods</td>
<td>Yes – iron fortification and supplementation SPECIFIC CONTEXTS</td>
<td>Given the high prevalence of iron deficiency anemia and low costs of iron fortification, a wider application is justified</td>
</tr>
<tr>
<td>Salt iodization</td>
<td>Yes CORE</td>
<td></td>
</tr>
<tr>
<td>Iodized oil capsules</td>
<td>Yes – maternal iodine supplements SPECIFIC CONTEXTS</td>
<td></td>
</tr>
<tr>
<td><strong>Complementary and therapeutic feeding interventions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention or treatment of moderately malnourished children 6-23 months using complementary foods</td>
<td>No – except that “additional food supplements in food-insecure areas” was included in the complementary feeding intervention</td>
<td>Added based on recent research and humanitarian imperative</td>
</tr>
<tr>
<td>Treatment of severe acute malnutrition using a community based approach</td>
<td>Yes (community based approach was not specified) CORE</td>
<td>Community management of treatment added on the basis of new evidence</td>
</tr>
</tbody>
</table>

calls for enhancing nutrition through a Framework for Action\textsuperscript{37} and a Roadmap for Scaling up Nutrition.\textsuperscript{38} In conjunction with SUN’s establishment, the World Bank funded a costing of the package of essential interventions.\textsuperscript{39} Taking into consideration new evidence on some key interventions and implementation feasibility, the LNS list of essential interventions was slightly adapted and “updated.” The “updated” “SUN list” of essential nutrition interventions includes two new interventions and excludes several others for reasons noted in the table above.\textsuperscript{40}

Although the following interventions from the LNS were not included in the SUN list, the assumption is that other programs will implement several of them, such as malaria or safe motherhood programs. The SUN interventions that the health sector will implement are reviewed below. The recommended interventions take into account Nepal’s experience, if any, their applicability and feasibility to Nepal, and any new global experience on effectiveness or implementation guidance. In addition, interventions that are currently being implemented in Nepal—which are endorsed by the LNS or SUN list—are reviewed below.

**Effective Nutrition Interventions Not Costed by the Scaling Up Nutrition Analysis**

<table>
<thead>
<tr>
<th>LNS INTERVENTIONS</th>
<th>REASON NOT INCLUDED IN SUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal supplements of multiple micronutrients CORE</td>
<td>Iron folate included as the maternal supplement intervention and because no costs available for MNS</td>
</tr>
<tr>
<td>Maternal calcium supplementation CORE</td>
<td>No programmatic guidelines available; no WHO guidelines; no clear delivery mechanisms/platforms, compliance or cost information</td>
</tr>
<tr>
<td>Interventions to reduce tobacco consumption or indoor air pollution CORE</td>
<td>Assume costs included in tobacco and climate change programs</td>
</tr>
<tr>
<td>Maternal supplements of balanced energy and protein SPECIFIC CONTEXTS</td>
<td>No program guidelines available; no clear indication of targeting, quantity, nature of supplements; hence, no cost estimates feasible for now. Will follow in later iterations.</td>
</tr>
<tr>
<td>Intermittent preventative treatment of malaria SPECIFIC CONTEXTS</td>
<td>Assume costs included in malaria programs</td>
</tr>
<tr>
<td>Insecticide-treated bednets (women and children) SPECIFIC CONTEXTS</td>
<td>Assume costs included in malaria programs</td>
</tr>
<tr>
<td>Neonatal vitamin A supplementation SPECIFIC CONTEXTS</td>
<td>WHO reviewing programmatic guidance</td>
</tr>
<tr>
<td>Delayed cord clamping CORE</td>
<td>Assume costs included in maternal health programs for safe delivery</td>
</tr>
<tr>
<td>Zinc supplementation (preventative) CORE</td>
<td>No programmatic guidelines available; no costs data, nor are there data on compliance and delivery mechanisms, thus no scaling up costs can be estimated for now</td>
</tr>
<tr>
<td>Conditional cash transfer programs (with nutrition education) SPECIFIC CONTEXTS</td>
<td>Costs of supply side included; cost of cash transfers per se not included</td>
</tr>
</tbody>
</table>


\textsuperscript{38} Adapted from Horton et al. Scaling Up Nutrition: What will it cost? The World Bank 2010.


\textsuperscript{40} DHS 2006. Figure 8.1.

\textsuperscript{41} DHS 2011 Preliminary Report. Figure 4.
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could prevent 22% of neonatal deaths,\textsuperscript{41} which made up 54% of all under five deaths in 2006,\textsuperscript{42} and 61% in 2011.\textsuperscript{43} In 2006, only 53% of children under six months were exclusively breastfed, and this proportion was as low as 56% and 30.6% for children 2-3 months and 4-5 months respectively. Even in children less than two months, only 88% of infants were exclusively breastfed. Importantly, however, exclusive breastfeeding increased significantly between 2006 and 2011, such that currently, 69.6% of children 0-5 months are exclusively breastfed (Figure 14). The increase was mainly in children 2-5 months old as the rate for children 0-1 in 2011 is essentially the same as that of children <2 months in 2006. As noted earlier, however, this improvement essentially returns Nepal to the same exclusive breastfeeding situation as in 2001. Nevertheless, the achievement is important; only a handful of countries have exclusive breastfeeding rates above 70%, including Mongolia, Oman, Rwanda, and Sri Lanka.

In 2006, 13% of children below six months were already receiving complementary food, and 27.6% of children 6-9 months are not receiving any solid or semi-solid foods, indicating both early and late complementary feeding. In 2011, early complementary feeding had fallen to 9.5% but late complementary feeding has increased to 29.6%. The frequency and quality of complementary feeding also appeared to be inadequate in 2006 – only 10.6% of children 6-9 months were receiving any animal foods, only 62.1% of children 6-23 months were receiving 3+ food groups, and only 82.4% of the same age group received complementary foods the minimum number of times or more (Figure 14). As a result, only 57.3% of breastfed children 6-23 months were getting both 3+ food groups and feeding the minimum number of times or more. Similar data is not yet available for 2011.

Such poor practices are having a negative impact on the health and growth of Nepali children. The LNS calculated that achieving 99% coverage with breastfeeding promotion and support could reduce 10% of deaths before 24 months, and the same coverage of complementary feeding and other supportive strategies could reduce stunting by 17.2% in the 36 countries with the highest burden of undernutrition.\textsuperscript{44}

Quite appropriately, therefore, improving infant and young child feeding (IYCF) is a key priority of the Ministry of Health and Population (MOHP). The protection, promotion, and support of optimal feeding practices for infants and young children is listed as a specific objective of the Protein Energy Malnutrition program of the National Nutrition Policy and Strategy 2004, and the MOHP developed a policy on IYCF. A National Strategy on Infant and Young Child Feeding was drafted in 2004, but it has not been finalized. UNICEF has developed a community-based IYCF promotion package as part of a pilot to distribute multiple micronutrient powders (MNPs), together with IYCF counseling. The core of the package is a flip chart for health workers, particularly female community health volunteers (FCHVs), to counsel caregivers. The government has adopted the package and it is being

\textsuperscript{44} Bhutta et al. What works? Interventions for maternal and child undernutrition and survival. The Lancet 2008: 371
rolled out in 45 districts. Other agencies and NGOs are using adaptations of the same package in their programs and for the IYCF counseling component in the community-based management of acute malnutrition program (CMAM), and in a child grant program. Helen Keller International (HKI) has developed a training manual for FCHVs, which involves a five-day training on essential nutrition actions, including IYCF, and behavior change communication (BCC). The training approach is based on the principles of BCC of small doable actions, and the widely acknowledged theory that adults learn best by reflecting on their experience. HKI has also developed its own flipchart. These materials are being used within HKI’s Action Against Malnutrition through Agriculture Project (AAMA), which is being implemented in two districts and aims to increase household food production (to increase access to micronutrient-rich foods) and behavior change communication around essential nutrition actions. The WHO has provided IYCF training to health workers and mass media campaigns, including television and radio spots and chat shows, which have been implemented, during World Breastfeeding Week, for example.

The UNICEF-developed IYCF flip chart, which forms the “cornerstone” of several IYCF efforts in Nepal, is very focused on complementary feeding practices. It was originally developed as the IYCF counseling component of a pilot to distribute MNPs and was designed for use with caregivers who are starting to think about complementary feeding or whose children are already eating complementary foods. As such, there is almost no mention of exclusive breastfeeding and no mention at all of initiation of breastfeeding. In addition, there is insufficient detail about what complementary foods to feed because the emphasis is on how often to feed and how much. An IYCF technical group that could identify these weaknesses and coordinate improvements has existed in the past but has not functioned in recent years. Although the flip chart is intended for use by FCHVs, half of whom are illiterate, it contains large amounts of text (on the back of the pictures).

The package is being used mainly for the training of community level or extension health workers (particularly FCHVs) to counsel caregivers during Mothers Groups. Community-level health workers are considered to have the best access to caregivers and sufficient time for counseling and group discussions. However, the effectiveness of this strategy has not been evaluated. Furthermore, none of the programs in which the community-based package is being used have completed planned evaluations, including an assessment of changes in IYCF behavior. Whether FCHVs are as skilled at counseling and promoting behavior change as they are at delivering specific interventions and commodities is unknown. While counseling can change practices—particularly practices that are poor because of low levels of knowledge—counseling cannot help caregivers change behaviors that are poor because of constraints such as poverty, time, access, etc.

Somewhat in contrast to the national situation, the Nepal Family Health Program (NFHP), which operates in 22 districts, has recorded some improvements in IYCF practices between 2006 and 2009. For example, slightly more newborns are fed within an hour of birth; prelacteal feeding has declined significantly, and more children 6-23 months receive three or more food groups. However, contrary to the national situation since 2006, the prevalence of exclusive breastfeeding has fallen.

HKI

46 A National Technical Committee on Nutrition has recently been reestablished under the MOHP including eight working groups on different topics.
47 Nepal Family Health Program. Family Planning, Maternal, Newborn and Child Health Situation in Rural Nepal: A Mid-term Survey for NFHP II. March 2010. USAID.
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has recorded some increase in caregivers’ willingness to feed eggs to young children in one of their AAMA project areas.

Global experience: The LNS found that “all forms of extra support” for breastfeeding mothers increased the duration of “any breastfeeding” and “appropriately designed interventions can have a positive effect on feeding practices.” The main interventions which have a proven positive impact on either breastfeeding or complementary feeding are lay and professional support, individual and group counseling, mass media campaigns (for breastfeeding), and nutrition education with or without food supplements (for complementary feeding).

The interventions which demonstrated the strongest evidence of successful breastfeeding promotion include: individual counseling, which substantially increased the odds of exclusive breastfeeding in the neonatal period and at six months; group counseling, which had a similar effect; and a mass media campaign in Honduras, which has been attributed with increasing exclusive breastfeeding from 48%-70% at one month, from 24%-31% at four months, and 7%-12% at six months of age. Nutritional education on complementary feeding reduced stunting, but in food insecure areas, it was only effective if combined with food supplements or cash transfers. The LNS calculated that while 99% coverage of breastfeeding promotion could reduce deaths at 12 months by 11.6%, the same coverage of complementary feeding interventions could reduce the prevalence of stunting at the same age by 19.8%. Of all the interventions recommended by the Lancet Nutrition Series, “feeding interventions (promotion of complementary feeding with supportive strategies)” is estimated to lead to the largest relative reduction in stunting by far

Improving IYCF practices has long been recognized as a very important intervention for reducing undernutrition. UNICEF and the WHO developed a Global Strategy for Infant and Young Child Feeding in 2003. Since then, myriad materials and programs have been produced to support implementation of the Global Strategy. UNICEF’s New Program Guidance on IYCF reports that between 1995 and 2008, the global rate of exclusive breastfeeding (EBF) increased from 33% to 38%. Although the global improvement is small, in countries that have shown strong commitment and invested heavily in IYCF, the improvements have been much more significant. UNICEF records that 20 countries have achieved increases of more than 20 percentage points since the 1990s. These include Pakistan and Timor Leste, which increased EBF by 21 percentage points, and Sri Lanka by 59 points (Figure 16).

Unfortunately, similar success stories do not exist for complementary feeding, primarily because indicators for global assessment and trend analysis have only recently been finalized. Data that does exist, using the new indicators, reveal that

49 Bhutta et al. What works? Interventions for maternal and child undernutrition and survival. Lancet 2008. NB. The intervention considered by the LNS as feeding interventions is “behavior change communication for improved complementary feeding, with additional food supplements in food-insecure populations.”
50 In fact, preliminary data from DHS 2010 indicates that EBF rates have increased to 73.5%, an increase of 61.4 percentage points in ten years.
complementary feeding practices are far from acceptable. For example, in India, the country with the highest number of stunted children, only 54.5% of children 6-8 months\textsuperscript{52} received any complementary foods in the previous day.\textsuperscript{53}

The UNICEF Programming Guide provides a summary of evidence of effective interventions with full references.\textsuperscript{54}

For improving breastfeeding practices and promoting breastfeeding it lists:

- Maternity care practices
- Professional support
- Lay and peer support
- Community-based breastfeeding promotion and support
- Media and social marketing
- Support for breastfeeding in the workplace

To improve complementary feeding, notable interventions include:

- Nutrition education to improve caregiver practices
- Use of high quality, locally available foods and traditional practices to increase energy density
- Use of supplements, such as multiple micronutrient powders or lipid-based nutrient supplements
- Use of fortified complementary foods
- Use of blended foods together with multiple micronutrient powders and counseling on complementary feeding practices
- Special support for food insecure populations

A systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries found that providing complementary food was the most effective at improving linear growth. Also effective were increasing the energy density of complementary food and educating about complementary feeding. The potential impact of providing complementary food may depend upon the food security situation; this intervention was more effective in Asia and Africa. Provision of a food may also enhance the ability of caregivers to implement the education component of

\textit{Calculations undertaken in 2000 when the program was operating in 32 districts:}

The annual cost of the VAS program was US$1.7 million. It cost $1.25 to deliver two vitamin A capsules to each participant. The cost per averted death was $327. The VAS program also reduced the incidence and severity of diarrheal disease and measles, which in turn reduced the need for MOHP services, thereby saving the GoN $1.5 million annually. Factoring in these cost savings, the net annual cost of the program at the time was $167,000. The net annual cost of the permanent, nationwide program was estimated to be $1.1 million. Ref: Fiedler J. Health Policy & Planning, 2000.
the intervention. Education interventions appeared to be most effective when they emphasize the addition of nutrient-rich animal-source foods, increased the energy density of complementary foods, and targeted younger children.55

Handwashing and hygiene counseling
Although not necessarily a “health sector” intervention, hand washing and hygiene counseling are reviewed because they appear on the LNS list of effective interventions and because opportunities to counsel on IYCF can often be used to educate caregivers on hand washing and hygiene.

Nepal experience: Apparently, behavior change communication for hand washing and hygiene interventions has been neglected—at least in health sector program. The community based IYCF flip chart does mention hand washing and other hygiene messages, but these components are not given particular emphasis. As for the IYCF behaviors, no data exists on whether the counseling provided has been successful in increasing hand washing or other hygiene behaviors. An exception is the Nepal Family Health Program, which reports that in 2009, 74% of rural women used soap to wash their hands in the 24 hours preceding the survey, which is an increase from 65% in 2006.56 Nationally, the DHS 2006 records that 64.1% of women used soap for hand washing in the 24 hours prior to the survey.57

Global experience: The Lancet analysis included “hand washing or hygiene interventions” in the list of “core” interventions. These interventions fall under the category of “disease prevention strategies” and include hand washing, water quality treatment, sanitation and health (hygiene) education. The estimated effect of 99% coverage is a relative reduction of stunting at 24 months by 2.4% through a 30% reduction in the incidence of diarrhea.58 A systematic review and meta-analysis of these interventions found that they all have similar impacts on diarrhea with the relative risk estimates from the overall meta-analysis ranging from 0.63-0.75.59 A specific systematic review on the effects of hand washing with soap found similar results; hand washing with soap reduced the risk of diarrheal disease by 42% and the relative risk was 0.58.60 A Cochrane review found the same – a 32% reduction in diarrhea episodes in children living in communities in low- or middle-income countries and a relative risk of 0.68. The Cochrane review points out that this simple intervention has a comparable effect on diarrhea to providing clean water in low-income areas.61 A study by Luby et al. in Pakistan gave intervention neighborhoods plain or antibacterial soap and hand washing promotion through weekly home visits for one year. Children under five in intervention households had 50% lower

56 Nepal Family Health Program. Family Planning, Maternal, Newborn and Child Health Situation in Rural Nepal: A Mid-term Survey for NFHP II: March 2010. USAID.
57 DHS 2006 Table 3.11.
incidence of pneumonia than controls, and children less than 15 years old had 53% lower incidence of diarrhea.\textsuperscript{62} Hygiene and hand washing counseling would have a very high benefit cost ratio, especially when implemented as part of a package of IYCF counseling. Indeed, the World Bank costing exercise attributed no cost to this intervention since it was assumed to be included in the “community nutrition program.”

As noted above, this intervention was included in The Lancet list because of its impact on stunting by reducing episodes of diarrhea. A pooled analysis of nine global studies with data on diarrhea and growth found that the probability of stunting at 24 months of age increased by 2.5% per episode of diarrhea, and 25% of all stunting in 24 month old children was attributable to having five or more episodes of diarrhea in the first two years of life.\textsuperscript{63} In Nepal, 12% of children had diarrhea in the two weeks preceding the DHS 2006 survey and 14% in the 2011 survey. Diarrhea remains the second leading cause of post-natal death, after pneumonia. It thus seems likely that diarrhea is contributing to the high stunting levels in Nepal and interventions to reduce diarrhea further will help accelerate reductions in stunting.

**Vitamin A supplementation and deworming**

**Nepal experience:** Nepal has experience in implementing a number of vitamin A supplementation interventions. These are:

1. Vitamin A supplementation of all children 6-59 months, together with deworming of children 12-59 months
2. Vitamin A supplementation of postpartum women
3. Inclusion of vitamin A supplementation in treatment for measles, xerophthalmia, prolonged diarrhea, and severe malnutrition
4. Treatment of night blindness in pregnant women with weekly low-dose supplementation
5. Vitamin A supplementation of neonates

The first three of these are being implemented nationally, while the latter two are small-scale pilots\textsuperscript{64} to test delivery options under permissive policies of the MOHP.

The Nepal vitamin A supplementation (VAS) program for young children is acclaimed as a global success story. In the late 1980s, three major research projects in Nepal concluded that periodic dosing of children 6-60 months with high-dose vitamin A resulted in significant reductions in child mortality.\textsuperscript{65} In 1993, the VAS program began in eight districts. By the end of 1997, the MOHP was implementing the program in 32 districts, and by 2002, it had expanded to all districts. FCHVs distribute the capsules to young children twice a year through a “campaign-style” activity. Health facility staff provide the capsules to the FCHVs and provide supervision and support. The National Technical Assistance Group (NTAG), an NGO that was created and initially completely funded by USAID to support the program, provides training to the FCHVs and conducts mini-surveys after each distribution to verify coverage. Donors provided all the capsules. NTAG’s unique training and support of the FCHVs is considered a key reason for the program’s success.\textsuperscript{66} NTAG’s annual mini-surveys, now called Micronutrient Surveys, consistently have recorded coverage at about 90% and above, and since 2007, it has been 98%. The Health Management Information System (HMIS) also records similar figures. DHS 2006 data supports these results; 87.5% of children received a

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\textsuperscript{64} The pilot of night blindness has been completed and is no longer running. The pilot of neonatal VAS has also ended and is undergoing final evaluation.


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vitamin A supplement in the six months preceding data collection.

In 2000, the program saved the lives of about 4,200 children under the age of five (at that time the program was only covering 32 districts). In the long term, the program saves about 7,500 lives per year. Cost per life averted was estimated at $345.67 DHS indicates that Nepal’s under five mortality rate declined from 118 in 1996, three years after the vitamin A program started, to 61 in 2006, by which time the program had been fully implemented for four years. Thapa et al. used 2001 DHS data to assess the effect of Nepal’s VAS program on child mortality at 12-59 months. After controlling for a number of potentially confounding variables, the analysis found that the effect of 100% community level VAS coverage since the child’s birth, relative to no coverage, is to reduce child mortality at 12-59 months by more than half (OR = 0.47). This effect was much greater than that found by Beaton and others. The authors attributed this finding to additional health-related activities undertaken by the FCHVs as part of the vitamin A distribution activity (e.g., nutrition education, contraceptive distribution, oral rehydration solution distribution).69 Yet another analysis of Nepal’s VAS program concluded: “universal supplementation with vitamin A narrowed differentials in child death across gender and caste in rural Nepal.” Specifically, the researchers found that excess child mortality in girls compared to boys was almost completely eliminated and that VAS narrowed mortality differentials among Hindu castes. There was no impact on different mortality across quintiles of asset ownership.70

Deworming for children 12-59 months was “piggy-backed” onto the vitamin A program starting in 2000, and high coverage mirroring—though slightly lower than vitamin A capsule coverage—was achieved by 2002 (Figure 17). A deworming impact study, undertaken in four districts in 2003, recorded a 77% reduction in under five anemia from a baseline of 47%, which was attributable to the deworming.71 As Figure 18 illustrates,
the Nepal Micronutrient Status Survey in 1998 and the DHS 2006 also record a reduction in under five anemia during this period; nationally, anemia fell from 78% in 1998 to 48% in 2006. The deworming program, which was already nationally implemented and achieving high coverage since 2002, has been credited with this achievement. However, anemia levels in under five children have not declined further since 2006. Possibly, the full effect of deworming has already been achieved in Nepal. Nepal also has a policy of deworming pregnant women, which will be discussed in the section on iron and folate supplementation of pregnant women.

There also have been positive “side effects” of the vitamin A program. The VAS program energized the FCHV program by providing tangible interventions that had not existed since its establishment in 1988. The success of the VAS program has been credited with establishing the FCHVs as “credible community workers,” worthy of recognition such as an endowment fund, and creating a “model for introducing community-based interventions.”

The postpartum VAS program has been operating since 1995. The supplement is intended to be distributed by health workers during postnatal check-ups. Records on coverage are included in the new health management information system (HMIS). Data is also available from the DHS 2006 and Micronutrient Surveys. As in many other countries, coverage of the postpartum dose is well below that for under five children. Overall, data from these three sources support each other and indicate that about 50%-60% of postpartum women receive the supplement, indicating there is significant room for improvement (Figure 19). The data also indicate that coverage improved between October 2006 and November 2007, apparently as a result of the Intensification of the Maternal and Neonatal Micronutrient Program (IMNMP), which will be described in more detail below. The program included the strengthening of a mechanism for delivering postpartum vitamin A through FCHVs (i.e., community-based distribution rather than facility based through postnatal check-ups), and additional education of postpartum women on the importance of preventing and treatment micronutrient deficiencies. It was started in five districts in 2003 and expanded to a further 35 districts between 2004 and 2008. An evaluation of the program in 2009 found coverage to be 46.2%, somewhat lower than that reported by the Micronutrient Survey for April 2009 (59.2%), and significantly higher than the coverage found in districts where the (IMNMP) program is not yet operating (30%).

Treatment with vitamin A for measles, xerophthalmia, prolonged diarrhea, and severe malnutrition in young children is national policy. Although health workers have been trained in this intervention and are generally aware of it, the extent of the intervention is unclear because the recording of doses is incomplete and forecasting and capsule supply issues may exist.

Nepal’s prevalence of night blindness during pregnancy is estimated at 5.2% (of women with children under five). The WHO classifies a prevalence of greater than 5% as moderate. A permissive policy exists in Nepal to treat night blind pregnant women (in 2nd and 3rd trimester) with a weekly low-dose (25,000 IU) vitamin A capsule for four weeks or until the night blindness is cured. The intervention was piloted in three districts, testing a “take home” model and an “in-facility” model. To implement the project, health workers were trained

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74 DHS 2006, Table 12.8. Although 12.9% of women reported that they were night blind, only 5.2% reported that they did not have problems seeing during the day.
75 WHO. Nutrition Landscape Information System Country Profile Indicators: Interpretation Guide. 2010. NB. There is no higher category.
and FCHVs were oriented to refer night-blind women for treatment. After one year of implementation, a study found that 10% of women were night blind and 35% of night-blind women were taking the capsules. All demonstrated good compliance. Efficacy was very high; 90% of women who completed four doses of treatment were cured. The low coverage was attributed to low awareness of the importance and availability of the treatment. Lack of awareness of the treatment also would have been compounded by the low ANC coverage in Nepal; only 9.4% of women have four or more ANC visits according to DHS 2006. The intervention is not currently being implemented.

Following VAS studies in Indonesia, India, and Bangladesh, which recorded reductions in infant mortality of 64%, 22%, and 15%, respectively, Nepal started a pilot study of vitamin A supplementation of newborns in four districts in mid-2009 (i.e., within the first 48 hours after birth). The objective of the pilot was to identify an optimal delivery mechanism by comparing FCHV dosing and mother dosing. An evaluation of the pilot is underway; the results were expected in mid-2011. Because 77% of under five deaths in Nepal occur in the first year of life, the results and evaluation of the pilot are eagerly awaited by some MOHP officers and donors who are keen to scale up this intervention.

A detailed review of the Nepal vitamin A program was undertaken in 2007. Based on the review and partner discussions, a five-year work plan for the period 2010-2014 and a five-year strategy have been drafted, though neither has been finalized. The documents recognize the following “unfinished business” related to the various vitamin A interventions:

- “Lower” coverage in younger children, in urban areas and some sub-regions (e.g., central mountains, far-western hills and western terai) of the under five vitamin A supplementation intervention. In addition, deworming coverage is always slightly lower than vitamin A coverage, although it should be equal for all children above 12 months (Figure 20).
- Low coverage of postpartum women
- “Unknown” coverage of vitamin A for clinical treatment of child illness
- Incomplete ownership of the under five VAS intervention by the MOHP as the result of the way it was initiated and implemented to date – technical support provided by NTAG and major funding provided by donors
- Unsustainable method of recording under five VAS coverage – Micronutrient (Mini) Surveys by NTAG, often with donor funding

![FIGURE 20: Variations in Coverage of Vitamin A and Deworming for Young Children](Ref: DHS 2006 Table 12.7)

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To address these issues, the draft strategy and work plan included several planned actions. The table below shows these plans and the current situation.

<table>
<thead>
<tr>
<th>PLANS MADE IN 2008/9</th>
<th>CURRENT STATUS IN 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased role of Nutrition Section, Child Health Division in management, planning and supervision of the under five VAS program.</td>
<td>The Nutrition Section currently manages and funds all direct supervision, supplies (scissors, registers, posters, etc.) and enumeration for the FCHVs for the distribution days. Overall, the MOHP says it 100% “owns” the VAS program.</td>
</tr>
<tr>
<td>Phased in purchase of the vitamin A capsules and deworming tablets by the MOHP for the under five VAS program.</td>
<td>The government is already covering 50% of all capsule needs and will be covering 100% of requirements by 2012. The government also continues to support all repacking of the capsules and is procuring 100% of deworming table requirements.</td>
</tr>
<tr>
<td>Transfer of the responsibility of Micronutrient Surveys to district health offices.</td>
<td>At the request of the MOHP, NTAG has started training in two districts on a pilot basis, for the DHOs to take over implementation of the surveys.</td>
</tr>
<tr>
<td>Phase out NTAG involvement.</td>
<td>NGAG phasing out from the VAS program has started.</td>
</tr>
<tr>
<td>Improve coverage of women postpartum following the strategy of IFA intensification and by linking it with newborn BCG vaccination, coverage of which is high – 93.2% according to DHS 2006.</td>
<td>The IMNMP has increased coverage of PP VAS and will be further scaled up. It does not however use the strategy of linking PP VAS with BCG vaccination.</td>
</tr>
<tr>
<td>Improve coverage in municipal areas.</td>
<td>New delivery methods are being piloted in urban areas as it is recognized that FCHV distribution, as practiced in rural areas, is not as effective in urban areas.</td>
</tr>
<tr>
<td>Improve use of vitamin A in case treatment through improved coordination within the health system and printing of the case treatment protocol.</td>
<td></td>
</tr>
</tbody>
</table>

**Global experience:** Vitamin A supplementation of young children: In 1997, the WHO issued recommendations that in countries with under five mortality rate above 70 per 1,000 live births, all children 6-59 months should be supplemented with high dose vitamin A every 4-6 months as a priority child survival intervention. The recommendations took into account the results of a meta-analysis by Beaton, which found evidence of a child mortality reduction of 23%. Today, 71% of children 6-59 months in developing countries (excluding China) are estimated to be reached with two doses of vitamin A. Only the supplementation of young children and neonates in Asia are included in the list of “core” interventions by The Lancet. Based on Beaton’s analysis, supplementation of under five children was assumed to have no impact upon stunting except to reduce the risk of mortality by 12% for one dose and 22% for two doses. Since The Lancet analysis, a Cochrane review in 2010 has reaffirmed the impact of VAS on child mortality; the review found a 24% observed reduction in the risk of all-cause mortality. Diarrhea mortality was reduced by 28% and VAS reduced incidence of diarrhea and measles morbidity. No effect was found.

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81 Personal communication: Mr. Raj Kumar Pokharel, Nutrition Unit, Child Health Division, Department of Family Health Services, Ministry of Health and Population, Nepal.


on mortality rates of measles, respiratory disease or meningitis or incidence of respiratory disease.\(^\text{85}\)

In 2004, Pedro et al. released analysis from the Philippines that indicated that only VAS led to measurable reductions in the prevalence in vitamin A deficiency (as measured by serum retinol) in “groups with the highest prevalence of vitamin A deficiency and lasted up to four months after dose administration.” The authors recommended that in areas of low vitamin A deficiency, VAS be targeted to stunted children, and in areas of high prevalence, capsules should be distributed three times per year. An article in 2010 advocated that vitamin A intake would be better improved through “more sustainable interventions” such as breastfeeding and kitchen gardening.\(^\text{86}\)

The United Nations Standing Committee on Nutrition presented analysis that globally vitamin A supplementation does not appear to have affected the prevalence of low serum retinol.\(^\text{87}\)

Whereas Central American countries (e.g., Nicaragua) where sugar and wheat flour have been fortified with vitamin A, have reached and maintained low serum retinol. Despite such arguments, and following a long and comprehensive review of the evidence, the WHO released updated recommendations on vitamin A supplementation in mid-2011,\(^\text{88}\) which include a “strong recommendation” for supplementation of infants and children 6-59 months in settings where vitamin A deficiency is a public health problem\(^\text{89}\) to reduce child morbidity and mortality. The recommendations take into account the above-mentioned Cochrane review and an additional one for HIV-positive people. It also takes into account safety considerations.

Vitamin A gelatin capsules cost about US$ 0.02 each,\(^\text{90}\) and the World Bank quotes VAS costs as US$1.2 per child per year giving a cost benefit of US$3-16 per disability-adjusted life year saved.\(^\text{91}\)

Neonatal vitamin A supplementation in Asia was also included in The Lancet list of “core” interventions. VAS was assumed to reduce infant mortality by 21% between two days and six months\(^\text{92}\) based on the same studies that influenced Nepal to start its pilot. In mid-2011, however, the WHO released a “strong recommendation” NOT to undertake neonatal vitamin A supplementation to reduce infant mortality and morbidity. The review found that although neonatal vitamin A supplementation may reduce mortality in the first six months of life in some settings—with some minor, transient side effects—these findings were inconsistent. The conclusions also placed high value on avoiding harm, the uncertainty of the evidence, and the conflicting research results, as well as costs and feasibility concerns.\(^\text{93}\) The recommendation reviewed three trials conducted in Indonesia,\(^\text{94}\) India,\(^\text{95}\) and Bangladesh,\(^\text{96}\) which showed a reduction in mortality during infancy,

\[^{85}\text{Herzer et al. Vitamin A supplementation for preventing morbidity and mortality in children from 6 months to 5 years of age. Cochrane Library 2010, Issue 12.}\]
\[^{86}\text{Latham M. The great vitamin A fiasco. World Nutrition 2010; 1:12-44.}\]
\[^{88}\text{http://www.who.int/elena/titles/vitamina_children/en/index.html.}\]
\[^{89}\text{Populations with a prevalence of night blindness ≥1% in children 24-59 months of age or a prevalence of serum retinol <0.70 µmol/l is ≥20% in infants and children 6-59 months of age.}\]
\[^{95}\text{Klemm RD et al. Newborn vitamin A supplementation reduced infant mortality in rural Bangladesh. Pediatrics, 2008, 122; e242-250.}\]

and four other trials conducted in Nepal, Zimbabwe, and Guinea-Bissau, which did not find any overall reduction in infant mortality. The recommendation also considered three systematic reviews on the effects and safety of neonatal vitamin A supplementation. The reviews found no statistically significant reduction in infant mortality, and some reported transient side effects, particularly bulging fontanelle, which is benign and not associated with acute or long-term neuro-developmental effects. The recommendation notes that four randomized, double-blind, placebo-controlled trials that are currently on-going in Pakistan, India, Guinea, and Tanzania to assess the feasibility of delivering neonatal vitamin A supplements through health workers. The trials are also evaluating the efficacy of neonatal vitamin A supplementation in improving child survival, which “will provide further knowledge to help inform updates to this guideline in the future.” In the interim, “mothers should continue to be encouraged to exclusively breastfeed infants for the first six months to achieve optimal growth, development and health.”

Vitamin A supplementation of postpartum women: In 2005, CIDA discontinued global provision of free capsules for postpartum dosing because of insufficient evidence that it affected maternal or neonatal mortality. However, there are proven impacts upon breast milk retinol, infant vitamin A status for a few months and maternal vitamin A stores. Together with recommendations on vitamin A supplementation of children 6-59 months, and neonates mentioned above, the WHO has also issued new recommendations on postpartum VAS. These indicate that postpartum vitamin A supplementation is NOT recommended as an intervention to prevent maternal and infant mortality and morbidity (“strong recommendation”). The document notes, “The quality of the available evidence for maternal mortality, maternal morbidity, and adverse effects was graded as low or very low. The quality of evidence for all-cause infant mortality was high and for cause-specific infant mortality and morbidity was very low. Postpartum women should continue to receive adequate nutrition, which is best achieved through consumption of a balanced healthy diet.” The recommendations were made in consideration of the results of three systematic reviews on the effects and safety of vitamin A supplementation in postpartum women. A 2007 UNICEF report indicates that two-thirds of priority countries were implementing postpartum vitamin A but only 12 were surpassing 50% coverage.

Vitamin A supplementation in pregnancy:

In 1998, the WHO recommended low dose
treatment of night blind women during pregnancy in areas where vitamin A deficiency is endemic among children and maternal diets are low in vitamin A. The recommendations were reconfirmed in 2001, along with the other vitamin A recommendations. Meanwhile in 2002, a Cochrane review was undertaken of vitamin A supplementation during pregnancy. It reported that a Nepal study had found a reduction on all-cause mortality and a reduction in night blindness but not elimination. Another study in Indonesia had a positive effect on anemia. Two other trials from Malawi did not corroborate these positive findings. The review therefore concluded that “although two trials from Nepal and Indonesia suggested beneficial effects of vitamin A supplementation, further trials are needed to determine whether vitamin A supplementation can reduce maternal mortality and morbidity and by what mechanism.” Based on the Cochrane review, supplementation of pregnant women was listed as an intervention with “insufficient or variable evidence of effectiveness” in The Lancet Nutrition Series. In addition, a just published study from Bangladesh concludes that weekly vitamin A supplementation in pregnant women did not reduce all-cause maternal, fetal or infant mortality, although it did increase plasma retinol and reduced, but did not eliminate night blindness.

Updated recommendations by the WHO for this age group also indicate that “vitamin A supplementation in pregnancy as part of routine antenatal care is NOT recommended for the prevention of maternal and infant morbidity and mortality (strong recommendation). However, in areas where vitamin A deficiency is a severe public health problem, vitamin A supplementation in pregnancy is recommended for the prevention of night blindness (strong recommendation). The quality of the available evidence for maternal mortality was found to be high, whereas for all other critical outcomes it was moderate.”

Deworming for under five children and pregnant women was included in The Lancet list of “optional” interventions for implementation in areas with high helminth infestation. Deworming of children was included by The Lancet because of its impacts on growth and anemia. A systematic review by Dickson et al. found modest improvements in growth and inconclusive impacts on cognitive performance. Another review of deworming’s impacts on anemia found a marginal increase in hemoglobin, which could translate into a 5-10% reduction in anemia in populations with a relatively high prevalence of intestinal helminths. The majority of the studies examined were in preschool and school age children, and the analysis did not differentiate the results on different population groups. In March 2008, potentially after The Lancet analysis was published, an analysis was published on the benefits of deworming preschool age children. Based on a review of published literature, the review concluded that deworming of this age group was shown to improve growth, micronutrient status (iron and vitamin A), and motor and language development. The paper goes on to review country experiences with large-scale deworming.

Deworming has a benefit: cost ratio of 8:1 based on a cost of US$0.25 per child per

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round per year (US$0.5 per year). An increasing number of countries now have large-scale programs for deworming of under five children, often in conjunction with vitamin A supplementation, following the Nepal model.

**Treatment of diarrhea with zinc**

**Nepal experience:** In May 2004, the WHO and UNICEF released a joint statement recommending changes in the clinical management of acute diarrhea – the use of a new formulation of oral rehydration solution (ORS) with reduced levels of glucose and salt, and the inclusion of zinc supplements. The Nepal MOHP formally adopted the new recommendations in August of that year and established a Zinc Technical Group in January 2005. Implementation of the new protocol was piloted in two districts (Rautahat and Parbat) in 2005 and 2006, and expanded to 25 districts in 2006 and 2007. It was incorporated into the Integrated Management of Childhood Illness (IMCI) program, which includes a community-based component, and is currently operating nationwide in all 75 districts. The new ORS and zinc supplements are distributed through health facilities, FCHVs, and private sector providers. In 2006, the government implemented a social marketing project for zinc treatment through private sector providers in 30 districts. Five different companies are currently producing the dispersible zinc supplements in Nepal and the government took over the responsibility of the procurement of zinc in 2010.

In late 2009, the Micronutrient Initiative (MI) supported a “zinc intensification” program in three districts (Sankhuwasabha, Gorkha, and Bajura). The program includes training all health workers and FCHVs, strengthening the government monitoring and reporting system, improved supply of zinc supplements, introduction of “compliance cards” and raising awareness through local radio channels. Private pharmacies were also oriented and encouraged to sell zinc supplements when approached for treatments of diarrhea. This program was evaluated in late 2010, about one year after the program started. The findings indicate that overall the knowledge and awareness of mothers, FCHVs, health workers, and pharmacists about the use of zinc to treat diarrhea was better in intensified districts. In addition, a higher proportion of FCHVs, health workers, and pharmacists reported providing zinc with ORS for diarrhea treatment, and confirmed availability of supplies and compliance cards. However, only 33.2% of children in intensified districts and 27.5% in non-intensified districts were reported to have received zinc during their last diarrheal episode. Although the difference was statistically significant, the coverage of zinc in diarrhea treatment remains low, even in intensified districts. Almost all mothers in both intensified and non-intensified districts reported that the child also received ORS and that the dosage of zinc was correct. However, it appears that mothers in intensified districts were more likely (70%) to give their child the full ten-day course of zinc than mothers in non-intensified districts (38%). The evaluation suggests that while the strategies implemented in the intensification program have improved the situation slightly, more effort is still needed to achieve high coverage of treatment of diarrhea cases with the full course of zinc and ORS.

Despite all the various efforts, available data on the use of zinc in diarrhea treatment is disappointing. HMIS data indicates that coverage in 2009/10 of ORS and zinc together was only 47.7%. Although treatment with ORS and zinc has increased year on year, the increases are small and potentially not commensurate with the effort or

importance. Moreover, the HMIS records falling coverage of ORS, down from 88.5% in 2006/7 to 52.2% in 2009/10 (Figure 21).

Moreover, a 2008 USAID supported survey in 26 districts found coverage to be only 15%, and the 2009 Nepal Family Health Program (NFHP II) Midterm Evaluation in 40 districts found coverage of only 7%. According to the DHS 2006, only 0.4% of children received zinc supplements, at the time it was being implemented in only two pilot districts. In the DHS 2011 Preliminary Report, 6.2% of children with diarrhea in the two weeks preceding the data collection were given zinc as part of their treatment. While this reflects a significant increase from the figure in 2006, it is very low, especially as the program was supposedly being implemented nationwide during the DHS 2011 data collection. In addition, anecdotal reports suggest that even when children receive zinc, compliance with the full 10-day course may be very low. The problems are reportedly inadequate supplies of zinc supplements (for example there was a national shortage of zinc tablets in 2008), weak logistical management, low awareness within the community of the importance of zinc and inadequate understanding of the treatment by health workers. In addition, private sector providers, who provide approximately 50% of treatment for diarrhea, prefer to recommend antibiotics and anti-diarrheals over ORS and zinc supplements because of higher profit margins.

**Global experience:** The initial WHO/UNICEF recommendations in 2004 were made primarily on the basis of analysis coordinated by the Zinc Investigative Collaborative Group, which documented the impact of zinc on diarrhea.\(^\text{119}\)

This same analysis was used by The Lancet series. The latest analysis (2009) corroborates these results finding that the intervention reduced the duration of both acute and persistent diarrhea by 0.5 days and 0.68 days respectively in children 6-59 months. However, no effects were found in children below six months and in pneumonia or malaria.\(^\text{120}\)

UNICEF data on zinc supplement supplies indicates that demand for zinc supplements has increased from 20 million tablets in 2006 to 150 million tablets in 2008, as a result of the new recommendations. Nevertheless, global data on coverage is not available and is estimated to be low, due to the same kinds of problems as experienced in Nepal – overall low coverage of treatment of diarrhea, problems with supplies, logistics and packaging, insufficient awareness of both health workers and the community, and poor collaboration of private sector suppliers.

**Multiple micronutrient powders**

Multiple micronutrient powders (MNPs) are encapsulated micronutrients in powder form, which can be added directly to food at the household level. The micronutrients are encapsulated in a thin coating of a soy-based hydrogenated

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lipid, which prevents the micronutrients from oxidizing the food, but dissolves in the stomach to enable absorption. Thus, the color or taste of the food, to which the MNPs are added, does not change. The micronutrients are packaged as single-dose sachets in amounts intended to be added to the complementary foods of young children in one serving. Typically, a single sachet will provide the recommended daily intake of the micronutrients included. Currently, most MNPs contain about 15 vitamins and minerals based on a formulation recommended by the WHO, WFP, and UNICEF. The sachet contents are sprinkled over complementary foods given to young children as a strategy to improve their micronutrient intake without requiring major behavior change by the caregiver or affecting the taste or smell of the child’s food. MNPs resolve problems previously experienced in giving young children iron syrup which has an unpleasant taste and smell. They also resolve the problem that tablets cannot be given to young children.

**Nepal experience:** Three agencies are supporting the government with MNP implementation in Nepal – UNICEF, the WFP, and HKI. The objective of these pilots is to reduce anemia and use the MNPs as a motivation to change infant, and especially, young child feeding practices. i.e., complementary feeding practices.

**UNICEF-supported pilots:** UNICEF support for MNPs started in 2009 when a “feasibility study” was undertaken in Makwanpur and Parsa districts. The outcome of the feasibility study was the development of the local name for the MNS of “Baal Vita,” agreement on the target age group of 6-23 months, and agreement that MNPs should be “packaged” with IYCF counseling. At the request of the government, UNICEF is currently piloting the intervention in six districts with the objective of identifying the optimal distribution methodology. The six districts cover mountain, hill, and terai eco zones, and the distribution is testing two delivery models. In the FCHV delivery model, FCHVs distribute the MNPs and provide IYCF counseling to caregivers of targeted children. All children 6-23 months are provided with 60 sachets every six months (i.e., one for every three days). The children are identified as soon as possible after they turn six months, and they continue to receive the MNPs until they are two years old. This usually means they receive three distributions. The “health facility delivery model” involves distributing the MNPs and IYCF counseling by health workers and FCHVs encouraging mothers to visit the health facility to access the services. The longer-term plan is to use the results of these pilots to scale up MNPs nationwide. A national strategy document has been developed along these lines. MaxPro, a private company offering social marketing and communication services, has been hired to support implementation of this project.

Under this project, the following developments have occurred:

- The government has endorsed a permissive policy for MNP linked

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122 Implementation started in Palpa and Makwanpur in May 2010 and in Gorkha and Rasuwa in December 2010. Planning for the start of the intervention is currently on going in Rupandehi and Parsa districts.
123 One between 6-12 months, one between 12-18 months and the third between 18-24 months. If the child is identified at 6 months, he may receive four distributions by the time he turns 24 months.
with IYCF community promotion and developed a Protocol for MNP distribution. A technical advisory team and 15 National Resource Persons have been established. The project is operating under this guidance.

- Training and communication material including posters, brochures, flip charts and reminder cards have been developed, tested and finalized. Packaging for the Baal Vita sachet and box has also been developed. Recording and reporting forms for all levels of the program have been created.
- Cascade training including central level masters training of trainers, district level training, advocacy and orientation, ilaka training, and community level training of FCHVs, health workers and community leaders has taken place. The fourth day of the community training includes a mothers’ group meeting at which FCHVS/health workers refine their counseling skills and distribute MNPs or advise caregivers to collect them from the nearest health facility (depending on the distribution model).

The pilots were started in the following six districts: Palpa and Makwanpur – May 2010; Gorkha and Rasuwa – December 2010 and Rupandehi and Parsa – May 2011. A multi-component supervision, monitoring and evaluation plan has also been developed with technical support of US Centers for Disease Control. Internal monitoring is conducted by field supervisors, (districts are divided into clusters and one field supervisor is assigned per cluster) who have been hired to support the pilots by Maxpro. Field supervisors visit health facilities and FCHVs and mothers/ caregivers/ households in VDCs within their clusters according to a specific schedule. They then attend a monthly meeting called by the district coordinator of the project to submit reports and discuss issues. Government officials from the Child Health Division (CHD) and District Health Offices (DHOs) carry out external monitoring. A three-month coverage and compliance survey was undertaken in Palpa and Makwanpur in August 2010 by NTAG. Results are not yet available. A one-year coverage and compliance survey will be undertaken in mid-2011. Final coverage and compliance surveys will also be undertaken in the four remaining pilots. Anemia and IYCF practices will not be measured as the focus of the pilots is on assessing the two delivery methodologies.

The overall objective of the MNP pilots is to achieve 80% coverage of target children and 75% compliance by the children who received the MNPs. At this stage, only preliminary data from the Makwanpur compliance survey and some data from the internal monitoring are available. All this data should be treated as very preliminary, however. The internal monitoring data suggests that coverage is higher with the FCHV distribution model – 77% over 65% with the health facility model. The Makwanpur coverage and compliance survey indicates the following:
- 81.5% coverage; 93% received correct number of sachets
- 73% received reminder card
- 55.8% received brochure
- 30% attended FCHV mother groups on MNPs

**WFP-supported implementation:**
Following a 2009 pilot study in three districts, the WFP started distributing MNPs with food/cash for assets (F/CA) programs in 17 food insecure districts in the mid- and far west under the WFP’s Protracted Relief and Recovery Operation (PRRO). This program is also funded by the World Bank-financed Nepal Social Safety Nets project. MNP distribution
started in January 2010. When caregivers enrolled in the F/CA activities go to distribution points to collect the cash/food, those with children under five are counseled on IYCF and offered MNPs. In addition, FCHVs organize mothers’ group meetings at the ward level where further counseling on IYCF is provided and MNPs are discussed. When distribution sessions of food/cash are not taking place, these mothers’ groups are used for the distribution of the next round of MNPs. All children 6-59 months are eligible for the MNPs, and 90 sachets were initially distributed every three months (i.e., enough for 1/day). However, the dosage schedule changed in June 2011 to 90 sachets every six months (i.e., enough for 1 every 2 days). The social mobilizers who organize communities to participate in the food/cash for work programs are also trained on MNPs so they can encourage food/cash for work recipients to access the MNPs. Numerous promotional materials have been produced to support the distribution including banners, which are displayed at distribution points, posters for health posts, distribution points, mothers groups and public areas, brochures, and compliance cards, which are given out to caregivers together with the MNPs. Flip charts have been produced, which are used for counseling the caregivers on IYCF and use of the MNPs.

Internal monitoring is undertaken by Field Supervisors hired by MaxPro, the organization retained to support implementation of the program, along the same lines as the UNICEF-supported pilot. The field supervisors visit caregivers in their homes within three months of MNP distribution to address any problems and to assess coverage, compliance, and practices. In addition, compliance surveys have been undertaken by New Era in 14 of the districts, three and six months after MNP distribution started. An endline survey was undertaken in December 2010 - February 2011 to function as a final evaluation. The results of the final evaluation are compared with baseline data collected from six districts. The endline assessed reductions in anemia, improvements in growth and changes in IYCF behaviors.

MaxPro’s internal monitoring indicates that coverage has been above 85% (range 88%-96%) for all distribution rounds, i.e., at least 85% of families in the food/cash for work program with children under five have received MNPs. A key result from the three- and six-months compliance surveys

The schedule for compliance and impact surveys for the WFP-supported implementation is below:

<table>
<thead>
<tr>
<th>District</th>
<th>Baseline survey</th>
<th>3 month compliance survey (1)</th>
<th>6 months compliance survey (2)</th>
<th>Endline survey (12 months after baseline)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dolpa, Jumla, Rukum (Pilot Project)</td>
<td>June-Sept 2009</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doti, Dadheldura, Darchula, Rolpa, Bajura, Udhayapur, Sindhuli, Kailali</td>
<td>March-May 2010</td>
<td></td>
<td>June-August 2010</td>
<td></td>
</tr>
</tbody>
</table>
is that the compliance\textsuperscript{125} is quite high in all districts and in most districts improved from the first survey to the second. (WFP’s goal is for 60% of targeted children to consume at least 80% of the sachets).

Overall, compliance in all 14 districts went up from 67.2% to 83.7%. Of the 14 districts where data is available, compliance was over 80% in ten districts, and even in the lowest compliance district in round 2, it was 64.3%, i.e., above the WFP target. On a district-by-district basis, compliance has improved in all but three districts, and the districts in which there were decreases in compliance are those with the highest coverage in the first round (Figure 22).

The compliance surveys also show the following:\textsuperscript{126}

- Mothers’ exposure to the posters was 69% and to the brochures was 79% on average, with exposure in hill areas lower (around 50%-60%).
- In the first compliance survey about 60% of mothers recognized that MNPs were a mixture of vitamins and minerals and about 40% thought it was a medicine. Understanding improved between rounds 1 and 2 such that 66% gave the correct answer.
- About 70% of children reportedly consumed seven sachets in the previous week, while about 8% consumed none. The situation improved between round 1 and 2, but not in the hills.
- MNP consumption was higher if mothers had greater exposure to information; the impact of attendance at mothers groups was particularly high, though only about 50% of mothers apparently attended mothers groups.
- About three-quarters of children reportedly liked the MNPs, and the proportion went up between round 1 and 2 – from 66%-75%.
- A similar proportion of mothers reported positive impact of the MNPs. This indicator increased by quite a large amount from round 1 to round 2 – from 52% to 71%. Positive impacts most commonly mentioned were “child looks healthier,” “child is smarter/more active,” and “child has gained weight.”
- About a quarter of mothers reported side effects (usually diarrhea, vomiting or fever) in round 1, but by round 2, only 13% did.
- Between round 1 and round 2, the proportion of breastfed children with a minimum acceptable diet\textsuperscript{127} rose from 20% to 29%, mainly due to improved dietary diversity, rather than adequate meal frequency, which was already high.

\textsuperscript{125} Field supervisors ask the caregivers about consumption of the MNPs and review the compliance card.

\textsuperscript{126} Compliance and endline results are quoted from a presentation by WFP/New Era in May 2011 – Micronutrient Powder (MNP) Supplementation for children in food insecure districts of Nepal: Results from 2010 compliance, baseline and endline surveys.

Preliminary results of the final evaluation indicate the following:

- A reduction in anemia levels was observed between baseline and endline in the mountain and hill intervention areas. However, the decline was statistically significant only in the mountains (51.6% to 38.4%). Meanwhile, a small, non-significant increase in anemia prevalence was noted in the control area. The mountain area had the highest baseline anemia levels.

- There were no significant differences in underweight or wasting prevalence, but stunting was significantly lower in the mountains between baseline and endline. In comparison, there was a non-significant increase in stunting prevalence in the control population.

Therefore, the overall results are highly encouraging, suggesting high coverage, high compliance, and high acceptance of MNPs by caregivers. A 25% reduction in anemia was also measured in the intervention area with the highest baseline anemia prevalence. The relatively limited impact may be related to the fact that anemia prevalence was comparatively low – between 30%-40% in the non-mountain areas. The compliance data points to some areas where information given to the caregiver could be strengthened to improve the program. In 2011, for example, the WFP is planning on working with HKI and MaxPro to improve the IYCF counseling materials.

**HKI-supported implementation:**
HKI has started a cluster randomized controlled trial on MNPs nested within their ongoing Action against Malnutrition through Agriculture (AAMA) program in Baitadi district. The AAMA program is operating in two districts in Nepal and involves homestead food production (HFP) coupled with education and behavior change communication (BCC) on a package of proven Essential Nutrition Actions (ENA), which include, in particular, infant and young child feeding. The program therefore aims to increase access to a diverse diet combined with education to improve infant and young child feeding practices. The trial will compare the impact of HFP plus BCC-IYCF with HFP plus BCC-IYCF plus MNPs with a control community, i.e., the “value-added” of MNPs. In the MNP arm, all children 6-23 months will receive 60 sachets every six months (same dosage as UNICEF-supported pilots). The MNPs will be distributed by FCHVs. The monitoring and evaluation plan for the study will include a baseline and endline survey. The surveys will include measurement of anemia, anthropometry and infections, internal or process monitoring by the field supervisors who will visit target households every 15 days to collect information on coverage, compliance, morbidity patterns, caretakers perceptions, and side effects. The study will last for 18 months and be completed by March 2012.

Although there is no mention of MNPs in the National Nutrition Policy and Strategy of 2004 or the National Strategy on Infant and Young Child Feeding, it is mentioned in the Five Year Plan of Action for the Control of Anemia among Women and Children in Nepal (2005/6 – 2009/10), and the MOHP has a 2009 Program Strategy for MNP Supplementation and Community-Based Infant and Young Child Nutrition Promotion. This presents the justification for distribution of MNPs and gives the objective as the prevention and control of micronutrient deficiencies. The target age group is

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128 ENA include maternal nutrition, early initiation of breastfeeding, exclusive breastfeeding for six months, introduction of appropriate complementary foods at six months, continued breastfeeding through two years or beyond, nutritional care for the sick child, control of anemia and intake of key micronutrients, especially iodine.

129 Full name: Multiple micronutrient vitamin and mineral and mineral mix powders supplementation and the community-based infant and child nutrition promotion program strategy 2066 (2009).
given as 6-23 months in general and 6-59 months “under the nutrition emergency program” in areas with “food insufficiency.” The strategy also mentions distribution of MNPs for adolescents and reproductive age women, and pregnant and lactating women. Plus, the strategy envisions the development of a public-private partnership approach and social marketing in the long-term to ensure sustainability. It does not mention any linkage with IYCF counseling.

The design of the programs supported by UNICEF, WFP, and HKI is similar. All emphasize complementary feeding counseling and the materials and messages used by the UNICEF and WFP supported programs are similar. They are modeled on the community-based IYCF package that was developed by UNICEF for the MNP pilots. The UNICEF program is comparing two delivery models. As expected, initial coverage results indicate that the FCHV model is more effective. This meets projected expectations since FCHVs have proven that they can achieve high compliance with key commodities such as vitamin A and drugs for ARI treatment. The WFP and HKI models utilize FCHVs primarily for initial distribution and counseling. In all programs, the principal method for “maintenance” between distributions is the FCHVs. Also, all programs start distribution at the first contact after the target child has turned six months; distribution is repeated six months later. Therefore, none of the programs are trying to reach children exactly at 6, 12, and 18 months of age, as initially discussed in the UNICEF-supported pilot. MaxPro is the implementing partner for both the WFP and UNICEF. Overall, the compliance and coverage results from the UNICEF and WFP-supported distribution suggest that MNPs are well accepted by communities and feasible distribution systems exist.

Costs of the UNICEF-supported pilots help to indicate costs for scale up. Start-up and recurring costs total US$9.90 per child 6-23 months of age, of which recurring costs total US$6.90. The majority of the recurring cost is the cost of the sachets. A box of 30 sachets costs US$0.85. Most children receive three distributions of sachets, 180 sachets total, during the period of 6-24 months. Thus, total sachets per child cost US$5.10.

Global experience: The Lancet list did not include MNPs as a recommended intervention because the evidence base for this intervention was not established at the time. However, the global case for MNPs has grown rapidly; some 16 studies (therapeutic and preventative) were counted in 2009. As a result, the SUN costing exercise in 2010 did include MNPs as a recommended intervention. Even more recently, a Cochrane systematic review has been conducted to assess the effects and safety of home fortification with MNPs for children under two years. The review compared the provision of MNPs containing at least iron, zinc, and vitamin A versus (i) no intervention or a placebo or (ii) regular supplementation (iron, iron, and folic acid or multiple micronutrients including iron, either in drops or syrups. The results indicate that MNPs reduce anemia by 32% and iron deficiency by 50% compared to no intervention or a placebo, but that there was no effect on growth. MNPs were found to be as effective as daily iron supplementation on anemia and hemoglobin concentrations.130

In addition, the evidence base demonstrating the impact of large-scale programs is beginning to grow. A long-standing, large-scale program in Mongolia that provided MNPs to 15,000 children free of charge achieved high coverage (89%) and compliance. On average, children took the MNPs for 13 months.

and 88% took them daily. Notably, the program recorded a decline in anemia from 46% to 25% in children 6-59 months and a reduction in stunting. Based on these results, the government decided to distribute MNPs nationwide beginning in early 2010. Another large-scale program in a Kyrgyzstan province recorded a 21% reduction in anemia in children 6-23 months after one year of MNP use. Improved care and feeding practices were also reported. The positive outcomes are resulting in program scale up nationwide. The Ministry of Health reports that the program is very cost-effective. Three-year programs in two provinces cost just US$300,000 each and national scale up would cost US$6 million compared to the estimated US$28 million lost each year “due to problems of iron and iodine deficiency.”

In contrast to these positive results, the impact of MNP distribution by the WFP and the UNHCR in Bhutanese refugee camps in Damak district in Nepal are ambivalent. Children 6-59 months were given MNPs from March 2008. A 24 month evaluation undertaken in May 2010 found no significant change in anemia despite high acceptance, coverage and compliance (prevalence was 43.3% in Jan 2007 and 40.2% in May 2010). The principal investigators hypothesize that improvements in anemia were not apparent because older children (25-59 months), at less risk of anemia, were included in the program or because the anemia was due to non-nutritional causes. The MNPs may have contributed to a 40% reduction in stunting during the same period, however. Additional research is necessary to comprehend this study’s results. Nevertheless, it is an outlier in an increasingly large body of evidence supporting the efficacy of MNPs.

In 2009, UNICEF prepared an informal “inventory” of MNP programs in Asia. Some 32 projects were operating (or had recently been operating) in 14 countries. Some were pilots or studies. Most of them were subnational or large scale and two were operating on a national basis. The trend is definitely towards increasing implementation of this intervention on a large scale. This trend is likely to be accelerated by the issuance of the WHO’s MNP guidelines in September 2011. The recommendations “strongly” recommend MNPs containing at least iron, vitamin A, and zinc to improve iron status and reduce anemia among infants and children 6-23 months of age. “The overall quality of the evidence for iron deficiency was found to be high, whereas for anemia, hemoglobin concentration, iron status and growth, it was moderate. Ideally, interventions with multiple micronutrient powders should be implemented as part of a national infant and young child feeding program.” The recommendation is based largely on the Cochrane review mentioned earlier. It includes a suggested scheme of one sachet per day for a minimum of two months, repeated every six months, for infants and children 6-23 months in all areas where prevalence of anemia is 20% or higher. The WHO is also developing recommendations on intermittent iron supplementation of preschool and school age children to increase children’s iron intake. The recommendations are expected before the end of 2011.

**Iron and folic acid supplementation of pregnant women and lactating women and deworming in pregnancy**

**Nepal experience:** Iron and folic acid (IFA) supplementation for pregnant and lactating women as part of antenatal care (ANC) and postnatal care (PNC) has been a policy of the MOHP since 1998.

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132 Preliminary, unpublished results of US CDC evaluation.
133 Ministry of Health, Kyrgyzstan.
However, as in other countries, coverage was low, in part, because attendance at ANC was low. The 2001 DHS recorded only 49.1% of women getting any ANC and only 14.3% with four or more ANC visits. Therefore, only 22.7% of women took any iron tablets. It is unknown what percentage consumed tablets for 90+ days as recommended. To improve the situation, the Intensification of Maternal and Neonatal Micronutrient Program (IMNMP) was started in five districts in 2003, with the support of MI. The program established community-based distribution of IFA tablets by health workers and FCHVS. The staff were trained to provide awareness raising and counseling for the community. In addition, IFA tablets were repackaged into smaller containers to facilitate community-based distribution and postpartum VAS also was emphasized. The community-based distribution included counseling on pregnancy care including ANC attendance, deworming, dietary diversification, and iodized salt consumption. A small-scale pilot using school children and mothers’ groups to register pregnant women was implemented. There were also annual coverage and compliance surveys undertaken. Evaluation of this program in 2004 found a 66% increase in coverage of IFA compared to the baseline. The program was expanded in Phase II to 35 districts and again evaluated in 2009. Coverage of IFA supplementation was significantly higher in intervention districts, as were several other interventions as show in Figure 23.

The IMNMP was further expanded over the next few years and is currently being implemented in 70 out of Nepal’s 75 districts with support primarily from MI, but also from a number of other agencies, including UNICEF. At present, the IMNMP is not being implemented in five districts.

Data from the Micronutrient Surveys and the DHS support the findings of the IMNMP evaluations that coverage of “any” iron supplementation in pregnancy has increased significantly (Figure 24).

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**Figure 23: Results of 2009 Evaluation of the IMNMP**

<table>
<thead>
<tr>
<th>Indicator/Intervention</th>
<th>Intervention districts</th>
<th>Control districts</th>
<th>Significant difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnancy care (rest, improved diet, workload, health checks, smoking &amp; alcohol)</td>
<td>95%</td>
<td>71.1%</td>
<td>yes</td>
</tr>
<tr>
<td>ANC visits (any)</td>
<td>92.1%</td>
<td>65.7%</td>
<td>yes</td>
</tr>
<tr>
<td>Average no. of ANC visits</td>
<td>3.7</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Pregnancy IFA (any)</td>
<td>90%</td>
<td>65%</td>
<td>yes</td>
</tr>
<tr>
<td>Pregnancy IFA (compliance)</td>
<td>66%</td>
<td>44%</td>
<td>yes</td>
</tr>
<tr>
<td>Post partum IFA (any)</td>
<td>59%</td>
<td>28%</td>
<td>yes</td>
</tr>
<tr>
<td>Post partum IFA (compliance)</td>
<td>50%</td>
<td>26%</td>
<td>yes</td>
</tr>
<tr>
<td>Deworming</td>
<td>69.4%</td>
<td>52.2%</td>
<td></td>
</tr>
<tr>
<td>Post partum vitamin A</td>
<td>46.2%</td>
<td>30%</td>
<td></td>
</tr>
</tbody>
</table>


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137 DHS 2001 Tables 9.1, 9.2 and 9.3.
An impressive reduction in anemia prevalence in pregnant women has been attributed to this program, but it is notable that anemia in non-pregnant women has also fallen (Figure 25). It is questionable whether the interventions of the IMNMP alone could have led to reductions in anemia in non-pregnant women on the scale indicated by the DHS results.

The compliance rates with IFA during pregnancy and coverage of IFA for postpartum women are less impressive than the coverage rate for “any IFA” in pregnancy. The Nepal policy is that pregnant women take 180 tablets during pregnancy and 45 postpartum. However, as shown in Figure 26, only 41.6% of women report taking 180+ and only 3% report getting the full course of 225 tablets, according to the April 2010 Micronutrient Survey. In the DHS 2006, only 6.8% of women reported taking tablets for 180+ days in their last pregnancy and only 23.2% of women said they received iron tablets postpartum. Deworming in pregnancy is also low – only 20.3%, although the 2010 Micronutrient Survey indicates that it has increased to 58.7%. The Micronutrient Survey also indicates an improvement in coverage of vitamin A postpartum (as reported in the section on vitamin A supplementation). Whereas coverage was only 29.4% in 2006; it appears to have increased to 63.1% in 2010. Thus, while coverage of iron supplementation in pregnancy has improved significantly, there are still problems with compliance of IFA and vitamin A postpartum and deworming during pregnancy.

**Global experience:** IFA supplementation of pregnant and lactating women has been a long-standing recommendation of the WHO. Guidelines dated 1998 recommend that where the prevalence of anemia in pregnancy equals or is greater than 40%, all women should receive supplements for six months during pregnancy and three months postpartum. If prevalence of anemia is less than 40%, supplementation is only needed for six months during pregnancy.\(^{139}\) (In 2006, anemia prevalence in pregnant women in Nepal was 42.4%.)

The Lancet included IFA supplementation of pregnant women in its list of core interventions based on a pooled analysis of data from eight studies that suggested an increase of 12g/L in hemoglobin at term, and a 73% reduction in the risk of

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139 Soltzfus R and Dreyfuss M. Guidelines for the use of iron supplements to prevent and treat iron deficiency anemia. INACG, WHO and UNICEF. 1998.
anemia at term. They further estimated that this reduction in anemia would reduce the risk of maternal death by 23%. Data is also accumulating—including from a study in Nepal—that iron supplementation during pregnancy could reduce low birth weight and may do so without improving anemia status in the mother. Finally, there is also evidence of IFA reducing neonatal death. An analysis of DHS data by Titaley et al. found the risk of early neonatal death in Indonesia was reduced by the provision of iron and folic acid supplementation, and they estimated that in Indonesia, where 72% of pregnant women reported using iron and folic acid supplementation, 20% of neonatal deaths could be attributed to mothers not using these supplements.

Despite the strong evidence base for IFA supplementation in pregnancy and the fact that the majority of countries have a national policy to provide free IFA supplements as part of ANC, global coverage of this intervention is believed to be low, although global data is not available. The reasons are usually one or more of the following: low coverage of ANC in developing countries; problems with supplies including forecasting, storage and packaging and poor compliance by the women due to side-effects; fears of a big baby, etc. Unlike Nepal, few countries have attempted distributing IFA supplements through community health workers. Therefore, increasing coverage of IFA relies upon increasing coverage of ANC.

Deworming under five children and pregnant women was included in The Lancet list of “optional” interventions to implement in areas with high helminth infestation. Deworming in pregnancy was included because of anticipated improvements in hemoglobin status between the first and third trimester. However, since The Lancet series, a Cochrane review has been published which concludes there is insufficient evidence to recommend use of anthihelminthics for pregnant women. Interestingly, neither The Lancet analysis nor the 2009 Cochrane review appear to have considered the results of Christian et al. in Nepal in which “women given albendazole in the second trimester of pregnancy had a lower rate of severe anemia during the third trimester. Birthweight of infants of women who had received two doses of albendazole rose by 48g (95% CI 91-98), and infant mortality at 6 months fell by 41% (RR 0.59, 95% CI 0.43-0.82)”.

Many countries do not have a policy of deworming in pregnancy because of fears of causing harm to the fetus. This is despite the fact that the WHO and UNICEF both recommend deworming for pregnant women. A WHO meeting in 2002 concluded, “Pregnant and lactating women should be considered a high-risk group and included in treatment campaigns, as should women of childbearing age”.\(^{148}\) This conclusion essentially repeated the findings of a consultation in 1994, which also recommended deworming of pregnant women, but not in the first trimester.\(^{149}\) This recommendation was again repeated in a joint WHO and UNICEF statement issued in 2004.\(^{150}\) A review of data on deworming during pregnancy concluded the health benefits of treating pregnant women outweigh any risks to mother, unborn infant or breastfed infant.\(^{151}\) A trial in Sri Lanka concluded that mebendazole during pregnancy improved some birth outcomes and was not associated with a significant increase in major congenital defects.\(^{152}\)

**Global experience:** MNSs during pregnancy are listed by the LNS as one of the maternal and birth outcome interventions for which there is sufficient evidence for implementation. The LNS inclusion of MNS in their list was mainly based on a systematic review of nine randomized controlled trials on this intervention. The review concluded that when compared with supplementation of two or less micronutrients or no supplementation or a placebo, multiple micronutrient supplementation resulted in a statistically significant decrease in the number of low birth weight babies, small-for-gestational-age babies and in maternal anemia. However, these differences lost statistical significance when MNS was compared with iron folic acid supplementation alone. No statistically significant differences were shown for the outcomes of preterm births and perinatal mortality in any of the comparisons.\(^{153}\) A later meta-analysis indicated a significant reduction in birth weight compared to iron folic acid supplementation and birth weight was significantly higher (weighted difference 54g). There were no significant differences in the risk of preterm birth or small-for-gestational-age infants.\(^{154}\) A further meta-analysis found the following in comparison to iron folate supplementation (i) similar improvements in hemoglobin levels, although MNSs often have lower doses of iron, (ii) small but significant increase in birth weight (pooled estimate +22.4g, with a range of +4.8-75.5g; similar to that achieved with a food supplement), and (iii) improved attainment of child height (i.e., reduced stunting) in some trials.\(^{155}\) The most recent meta-analysis also concludes, “MNS was more effective than IFA at reducing the risk of LBW and small size for gestational age.”\(^{156}\) A number of studies have also suggested

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149. WHO Informal Consultation on hookworm infection and anemia in girls and women, Geneva 1994.
155. Shrimpton et al. Multiple micronutrient supplementation during pregnancy in developing country settings: policy and program implications of the results of a meta-analysis. FNB 2009 (supplement).
longer-term benefits such as reduced stunting at two years in Viet Nam\textsuperscript{157} and slightly higher weight at 2.5 years in Nepal.\textsuperscript{158} In 2006, a WHO, UNICEF and WFP joint statement on the use of multiple micronutrients in emergencies was issued as a result of the strong evidence that MNS were at least as good at reducing anemia as IFA supplements and had greater impacts upon birth weight.\textsuperscript{159}

However, in 2005, Christian et al. pooled the results of the trials in Dhanusha and Sarlahi and reported a non-significant increase in perinatal mortality associated with MNS.\textsuperscript{160} A trial in Pakistan also noted non-significantly higher early neonatal mortality in the MNS group\textsuperscript{161} and in China, although there were non-significant differences for perinatal mortality, iron folic acid was associated with a significantly reduced early neonatal mortality by 54\%. The authors concluded that higher levels of iron were needed to maximize reductions in neonatal mortality.\textsuperscript{162} These suggestions of increased neonatal mortality have raised concerns, and to date, the WHO has not issued any recommendations on use of MNS in pregnancy. However, a recent meta-analysis by Kawai et al. deliberately set out to consider this question, including potential sources of heterogeneity in the effect of supplementation on perinatal mortality. They conclude, “micronutrient supplementation had no overall effect on perinatal mortality, although substantial heterogeneity was evident”. Subgroup and meta-analyses suggested that micronutrient supplementation was associated with a lower risk of perinatal mortality in trials in which >50\% of mothers had formal education or in which supplementation was initiated after a mean of 20 weeks gestation.”\textsuperscript{163} Overall, it appears that further evidence on the safety and impacts of MNS is still needed.

**Maternal calcium supplementation**

**Nepal experience:** With the support of Jhpiego,\textsuperscript{164} a small acceptability study has been undertaken on calcium supplementation during pregnancy to identify the form of calcium that women prefer. The study, which was carried out in two village development committees (VDCs) in Banke district, found that coverage and acceptability was high and that tablets were preferred over sachets of powder. A pilot in one district is now planned, in collaboration with the Nepal Family Health Program, to assess coverage and compliance, and to examine whether calcium supplementation interferes with IFA supplementation. The location of the pilot will depend upon available funding and government interest and will test a schedule of five months of supplementation (150 days). The estimated cost of the tablets is US$1.88 (about 130 NRs) per pregnant woman for 300 tablets (excluding shipping and repackaging if needed).\textsuperscript{165}

**Global experience:** Maternal calcium supplementation was included in the core list of interventions for improving maternal and newborn outcomes by the LNS because a meta-analysis has shown that it reduced the risk of preeclampsia. Preeclampsia is a leading cause of newborn and maternal mortality and


\textsuperscript{159} WHO, WFP and UNICEF. Preventing and controlling micronutrient deficiencies in populations affected by an emergency: Multiple vitamin and mineral supplements for pregnant and lactating women, and for children aged 6 to 59 months. Joint statement by the World Health Organization, the World Food Program and the United Nations Children’s Fund.


\textsuperscript{164} Jhpiego is an international non-profit health organization affiliated with Johns Hopkins University. It is dedicated to improving the health of women and families in developing countries.

\textsuperscript{165} Personal communication - Stephanie Suhowatsky, Jhpiego.
preterm birth. The meta-analysis found that calcium supplementation during pregnancy was a safe and relatively cheap way of reducing the risk of preeclampsia in women at increased risk and in women from communities with low dietary calcium. More evidence on the optimal dose is still needed however.\(^{166}\)

**Delayed cord clamping**

Delayed cord clamping involves delaying the clamping and cutting of the umbilical cord to allow blood flow between the placenta and the newborn to continue after the delivery. This increases the total blood volume of the newborn by about 50% and increases iron stores in the liver. Cord clamping is considered to be delayed if it takes place about three minutes after delivery or when the cord has stopped pulsating, as opposed to immediately after birth or within 10 seconds.\(^{167}\)

**Nepal experience:** Available information from a variety of sources suggests that delayed cord clamping has never been researched, piloted or established as policy in Nepal. It has reportedly never been specifically promoted in any training related to delivery care. Guidance on clamping/cutting/tying of the umbilical cord has not specified a time after delivery. However, current trainings for skilled birth attendants guide them to quickly dry the baby, discard the wet cloth, cover the baby with a dry cloth, put him/her in skin-to-skin contact with the mother, normally on her chest, and then cut the cord. In this way, it appears that delayed cord clamping may be happening in Nepal. However, placental transfusion from the placenta to the newborn via the umbilical cord is optimal when the baby is approximately level with the placenta or slightly higher (such as on her chest). If the baby is held (for example while drying) lower than the placenta, the rate of transfusion is slower, and if the baby is more than 50cm higher than the placenta, transfusion stops altogether.\(^{168}\) Therefore, depending on how high the baby is held while drying, the benefits of the delay in cord clamping that is currently taking place in Nepal may be limited. If, however, the baby is dried while lying on the mother, this is a height for optimal placental transfusion. Considering that delayed cord clamping will improve iron status particularly in newborns and infants, it is worth noting that the prevalence of anemia is highest in the youngest children. The 1998 Micronutrient Survey found that 90% of children 6-11 months were anemic, and the 2006 DHS recorded 81.2% of children 6-9 months and 82.2% of children 10-11 months with anemia. Anemia prevalence declined in older children to a low of 28.7% in children 48-59 months according to the 2006 DHS.

**Global experience:** Delayed cord clamping in the LNS was listed as “optional” for implementation in specific, situational contexts. It was considered as part of an anemia-reduction package to address iron deficiency in infancy. The LNS considered three systematic reviews,\(^{169,170,171}\) and two more recent studies\(^{172,173}\) and summarized these as indicating improved mean neonatal packed-cell volume within 24-48 hours.

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\(^{168}\) PAHO. Beyond survival: integrated delivery care practices for long-term maternal and infant nutrition, health and development. PAHO, Washington DC. 2007 (Figure 2).


\(^{171}\) Hutton et al. Late vs. early clamping of the umbilical cord in full-term neonates: a systematic review and meta-analysis of controlled trials. JAMA 2007.


of birth, and at five days after birth, reduced risk of anemia after birth (by 80%), and at 2-4 months (by 47%). A publication of the Pan American Health Organization emphasizes that the benefits for preterm and low birth weight infants are particularly significant and include decreased hemorrhage and sepsis, in addition to the benefits in terms of iron status. It also identifies benefits for the mother in relation to complications in delivery of the placenta.\textsuperscript{174}

**Iron and folic acid fortification of flour**

Iron fortification of foods was listed by The Lancet as an effective intervention in specific, situational contexts. Almost all foods can potentially be fortified and overall, evidence shows that as long as a bio-available fortificant has been selected and the fortification levels are adequate, taking into consideration the levels of consumption of the fortified food, fortification is an effective strategy to increase consumption of specific micronutrients. However, when the objective is public health, global experience has evolved to demonstrate that mandatory fortification of staple foods or condiments is really the only way fortification can be sustainable and effective. Moreover, the staple food or condiment to be fortified must be processed in a reasonably low number of medium- to large-sized facilities if the strategy is to be feasible to implement. The main staple food in Nepal is rice. Unfortunately, however, rice is milled in numerous small mills and to date no efforts have been made to try to fortify it. A second group of staples is wheat, maize, and millet. Wheat and maize flour fortification is potentially feasible in Nepal and is discussed below.

**Nepal experience:** Nepalese consume approximately 78g of wheat flour per day. This calculation is based on a per capita consumption of wheat of 37.9kg per day and an extraction rate of 75%.\textsuperscript{175} Wheat flour is consumed directly through foods such as chapattis (local bread), which are made in the home, and through processed foods such as biscuits, bread, and instant noodles. Instant noodle consumption is rising rapidly and Nepal has eight domestic producers in 2011, compared to only two in 2005. Nepalis ate an estimated 730 million packets of instant noodles in 2010, up from 430 million in 2007.\textsuperscript{176} The 2010 figure calculates out as approximately 15 packets per person per year on average.\textsuperscript{177} The Nepal Flour Millers Association estimates that average consumption of wheat flour as instant noodles is 13.5-15.5g/capita/day and growing.\textsuperscript{178} The consumption of such processed foods is higher in urban areas, but overall, consumption of such foods is rising. An unknown amount of maize flour is also consumed.

Wheat and maize flour in Nepal is milled from locally grown and imported wheat and maize. Detailed information on the milling industry is not available, but the best estimate is that 20%-30% of all wheat flour and 8% of total cereals (wheat, maize and millet) are milled in about 20 large-scale commercial roller mills throughout the country. The remainder is milled in small-scale village mills known as chakki or water mills. It is likely that the flour milled in the large mills can be cost-effectively fortified. In August 2011, a Notification was passed under the existing Food Act making fortification of all roller mill flour mandatory. Over the past few years, the MI has supported the industry startup of wheat flour fortification (with iron, folic acid, and vitamin A) by providing training and technical support, free fortification premix, and some machinery. The new legislation is largely the result of MI support for roller mill flour fortification and its advocacy for the legislation. The roller mills of Nepal are thus currently preparing to implement

\textsuperscript{174} PAHO. Beyond survival: integrated delivery care practices for long-term maternal and infant nutrition, health and development. PAHO, Washington DC. 2007.


\textsuperscript{177} Based on estimated population of 28,043,744 in 2010 (2001 census estimates).

this new law with the support of the Nepal Roller Millers Association. However, wheat flour mills currently complain that they are disadvantaged by a 13% VAT tax on refined (maida) flour. This tax does not apply to whole meal (atta) flour produced by the chakki mills or smuggled flour imports from India. As Indian mills are bigger and benefit from economies of scale, they are able to produce and sell flour more cheaply than Nepali mills. Therefore, flour imports have reduced the operating times of mills in Nepal by 10% with significant impacts upon milling costs. Shortages of electricity also constrain production and add to costs.

In addition to providing support to initiate fortification in roller mills, MI has also been supporting fortification pilots by small-scale mills such as chakki and water mills operated in rural areas. In 2007, MI started a pilot at a small mill fortification in one VDC of Lalitpur district. Based on the success of the pilot, the effort was expanded to a further nine VDCs in 2009. MI developed an innovative gravity-powered fortification device suitable for water mills, which is provided to the mills. The pilot also supports the small mills with seed money for a premix revolving fund, training, and creating awareness. A community NGO is paid to monitor the program. MI is evaluating the impact of this pilot project and the results are expected in August 2011. In a separate activity, the NGO Project Healthy Children is adapting the fortification device developed by MI to make it more suitable for electric chakki mills.

In light of the success of the MI pilot, the Asian Development Bank (ADB) has recently provided a US$ 1.8 million grant to the Government of Nepal (GoN) for Flour Fortification in Chakki Mills. The program will work in 65 VDCs in one or two districts to support and encourage small mills to fortify. A revolving fund for premix will be created; though the premix will be procured by the MOHP. Appropriate equipment, principally micro feeders, will be provided, together with training. Social mobilization will aim to encourage the small mills to participate and the community to accept the fortified flour and pay the incremental fortification cost. The VDCs will establish structures to work with the mills, monitor implementation of the program, and collect the fortification fee for the premix. Health post staff will carry out quality assurance checks. MI is providing technical support for implementation of the project, which it started in 2011 and will last three years.

Global experience: Evidence of the impact of wheat flour fortification with folic acid on the reduction of neural tube defects (NTDs) is well established. Reductions of 23%-46% in the rate of NTDs in countries such as Costa Rica, USA, Canada, and Chile have been documented as a result of national wheat flour fortification. Data is also available on the impact of iron fortification of flour on anemia prevalence. For example, Venezuela has recorded a reduction in anemia in school children of 43%. The actual reductions in anemia observed depend upon several variables including, (i) the type (and bioavailability of the fortificant), (ii) the baseline anemia prevalence, and (iii) the amount and duration of fortified wheat flour consumption. Good quality data on the impact of large-scale/national programs is lacking. Based on available global evidence, in 2008, the WHO released a recommendation for wheat and maize flour fortification and guidance on effective fortification levels. Currently, 63 countries, including Nepal, have national legislation or decrees that mandate fortification of one or more types of flour with either iron or folic acid. Flour fortification is considered highly cost effective for the reduction of anemia: 8:1.

179 Berry et al. Fortification of flour with folic acid. FNB 2010 (supplement).
180 Hurrel et al. Revised recommendations for iron fortification of wheat flour and an evaluation of the expected impact of current national wheat flour fortification programs. FNB 2010 (supplement).
The above-mentioned guidelines are applicable only to flour milled in “industrial roller mills (i.e., >20 metric tons/day milling capacity). Although there are several examples of pilots of small-scale wheat flour fortification in both Africa and Asia, none of them have been able to be taken to scale. Significant efforts have also been made to support fortification by small-scale factories in the salt iodization program. Problems experienced include: (i) reduced sustainability as inputs have to be provided by donors because they are not affordable by the small-scale salt factories, (ii) large number of small-scale facilities makes effective monitoring a challenge, (iii) quality of the basic salt product is often too low to iodize or to sell in the commercial market, and (iv) small-scale enterprises tend to operate on and off, and seasonally.

Salt iodization
Nepal experience: The Nepal salt iodization program was started in 1973, and in 1999, the “Iodized Salt (Production and Distribution) Act 1999” was approved by the government and gazetted. However, the standards and regulations under this Act have not been gazetted, and as such, salt iodization is not considered mandatory. All salt in Nepal is imported, mainly from the Indian states of Gujarat and Rajasthan, by the Nepal Salt Trading Corporation (STC), which also controls the salt trade and distribution. Some salt is still smuggled across the border, and, along with the large crystal “phoda” salt, which is found in mountainous regions, are often not iodized. A program of promotion of a “two child logo” over the last few years has contributed to reducing the consumption of this non-iodized salt in the districts that border India. Because of the high cost of distribution to the remote parts of Nepal, the transport cost is subsidized by the government. Salt is imported iodized or is re-iodized by the STC at the point of import, if it is found to be of low quality. Two stations for testing salt and for re-iodization are currently operating, although five were set up at key border points in the 1980s, with financial support from the Government of Japan.

Because of the centralized nature of the salt industry in Nepal, high coverage of iodized salt was rapidly achieved, despite the fact that it is not mandatory. The government policy is to import and distribute only iodized salt throughout the country. The STC has been implementing this policy as the Universal Salt Iodization Program since 1973. In 1998, 82.5% of households had iodized salt. However, that same year, only 55.2% of households consumed adequately iodized salt (i.e., >15ppm of iodine). In 2005, coverage with iodized salt increased to 95%, but coverage with adequately iodized salt remained virtually unchanged at 58%.

As shown in Figure 27, data from the Micronutrient Surveys suggest that coverage of adequately iodized salt has been about 50%-60% for the last ten years and more. However, a survey undertaken by the Governments of Nepal

186 Nepal Iodine Deficiency Disorders Status Survey 2005, MOHP, MI.
and India in 2007 found that coverage of adequately iodized salt had risen to 77%\(^\text{187}\). This improvement seems to have been confirmed by data from the DHS 2011 Preliminary Report, which indicates that coverage of adequately iodized salt was 80%.

As a result of the high iodized salt coverage, Nepal has an adequate iodine status as assessed by urinary iodine excretion (UIE) levels. Median UIE in school age children in 2007 (the most recent data available) was 202.8 µg/L, up from 188 µg/L in 2005 and 143.8 8µg/L in 1998.\(^\text{188}\) The WHO categorizes a median urinary iodine level of 100 and 199 µg/L as “adequate,” and notes that although levels of 200-299 are “above requirements.” This level of iodine intake (as measured by iodine excretion) is “likely to provide adequate intake for pregnant/lactating women, but may pose a slight risk of more than adequate intake in the overall population.”\(^\text{189}\) The proportion of people with UIE >199 is greater in urban areas (67.7%) and in the hills (54.5%) and terai (52.5%). Severe iodine deficiency has been largely eliminated though there is still a small proportion in the mountain region. This region also has quite a high proportion of people with mild to moderate deficiency (Figure 28). High UIE is found particularly in the sub-population consuming “2-child logo” salt - 235 µg/L compared to 140 µg/L in those consuming other types of salt. The same survey shows that 52.9% of the population consumes 2-child logo salt and that 92% of 2-child logo salt has iodine levels >30ppm and 75.4% has levels greater than 50ppm, which is the Nepal standard. The remainder of the salt is referred to as crushed and crystal salt, and 33.6% and 42.1% of these salts respectively have iodine levels less than 15ppm.\(^\text{190}\)

The most recent data on urinary iodine is from 2007, and the most recent data on iodized salt coverage is from the DHS 2011 Preliminary Report. However, data on iodized salt coverage also will be collected by the Living Standards Survey 2011. However, none of the past surveys or the Living Standards Survey included a quantitative measurement of the iodine content of the salt. In all cases, only rapid salt test kits were used to assess iodine content. This assessment is semi-quantitative at best, and considering that a major problem of the program is inadequately iodized salt, there would be considerable benefit in undertaking a quantitative assessment of the salt iodine content at the next opportunity.

**Global experience:** The universal salt iodization program is often cited as the most successful nutrition program in the

![Figure 28: Median Urinary Iodine Levels of School Age Children (µg/L)(2007)](image)


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world. Thirty-six countries have reached the target of at least 90% of households using adequately iodized salt, up from 21 countries in 2002. Some 72% of all households in developing countries now consume adequately iodized salt.\textsuperscript{191} In most of these countries, urinary iodine levels have increased in line with the increased consumption of adequately iodized salt, but this is less well documented. Some major lessons that have been learnt include: (i) the importance of mandatory legislation; (ii) the necessity of a detailed salt situation analysis and good data collection and monitoring systems so that it is possible to understand the situation; (iii) all salt should be iodized, including salt for food processing and animal consumption; (iv) focus on ensuring the supply of iodized salt rather than trying to create demand; and, (v) start with the largest salt producers first.

**Community-based management of acute malnutrition – severe and moderate**

Community-based management of acute malnutrition (CMAM) is essentially a “new” intervention. It has evolved from traditional facility-based treatment of severe acute malnutrition to “community-based” treatment in emergency situations, to being offered as a routine outreach service of health systems in “non-emergency” situations when there is a high prevalence of wasting. The “evolution” has occurred because of increased understanding and awareness that severely wasted children are nine times more likely to die;\textsuperscript{192} that prevalence of severe wasting can be high even in “non-emergency” situations;\textsuperscript{193} and, by the development of ready-to-use therapeutic foods (RUTFs), which can be safely fed to children in their homes because they contain no water and are not susceptible to bacterial infection.

The principle of CMAM is to identify cases of severe acute malnutrition (SAM)\textsuperscript{194} early through active screening in the community, and to treat uncomplicated cases in the home utilizing out-patient services. Because of early identification, children are less severely malnourished and do not have to spend extended periods for treatment in health facilities, which is often unfeasible for caregivers and places a heavy burden on health systems. The community-based treatment of SAM includes feeding with ready-RUTF, which is a safe palatable food with high-energy content and adequate amounts of vitamins and minerals, and a short course of basic oral medication to treat infections.\textsuperscript{195} The management of moderate acute malnutrition (MAM) is also intended to be treated as a component of CMAM.

**Nepal experience:** The DHS 2006 gives the prevalence of wasting in Nepal as 12.6% and severe wasting as 2.6%. Based on population figures at the time of the DHS 2006, this implies just over 90,000 Nepali children less than five years old with severe wasting. The DHS 2011 Preliminary Report gives the prevalence of wasting as 10.9% and severe wasting unchanged at 2.6%. At estimated population figures for 2011, 92,428 children are currently severely wasted. As noted above, they are at significantly increased risk of death and in need of treatment. Prevalence of severe wasting appears to be highest in children below 24 months, particularly those below 12 months. It is also associated with being born small and to having an

\textsuperscript{190} UNICEF. Tracking Progress on Child and Maternal Nutrition: A survival and development priority. UNICEF 2009.


\textsuperscript{193} Indicators are severe wasting as measured by weight for height (<-3 SD) or MUAC (<115mm) and/or edema.

undernourished mother. The mother’s level of education seems to have relatively little correlation with the prevalence of severe wasting, and neither is severe wasting prevalence higher in lower wealth quintiles (DHS 2006 data not shown; DHS 2011 data not yet available). Geographically, severe wasting is equally high in urban and rural areas (prevalence in urban areas seems to have increased significantly in 2011, compared to 2006), and is almost twice as high in mountain and terai areas compared to hill areas (Figure 29).

Because treatment for severe malnutrition was only available through a small number of NGOs and government facilities—with limited coverage and outcomes—a feasibility assessment of community-based therapeutic care was undertaken in 2007, with the support of UNICEF. The assessment concluded that better services for treatment of severe malnutrition were needed, and that community-based treatment, integrated into routine health services, namely IMCI, should be explored. A pilot study in three districts was therefore launched with the support of UNICEF and international NGOs with experience in CMAM, namely Concern, and Action Contre La Faim International (ACF). The pilot was started in Mugu, Achham, and Bardiya in 2009, and Kanchanpur and Jajarkot were added in 2010. The pilots are testing different ways to provide initial and on-going assistance to the district health offices (DHO), which are the ultimate implementers in all cases. In Bardiya, initial technical assistance and monitoring support was provided by Concern, but the DHO is now fully responsible with support from MOHP’s Nutrition Section and UNICEF. In Mugu and Achham, UNICEF consultants provide technical and monitoring support to the DHO, and in Jajarkot and Kanchanpur support is provided by national NGOs.

The general Nepali model of community-based treatment of SAM (CB SAM) is for community health workers, including MCH workers, village health workers, and FCHVs, to conduct sensitization and screening activities at the community level using mid-upper arm circumference (MUAC) tapes and checks for edema. Children with a MUAC measurement below 115mm (red) are referred to the closest outpatient treatment post (OTP). In Nepal, OTPs are often sub-health posts. The child is reassessed at the OTP using height and weight, and a health check determines if any medical complications exist, and if the child has an appetite. Children are admitted for SAM treatment if they demonstrate at least one of the following: MUAC <115mm, wasting <-3SD, or edema. Children with an appetite and no complications are treated in the OTP with IYCF counseling, RUTF and basic drugs, which they take home. They return to the OTP every week or two weeks to assess progress and receive supplies. Children are considered cured when they have achieved a 15% weight gain. Community health workers assist in monitoring the admitted children in their homes. In addition, CMAM monitors have been recruited as contractual staff members of the DHO. They are recruited locally and provide monitoring and supportive supervision for implementation at the

![FIGURE 29: Prevalence of Severe Wasting by Age, LBW, Mothers’ Nutritional Status, Mother’s Education and Wealth Quintile](image-url)

OTPs and of community-related activities in CMAM districts. Children with medical complications or no appetite are referred to stabilization centers (SCs) at the District Hospital or selected Primary Health Care Centers, where they receive inpatient treatment.

Activities of the pilot have included:
- Development of a national treatment protocol and training package
- District and VDC advocacy workshops to orient stakeholders plus orientation of women’s groups to support community mobilization. Faith healers have also been oriented on CMAM in some districts to encourage them to refer sick and malnourished children to health facilities.
- Cascade training starting with master training of trainers in Kathmandu and then training of district trainers who train health workers, village health workers, MCH workers, and FCHVs.
- Provision of supplies including therapeutic foods, drugs, anthropometry equipment, MUAC tapes, forms and formats for record keeping and reporting.

The pilot is not complete yet and implementation in Kanchanpur and Jarjarkot only stared in September 2010. However, process monitoring data is available to the end of July 2011, and is shown in Figure 30. As the data show, the CMAM pilot results appear to indicate that community-based treatment of SAM activities, as established in the pilots, are able to identify and treat SAM cases. The achievements all compare favorably to Sphere standards, which were established for well-resourced, intensive CMAM activities in emergency settings. Recovery rates are high and the proportion of deaths is significantly lower than the Sphere cut-off. This presumably reflects the fact that children are less sick when they enter the program because of the active community screening. This is exactly the objective of CMAM. The proportion of defaulters is 9.1% on average across all pilots. This is down from 11% in December 2010. At the time, although this rate was well below the Sphere standard of 15%, it was still a cause for concern of the program managers. Reasons for the “high” defaulter rate were reported as (i) poor follow up between OTP visits, (ii) misunderstandings on the need to return to the OTP, (iii) admission of children with no appetite although such children should be referred to OTP, and (iv) the distance to the OTP. Additional OTPs therefore were established in some districts to address this problem and improved follow up of admitted children between visits took place. It was also agreed that stricter adherence to the protocol regarding children with no appetite was necessary. The July 2011 data suggest that these strategies have started to work.

However, there is possibly a problem of low coverage. Based upon initial baseline data for each pilot district on the prevalence of severe acute malnutrition,

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**FIGURE 30: CMAM – Results as of July 2011**

<table>
<thead>
<tr>
<th>District</th>
<th>Admissions</th>
<th>Discharged (%)</th>
<th>Under treatment (%)</th>
<th>Recovered (%)</th>
<th>Deaths (%)</th>
<th>Defaulters (%)</th>
<th>Relapsed (%)</th>
<th>Non Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sphere standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bardiya May 2009</td>
<td>2,364</td>
<td>85.4</td>
<td>14.6</td>
<td>86.2</td>
<td>0.4</td>
<td>12.4</td>
<td>3.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Achham Jan 2010</td>
<td>1,383</td>
<td>80.8</td>
<td>19.2</td>
<td>94.2</td>
<td>0.3</td>
<td>4.5</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Mugu July 2010</td>
<td>917</td>
<td>85.0</td>
<td>15.0</td>
<td>90.5</td>
<td>2.1</td>
<td>6.5</td>
<td>1.4</td>
<td>0.9</td>
</tr>
<tr>
<td>Kanchanpur Sept 2010</td>
<td>1,966</td>
<td>55.8</td>
<td>44.2</td>
<td>99.6</td>
<td>0.1</td>
<td>10.2</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Jarjarkot Sept 2010</td>
<td>547</td>
<td>84.3</td>
<td>15.7</td>
<td>85.7</td>
<td>2.0</td>
<td>12.4</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7,677</td>
<td>71.4</td>
<td>28.6</td>
<td>89.4</td>
<td>0.8</td>
<td>9.1</td>
<td>1.7</td>
<td>0.7</td>
</tr>
</tbody>
</table>

196 The Sphere standards were developed under the Sphere Project by a group of humanitarian NGOs and the Red Cross and Red Crescent movement. The Sphere Project is an initiative to define and uphold the standards by which the global community responds to the plight of people affected by disasters. Sphere standards are frequently updated.
it appears that some SAM children are not being identified by the community screening process. To address this problem, districts are linking screening with vitamin A distribution or with national immunization days.

The pilots, as they are currently operating, are almost completely implemented by DHO staff. Central level MOHP and NGO staff and UNICEF consultants provide only technical support and monitoring. It will be feasible to phase out these roles in the future when the pilots are taken to scale. Particularly the monitoring is recognized as a task that is important for the pilots to identify problems, but monitoring would not continue in its current form in a scaled up program.

Some difficulties have been experienced with supplies. Many of the products, in particular RUTF, are currently sourced internationally. This requires good long-term forecasting and timely ordering to ensure that stocks are available when needed. In addition, all supplies were provided by donors so the pilot has not fully tested the distribution of supplies through the government system. By all accounts, the protocols and training materials developing in Nepal for CMAM are good. Some slight changes are recommended in the protocols based on the pilot experience.

A recognized weakness in the Nepal CMAM pilots relates to the treatment of MAM cases. Under the current plan, MAM cases only receive counseling to improve their nutritional status. Many program stakeholders in Nepal consider this insufficient because caregivers of MAM cases often have limited resources and capacities to improve the care of their children. In addition, health workers at the OTPs have insufficient time or capacity to counsel adequately MAM cases on top of managing the counseling and treatment of SAM cases. The numbers of MAM children are significantly higher than SAM (just under 300,000 in Nepal based on estimated 2011 population figures), and therefore the case load for providing intensive, quality counseling and follow up is huge. A number of stakeholders involved in the CMAM pilots have raised the question of whether MAM cases should be provided with supplementary foods. No data is currently available on the impact of existing counseling on MAM or what proportion of MAM children progress to SAM.

Rough data on the cost of community-based management of SAM in Nepal is available. UNICEF figures show that the cost of training per district is about US$ 45,000. This covers the training of all health workers in an average district on CMAM, including IYCF counseling. Running costs for CB-SAM are approximately US$ 8,000 per district per year, and the average cost of RUTF per child is US$ 58. On average, children in the pilots have been admitted for 46 days and have required 96 sachets of RUTF. These costs compare very favorably to “global costs” of US$200 per child per episode with the food costing about US$50-70. While the food cost of the Nepal pilot is similar to global data, it appears that the running costs of the program are considerably less. Using DHS 2011 prevalence data and estimated 2011 population data, the estimated incidence rate of SAM is 184,856 per year. Total cost of treating these children is thus approximately US$ 10,721,648 per year.

Because a large proportion of the cost is the RUTF, Nepal is interested in local/regional production. However, while there may be several advantages of locally/regionally produced RUTF, such as...
development of local industry or use of local, more sustainable ingredients, cost is not necessarily one of them. The price for RUTF through UNICEF, for example, benefits from significant economies of scale. Global experience suggests that aside from addressing quality issues, local production should not be considered until there is a guarantee of large orders. It is interesting to note, however, that the Nepali food company Chaudhary Group claims to be able to produce both RUTF and ready-to-use-supplementary food (RUSF). It is not actually in production, however, and has not passed any international quality assurance checks.

An external evaluation of the CMAM pilots is on-going. The purpose of the evaluation is to assess the performance of three CMAM pilots in Bardiya, Achham, Mugu, and Jajarkot in terms of the pilots’ relevance and appropriateness, the effectiveness and coverage, the efficiency and quality, and the sustainability and scalability. The performance of the pilots will also be assessed according to the three assumptions and indicators outlined in the national CMAM pilot strategy (ref) which include:

1. CMAM will reduce the barriers of access to treatment for acute malnutrition, and therefore increase the percentage of children receiving treatment (coverage) from less than 1% to 50%;

2. CMAM can be sustained through integration in the regular health services with existing human resources and facilities;

3. CMAM can create effective treatment capacity for children suffering from severe acute malnutrition.

Global experience: The Lancet Nutrition Series included “treatment of severe acute malnutrition” as a core intervention for all countries. The assumption was that SAM treatment through facility-based management would reduce deaths due to SAM by 55%. The potential of community-based treatment was recognized, but at the time, there were no randomized trials confirming the efficacy.200 Benefiting from the increase in data on the impact and feasibility of community-based treatment of SAM, the SUN costing exercise included treatment of SAM in the list of essential interventions but specified a community-based approach. In 2009, after the release of the LNS, the WHO and UNICEF issued a joint statement on “WHO child growth standards and the identification of severe acute malnutrition in infant and children.”201 The statement highlighted the fact that children with SAM (by the WHO child growth standards) are at an “elevated” risk of death and that using the new WHO standards would result in a two to four times increase in the numbers of infants and children falling below -3SD compared to using the former NCHS reference. The statement increased the moral imperative for establishing programs. In addition, experience was growing that CB SAM was feasible and effective. CB SAM is now recognized as a routine intervention provided through the health system wherever prevalence of wasting is high, rather than as a specialized intervention relevant in emergency situations only.

Although the community-based management of SAM was only endorsed by the UN in 2007, with the publication of the WHO, WFP, UNICEF, UN SCN and UNICEF Joint Statement on Community-Based Management of Severe Acute Malnutrition,202 46 countries have started community-based management of SAM in the last five years, although often on a small scale. It is only now that programs are starting to expand. Nepal is very much at the forefront of this evolution.

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Overall, Asia has lagged behind Africa in implementing community-based management of SAM, although the prevalence of wasting in South Asia is double that in Africa. Even though community-based management of SAM is perceived as an “expensive” intervention, it is very cost effective at US$ 41 per DALY saved. A new analysis from Malawi reaches a very similar figure of US$ 42 per DALY in a “best case scenario.” A Cochrane review that will assess the effects of RUTF on health outcomes such as recovery rate, relapse during the intervention period, anthropometrical status, weight gain, and mortality in children with moderate or severe undernutrition is currently under preparation.

In contrast to severe malnutrition, programs for the management of MAM in children have remained virtually unchanged for the past 30 years. Nevertheless, it seems likely that this form of malnutrition is associated with a larger proportion of nutrition-related deaths than severe malnutrition. The only global guidance on treatment of moderate malnutrition was developed 30 years ago for emergency contexts. It states, “When the moderate wasting rate is above 10%, establish supplementary feeding for malnourished individuals in vulnerable groups and therapeutic feeding programs for severely malnourished individuals. If the moderate wasting rate is above 15% or if there are aggravating factors (such as food insecurity, high mortality, disease epidemics) start general rations, expand targeted supplementary feeding to be blanket feeding for vulnerable groups (such as children and pregnant and lactating women) and maintain therapeutic feeding services.”

Based on these recommendations and DHS 2006 sub-regional data, Nepal should be providing general food rations and blanket supplementary feeding in at least four sub-regions, including three in the terai.

The general principles for treatment of MAM recognize that children with moderate acute malnutrition have a three times greater risk of dying than children without acute malnutrition, and are likely to live in a vulnerable environment, such as a food insecure area or poor family. It is also likely that a proportion of MAM children will progress to SAM, for example, if they become sick.

A meeting was organized by the WHO, UNICEF, WFP, and UNHCR in October 2008 to answer the question “What diets should be recommended to feed moderately malnourished children?” The meeting commissioned four background papers and attempted to bring together all available experience on treating moderate malnutrition. Moderately malnourished children were taken to be all children with moderate wasting and/or moderate stunting. Moderate malnutrition affects large numbers of children in poor countries. They are at increased risk of mortality due to common diseases, and, they may worsen if not adequately treated, resulting in severe acute malnutrition (wasting and/or edema) and/or severe stunting. The meeting also concluded that in the absence of specific recommendations, children with severe stunting and/or growth faltering would benefit from a diet adapted for moderately wasted children. In general, therefore, recommendations for addressing MAM

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207 "Children with weight for height between -2 and -3SD are about three times more likely to die than children above -1SD. As the proportion of children with MAM is usually much larger than SAM, the number of children dying as a result of MAM may be higher than those dying due to SAM, even though the risk of death for SAM children is nine times greater than non-wasted children.
(moderate wasting) could also be applied to moderate and severe stunting and growth faltering. Outcomes and conclusions of the meeting, which are most relevant to the current discussions in Nepal, are listed below. Unless otherwise stated, the reference for the below points is the Proceedings of the Consultation.210

- Tentative recommendations for the nutrient density of diets suitable for feeding children with moderate malnutrition were made211 and potential foods and ingredients were reviewed.212

- Wasted children can put on weight (recover) at a rate of 5g/kg/day or more. This may require an additional 25kcal/kg/day or more, in addition to an “adequate” base diet. For stunted, non-wasted children, height gain should be associated with some weight gain, to maintain weight-for-height. It is unclear whether a diet adequate for treating a moderately wasted child will be adequate to treat a stunted child. Wasting may be corrected in a few weeks with adequate diet, but the correction of stunting may take longer.

- Potential options for obtaining a diet that can address moderate malnutrition are (i) through local foods, (ii) modified RUTFs, (iii) fortified blended foods, and (iv) complementary food supplements in addition to a local diet.

- In conditions where food security and poverty do not restrict access to a diverse diet, locally available foods can be used to treat moderate acute malnutrition. Linear programming can be used to design optimal diets that deviate as little as possible from current diets.

- Diets providing 12%-15% of energy as protein will probably be adequate for addressing both wasting and stunting. At least 30% of energy should be provided from fat.

- Animal-source foods are particularly valuable as they usually have a higher content of type I and type II nutrients and are virtually free of antinutrients (phytate, polyphenols, trypsin inhibitors). Such foods also do not contain any dietary fiber and dairy products can have a specific effect on growth through the stimulation of IGF-1 secretion.213

- The minimum amount of animal source foods that are needed is not known, but milk, and potentially eggs, seem to have advantages over meat and fish in terms of growth but not in terms of improving micronutrient status.

- Diets based exclusively on plant foods need to be fortified and processed in such a way as to remove antinutrient contents such as phytate.

- Vegetable oils are useful to provide adequate quantities of essential fatty acids.214

- A review of dietary counseling for moderately malnourished children found that to date, most counseling for moderately malnourished children is the same as general dietary advice given to mothers of well-nourished children. However, the review also concluded that, “the generic dietary recommendations for well-nourished children may meet the requirements of children with moderate malnutrition if

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212 Michaelsen et al. Choice of foods and ingredients for moderately malnourished children 6 months to 5 years of age. FNB 2009 (supplement).
213 Michaelsen et al. Choice of foods and ingredients for moderately malnourished children 6 months to 5 years of age. FNB 2009 (supplement).
214 Ibid.
the recommendations are made more specific and context appropriate." In addition, dietary counseling as a means to provide essential knowledge and skills will contribute to sustained improvements in feeding practices, which can potentially prevent malnutrition and/or relapse.

- Capacity building of health care providers in dietary counseling is essential and formative research should always be carried out to ensure that only foods and feeding practices that are affordable, feasible and acceptable to families are recommended. In addition, caregivers of children with moderate malnutrition need a “reinforced approach” for dietary counseling, including demonstrations, home visits, and/or group meetings.

- RUTFs have been used successfully to treat moderate malnutrition, for example in Malawi and Niger. However, RUTF probably provides nutrients in excess of what moderately malnourished children need, and providing RUTF is likely to be unrealistic in the majority of situations due to shortage of supply and cost implications. RUTF could potentially be modified, including by using more locally available ingredients to bring costs down and make the food more acceptable. Thus, for example, Supplemenary Plumpy produced by Nutriset uses whey and soy protein isolates rather than skimmed milk powder, which is used in Plumpy’Nut. Plumpy’Doz is essentially the same as Plumpy’Nut but is consumed in smaller quantities added to the daily diet. However, it has proven difficult to modify RUTF while still avoiding antinutrient content and maintaining palatability, processing, storage and packaging advantages.

- To date, the majority of food supplements provided for moderate malnutrition have been fortified blended foods such as corn-soy blend or wheat-soy blend, in combination with oil and sugar. However these are unsuitable due to a high content of antinutrients, absence of milk, suboptimal micronutrient content (even though these foods are fortified), and high bulk and viscosity. These foods are therefore being improved and their efficacy is currently being tested.

- Complementary food supplements, which compensate for shortage of specific nutrients, may have a role to play. These include: (i) micronutrient powders, (ii) powdered complementary foods supplements that provide protein or amino acids and micronutrients, (iii) complementary foods supplements that have active ingredients (enzymes), and (iv) lipid based nutrient supplements (which provide a varying amount of energy). These foods aim to provide only the additionally required nutrients to an otherwise local diet or basic food ration. This limits costs as well as interference with prevailing dietary habits. However, only certain outcomes (e.g., impact of

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218 De Pee, S and Bloem M. Current and potential role of specially formulated foods and food supplements for preventing malnutrition among 6-23 month old children and for treating moderate malnutrition among 6-59 month old children. FNB 2009 (supplement).
219 For example, corn soy blend from WFP is being replaced by improved corn soy blend for general use and improved corn soy blend plus milk for young children and moderately malnourished children. The latter includes improved micronutrient content, dehulled soybeans to reduce fiber and phytate, skimmed milk powder, sugar to provide up to 10% of energy and oil.
micronutrient powders on anemia) have been tested, as many of these foods are relatively new. One of the most successful pilot nutrition counseling programs for moderate malnutrition was implemented in Bangladesh and provided micronutrient supplements, including zinc, in addition to counseling.220

• A study by Ruel221 was cited, which compared two populations. In one population, all children 6-23 months received a monthly supply of fortified blended food and oil, and in the second population, only children 6-59 months suffering from moderate acute malnutrition were given a monthly supply of the same. After three years, the levels of malnutrition were lower in the first population. The authors concluded that a preventative strategy that provided the supplementary food to all children during the “window of opportunity” was more effective than treating those with moderate malnutrition. The strategy for a population thus suggested is focus on preventing malnutrition through programs that target pregnant and lactating women and children 0-23 months of age, and on treatment of moderate and severe wasting among children under five years of age.222

Horton has roughly calculated that the benefit cost analysis of providing a supplementary food might be about US$500-1,000 per DALY saved. This intervention is by far the least cost-effective of the SUN interventions.223 Horton reports that India has produced a ready-to-use food that provides 250kcal and costs US$0.13 per child per day. Based on this cost, and an approximate number of MAM kids in Nepal of 300,000, and assuming the number of treated children is doubled to account for poor targeting, treating MAM with supplementary food would cost approximately US$28.5 million per year. However, if a fortified blended food, rather than the Indian ready-to-use food, was used, this cost might be lowered.

**Supplementary food for young children and pregnant women**

**Nepal experience:** In 2002, WFP started a program to increase utilization of Maternal and Child Health Care (MCHC) services through the provision of a food supplement for pregnant women and young children when they came for services. The program operates in 51 VDCs in nine districts in the far west, mid-west, and eastern regions, covering more of the hill districts and some mountain districts. These districts were selected because of evidence of chronic food insecurity and high out-migration. When mothers attend MCH services, they are provided with a monthly ration of Super Cereal, a micronutrient-fortified blended food consisting of wheat, corn, soybeans, and sugar, which provides 500kcal, 18.5g of protein and 7.5g of fat per each 125g serving. A 7kg package of Super Cereal is provided to each beneficiary per month, i.e., mothers or children 6-36 months if they have attended basic maternal and child health services such as ANC, PNC, growth monitoring or individual/group counseling during monthly MCH sessions on the given clinic dates at the government local health facilities. The MCH services are routine services provided by the MOHP, but support is provided by the implementing partner of WFP, Himalayan Health and Environmental Services Solukhumbu (HHESS), to strengthen and improve the

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222 De Pee, S and Bloem M. Current and potential role of specially formulated foods and food supplements for preventing malnutrition among 6-23 month old children and for treating moderate malnutrition among 6-59 month old children. FNB 2009 (supplement).
services. Logistic management of the food storage and distribution is undertaken by the Ministry of Education (Food for Education Unit).

Data on the impact of this intervention is limited although quarterly process monitoring reports are available. These are based on information collected by WFP staff who make regular monitoring visits to the health facilities to see the MCHC monthly clinics. WFP also reviews routine health facility reports. The various data suggest that there have been improvements in the provision and quality of MCH services and attendance at the facility. An evaluation is planned for 2012/2013 if funding is available. The evaluation will assess the impact of the program on maternal and child anemia, child growth, and coverage of health services.

WFP has provided information that the program costs US$25 per pregnant women for six months and US$99 per 6-36 month old child for 30 months. These costs include storage, distribution, and management of the food supplement. The program is currently reaching 22,000 children and 9,000 pregnant and lactating women.

In 2007, the MI and WFP supported the introduction of a commercial low-cost fortified complementary food in Nepal. The objective to make the Champion brand of complementary food widely available at pharmacies and retail outlets in major cities and expand availability gradually to rural markets as experience with the product grew. A social marketing campaign would raise awareness and demand for the product. Population Services International (PSI) was hired as the principal implementer of the program in charge of distribution and promotion. By August 2009, sales targets had not been met and the program was ended. An evaluation was undertaken by Deloitte, on behalf of the MI in 2010. The evaluation revealed problems with the marketing strategy, e.g., “people didn’t know what it was for.” Also, apparently the timeline for adequate production and distribution was insufficient to ensure that the product was available. There are other low-cost fortified complementary foods available in the market, but consumption is not high.

**Global experience:** The LNS recommended “maternal supplements of balanced energy and protein” based on a Cochrane systematic review which found that balanced energy/protein supplementation was associated with a modest increase in maternal weight gain and in mean birth weight, and a substantial reduction in the risk of small-for-gestational age birth.\(^{224}\) The LNS therefore assumed that in areas where >10% of pregnant women have BMI <18.5, the risk of intrauterine growth retardation (IUGR) could be reduced by 32%.\(^{225}\) Just under a quarter of Nepali women (15-49 years) have a BMI <18.5 and 26.3% of girls 15-19 have low BMI. The proportion of pregnant women with low BMI is unknown, but based on these findings, Nepali women and newborns


could significantly benefit from this intervention if properly designed. The LNS review emphasized the need for a balanced protein/energy supplement; high protein supplements and protein only supplements showed no benefits.

The LNS also recommended “additional food supplements in food-insecure populations” in association with behavior change communication for complementary feeding. There is extensive global experience with the provision of supplementary foods for young children. The India Integrated Child Development Services (ICDS) program is just one large example in which preschool aged children are provided with food at community centers. However, child malnutrition rates in India remain largely unchanged. Overall, many programs which have provided a supplementary food appear to have suffered from one or more of the following: (i) poor targeting in the sense that the most vulnerable children were not consistently reached or that provision of a supplementary food did not address the principal cause of the undernutrition, (ii) sharing of the food supplement in the home or poor sustainability of the program, (iii) choice of supplementary food in terms of nutritional composition and/or acceptability to beneficiary, and (iv) quality of program implementation including poor implementation of additional interventions such as counseling, coverage, quality of services and monitoring.

Many countries and programs have attempted to introduce a commercial, low-cost fortified complementary food. For example, the ADB funded a program in Viet Nam to identify medium-scale local producers to produce a product that was locally developed and shown to be effective by an international NGO. Members of the Viet Nam Women’s Union planned to sell the product and keep some of the profits for themselves. The produce was to be priced so it was affordable for low-income, rural communities. The program failed, however, because producers were not interested. Also, the profit margins were not high enough to justify the start-up costs of machinery purchases. UNICEF supported the development of a soya-based product in Indonesia at the time of the economic crisis. However, an evaluation of its efficacy suggested limited impact on children’s nutritional or micronutrient status. Potentially, the limited impact was a result of insufficient amounts eaten by the targeted children or the families did not receive enough (even though it was distributed free or sold at a subsidized rate by community health workers) or because the food was shared within the family, and possibly the child did not like it. Meanwhile, the government has a generic fortified complementary food, which is sold at a subsidized rate. No evaluation has ever been undertaken, however, and there is no evidence that it is impacting on the significant undernutrition rates in Indonesia. Overall, the global evidence suggests that it is impossible to make a quality fortified, complementary food at a low enough cost to be widely purchased by vulnerable communities. High cost complementary foods, however, are widely attributed with ensuring adequate iron intake of young children in developed countries. There is also high demand for such foods because of their convenience advantage. Hence, the theory of providing a fortified complementary food appears to be valid, but the problem remains in making it available at low cost.

**Child grant with IYCF counseling and food supplements**

**Nepal experience:** Nepal has a strong history of social protection, having established allowances/pensions for the elderly, widows, and the disabled. In July 2009, the government announced it was adding a child grant to this list. To improve the condition of childcare in poor and highly backward families, the “Child Protection Grant” provides
Rs 200 per month per child under the age of five for up to two children per family. The grant is available for all poor Dalit families and for all families in the Karnali zone, which comprises five of Nepal’s 75 districts. The government primarily funds the child grant program, and it uses the same registration and delivery system as Nepal’s other cash transfer systems. UNICEF has been assisting the government to start the child grant program in the Karnali zone with capacity building and complementary measures to make it more effective.

Since the program also aims to increase birth registration, key complementary measures are awareness-raising about birth registration, building up the birth registration system, and providing nutrition awareness, particularly on IYCF. The grant is distributed by the Ministry of Local Development (MOLD). Support is also planned from the ADB.

Performance goals for the grant include a reduction in child underweight by 25% and increasing the coverage of the grants to 85% of eligible children by early 2014. Funding for the project totals US$6.15 million with contributions from the government ($3.7 million), ADB ($2 million), UNICEF ($417,000), and communities in kind ($29,000). The first grants were distributed in mid-2010 (with some retroactive payments since October/November 2009, which is when the program was intended to start).

Along with the birth registration campaign, which initiated the grant, families have been receiving counseling on IYCF and essential hygiene behaviors to use the grant optimally to improve the nutritional status of their children. The IYCF counseling component is being overseen by the Child Health Division of the MOHP. The intervention utilizes master trainers involved in the MNP distribution pilot, and as with the MNP pilot, field supervisors have been hired to support the intervention under the District Nutrition Coordinator, a position created for this pilot. The health staff from the Ilaka level and FCHVs provide the actual IYCF counseling, with the support of the Social Development and Protection Centre, through mothers groups and other community-based meetings, such as women’s savings groups and community based organization meetings. The mothers groups aim to reach at least 50% of child grant recipients. The IYCF counseling manual is essentially the same as that used in the CMAM and MNP pilots. A mass media campaign utilizing local radio stations has also been implemented. Field supervisors are undertaking internal/process monitoring along similar lines to the MNP intervention. Baseline data on child anthropometry and IYCF behavior is available from district-level nutrition surveys undertaken in all of the five Karnali districts between 2009 and 2010. A midline survey in 2011 will collect data on IYCF behaviors and household expenditure using the same methodology as the Living Standards Survey. The endline survey will be undertaken in 2014, and will collect data on IYCF behaviors, household expenditure, and child growth.

As a somewhat separate activity, a food supplement is available in all five districts from the MOHP; 1.5 kg/month of commercially produced fortified complementary food (fortified flour) is being provided for each child 6-11 months and 2.5 kg for children 12-23 months. The MOLD is coordinating the activity at central and district levels, and it is also linked with the IYCF counseling. UNICEF and USAID have assisted with the transport costs and will support the monitoring and evaluation, but the MOHP covers all other costs. Anecdotal reports indicate that coverage may be low because the fortified flour has to be collected from health facilities and there has been no

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226 The five districts are Dolpa, Humla, Jumla, Kalikot and Mugu and form the mid-west mountain sub-region.
By August 2010, coverage of targeted children for the child grant had reached 91.4%, and by November 2010, this percentage had risen to 99.27% (above 95% in all five districts). The number of children with birth registration has also increased significantly. Data is not yet available on the impact of the IYCF counseling or food supplement.

Global experience: Nepal’s child grant in Karnali is a non-conditional, universal cash transfer. It is considered “universal” as it is not targeted to individuals meeting certain criteria; rather, it is targeted geographically and categorically to children. The “unconditionality” of the Nepal child grant contrasts to other child grants, in particular conditional cash transfers (CCTs) in Latin America, which have been credited with significant improvements in nutrition. CCTs were included by the LNS in the list of optional interventions (specific contexts) because overall the programs showed an improvement in care seeking and an associated increase in the value of total household consumption of goods and services. Several major programs that include CCTs have also documented reductions in stunting such as PROGRESA (now Oportunidades) in Mexico, which combined CCTs with nutritional education and micronutrient fortified food supplements and achieved a 1 cm increase in height per year translating into a 10% reduction in the prevalence of stunting in children 12-36 months. However, questions remain about how important the conditionality is. The South African Child Support Grant is unconditional and has reduced child stunting. Basset argues that conditionality is most likely to increase gains in health and nutritional status in conditions where relevant health and nutrition services exist and are of good quality, but are underutilized (or when the availability of services can be improved simultaneously).

It is notable that the countries in which CCTs have worked best have been middle-income countries with fairly good availability of services. A DFID publication on the relevance of conditional cash transfers for Nepal argues that there is no credible evidence that imposing conditions leads to the expected impacts on human behavior or human development outcomes, at least with regards to education. It quotes evidence that conditionality may have negative impacts, provides perverse incentives and puts the greatest burden on the poorest and most vulnerable. The review also argues that conditionality requires a level of administrative capacity that may not be in place in Nepal. A second DFID publication supports the universal targeting of the child grant. Evidence is provided that universal targeting is likely to best serve the interests of both the poor and the nation, compared to targeting by proxy means testing or community-based targeting both of which have high inclusion and exclusion errors. A case is also made to expand the child grant from the current limit of two children per family to all under five children as poor households and those from excluded groups tend to have larger numbers of children. The document reports that universal coverage of the child grant to all under fives nationwide would cost approximately 0.8% of GDP, reach 48% of households (and 66% of poor households), and reduce the poverty gap in these households by a further 13%, resulting in

an overall impact from the child grant of 17%.

**Growth Monitoring and Promotion**

**Nepal experience:** As in most countries, routine facility-based growth monitoring (GM) is already standard practice in Nepal, and HMIS data records “growth monitoring coverage” as 56.8% of children under three in 2009/10. The average number of growth monitoring visits was 2.56 per child under three compared to a target of six visits by one-third of children and four visits by two-thirds of children under three (which would average out to 4.66 visits per child). HMIS also reports on “malnourished as a percent of new growth monitored cases of under three children.” In the year 2009/10, 5.8% of children were recorded as “malnourished.” On the assumption that the growth chart is monitoring weight for age and that this prevalence represents -3SD (i.e., severe underweight), this prevalence compares to DHS 2011 data, indicating that 3.35% of children below three were severely underweight.

Community-based growth monitoring, meaning regular monitoring and plotting on the growth chart in the community rather than a health facility, is not currently implemented in Nepal except within a community mobilization program supported by UNICEF and on a small scale by some NGOs. The goal of the UNICEF “Decentralized Action for Children and Women” (DACAW) program is to ensure the progressive realization of the rights of children and women through rights-based and bottom-up approaches that focus on the most severely disadvantaged. The program involves three strategies: (i) strengthening individuals and communities to demand change by using Community Action Process (CAP), (ii) strengthening the capacity of local service providers/delivery agents to respond to demands from the community, and (iii) strengthening decentralized local governance in favor of children and women. The CAP uses various participatory tools and techniques to facilitate community discussions on issues that affect the wellbeing of women and children. One of these tools is community-based growth monitoring.

In DACAW settlements, community mobilizers weigh all children below three on a monthly basis. Weights are plotted on children’s individual growth charts and on a large community chart. The charts illustrate for the community how many children are below the growth line. Over time, the community can see how the situation changes by comparing the current chart with previous community charts. After the weighing, the community mobilizer and the village facilitator, both of whom have been trained on nutrition, lead community discussions as to why some children are faltering or underweight and what can be done about it. This kind of activity/process is called growth monitoring and promotion (GMP), the defining feature being that the growth monitoring data is used to guide and target growth promotion activities.

Routine reporting from the community-based monitoring indicates that in 2007, nearly 60,000 children were being weighed on a monthly basis and that underweight prevalence had fallen from 43% in 1999 to 16% in 2007 in DACAW areas. However, as new communities have progressively been added to the DACAW program over the years, and older children have “graduated” from the program, the data are not strictly comparable.

Nepal is in the process of adopting the new WHO growth standards and reprinting the child-health growth cards. This process, and the current focus on increasing nutrition activities, has led to a discussion on whether or not...
Nepal should establish a program of community-based GMP, which forms the focus of community-based nutrition programs in many countries. A pilot is planned in Nepal, which will compare growth monitoring and promotion (GMP) undertaken by FCHVs with GMP undertaken by health workers, to determine which model is more effective in Nepal. Opinion within the MOHP and the external development community supporting nutrition activities appears divided on whether to establish community-based GMP in Nepal.

Global experience: In the 1980s and early 1990s, community-based growth monitoring and promotion formed the cornerstone of most large nutrition programs. The theory was that monthly growth monitoring made growth (or lack of growth) visible to caregivers, health workers, and the community, and created an entry point for intervention at all levels, i.e., the promotion component. The health worker counseling the caregiver using the growth chart was one of the most common promotion activities. Using the growth chart was supposed to help identify the causes of growth faltering so that caregivers could change their behavior. Community awareness of the extent of growth faltering or underweight was intended to galvanize action at a community level, such as building a well or providing more support to women so they had time for child caring. In reality, numerous evaluations and reviews have struggled to prove that community-based growth monitoring improves growth promotion or behavior change or child growth. For example, a review by Ashworth et al.\textsuperscript{234} summarizes the evidence as follows:

“There is evidence from small-scale studies in Nigeria, Jamaica, India (Narangwal and Jamkhed), and from large programs in Tanzania (Iringa), India (Tamil Nadu Integrated Nutrition Project), Madagascar, and Senegal that children whose growth is monitored, and whose mothers receive nutrition and health education, and have access to basic child health services, have a better nutritional status and/or survival than children who do not. There is tentative evidence from a large-scale program in Brazil (Ceara) that participation in growth monitoring confers a significant benefit on nutritional status independent of immunization and socioeconomic status. There is evidence from India (Integrated Child Development Services) and Bangladesh (Bangladesh Rural Advancement Committee, and Bangladesh Integrated Nutrition Project) that growth monitoring has little or no effect on nutritional status in large-scale programs with weak nutrition counseling. There is evidence from Tamil Nadu in a randomized trial that when mothers are visited fortnightly at home and have unhurried counseling, no additional benefit accrues from the visual depiction of growth on a chart. There is some evidence that growth monitoring can improve utilization of health services.” The paper concludes “growth monitoring may not be the best use of limited resources in countries with weak economies and inadequate health budgets: a limited package of health and nutrition interventions, including good nutrition counseling, may be preferable…” The paper goes on to suggest different approaches depending on whether growth monitoring is in place. Where it is not in place, as in Nepal, Ashworth et al. recommend a focus on growth promotion activities with intensive counseling at all child health contacts and through home visits. Chart weights might be taken at birth, immunization contacts, vitamin A distribution, and sick child visits with follow up of those faltering and underweight.

A very recent paper comes to similar

conclusions; it emphasizes that the types of community interventions to reduce undernutrition (i.e., promotion activities) that are effective, practical and sustainable “are not necessarily linked to growth monitoring,” and that the consideration should therefore be on whether “community based (nutrition) programs can be designed and implemented successfully without monitoring the growth of each child.” The paper also suggests that growth-monitoring sessions are not justifiable as “platforms” for delivery of services “as less time-consuming solutions may be found to improve the coverage of community services, all of which can also be delivered without taking measurements of child growth.”\(^{235}\) The LNS listed growth monitoring as an intervention for which evidence showed little or no effect on the basis that “Available evidence on growth monitoring was not sufficient to support its use alone (without adequate nutrition counseling and referrals) as an essential nutrition support.” The Ashworth article was one of the references.

A consideration for Nepal is the number of children that would be identified by growth monitoring. In Nepal, 28.8% of children are underweight, according to the DHS 2011 Preliminary Report, and will thus fall below the line on their growth chart. If the community-based growth monitoring also seeks to identify faltering children (which it should), an additional 15%-20% of children may be identified by the activity. Thus, the time-consuming process of weighing every child in the community, while all mothers and children wait, will serve to identify that half of all children (29% + 20% = 49%) have a problem and need counseling or an alternative growth promotion intervention. A more effective use of time and resources would be to focus on effective interventions, such as group IYCF counseling, or perhaps counseling by age group, and provision of essential services such as those recommended by this review. An additional issue is that growth monitoring and promotion can at best guide interventions that address the postpartum causes of child growth faltering, such as young child feeding. However, as noted earlier in this report, a significant proportion of child growth faltering globally, perhaps half, is due to maternal nutrition causes. In Nepal, with its high prevalence of maternal undernutrition and adolescent pregnancies, prenatal causes of child undernutrition are likely to be very

\(^{235}\) Mangaasaryan et al. Revisiting the concept of growth monitoring and its possible role in community-based nutrition programs. FNB 2011.
Recommendations for Evidence-Based Nutrition Interventions in the Health Sector

Based on the above review, in this section, the report authors recommend nutrition interventions that Nepal should maintain or strengthen, the interventions that should be scaled up or expanded, and those that need more evaluation. No interventions should be discontinued. In March 2011, a summary of the review and the recommendations were presented to a meeting of government representatives, particularly those from the MOHP, and the international development assistance community. The participants made decisions on future health sector interventions to improve maternal and child nutrition. Their final selections and additional inputs from the peer review are shown in Figure 31. Following is a more detailed discussion of the recommendations and how each of the interventions could be implemented.

The overall priority for Nepal in the future is the reduction of stunting because the prevalence is still high despite significant improvements, and because it impacts so significantly on child health and development and, in the longer term, on social development. A second priority must be the reduction of wasting because these children are at high risk of death, and there is a humanitarian and moral imperative. Underlying both stunting and wasting is maternal nutrition. As discussed, maternal undernutrition accounts for roughly half of childhood stunting and 2006 DHS data show that high maternal undernutrition and high wasting occur in the same geographical areas. Maternal nutrition should also be addressed for the well-being of women and as a fundamental human right.

Figure 31 indicates a clear pattern: the majority of interventions to maintain or scale up are micronutrient interventions, which already have proven successful in Nepal. Interventions to scale up are predominantly for child growth, which have been somewhat neglected in Nepal, and are more complex than

Recommendation Categories

Maintain/Strengthen: intervention is already being implemented on a large scale. Needs to be maintained (in sustainable way) or “strengthened,” e.g., address weakness, increase coverage, quality.

Scale Up/Expand: intervention being implemented at small scale or as a pilot. It should be scaled up nationwide or expanded. Should include a strong monitoring and evaluation component.

More Evaluation: intervention may be happening at small/pilot scale in Nepal or may be a new intervention. Results/global evidence are so promising that the pilot should be completed or a pilot should be established to assess the feasibility and effectiveness in Nepal.

Discontinue: intervention may have started or be in pilot phase. Results/global evidence is not supportive so should be discontinued. May not be feasible/relevant for Nepal.

See Annex 2 for the agenda and list of participants at the meeting.
many of the micronutrient interventions. An exception is the proposed scale up of multiple micronutrients powders, a relatively new intervention on the global nutrition scene. Finally, the interventions flagged for “more evaluation” feature several interventions for maternal nutrition. In contrast to the micronutrient interventions, both the global and Nepal evidence on what works is lacking for maternal nutrition, hence the need for evaluation in the context of Nepal. In addition, several “new” interventions need “more evaluation.”

**Recommendations for Maintenance and Strengthening**

**Vitamin A supplementation and deworming**

Taking into account the success of the Nepal program for vitamin A supplementation of all children 6-59 months, and the deworming of children 12-59 months, as well as the WHO’s new recommendations on vitamin A supplementation for this age group, the under five vitamin A supplementation and deworming should be maintained. Coverage of this intervention should be sustained in a cost-effective way and should become a routine activity of the health system. “Unfinished” programmatic consolidation should be finalized, particularly the transfer of full ownership, management, and funding to the MOHP, while retaining NTAG for technical and emergency back up support. This should include procuring and managing all supplies, a system that is largely already in place. There should be a focus on increasing coverage where it is currently low. Vitamin A coverage of young children should be increased, especially those 6-11 months and in urban areas and several sub-regions, most notably the central mountains. Deworming coverage should be increased overall to the same level as vitamin A supplementation, and particularly in 12-23 month old children. A sustainable system for recording and verifying coverage is needed, which may mean continuing the Micronutrient Surveys but conducted by the DHOs, or it may require an altogether new system. Biannual contacts between caregivers and FCHVs for vitamin A and deworming may be another mode to deliver other services.

The Nutrition Technical Committee of the MOHP should review the new WHO
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guidelines on vitamin A supplementation of postpartum women, pregnant women, considering the reasoning behind the recommendations and the Nepal context. The review should decide whether postpartum supplementation should cease; whether treatment of pregnant women with night blindness should be implemented; and whether neonatal supplementation should commence.

Inclusion of vitamin A supplementation in treatment for measles, xerophthalmia, prolonged diarrhea, and severe malnutrition needs to be strengthened as a routine component of community-based IMCI, which is universally implemented in Nepal. The 2007 Vitamin A Program Review recommended improving forecasting based on prevalence of the relevant diseases, improved recording of dosing in the HMIS, and procuring capsules for this use through the essential drug system as opposed to with the twice yearly procurement for under five supplementation.

Treatment of diarrhea with zinc
Treating diarrhea in children with zinc is officially being implemented nationwide, but coverage remains low, even in the MI-supported “intensification districts.” Coverage of ORS is also low and declining and use of anti-diarrheals and antibiotics, supplied by pharmacists, is widespread. Efforts to increase coverage of this intervention thus need to be included as part of general efforts to improve treatment of diarrhea. Although it has been suggested that the severity of diarrhea cases has fallen, diarrhea remains the second cause of death in young children after pneumonia. Therefore, general efforts are needed to prevent and optimally treat diarrhea, including:

- Retraining of health workers and FCHVs on treating of diarrhea.
- Mobilizing and raising community awareness of optimal diarrhea treatment. A mass media campaign might be considered to increase awareness of ORS and zinc as the optimal diarrhea treatment.
- Increasing both ORS and zinc treatment in diarrhea cases. Efforts to increase use of zinc tablets must include finding ways to increase cooperation of private pharmacists and to address problems in the supply chain for zinc supplements within the health system. Some countries have physically bundled ORS sachets and zinc tablets together in sufficient quantities for the treatment of one diarrhea episode and distributed them to families to keep in the home so that they do not have to visit the health facility when their child gets diarrhea.
- Improving feeding during diarrhea. Messages on feeding sick children should be included in the IYCF counseling package, including appropriate treatment with ORS and zinc.
- Increasing the coverage of interventions to prevent diarrhea, such as hand washing.
- Consider the findings of the MI evaluation of the zinc intensification project.

Iron and folic acid supplementation of pregnant and lactating women and deworming during pregnancy
The IMNMP appears to have developed a successful strategy for increasing coverage of IFA supplementation for pregnant and lactating women, as well as deworming during pregnancy. National coverage of “any” IFA during pregnancy is already quite high, but IFA for lactating women is much lower and compliance with the full dosage is low (pregnancy and postpartum components). Deworming during pregnancy is also much lower. The focus in the future should therefore be on expanding the IMNMP to all districts (currently it is not being implemented in five districts), institutionalizing the successful components into routine health systems, and improving the coverage and compliance. The IMNMP has essentially
established systems for community-based delivery of a maternal package of micronutrient interventions. Postpartum vitamin A has also benefited from this program. In the future, treatment of night blindness with vitamin A could also be included as part of this package if the MOHP chooses to scale up this intervention. As with under five vitamin A supplementation, coverage of these interventions should be monitored through the Micronutrient Surveys implemented by the DHOs.

The IMNMP also needs to be appropriately integrated into efforts to improve maternity care in general. It might be necessary to retrain health workers, in particular community health workers and FCHVs who were trained in 2003 during the first phase of the IMNMP. An interesting finding of the 2009 IMNMP evaluation is that the IMNMP appears to have contributed to improved awareness and practices for care during pregnancy including rest, improved diet, avoiding work, alcohol and smoking. This strength of the IMNMP strategy could be built upon and could form a component of a general strategy to improve maternal nutrition, which is a priority of the MOHP.

Salt iodization
The salt iodization program in Nepal essentially has two problems. The first is that coverage of adequately iodized salt needs to be further increased to >90%. This is expected to address the 20% of the population with mild to moderate iodine deficiency. Strategies to increase coverage of adequately iodized salt should focus on improving internal and external quality assurance of salt iodization. The second problem is that a growing proportion of the population has median urinary iodine levels that indicate more than adequate iodine intakes for the general population. Consideration should be given to reducing the standard for iodized salt to something like 30ppm of iodine as is common in other countries.

Overall, a review of the whole USI program should be undertaken and a strategy updated to achieve and maintain USI. This same review could consider the pros and cons of adjusting the current standard. The review would be able to use updated data on iodized salt coverage from the DHS 2011 and Living Standards Survey 2011. Opportunities should also be sought to get a quantitative assessment of salt iodine content in the next available survey.

**Recommendations for Scale up**

**Promotion of breastfeeding and behavior-change communication for improved complementary feeding**
Improving infant and young child feeding is probably one of the most important nutrition strategies for Nepal at this stage. Yet, efforts in this area are fragmented and weak. Although exclusive breastfeeding has improved substantially since 2006, there is no data on what has caused this improvement, and none of the recent efforts to improve IYCF practices have been evaluated. It also appears that despite recent efforts, complementary feeding practices have deteriorated. Priority must therefore be given to this intervention.

Overall, therefore, this review finds that IYCF interventions need to be refined and intensified. The national IYCF strategy needs to be strengthened to be more comprehensive and detailed. An oversight and coordinating structure needs to be fully operational, and an IYCF technical advisory group should be reestablished, perhaps within the National Technical Committee on Nutrition. Emphasis needs to be placed on building up the capacity of the health system to provide quality counseling and support to caregivers and their families for improved IYCF behaviors.
Detailed information about feeding behaviors, cultural norms, and taboos seems to be lacking, and it is likely that the situation will differ from community to community. Some amount of formative research may be needed, but in the meantime, there is already sufficient “macro” information to develop a core set of priority messages that are nationally applicable. Some of this information is shown in Figures 32 and 33. Data from the DHS 2011 Preliminary Report, presented in two different ways, indicates that water, complementary foods, and “other milks” are all being given to children below six months and that some 25% of children 6-9 months are not receiving any complementary food. Other data from the DHS 2006 shows that about 40% of children are not getting a sufficiently diverse complementary diet and use of animal foods and fats is very low (Figure 34). The data also show that there is not significant variation in these practices across the country or even across wealth quintiles (Figure 35). Thus, an initial set of messages could be developed that are applicable to the whole country. Relevant priority IYCF messages are:

- Put the baby to the breast within one hour of birth; don’t give prelacteals
- Do not give water or “other milk” before six months
- From about six months, give babies soft foods made with cereals. Add animal foods, legumes, and fats
- Feed babies a variety of foods, at least three different kinds per meal
- Feed babies more frequently, at least twice per day when 6-8 months and three times per day from 9-23 months
- Cook special foods for young children and give your child his own bowl of food

In the future, more refined, context specific messages may be needed and should be developed following formative research to understand existing IYCF behaviors and what foods and practices could feasibly be encouraged.
As part of the process of agreeing on core messages, to create a more universal and standardized package, a thorough comparison and review should be undertaken of all IYCF training and counseling tools currently being used in Nepal. An IYCF Harmonization Workshop might be the best mechanism for this. It would also be valuable to try to understand how and why exclusive breastfeeding practices improved between 2006 and 2011. Finally, improved data is needed on IYCF, including use of the updated “indicators for assessment infant and young child feeding practices”\textsuperscript{237} in all surveys, and establishing systems to assess the impact of IYCF interventions.

In this review, discussion has focused on IYCF counseling as a specific intervention identified by the LNS as effective. However, as emphasized by the new UNICEF Programming Guide on Infant and Young Child Feeding, global evidence suggests that changing IYCF behaviors requires large-scale implementation of comprehensive, multi-level, multi-component programs with strong government leadership. A comprehensive IYCF strategy should include all of the components below with prioritization based on country context:\textsuperscript{238}

1. Legislation on the marketing of breastmilk substitutes and maternity protection
2. Skilled support by the health system, including: improving curriculum of pre- and in-service training, establishing counseling and other support services at health facilities, capacity development for health providers and counselors, institutionalization of the Ten Steps to Successful Breastfeeding in all maternity facilities
3. Community-based counseling and support, including: community-based counseling services and capacity development of community workers and mother support groups
4. Communication for behavior and social change through multiple channels
5. Possible additional complementary feeding interventions including: improving the quality of complementary foods through locally available ingredients, provision of nutrition supplements and foods such as multiple micronutrient powders, lipid-based nutrition supplements, social and commercial marketing of nutrition supplements and complementary foods and social protection schemes with a nutrition component (e.g., cash transfers)
6. IYCF interventions in difficult circumstances such as HIV and emergencies

Well-designed and implemented programs build upon a detailed situation analysis. Relevant formative research and key messages provided should be simple, action-oriented, age-appropriate, feasible, and build upon existing practices and beliefs.


Particular attention should be given to establishing legislation to control the marketing of breastmilk substitutes (BMS). Although marketing and consumption of these products is not currently high, experience from other countries suggests that breastmilk substitute companies will turn their attention to Nepal as economic development continues. Experience from other countries also shows that it is much easier to establish strong legislation to control marketing of BMS before these companies have developed allies and dependence on their products.

**Hand washing and hygiene counseling**
In view of the high proportion of under five deaths due to diarrhea, all effective interventions to prevent and treat diarrhea should be strengthened in Nepal. Several of these will be implemented outside the health sector, including counseling for hand washing and hygiene behaviors. However, IYCF counseling and childcare counseling, and education in general, usually provided by the health sector, are important opportunities for hand washing and hygiene counseling. Thus, it is recommended that awareness raising and support for behavior change on hand washing and hygiene behaviors are incorporated into all efforts to improve IYCF and general childcare behaviors. Particularly, hand washing before preparing food and after going to the toilet and safe disposal of child feces should be promoted.

**Multiple micronutrient powders**
Final coverage and compliance surveys for the UNICEF-supported MNP pilots have yet to be completed. However, preliminary data from the evaluation of the WFP-supported distributions is available and the results have been described earlier in this document. They indicate high coverage and compliance and a significant reduction in anemia prevalence in the study communities with >40% anemia at baseline. MNP's appear to be a feasible and potentially very effective intervention for Nepal, considering the levels of childhood anemia in Nepal, global data on the impact of MNPs on anemia prevalence from efficacy studies and large-scale programs, and the high levels of coverage and compliance achieved so far in both the UNICEF and WFP-supported distributions.

The full potential impact of deworming of young children has already been apparently achieved, considering that the program has been universally implemented with high coverage for eight years, and there has no further decline in anemia prevalence in children between 2006 and 2011. No significant reductions in anemia prevalence can be expected in the short term by educating communities in dietary diversity or consuming more iron-rich foods. In addition, staple food fortification, even when well implemented, is not a good strategy for reaching young children since their consumption of commonly fortified staple foods is often inadequate to affect anemia. Therefore, an additional intervention is necessary to reduce the still very high prevalence of anemia in young children. MNPs could theoretically also improve the status of other micronutrients such as zinc, iodine, vitamin A, and some of the B vitamins.

While there is significant global evidence that MNPs reduce anemia, there is little to no evidence of the impact of MNP distribution on IYCF practices. Theoretically, when good IYCF counseling, particularly on complementary feeding, is combined with distribution of MNPs, behavior change may be more significant and rapid. It is possible that the MNPs would function as a “motivator” and “reminder” to caregivers of the importance of complementary feeding. They could function as a new and novel commodity
that creates excitement and interest around complementary feeding leading to greater attention and effort on the practice. They might also empower mothers to feed her child differently and to reject harmful cultural norms and the advice of mothers-in-law, for example. Once the new practices are established, many caregivers report that children “have more energy and better appetites” and so are easier to feed and more willing to eat. Complementary feeding with MNPs thus becomes a self-fulfilling prophecy, which may cause the behavior changes to be maintained, rather than reverting to old practices when the novelty of the MNPs has worn off. This scenario is all theory, however. There appears to be no conclusive data to indicate that complementary practices improve more when IYCF education is given with MNPs. It is notable that the WFP compliance surveys recorded improvements in dietary diversity. The proportion of children whose diet achieved minimum dietary diversity increased from 21% in round 1 to 31% in round 2 of the compliance surveys. Possibly, Nepal is the most advanced country in terms of specifically and actively linking MNPs with IYCF counseling and in putting in place mechanisms to measure the behavior change.

The recommendation is therefore to scale up MNPs with high-quality IYCF counseling. The target age group should be children 6-23 months because this age group has the highest anemia prevalence in Nepal (Figure 36). It is also the age group recommended by the WHO guidelines, and because it would be unrealistic to scale up MNPs for all children 6-59 months. This age group also would benefit most from the IYCF counseling. MNP distribution should be targeted based on under two anemia prevalence, starting first in all areas where anemia prevalence is ≥40%. Nationally, based on 2006 DHS data, anemia prevalence in children under 6-24 months was 74.1% compared to 48.4% for children 6-59 months. As prevalence is higher in under twos, and this data is not readily available, the prevalence rate in children 6-59 months will be used for planning purposes. Looking at 2006 data (because 2011 data for these indicators is not yet available), there appears to be no particular reason to focus on poorer families as anemia prevalence is high (just under 40%), even in the richest quintile, and is equally prevalent in rural and urban areas (Figure 36). Complementary feeding practices, although worse in lower quintiles, are not so different to those in higher quintiles (Figure 35). The WHO guidelines recommend the MNPs contain at least iron (12.5mg), vitamin A (300µg), and zinc (5mg) plus “other micronutrients and minerals at currently recommended nutrition intake (RNI) doses for the target population.” The guidelines also recommend that enough sachets be provided for the child to have one per day for a “minimum of 2 months, followed by a period of 3-4 months off supplementation, so that use of the micronutrient powders is started every 6 months.”

241 Presentation by WFP/New Era in May 2011 – Micronutrient Powder (MNP) Supplementation for children in food insecure districts of Nepal: Results from 2011 compliance, baseline and endline surveys.
242 The newly-issued WHO guidelines actually suggest MNPs are used where the prevalence of anemia in children under two is 20% or higher but this would be nationwide in Nepal and is not feasible for the initial phase of implementation.
243 Authors calculation from Table 12.9 of DHS 2006.
Final coverage and compliance surveys for the UNICEF-supported pilots will be complete at the end of 2011 (assuming no delays). Preliminary data suggests that the FCHV delivery model achieves slightly higher coverage. This is to be expected and should be the distribution methodology utilized. Lessons learnt from these pilots, and the WFP program, should be built into the scale up of the program. Further analysis of the data from the endline survey of the WFP-supported distribution could provide valuable information on the most effective strategies or conditions for achieving high coverage, compliance, anemia impact or improvements in IYCF practices. At a later stage, local production of MNPs might be considered.

**Integrated management of severe acute malnutrition**

The high levels of acute malnutrition in Nepal require the scale up in the near future of community management of severe acute malnutrition, at least in high wasting areas. The results of the CMAM pilots suggest that the objectives of the CMAM pilots have been largely achieved, at least in relation to severe acute malnutrition, namely:

1. To build the capacity of local health structures, FCHVs and local NGOs in addressing acute malnutrition through the implementation of CMAM, and to evaluate the effectiveness in increasing coverage of identification and effective treatment of SAM cases, initially over a pilot period of 6-12 months, and in the long term, the effectiveness in reducing SAM prevalence over 5-10 years.

2. To examine various modalities for CMAM introduction in the health system and in relation with other interventions (e.g., nutrition, food security, CB-IMCI), and document the process and outcomes for lessons learned.

3. To study specific aspects and challenges of CMAM implementation, including: how to identify and target most affected communities, optimize social mobilization and identification of cases, build and maintain health system capacity, how to improve caregiver time allocations and care behaviors, logistic supplies arrangements and management, impact on program outcomes and cost analysis.

The results of the pilots so far suggest that community-based treatment of SAM is both feasible and effective in Nepal and design faults and weaknesses have been, and continue to be, addressed within the pilot districts. Although scale up of community-based treatment of SAM will be an expensive and a large undertaking, CMAM offers the most feasible and cost-effective opportunity for the treatment of severe acute malnutrition.

An external evaluation of the CMAM pilots is currently being finalized. The findings of the evaluation should be taken into account when designing the details of the scale up. Following the evaluation, necessary adjustments should be made to the program design and protocols. In addition, conclusions of a recent international conference on CMAM scale up at country level245 should be taken into account. Community-based treatment of SAM should then be scaled up relatively slowly with a strong monitoring and evaluation component to develop lessons learnt and improve implementation as program experience develops. Most logically, community-based treatment of SAM should be first scaled up in sub-regions with the highest prevalence of severe wasting.

Efforts to establish community-based services for treatment of SAM should be matched by strengthening and capacity support for facility-based treatment and ensuring linkages and referral between community and facility-based services.

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245 Addis Ababa, 14-16 November 2011.
Hence, the agreement has been to scale up “integrated management of severe acute malnutrition” and not community-based management of SAM only. However, it is recognized that a good strategy for addressing MAM is not yet available in Nepal. Therefore, interventions to treat children with MAM are included in the section below on interventions needing further evaluation.

Roller mill flour fortification
Roller mill flour fortification is now mandatory in Nepal. The approximately 20 roller mills in the country know how to fortify and have the necessary equipment. They are currently discussing collaborating with each other to buy the premix through the Roller Flour Mill Association. They will also need to adjust their packaging to indicate that the flour is now fortified and to establish internal quality assurance systems, if they have not already done so. The World Bank has recently supported a review of the regulatory monitoring system for foods in Nepal. It reveals that local flour mills are struggling with a number of issues that affect their production and profit margins. These problems could affect the success of the flour fortification program, as fortification will be one additional burden on the roller millers who only have a small portion of the market. Government efforts to ensure an even playing field for the roller mills—including control of illegal imports and ensuring even application of the mandatory fortification legislation across all mills and imports—will help to increase the success of this intervention. The government will also need to develop an effective system for monitoring the quality of fortified flour. It is recommended that relevant external development partners consider providing technical support to aid government and industry efforts. Despite the above-mentioned problems, achieving the fortification of all roller mill flour appears very feasible.

Recall, however, that the majority of Nepal’s flour consumption (which is not high) is milled in small-scale chakki and water mills. The fortification of roller mill flour will therefore benefit mainly urban populations and those eating processed wheat-flour foods, such as instant noodles, which is a major market for flour from roller mills. Other interventions will be needed to improve the micronutrient intake of rural populations, one of them potentially being flour fortification by small-scale mills, which is being piloted with the support of MI and the ADB.

Recommendations for Further Evaluation

Interventions to improve maternal nutrition
For improving maternal and birth outcomes, the LNS recommended micronutrient supplements (iron, multiple micronutrients, and calcium), salt iodization and interventions to reduce tobacco consumption or indoor air pollution. In specific situations, it also recommended balanced energy and protein food supplements, deworming, and malaria prevention and treatment. Although not specifically mentioned by the LNS, efforts to strengthen family planning and improve child spacing, particularly if focused on adolescents and young women, are also likely to benefit maternal nutrition, reduce low birth weight and reduce teenage pregnancies. Nepal is already implementing or planning to implement several of these, so a first priority for future efforts is to ensure the coverage and quality of the interventions being implemented.

Recommendations for improving coverage of iron supplementation and deworming in pregnancy and salt iodization have already been discussed. Other potential interventions are discussed below.

Although the LNS recommended multiple micronutrient supplementation (MNS) during pregnancy, as reviewed, questions
have been raised as to whether MNS increase the risk of perinatal mortality and if so, in what conditions. In view of the fact that there are multiple well-established benefits of iron and folic acid supplementation, and no WHO guidelines yet on MNS, it seems prudent for Nepal to concentrate on improving the coverage and compliance with this proven intervention, pending further information on MNS. If MNS are eventually recommended, they can be distributed using the same delivery systems as the iron and folic acid supplements. Therefore, focusing on strengthening this program now will not be “wasted.”

As noted, there is already a plan to pilot calcium supplementation in pregnancy in one district. This pilot should be implemented and evaluated for feasibility. If results are positive, and it is possible to assess the cost-effectiveness, consideration could be given to scaling it up, perhaps within the IMNMP program.

Another important issue for consideration is tobacco consumption and indoor air pollution. One-fifth of all Nepali women smoke (19.6%), and if they are poor (lowest wealth quintile) or have no education, this proportion rises to one-third. In addition, because 56.5% of men in Nepal smoke, women who live in their households will be exposed to secondary smoke. Also, it appears likely that exposure to household smoke from cooking is high, especially in rural areas. Therefore, exposure to smoke may be an important cause of LBW in Nepal, and interventions to reduce the exposure are required. Within the health sector, counseling for adolescent girls, pregnant women and mothers should include information about the dangers of smoking. Interventions in other sectors may be targeted to reducing women’s exposure to household smoke in particular. Since few past efforts have been made on this issue, it is included in this section on “further evaluation.”

Malaria is considered to be endemic in 65 of Nepal’s 75 districts so malaria prevention and treatment interventions are likely to be important for general maternal well-being, including nutrition. Although 61% of households have bednets, there are large disparities; only 23.3% of households in the lowest quintile have a bednet and just 14.4% in the mountain region. In addition, it is unknown how many women sleep under them. This review has not attempted to document Nepal’s experiences with malaria prevention and treatment, but it is important to recognize that malaria is an important cause of maternal and childhood anemia, as well as morbidity and mortality.

The LNS analysis concluded that balanced energy and protein food supplements might reduce the risk of a small for gestational age (SGA) baby by 32%. Supplements also modestly increased maternal weight gain during pregnancy. These are worthy outcomes, and it would seem worthwhile to consider food supplements for pregnant women in Nepal, especially in sub-regions where maternal malnutrition, low birth weight and stunting are high. The WFP currently provides a significant amount of food assistance to Nepal. It also is implementing a program to provide food supplements to pregnant women attending MCHC services in a small number of VDCs in nine districts considered food insecure. This would appear to be an ideal situation in which to assess the impact of this intervention in Nepal. This program has been running since 2002 with little data on coverage or impact. One recommendation of this review would be to consolidate the resources available for this program and to run a robust trial to evaluate the outcome of this intervention.

A two-phase study comparing the impact of cash or food transfers plus enhanced nutrition counseling is planned with

246 DHS 2006. Table 3.10.1.
247 DHS 2006. Table 3.10.2.
248 DHS 2006. Table 2.10.
ACCELERATING PROGRESS IN REDUCING MATERNAL AND CHILD UNDERNUTRITION IN NEPAL

support from the World Bank and DFID. In the first phase, a 2.5-year efficacy study will compare the impact of three interventions: (i) cash + counseling, (ii) food + counseling, (iii) counseling only, and a control (existing interventions for maternal nutrition) on birth weight and selected maternal and neonatal nutritional and health outcomes. In the second phase, the most effective approach of the efficacy study will be tested in an effectiveness trial under normal operating conditions in a number of areas of Nepal and elsewhere in South Asia.249

Another potential intervention to improve maternal nutrition is weekly iron folate supplementation of adolescent girls. Although not specifically recommended by the LNS, a WHO recommendation exists for weekly iron folate supplementation (WIFS) in women of reproductive age in populations where the prevalence of anemia is above 20% and food fortification programs are not in place.250 Nepal meets these criteria. A variety of evidence, including several programmatic interventions in East Asia, suggest that WIFS is effective at reducing anemia with a dose response such that the longer a woman consumes the supplement pre-pregnancy, the less likely she is to be anemic during the first and second trimesters of pregnancy. WIFS were not effective at eliminating anemia in the third trimester but anemia levels were lower than in a control group consuming daily IFA.251 The WHO Regional Office for the Western and Pacific Region has also released an analysis of best program practices.252 The report reviewed experiences in 10 programs, including the two mentioned below in India. Nine of the programs provided WIFS to adolescent schoolgirls and four provided them to non-school going adolescent girls. The reviewed programs experienced compliance ranging from 44%-71% in Cambodia to 92.2% in Egypt. Eight of the programs recorded reductions in anemia prevalence between baseline and endline. Several The government subsequently scaled up several programs or there are plans for scaling up.

India has had a positive experience with weekly iron folate supplementation and deworming in adolescent girls. Pilot studies in several states recorded high compliance and significant reductions in anemia after 1-2 years of implementation. The adolescent anemia program in India targets both girls in school and those out of school. Out-of-school girls are primarily reached through the Integrated Child Development Services (ICDS) network, which includes ICDS centers and anganwadi workers in all villages. Some states have attempted to strengthen this approach by using school going girls to reach out to their non-school peers. By the end of 2005, ten million girls were being reached each year.253

In Uttar Pradesh, the overall prevalence of anemia in the adolescent girls involved in the program was reduced from 73.3% to 25.4%, with no difference observed between the girls for whom consumption was supervised compared to those who were unsupervised. Counseling on the positive effects of WIFS was thought to have contributed to a high compliance rate of over 85%. The cost of implementation was US$0.36 per beneficiary per year. The program, which was called Uplifting Marriage Age, Nutrition and Growth (UMANG), reached all schoolgirls and

249 Personal communication – Luc Laviolette, World Bank South Asia.
non-school girls with WIFs, deworming tablets at six-month intervals, and family life education. It was implemented by three government ministries – Health, Education, and the Integrated Child Development Services (ICDS), and a state-based NGO. Different approaches were used for reaching non-school girls and schoolgirls.254

This intervention could be tested in Nepal by adding it to an on-going pilot of adolescent-friendly health services, which is currently focused on improving the access of adolescent girls to counseling, contraception and treatment for sexually transmitted diseases. If a community component was added, it could help to increase demand for the health services and to distribute the IFA and deworming tablets to both in-school and out-of-school adolescent girls. Education could also be provided on nutrition, discouragement of early marriage and pregnancy, and discouragement of smoking. Anemia rates in adolescent girls (15-19) were 39% according to the DHS 2006; the highest prevalence in women 15-49 years. As the average age of first birth is 19.9 years and 40.9% of all 19 year-olds have begun child bearing,256 this intervention could significantly impact on low birth weight due to adolescent pregnancies. It might also help to reduce the proportion of teenage pregnancy and increase the age of first birth.

Another potential intervention to improve maternal nutrition is currently being implemented as a large-scale randomized controlled trial in Dhanusha district in Nepal. The Centre for International Health and Development (CIHD) of University College London (UCL) has been working with a local organization, Mother and Infant Research Activities (MIRA) since 1992, operating large-scale trials on newborn survival and maternal and young child nutrition. In 2004, they published the results of a community-based intervention for newborn survival implemented in Makwanpur district. The intervention was community mobilization with women’s groups focused on maternal and newborn health. The study employed 12 local women as female facilitators, who were not health workers, to convene 111 women’s groups covering a rural population of 80,000. The female facilitator supported women’s groups through an action-learning cycle in which they identified local maternal and newborn health problems and formulated strategies to address them. These included community generated funds for maternal or infant care, stretcher schemes, production and distribution of clean delivery kits, home visits by group members to newly pregnant mothers, and raising awareness with a locally made film to create a forum for discussion.

The study also provided health system strengthening in both the intervention and control communities. The results included a 30% drop in neonatal mortality and a substantial reduction in maternal mortality compared to control areas. Women in intervention areas were more likely to have antenatal care and hygienic practices and there were smaller effects on institutional delivery and trained birth attendance. The cost-effectiveness was calculated as US$ 3,442 per newborn life saved and $111 per life year saved. The intervention was considered scalable through both government and non-government organizations.257,258 The intervention has since been replicated in Jharkhand and Orissa states in India with a 45% reduction in neonatal mortality.259

The partnership is currently replicating a similar but more scalable and lower

224 Vir et al. Weekly iron and folic acid supplementation with counseling reduces anemia in adolescent girls: A large-scale effectiveness study in Uttar Pradesh, India. FNB 2008.
255 DHS 2006 (Table 4.9).
256 DHS 2006 (Table 4.10).
cost intervention with women’s groups in Dhanusha. The Dhanusha study is being implemented in 270 women’s groups in 30 VDCs covering a population of about 210,000. An additional 30 VDCs (approximate population 210,000) function as the control. The intervention has been operating since mid-April 2007, during which time the women’s groups have completed two “action-cycles” of problem identification, prioritization, planning and strategy implementation. The first was on maternal and newborn health (as in Makwanpur), and the second is on maternal and infant nutrition, including postpartum care practices. Unlike in Makwanpur, in the Dhanusha study, the female facilitator is the local FCHV, supported by a literate local woman. Each FCHV and co-facilitator is paid a Rs200 incentive per meeting facilitated and Rs200 per orientation meeting attended. MIRA provides guidance to the FCHV and co-facilitator on how to support the women’s groups. Surveillance throughout the trial has collected data on neonatal, infant and under-five mortality rates and still birth rate, maternal and newborn morbidity, health care seeking and home care practices in pregnancy and postpartum, eating behavior in pregnancy and postpartum and breast feeding and infant feeding in the first 4 to 12 weeks of life. An endline survey currently being implemented will collect data on child and maternal anthropometry, breastfeeding behavior (including exclusive breastfeeding to six months), complementary feeding and hygiene practices and postpartum nutrition, care and hygiene practices. Results are expected by the end of 2011.

This intervention, involving women’s groups is very interesting. It has proven to be effective in both Nepal and India. The government could potentially scale up the methodology of the Dhanusha trial with the support of external assistance partners, since the facilitator of the women’s groups was the FCHV. The second round of this trial also focused specifically on maternal and infant nutrition. This community-based intervention could potentially dovetail nicely with some of the above-planned interventions, which are more service-delivery focused. It is recommended that the results of the Dhanusha study are reviewed as soon as they become available, and assuming it is effective, the scalability be assessed, at least on a pilot basis initially.

Prevention/Treatment of MAM
As presented earlier in this review, evidence on how to treat moderate acute malnutrition is limited and global guidance has not been updated. However, there is some evidence that good quality counseling and support in food secure/non-poor areas could be sufficient to reverse moderate malnutrition. In addition, complementary food supplements, such as multiple micronutrient powders (MNPs), could help to address nutritional deficiencies in the diet. There is also the possibility that MNPs can facilitate changes in complementary feeding behaviors, thereby improving dietary intake. As Nepal is planning to scale up of quality IYCF counseling and MNP distribution, together these two interventions might possibly be sufficient to address at least some of the moderate acute malnutrition, and indeed, some of the moderate stunting, currently seen in Nepal. This hypothesis should be tested in an area where MNP distribution with high quality IYCF counseling is being implemented. Specifically, the study should aim to determine if MNP distribution with high quality IYCF counseling can reverse/cure moderate acute malnutrition and moderate stunting and prevent the progression of moderate acute malnutrition to severe.

260 Personal communication – Naomi Saville, CIHD, UCL and MIRA.
The global evidence suggest that provision of a supplementary food may be necessary for reversing moderate malnutrition, particularly in food insecure areas or where poverty constrains access to a quality and diverse diet. However, a variety of potential supplementary foods is available with different cost and acceptability implications. It is therefore recommended to undertake an effectiveness trial to compare the costs, feasibility, acceptability and impact of potential supplementary foods such as a commercial supplementary food and a locally produced supplementary food such as sarbotam pito, a mixed grain preparation, with which Nepal already has significant experience. Guidelines are now available on the nutrient content and ingredients of appropriate supplementary foods. The foods tested should therefore meet these criteria. This study could be merged with the one mentioned above such that the study has three intervention arms as follows: (i) MNPs and quality IYCF counseling only, (ii) MNPs, quality IYCF counseling and provision of a locally produced supplementary food, and (iii) MNPs, quality IYCF counseling and provision of a commercial supplementary food. Such a study could also evaluate the cost-effectiveness of the different interventions. In the long-run, it may be necessary for Nepal to implement a mixture of interventions for treating moderate malnutrition depending on the available funding, severity, and numbers of moderately malnourished children, and the local context in relation to food security and poverty.

Child grant with IYCF counseling and food supplements
The child grant in Karnali has only been operating since mid-2010, and the IYCF component and food supplements only started in mid-2010 and early 2011, respectively. This pilot will therefore need to continue for some months before an impact evaluation can be undertaken; the endline is planned for 2014. As noted, the endline evaluation for this program will assess IYCF practices, household expenditures, and child growth. However, a mid-line in 2011 will collect data on household expenditure. The purpose of collecting data on household expenditures is to evaluate the impact of the child grant on household expenditure. In completing this pilot and undertaking the final evaluation, the following should be considered:

- Non-conditional cash transfers provided for the purpose of improving child nutrition will be most effective in conditions where poverty is the primary constraint for good nutrition. This is based on the assumption that the cash and education provided will be used to increase access to foods, care, and services required for good child nutrition. However, if the food or services are unavailable in the community, and the cash does not increase the ability to improve care practices, the cash grant may have little impact on nutrition. Since little data exists on the determinants of child nutrition in the Karnali region, why stunting but not wasting rates are so high is unknown. Therefore, using the process monitoring and the mid- and end-line surveys to try to establish what the cash grant was used for would be helpful to document the process by which this intervention improved nutrition – if indeed it does.

- Based on the information received by this review, it seems as if the food supplement component of this program may not have very high coverage and may not be very well coordinated with the other components. However, if numbers are great enough, this would create the opportunity to compare the impact of the grant, plus IYCF counseling plus the food supplement with the grant and IYCF counseling only. It may also be possible to compare the impact of the food supplement in families that collected it regularly with those who only collected it occasionally.
As with other programs with an IYCF counseling component, this evaluation will hopefully provide important evidence that IYCF counseling can improve IYCF behaviors.

Commercial fortified complementary food
The previous effort to introduce a low-cost fortified complementary food into Nepal is believed to have failed because of poor program design, particularly product marketing and production and distribution planning. There is interest to “try again” with a different implementing partner but using the same previously developed product. Lessons should be learnt from the first effort’s evaluation. New global experience may also be available on promoting a commercial complementary food, particularly from GAIN or Alive and Thrive.

Small-scale fortification of flour
As noted above, two pilots on small-scale fortification of flour are currently being implemented in Nepal: one supported by MI in Lalitpur with water and chakki mills, and the second with ADB support for chakki mills. Evaluation of the MI pilot is on-going, and the evaluation of the ADB pilot is being designed. The key question will be on the feasibility, cost-effectiveness and sustainability of the intervention, and a secondary question will be whether small-scale fortification can increase the micronutrient status of communities who consume it. A core issue is whether the pilot systems to monitor the quality of fortification are effective, cost-effective, and sustainable. These pilots will contribute significantly to the global experience of small-scale flour fortification, particularly the ADB-supported one because of its larger scale.

Delayed cord clamping
This review’s findings indicate that delayed cord clamping may already be taking place in Nepal “by accident.” Therefore, some evaluation should be undertaken to understand better the timing of cord clamping and how it is occurring. This information could be used to establish a delayed cord clamping policy, to update existing training material for skilled birth attendants and other relevant health professionals, specifically to train them to practice delayed cord clamping, and if necessary, to recommend changes in current practices or policies, which may be interfering with delayed cord clamping. Available opportunities should be taken to try to evaluate the impact of delayed cord clamping in Nepal.

Community based growth monitoring and promotion
Based on our research, we do not recommend that Nepal initiate community-based growth monitoring and promotion (GMP). However, if high interest exists to explore further the relevance of GMP for Nepal, a potentially useful evaluation would be a study that compares implementation of a growth promotion package such as MNPs and IYCF counseling with a growth monitoring and promotion package e.g., growth monitoring, plus MNPs, and IYCF counseling. Such a study could provide information on whether growth monitoring improves the impact of the growth promotion interventions, such as the IYCF counseling.
Implementing the Interventions as a Comprehensive Nutrition Program

The previous section of this report discussed implementation recommendations for the individual interventions. In this section, suggestions are proposed for implementing these interventions within a comprehensive nutrition program, as part of the Nepal Health Sector Program II.

**The Nepal Health Sector Program II and the Multisectoral Plan for Nutrition**

The authors of this report have reviewed the Nepalese and global evidence for effective nutrition interventions within the health sector. The essential nutrition interventions recommended by this report could be implemented through two separate but interlinked programs in Nepal: the Nepal Health Sector Program II (NHSP II) of the MOHP and the Multisectoral Plan for Nutrition, which is being coordinated by the National Planning Commission.

Under the NHSP II, as discussed, essential nutrition interventions will be (i) strengthened and maintained on a national level and (ii) expanded or scaled up to achieve large-scale implementation on a national/sub-national level. In addition, several pilots, studies, and trials are planned to develop Nepal-based evidence on interventions identified as promising by this review. Obviously, these will be implemented only on a small scale, but within the NHSP II. They have been referred to as needing “more evaluation.”

Under the Multisectoral Plan for Nutrition, evidence-based interventions for nutrition from a variety of sectors will be implemented in a limited number of areas, under the coordination of special “nutrition architecture” structures, which will be established at all levels. The health sector nutrition interventions identified for national level strengthening/maintenance and expansion/scale up will form the health sector interventions within this Multisectoral Plan for Nutrition.
Principles for Implementation of Nutrition Interventions within the NHSP II

The NHSP II identified “reducing malnutrition” as one of the priorities of the Plan, alongside sustaining and expanding the existing essential health care services (EHCS) package, further reducing maternal and newborn deaths, increasing use of family planning, addressing new, neglected and reemerging diseases and addressing levels of noncommunicable diseases. The vision of the NHSP II is to improve the health and nutritional status of the Nepali population, especially the poor and excluded, by increasing access and utilization of quality essential health care services, reducing cultural and economic barriers to accessing health care services and harmful cultural practices in partnership with non-state actors, and improving the health system to achieve universal coverage of essential health services.

Thus, building upon the priorities and vision of the NHSP II, proposed principles for implementation of the nutrition interventions within the NHSP II are:

- Integration of nutrition interventions into existing programs where possible
- Achieving scale and equity with quality services
- Integrated training to the extent possible (to avoid same people being trained over and over again on different topics)
- Ensuring balance of community-based, outreach, and facility-based services
- Contributing to continuum of care
- Developing appropriate public-private collaboration (e.g., strengthen involvement of pharmacies and private doctors and of CBOs and NGOs)

Creation of a Community-Based Behavior Change Communication Nutrition Package

A significant focus of future nutrition action will be to improve counseling and support provided to community-level caregivers. Specifically, an improved package for IYCF counseling has been extensively discussed. This will most likely be implemented by FCHVs with the support of the health system, in particular MHC workers and village health volunteers. At the same time, the need to improve maternal nutrition, including maternal care practices, has been highlighted. It is therefore suggested that Nepal develops a comprehensive community-based package for maternal and child nutrition care that focuses on encouraging behavior change on key care practices that affect maternal and child nutrition. This package would put into practice the behavior change components of the Community Nutrition Program that was recommended in the NAGA report. Practices that should be targeted are those concerning all of the Essential Nutrition Actions (ENA) identified for Nepal. These are:

- IYCF practices – optimal breastfeeding and complementary feeding
- Care of sick children, including health seeking and feeding
- Hygiene behaviors for prevention of illness
- Maternal diet and health seeking to improve maternal nutrition
- Accessing micronutrient services and commodities
- Child spacing and family planning, including avoidance of teenage pregnancy
- Decrease smoking and smoke exposure in the household to reduce risks to women and children

The package should use innovative and effective behavior change communication methodologies, possibly including some of the methodologies used by the Dhanusha
mothers’ group study. The package should develop strong linkages with other community-based initiatives such as the community-based Newborn Care Package, the Birth Preparedness Package, and community-based IMCI. For the remainder of this report this package will be referred to as the Nutrition Behavior Change Communication package but a more attractive name might be developed in the future.

**Integration of Nutrition Interventions into Existing Programs**

An important principle in strengthening nutrition programming in Nepal is to incorporate effective interventions into existing programs, rather than trying to establish “stand-alone” nutrition programs. The advantage of this approach is that nutrition interventions benefit from existing infrastructure, systems and contacts with the community. This also improves efficiency and effectiveness from the point of view of the health system and the community. Separate delivery mechanisms for nutrition interventions should only be considered when appropriate and effective programs do not exist. Another important principle is that a balance is needed between community-based, outreach, and facility-based services. Figure 38 suggests how the identified nutrition interventions might be integrated into existing programs in Nepal.

The importance of integrating and ensuring a continuum of care has been identified as an opportunity to accelerate progress in public health and reduce inefficiencies. In particular, strong calls have been made to integrate programs for maternal, neonatal and child health, recognizing that women and their children form a unit and that factors affecting one stage of the life cycle, impact upon the other. Nutrition for women and children should be integrated into these programs. Paradigm shifts towards a continuum of care would address competition in advocacy for women and children, conflicts between facility-based vs. community care and vertical vs. horizontal programming, global tracking vs. national and district needs and competing interests of partners, donors and governments.261

Taking into account effective interventions identified for maternal, neonatal and child survival, and sexual health,262 Kerber et al. developed eight integrated packages of essential interventions organized along the continuum of care by lifecycle and place of service delivery. Figure 39 shows the eight integrated packages, with evidence-based nutrition interventions

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<thead>
<tr>
<th>NUTRITION INTERVENTION</th>
<th>PROGRAMME</th>
<th>TYPE OF PROGRAMME</th>
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</thead>
<tbody>
<tr>
<td>Vitamin A supplementation and deworming for U5</td>
<td>CB-IMCI</td>
<td>Outreach</td>
</tr>
<tr>
<td>Diarrhea treatment with zinc</td>
<td>CB-IMCI</td>
<td>Facility-based and outreach</td>
</tr>
<tr>
<td>IFA, deworming and VAS for pregnant and postpartum</td>
<td>Safe Motherhood (ANC &amp; PNC) and IMNMP</td>
<td>Facility-based and outreach</td>
</tr>
<tr>
<td>Salt iodination</td>
<td>Food fortification</td>
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<tr>
<td>IYCF and hand washing counseling</td>
<td>Nutrition BCC package</td>
<td>Community-based</td>
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<tr>
<td>MNPs</td>
<td>Nutrition BCC package</td>
<td>Community-based and outreach</td>
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<tr>
<td>Roller mill flour fortification</td>
<td>Food fortification</td>
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<tr>
<td>Integrated management of SAM (community &amp; facility based)</td>
<td>CB-IMCI/Nutrition BCC package</td>
<td>Facility-based, outreach, and community-based</td>
</tr>
</tbody>
</table>

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262 Effective interventions were identified in four Lancet articles on the stated topics between 2003 and 2006. See references of Kerber article for more details.
added in red, based on the 2008 Lancet Series on Nutrition published after the Kerber article.

As in most other countries, public health programs in Nepal do not follow this model. Many programs cut across places of service delivery or stages of the life cycle. Others include only some of the essential interventions for a specific stage of life and place of delivery. Meanwhile, for each program, separate processes for district planning, training, logistics supply, recording and reporting, supervision and refresher training all exist,263 creating inefficiencies, overlap, redundancies and contradictions. It is probably unrealistic to consider changing the existing set up to adopt the eight packages Kerber et al. proposed. But, any efforts to move towards the Kerber model would be advantageous, and it would be important also to ensure that there are not gaps in the existing system, i.e., no essential interventions have been omitted, no stages of the life cycle have been neglected and, as appropriate, interventions are implemented across all levels of service delivery. Efforts should also be made to reduce overlap and redundancies, such as joint trainings, and joint recording and reporting, and to increase coordination between the different programs, for example, harmonization and reinforcement of messages between programs.

Geographic Targeting of Nutrition Interventions

At present, many social development and nutrition programs prioritize the far west and the mountain regions of Nepal. While

263 Extracted from presentation made by Core Group Members of Child Health in Nepal on "Integrated Approach for Newborn, Child Health and Nutrition."
the country; nevertheless, prevalence remains ≥40% in the mountains and the hills. The prevalence in the sub-regions is yet unknown. If a cut off of ≥30% is selected, the terai should also be targeted. The WHO categorizes prevalence above 30% as “high prevalence” and ≥40% as “very high prevalence.”\(264\) While stunting obviously needs to be addressed nationwide in the long run, it would seem appropriate initially to target all areas where stunting prevalence is ≥40% or ≥30% depending on resources.

In 2006, wasting prevalence was at critical levels (≥15%) in the terai. Preliminary data from the DHS 2011 indicates that there has been a dramatic decline in wasting prevalence in the terai, and a small increase in the mountains and hills such that they are all now roughly equal. This would suggest wasting-prevention/treatment needs to occur throughout the country.

For both stunting and wasting, however, interventions should be targeted using sub-regional data from the DHS 2011 that will become available in early 2012.

An additional consideration when targeting all interventions should be the number of people affected. Figure 42 shows the number of under five children who are anemic, stunted, wasted, and severely wasted and the number of women with low BMI and anemia. Just under 140,000 stunted children live in the mountains; whereas, more than four times that number lives in the hills, and almost five times in the terai. Similarly, almost 60,000 children in the terai are severely wasted, compared to just over 8,000 in the mountains. The situation is the same for women; more than a million have low BMI in the terai compared to almost 90,000 in the mountains. Therefore, a major recommendation of this review is that the geographical focus of nutrition interventions must achieve a better

balance between the western mountain areas and areas where a much larger proportion of the problems exist.

MNPs and community-based management of SAM will be scaled up in Nepal to address primarily childhood anemia and severe wasting, respectively. It is therefore recommended that MNPs are scaled up in all sub-regions in which the prevalence of anemia is ≥40% and that community-based management of SAM is scaled up in all sub-regions in which the prevalence of wasting is ≥10%. These cut-offs have been adopted from the WHO cut-offs for public health significance; anemia prevalence ≥40% is categorized as a “severe public health problem” and wasting prevalence 10%-15% is “serious.” Emergency guidelines recommend that therapeutic feeding services are established when wasting prevalence exceeds 10% and there are “aggravating factors,” such as food insecurity and infectious disease, as is the case in Nepal.

As mentioned, data on sub-regional prevalence of anemia and wasting from the 2011 DHS should be used for targeting implementation. The DHS surveys only present data to the sub-regional level; data on anemia, stunting, wasting, etc., are not available for districts. In addition, because of their small size, the mountain areas of the west, mid-west and far-west have been combined and are referred to as the ‘western mountains’ in all tables of the DHS reports. When this report was written, however, sub-regional data was not yet available from the 2011 DHS. Therefore, an indicative plan is suggested below based on 2006 sub-regional data. Figure 43 and 44 show the sub-regions that meet these two criteria based on data from the DHS 2006. By coincidence, the sub-regions with anemia ≥40% and wasting ≥10% are almost exactly the same except that the western hills are included in the anemia ≥40% map only. Based on the 2006 data, for ease of implementation, MNPs and community-based treatment of SAM should be scaled up in the same sub-regions, excluding the western hills where the anemia prevalence is 42% - just over the 40% cut-off. Therefore, 2006 data suggests that MNPs and community-based treatment of SAM are scaled up in all of the terai, in the “western mountains” and the far western hills. This area encompasses 34 of Nepal’s 75 districts and is home to just over two million under five children (59% of the US population; estimated 2011 population data from the Census 2001). Within this area, it is suggested that community-based

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266 WHO, UNHCR, IFRC, WFP. The management of nutrition in major emergencies. 2000.
Treatment of SAM and MNPs are scaled up over three years, starting first in the sub-regions with highest levels of wasting (Figure 45).

The Nutrition BCC package will also be scaled up. This should be implemented nationwide as a priority intervention for addressing maternal and child undernutrition. In sub-regions where MNPs and CB SAM are implemented, the nutrition BCC package should be rolled out at the same time. Thus, training and district planning for the whole package – Nutrition BCC, MNPs, and CB SAM - can be undertaken together. In these districts, the BCC package should include extra components for MNPs and CB SAM. For example, the BCC Nutrition will need to include special counseling on use of the MNPs and counseling on infant and young child feeding should be more intensive and prescriptive to address moderate acute malnutrition. Therefore, in the MNP/CB SAM sub-regions the Nutrition BCC package is referred to as Nutrition BCC+.

Under this proposed plan, the whole nation will be covered by either the nutrition BCC package or the CB SAM & MNPs & BCC+ package by the end of 2014 (Figure 46). See Annex 3 and 4 for details.

Preparation Activities for Maintenance/ Strengthening and Expansion/Scaling Up
The above plan envisages starting to implement the new interventions in 2012. In addition, work needs to begin on maintaining/strengthening existing interventions. These will require a significant amount of preparation. Some specific preparation activities are:

1. Hold an IYCF harmonization workshop to harmonize existing IYCF materials and agree on core messages.
2. Develop the BCC package for maternal and child nutrition, incorporating the agreements on IYCF and adding information on the other subjects to be included in the BCC package. Field-test the package, including the materials and the methodologies to ensure it works and develop necessary training materials.

3. Strengthen the nutrition component/messages in existing community-based programs (BPP, CB-NCP, CB-IMCI etc.) and ensure linkages and synergies with the nutrition BCC package.

4. Prepare for scale up of MNPs including designing the “plus” components of the Nutrition BCC package, procuring supplies, updating training, and recording and reporting materials etc.

5. Prepare for scale up of CB SAM, taking into consideration the evaluation findings.

6. Undertake a technical review of the new WHO guidelines on vitamin A supplementation. Make final decisions on what to implement in Nepal.

7. Plan and strategize for the strengthening of VAS and deworming for U5, including identifying what strategies are needed to increase coverage in the low coverage areas and undertaking additional training or preparation as necessary.

8. Complete the evaluation of the IMNMP, and based on the lessons learnt, prepare for nationwide strengthening/maintenance.

9. Plan strategies for improving diarrhea treatment including potentially a mass media campaign, community mobilization, collaboration with pharmacists and the private sector and refresher trainings for health workers.

10. Undertake a review of USI program.

11. Facilitate the passage of legislation for mandatory salt and start to implement the new legislation on mandatory roller mill flour fortification. This should include development of a plan to establish/strengthen systems for regulatory monitoring of both salt and roller mill flour.

12. Develop an implementation plan for all the planned activities, including annual targets and detailed objectives, based on sub-regional prevalence data of anemia and wasting prevalence from the DHS 2011.

**The Strategy for Improving Maternal Nutrition**

Improving maternal nutrition is a high priority for the Nepali government. While interest and commitment to address maternal nutrition is high, the government is frustrated by the limited information about what is feasible to implement at scale in Nepal. This review however, and the work on the Multisectoral Plan for Nutrition, have identified several proven or promising interventions. Within the health sector alone, these fall into three categories.

Interventions to be strengthened: these include improving coverage and compliance of IFA and deworming during pregnancy and lactation. Family planning, especially focused on adolescents and young women, also needs to be improved.
New interventions that are planned: these include the nutrition BCC package, which should include a strong focus on care for women, such as diet and rest during pregnancy, care seeking behaviors and prevention of infection. A pilot is planned on calcium supplementation during pregnancy, as well as a study on the impact of cash vs. food for pregnant women. In addition, evaluating the impact of food supplements for pregnant women distributed by the WFP as part of the MCHC program was proposed.

Potential additional interventions: final decisions are yet to be taken on these interventions, but an “adolescent care” package has been proposed, building upon an existing pilot of adolescent friendly services. In addition, there is the potential to scale up the women’s group intervention that is currently being evaluated in Dhanusha.

Together, these interventions and pilots form a fairly comprehensive package to improve maternal nutrition. In addition, several of the studies planned, could potentially be scaled up in the future—if they prove successful—which will enable an even more comprehensive package. Meanwhile, additional interventions, such as reductions in exposure to indoor smoke, have been identified in other sectors through the Multisectoral Plan for Nutrition.

Coverage Assessments and Impact Evaluation
An ambitious effort on nutrition is planned for the health sector. It will be important to maintain Nepal’s excellent record in evaluating new interventions and monitoring the coverage and quality of implementation of routine/new programs. Specifically, a final decision needs to be made on whether the District Health Offices are able to “take over” implementation of the Micronutrient Surveys, from NTAG, and if not, to make an alternative plan.

It will also be important to plan and budget for baselines and endlines in the selected districts that will implement only the Nutrition BCC package, and for those districts that will implement the CB SAM & MNP & Nutrition BCC+ package. The baselines and endlines should be designed to be able to evaluate the impact of the two packages, including the question on whether MAM can be reversed with the latter package alone, and whether the Nutrition BCC package leads to improvements in maternal nutrition, IYCF practices, and child nutritional status. If the final evaluations are undertaken in 2015, the results could inform the Nepal Health Sector Plan III, which will start in 2016.

Remaining Questions
Several questions remain which were beyond the scope of this review. One concerns the capacity of the Nepal health system to lead the implementation of the identified interventions. Overall, there are a shortage of health staff working on nutrition and a low level of capacity on public nutrition. Significant amounts of training and supportive supervision are likely to be needed to ensure quality implementation of the interventions identified. Greater resources in terms of health personnel, funding, training, and materials will also be needed.

A key human resource question for nutrition programming is the extent to which the role of FCHVs can continue to be expanded. For example, under the current plan, the Nutrition BCC package and the CB SAM & MNPs and BCC+ package will be added to the already heavy workload of the FCHVs. Is this feasible? Are there alternative community workers who could be recruited to assume some of the new workload or could facility-based health workers play a larger role in implementing some of these interventions? Are there support structures that could be mobilized for the FCHVs or do new FCHVs need to be
recruited? The significant role FCHVs have played in the health and nutrition achievements of Nepal is well recognized, but it seems unrealistic to continue to add new responsibilities to this volunteer and aging cadre of workers.

Another important issue is to better understand the extent to which household availability and access to food and/or poverty are a primary cause of maternal and child undernutrition. The distinction is important because where household food security and/or poverty are the primary constraints, interventions such as IYCF counseling, and even MNPs, are going to have limited impact. In such situations, interventions that improve household income or provide food are needed. Analysis of the 2010/11 Living Standards Survey may potentially help to answer this question.
Annex 1: NAGA Priority Determinant Model

- **Food is available**
  - Yes
    - **Food is affordable**
      - Yes
        - **Quality of food is good**
          - Yes
            - **Nutrition behaviors are good**
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                - **Infection is minimized**
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          - **Nutrition behaviors are good**
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              - **Infection is minimized**
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          - **Nutrition behaviors are good**
            - No
              - **Food is affordable**
                - No
                  - **Food is available**
                    - Yes
                      - **Focus on agricultural, market and infrastructure interventions to increase household food availability and use**
                    - No
                      - **Focus on poverty alleviation efforts to increase household income and direct its use toward nutrition goals**
                - Yes
                  - **Focus on improving micronutrient content, food diversity and increased use of animal source foods**
              - No
                - **Food is available**
                  - Yes
                    - **Focus on agricultural, market and infrastructure interventions to increase household food availability and use**
                  - No
                    - **Focus on poverty alleviation efforts to increase household income and direct its use toward nutrition goals**
                - **Food is affordable**
                  - Yes
                    - **Focus on improving micronutrient content, food diversity and increased use of animal source foods**
                  - No
                    - **Focus on nutrition behavior change in all levels of education, across all sectors**
                - No
                  - **Focus on nutrition behavior change in all levels of education, across all sectors**
                  - **Focus on health services and use, water and sanitation, hygiene behaviors, and food safety**
Annex 2: Agenda and List of Participants at March 16-17 Meeting

Review of the Evidence for Health Sector Nutrition Interventions in Nepal
March 16-17, 2011, World Bank Office
Draft Agenda

Background and Meeting Objective
The second Nepal Health Sector Program (NHSP-2) recognizes the importance of nutrition and has outlined the need to scale up well-proven nutrition interventions, building on Nepal’s success with health sector nutrition interventions, such as vitamin A supplementation for children 6-59 months, salt iodization and iron-folic acid supplementation for pregnant women. Despite the high achievements for the above-mentioned interventions, more needs to be done to address the high rates of maternal and child undernutrition. Meanwhile, globally, consensus is developing on “what works” in nutrition and what are essential “short route” health sector interventions, which could significantly reduce stunting. Several of these interventions have been piloted in Nepal. The World Bank has supported a consultancy to review the status of the essential nutrition interventions in Nepal and these pilots, and to make recommendations to the Ministry of Health and Population (MoHP) on activities that need further testing and those for which significant evidence indicates scaling up. This review and recommendations will enable the MoHP to include new activities when preparing its annual plans of work and budgets.

The objective of this meeting is therefore to hear the outcomes of the review and to develop consensus on how to scale up health sector nutrition interventions for which there is evidence, and further evaluate nutrition interventions for which more information is need.

WEDNESDAY, MARCH 16

<table>
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<tr>
<th>TIME</th>
<th>AGENDA ITEM</th>
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<tbody>
<tr>
<td>9.00</td>
<td>Registration</td>
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<tr>
<td>9.30</td>
<td>Development of a Multisectoral Nutrition Plan in Nepal: status and update</td>
<td>National Planning Commission</td>
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<tr>
<td>10.00</td>
<td>Questions and Discussion</td>
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<tr>
<td>10.15</td>
<td>Coffee break</td>
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<tr>
<td>10.45</td>
<td>Review of implementation of essential nutrition interventions in Nepal</td>
<td>Karen Codling, World Bank Consultant</td>
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<tr>
<td>11.45</td>
<td>Feedback and additional information by the MoHP</td>
<td>Dr Raj Kumar Pokharel</td>
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<tr>
<td>12.00</td>
<td>Questions and Discussion</td>
<td>Facilitated by Dr. Ramesh Kant Adhikari</td>
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<tr>
<td>12.30</td>
<td>Lunch</td>
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<tr>
<td>13.30</td>
<td>Recommendations for implementation of essential nutrition interventions in Nepal</td>
<td>Karen Codling, World Bank Consultant</td>
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<td>14.30</td>
<td>Feedback and response by the MoHP</td>
<td>Dr Raj Kumar Pokharel</td>
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<td>14.45</td>
<td>Coffee break</td>
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<td>15.00</td>
<td>Discussion and consensus development – organized by intervention</td>
<td>Facilitated by Dr. Ramesh Kant Adhikari</td>
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<tr>
<td>16.30</td>
<td>Meeting closed for the day</td>
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THURSDAY, MARCH 17

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<tr>
<td>9.00</td>
<td>Re-cap of conclusions of Day 1</td>
<td>Dr. Raj Kumar Pokharel and Dr. Ramesh Kant Adhikari</td>
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<tr>
<td>9.15</td>
<td>Implications for Policy and Advocacy</td>
<td>Karen Codling, World Bank Consultant</td>
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<td>9.30</td>
<td>Discussion and Conclusions on Policy and Advocacy</td>
<td>Facilitated by Dr. Ramesh Kant Adhikari</td>
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<td>10.30</td>
<td>Coffee break</td>
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<tr>
<td>10.45</td>
<td>Implications for Capacity Development</td>
<td>Karen Codling, World Bank Consultant</td>
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<td>11.00</td>
<td>Discussion and Conclusions on Capacity Development</td>
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<td>13.00</td>
<td>Implications for Data Management Systems</td>
<td>Karen Codling, World Bank Consultant</td>
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<td>13.45</td>
<td>Discussion and Conclusions on Data Management Systems</td>
<td>Facilitated by Dr. Ramesh Kant Adhikari</td>
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<td>15.00</td>
<td>Options and opportunities for developing nutrition activities in other sectors: discussion and consensus development</td>
<td>Facilitated by Dr. Ramesh Kant Adhikari</td>
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<tr>
<td>15.30</td>
<td>Next steps for MOHP</td>
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<td>Next steps for NCP</td>
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<td>16.00</td>
<td>Closing remarks</td>
<td>World Bank</td>
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<td>16.15</td>
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</table>

LIST OF PARTICIPANTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>DESIGNATION</th>
<th>ORGANIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Y.V. Pradhan</td>
<td>Director General, DoHS</td>
<td>MOHP</td>
</tr>
<tr>
<td>Dr. Bichha</td>
<td>Director CHD</td>
<td>MOHP</td>
</tr>
<tr>
<td>Mr. Raj Kumar Pokharel</td>
<td>Chief, Nutrition Section</td>
<td>MOHP</td>
</tr>
<tr>
<td>Dr. Padam. B. Chand</td>
<td>Chief, Policy, Planning and International Cooperation Division</td>
<td>MOHP</td>
</tr>
<tr>
<td>Dr. Baburam Marasini</td>
<td>Coordinator, HSRU, Logistic Management Division</td>
<td>MOHP</td>
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<tr>
<td>Dr. B.K. Subedi</td>
<td>Deputy Director General, Department of Health Services</td>
<td>MOHP</td>
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<tr>
<td>Dr. Ms. Kiran Regmi</td>
<td>Director/Family Health Division-DoHS</td>
<td>MOHP</td>
</tr>
<tr>
<td>Mr. Arjun Bahadur Singh</td>
<td>Health, Training Centre-DoHS</td>
<td>MOHP</td>
</tr>
<tr>
<td>Dr. Chop Lal Bhushal</td>
<td>Director/National, Executive Chairman/ Nepal, Health Research Council</td>
<td>MOHP</td>
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<tr>
<td>Dr. K.K. Rai</td>
<td>Director/National Centre for Aids and STD Control</td>
<td>MOHP</td>
</tr>
<tr>
<td>Dr. Chet Raj Pant</td>
<td>Member, NPC and Chairman NINSC</td>
<td>NPC</td>
</tr>
<tr>
<td>Mr. Bhagwan Aryal</td>
<td>Program Director, Health</td>
<td>NPC</td>
</tr>
<tr>
<td>Mr. Atma Ram Pandey</td>
<td>Secretary</td>
<td>NINSC</td>
</tr>
<tr>
<td>Dr. Ramesh Kant Adhikari</td>
<td>Professor and Head, Department of Pediatrics</td>
<td>KIST Medical College</td>
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<tr>
<td>Dr. A.T. Shepka</td>
<td>-</td>
<td>KIST Medical College</td>
</tr>
<tr>
<td>Dr. Tirtha Rana</td>
<td>Nutrition Expert</td>
<td>Consultant</td>
</tr>
<tr>
<td>Dr. Madhu Devkota</td>
<td>Professor, Nutrition</td>
<td>IOM</td>
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<tr>
<td>Ms. Sushila Malla</td>
<td>President</td>
<td>NNA</td>
</tr>
<tr>
<td>Dr. Armit Bhandari</td>
<td>-</td>
<td>DFID</td>
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<tr>
<td>Ms. Saba Mebrahu</td>
<td>Chief of Nutrition</td>
<td>UNICEF</td>
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<tr>
<td>Naveen Poudyal</td>
<td>Project Officer</td>
<td>UNICEF</td>
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<tr>
<td>Pradhumma Dahal</td>
<td>Project Officer, Nutrition</td>
<td>UNICEF</td>
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<tr>
<td>Aniruddha Sharma</td>
<td>Project Officer</td>
<td>UNICEF</td>
</tr>
<tr>
<td>Ms. Pooja Pandey Rana</td>
<td>Director of Programs</td>
<td>HII</td>
</tr>
<tr>
<td>Ms. Debendra Adhikari</td>
<td>Health and Nutrition Officer</td>
<td>HII</td>
</tr>
<tr>
<td>Ms. Robin Houston</td>
<td>Deputy Director</td>
<td>NFHP</td>
</tr>
<tr>
<td>Dr. Jaganath Sharma</td>
<td>Senior Project Officer</td>
<td>NFHP</td>
</tr>
<tr>
<td>Ms. Sophiya Uperti</td>
<td>Program Officer</td>
<td>WFP</td>
</tr>
<tr>
<td>Ms. Jolanda Hogenkamp</td>
<td>Director of Programs</td>
<td>WFP</td>
</tr>
<tr>
<td>Ms. Marina Kalisky</td>
<td>Nutrition Officer</td>
<td>WFP</td>
</tr>
<tr>
<td>Mr. Hari Koikala</td>
<td>Program Specialist</td>
<td>USAID</td>
</tr>
<tr>
<td>Anne Macauley</td>
<td>M&amp;E Specialist</td>
<td>USAID</td>
</tr>
<tr>
<td>Han Kang</td>
<td>Deputy Director, HFP</td>
<td>USAID</td>
</tr>
<tr>
<td>Amy Prevatt</td>
<td>Food Security Expert</td>
<td>-</td>
</tr>
<tr>
<td>Ms. Latika Pradhan</td>
<td>-</td>
<td>AusAID</td>
</tr>
<tr>
<td>Mr. Nustu Sharma</td>
<td>-</td>
<td>AusAID</td>
</tr>
<tr>
<td>Mr. Ashok Bhurtyal</td>
<td>-</td>
<td>WHO</td>
</tr>
<tr>
<td>M. Mandip Rai</td>
<td>-</td>
<td>FAO</td>
</tr>
<tr>
<td>Dr. Maureen Durang</td>
<td>-</td>
<td>Nepal Health Sector Support Program (NHSSP)</td>
</tr>
<tr>
<td>M. R. Mahajan</td>
<td>Director</td>
<td>Micronutrient Initiative</td>
</tr>
</tbody>
</table>
Annex 3:
Indicative Phasing of Nutrition BCC and CB SAM/MNP Scale Up Based on DHS 2006 Sub-Regional Data

NB: Geographic coverage and phasing based on DHS 2006 prevalence figures for anemia in children, wasting and stunting. DHS does not differentiate between the far western, mid-western and western mountains. The DHS consider these three regions as one region - western mountains.

Nutrition BCC: Nationwide - all districts. Joint training with training on CB SAM and MNPs in districts where these interventions overlap. Phasing based upon consideration of BF within one hour, stunting and low maternal BMI but aim to achieve whole country by end of 2013. NB. Highest prevalence of low maternal BMI is in sub-regions where CB SAM and MNPs will be implemented, so in effect Nutrition BCC roll out prioritized based on BF within one hour and stunting.

CB-SAM: In all sub-regions with >10% wasting. Sub-regions with >10% wasting: all terai, far-west hills, western mountains (far western, mid-western and western). Calculate expected number of children based on 2x severe wasting prevalence

MNPs: In all sub-regions with > 40% anemia. Sub-regions with >40% anemia: all terai, far-west hills, western mountains (far western, mid-western and western) and western hills. However, do not include western hills in order that MNP and CB SAM sub-regions are the same and recognizing that anemia in western hills is only 2% above the cut-off.

Phasing of CB SAM/MNP: based on wasting prevalence. Plus takes into account numbers of children

<table>
<thead>
<tr>
<th>BF within 1 hour</th>
<th>Stunting</th>
<th>BMI &lt;18.5</th>
<th>Wasting</th>
<th>Anemia</th>
<th>Phasing of Nutrition BCC</th>
<th>Phasing of CB SAM and MNPs</th>
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<td>26.7</td>
<td>57.3</td>
<td>12.7</td>
<td>6.1</td>
<td>32.4</td>
<td>2012</td>
</tr>
<tr>
<td>MWH</td>
<td>24.3</td>
<td>65.5</td>
<td>19.5</td>
<td>9.1</td>
<td>34.1</td>
<td>2012</td>
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<tr>
<td>EM</td>
<td>33.3</td>
<td>55.5</td>
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<td>8.7</td>
<td>33.8</td>
<td>2012</td>
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<tr>
<td>CH</td>
<td>31.6</td>
<td>44.9</td>
<td>12.8</td>
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<td>35.4</td>
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<td>EH</td>
<td>30.6</td>
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<td>WH</td>
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<tr>
<td>CT</td>
<td>36.2</td>
<td>52.8</td>
<td>36.8</td>
<td>20.7</td>
<td>62.9</td>
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<tr>
<td>FWT</td>
<td>63.3</td>
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<td>2012</td>
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<tr>
<td>FWH</td>
<td>21.4</td>
<td>58.3</td>
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<tr>
<td>WT</td>
<td>21.9</td>
<td>52.2</td>
<td>24.6</td>
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<td>2013</td>
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<tr>
<td>MWT</td>
<td>42.4</td>
<td>42.1</td>
<td>26.3</td>
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<tr>
<td>WM</td>
<td>32.1</td>
<td>66.8</td>
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<td>33.9</td>
<td>37</td>
<td>31.8</td>
<td>11.2</td>
<td>49.4</td>
<td>2014</td>
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<tr>
<td>Nat Av</td>
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<td>49.3</td>
<td>24.4</td>
<td>12.6</td>
<td>48.4</td>
<td>2012</td>
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</table>

Global cut off
Top 3rd >50 >40% >20% >10% >40%
Mid 3rd 35-50 47-57 19-28
Bottom 3rd <35 >58 >28
### Annex 4:
Calculations on Indicative Phasing of Nutrition BCC, CB SAM and MNPs Scale Up Based on DHS 2006 Sub-Regional Data

<table>
<thead>
<tr>
<th>Sub-regions</th>
<th>No of districts</th>
<th>No of children &lt;5</th>
<th>&gt;10% wasting</th>
<th>Districts</th>
<th>Preval of SAM (prev)</th>
<th>No of SAM (prev)</th>
<th>No of SAM (incidence)</th>
<th>&gt;40% anemia</th>
<th>Districts</th>
<th>No of children 6-24 months</th>
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<tr>
<td>Nutrition BCC</td>
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<tr>
<td>Eastern mountain</td>
<td>3</td>
<td>49,260</td>
<td>0</td>
<td>0.9%</td>
<td>346</td>
<td>887</td>
<td></td>
<td>24,776</td>
<td></td>
<td></td>
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<tr>
<td>Central mountain</td>
<td>3</td>
<td>49,260</td>
<td>0</td>
<td>0.0%</td>
<td>-</td>
<td>-</td>
<td></td>
<td>14,776</td>
<td></td>
<td></td>
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<tr>
<td>Eastern hill</td>
<td>8</td>
<td>308,050</td>
<td>0</td>
<td>1.2%</td>
<td>3,697</td>
<td>7,393</td>
<td></td>
<td>92,413</td>
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<tr>
<td>Central hill</td>
<td>9</td>
<td>346,557</td>
<td>0</td>
<td>1.0%</td>
<td>4,366</td>
<td>6,931</td>
<td></td>
<td>103,567</td>
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<tr>
<td>Western hill</td>
<td>11</td>
<td>425,569</td>
<td>0</td>
<td>1.0%</td>
<td>4,236</td>
<td>8,472</td>
<td></td>
<td>127,071</td>
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<tr>
<td>Mid-western hill</td>
<td>7</td>
<td>328,544</td>
<td>0</td>
<td>1.4%</td>
<td>9,469</td>
<td>12,938</td>
<td></td>
<td>80,863</td>
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<tr>
<td>Sub total</td>
<td>41</td>
<td>1,446,241</td>
<td>0</td>
<td>1.2%</td>
<td>18,310</td>
<td>36,621</td>
<td></td>
<td>613,872</td>
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<td>CMAM and MNPs</td>
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</tr>
<tr>
<td>Far-west mountain</td>
<td>3</td>
<td>49,260</td>
<td>1</td>
<td>3.7%</td>
<td>2,315</td>
<td>4,600</td>
<td></td>
<td>14,776</td>
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<tr>
<td>Mid-west mountain</td>
<td>5</td>
<td>82,100</td>
<td>1</td>
<td>4.7%</td>
<td>3,829</td>
<td>7,717</td>
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<td>24,600</td>
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<td>Western mountain</td>
<td>2</td>
<td>32,840</td>
<td>1</td>
<td>4.7%</td>
<td>1,543</td>
<td>3,087</td>
<td></td>
<td>9,852</td>
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<tr>
<td>Far-western hill</td>
<td>4</td>
<td>154,025</td>
<td>1</td>
<td>4.4%</td>
<td>6,777</td>
<td>13,554</td>
<td></td>
<td>46,208</td>
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<tr>
<td>Eastern terai</td>
<td>5</td>
<td>447,623</td>
<td>1</td>
<td>0.7%</td>
<td>3,193</td>
<td>6,267</td>
<td></td>
<td>134,287</td>
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<tr>
<td>Central terai</td>
<td>7</td>
<td>626,672</td>
<td>1</td>
<td>4.6%</td>
<td>20,827</td>
<td>51,654</td>
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<td>138,002</td>
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<tr>
<td>Western terai</td>
<td>3</td>
<td>268,574</td>
<td>1</td>
<td>4.2%</td>
<td>11,280</td>
<td>22,560</td>
<td></td>
<td>80,572</td>
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<td></td>
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<tr>
<td>Mid-western terai</td>
<td>3</td>
<td>268,574</td>
<td>1</td>
<td>3.7%</td>
<td>9,087</td>
<td>19,874</td>
<td></td>
<td>80,572</td>
<td></td>
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<tr>
<td>Far-western terai</td>
<td>2</td>
<td>179,049</td>
<td>1</td>
<td>4.8%</td>
<td>8,594</td>
<td>17,189</td>
<td></td>
<td>53,715</td>
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<td>Sub total for CMAM and MNPs</td>
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<td>9</td>
<td>34</td>
<td>76,267</td>
<td>152,533</td>
<td>9</td>
<td>34</td>
<td>632,615</td>
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</table>

**Grand Total**: 75 districts, 1,354,950 children, 2.6% wasting, 94,577 children with SAM, 189,154 children with severe SAM, 1,066,988 children with SAM or severe SAM.

### Phasing by year:

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Far-west mountain</td>
<td>626,672</td>
<td>57,854</td>
<td>188,002</td>
<td>268,574</td>
<td>49,280</td>
<td>49,280</td>
<td>49,280</td>
<td>380,050</td>
<td>1,79,049</td>
<td>154,023</td>
<td>18,594</td>
<td>46,208</td>
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<td>Mid-west mountain</td>
<td>268,574</td>
<td>22,560</td>
<td>80,572</td>
<td>80,572</td>
<td>346,557</td>
<td>423,508</td>
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<td>80,572</td>
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<td>80,572</td>
<td>80,572</td>
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<tr>
<td>Western mountain</td>
<td>268,574</td>
<td>19,874</td>
<td>80,572</td>
<td>80,572</td>
<td>346,557</td>
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<td>80,572</td>
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</tr>
<tr>
<td>Total</td>
<td>805,722</td>
<td>74,843</td>
<td>241,171</td>
<td>241,171</td>
<td>714,621</td>
<td>611,824</td>
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<td>217,021</td>
<td>217,021</td>
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### Population Estimates (2011, medium fertility variant, CBS)

<table>
<thead>
<tr>
<th>Region</th>
<th>0-4 population</th>
<th>No of districts</th>
<th>Avg pop/ districts</th>
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</thead>
<tbody>
<tr>
<td>Mountain</td>
<td>262,721</td>
<td>16</td>
<td>16,420</td>
</tr>
<tr>
<td>Hill</td>
<td>1,501,746</td>
<td>39</td>
<td>38,506</td>
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<tr>
<td>Terai</td>
<td>1,790,493</td>
<td>20</td>
<td>89,525</td>
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<tr>
<td>Total</td>
<td>3,554,959</td>
<td>75</td>
<td>47,420</td>
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**Notes:**
- Prevalence of severe wasting in western mountains from DHS 2006 is applied for far-west, mid-west and western mountain sub districts.
- Assume kids 6-24 months is 30% of total kids 0-4 yrs.
Annex 5: Contributors to the Review

The following people contributed to this review in one or more of the following ways: (i) provided materials on past and current nutrition interventions in Nepal, (ii) contributed ideas or comments during the process of the review, including during the dissemination meetings held on March 16-17 and May 19, 2011, (iii) provided comments to drafts of the report.

- Y.V Pradhan – Director General, Department of Health Services, MOHP
- B.K Subedi – Deputy Director General, Department of Health Services, MOHP
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- Bichha – Former Director, Child Health Division, Department of Health Services, MOHP
- Rajkumar Pokharel – Director, Nutrition Division, Department of Health Services, MOHP
- Naresh Pratap KC – Director, Family Health Division, Department of Health Services, MOHP
- Padam B. Chand – Chief, Policy, Planning and International Cooperation Division, MOHP
- Baburam Marashini – Coordinator, HSRU, Logistics Management Division, MOHP
- Tej Prasad Panthi – Planning Officer, National Planning Commission Secretariat
- Maureen Dariang - Nepal Health Sector Support Program (NHSSP), Family Health Division, DOHS, MOHP
- Ramesh Kant Adhikari – Professor and Head, Department of Pediatrics, KIST Medical College
- Madhu Dixit Devkota – Professor, Dept. of Community Medicine and Family Health, Institute of Medicine
- Tirtha Rana – Nutrition Expert
- Ang Tshering Sherpa – Lecturer, Dept. of Community Medicine, KIST Medical College
- Albertus Voetberg – Lead Health Specialist, South Asia Region, World Bank
- Amit Bhandari – Health Advisor, DFID Nepal
- Gourav Sharma – Maternal Health & Nutrition Advisor DFID Nepal
- Natasha Mesko - Maternal Health & Nutrition Adviser, DFID Nepal
- Anne Peniston, Director, Office of Health and Family Planning, USAID
- Ann McCauley – Senior Public Health Advisor, Office of Health and Family Planning, USAID
- Hari Koirala – Program Specialist, USAID
- Nastu Sharma, Senior Program Manager, AusAID
- Latika Maskey Pradhan – Program Manager, AusAID
- Saba Mebrahtu – Chief, Nutrition Section, UNICEF
- Pankaj Metha – Chief Health Section, UNICEF
- Anirudra Sharma – Emergency Nutrition Specialist, UNICEF
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- Pradumna Dahal – Project Officer – Nutrition, UNICEF
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• Robin Houston – Deputy Project Director, Nepal Family Health Program II
• Jaganath Sharma - Coordinator and Senior Program Officer, Community Based Maternal and Newborn Health Team, Nepal Family Health Program II
• David Spiro - Country Director, Helen Keller International
• Pooja Pandey Rana – Director of Programs, Helen Keller International
• Sophiya Uprety – Program Officer (Nutrition), WFP
• Marina Kalisky – Program Officer (Nutrition), WFP
• Amrit Gurung – Program Officer, WFP
• Siti Halati – Program Officer, World Food Program
• Ashok Bhurtyal - WHO
• Macha Raja Maharjan - Director, MI Nepal
• Naomi M. Saville - Senior Research Associate, Centre for International Health and Development, University College London
• Stephanie Suhowatsky – Jhpiego
• Neena Khadka – Save the Children
• Neera Sharma – Save the Children
• Mark Arnoldy – Fulbright Scholar, Public Health and Nutrition
• Sheila Reed - InterWorks – Consultant undertaking evaluation of the CMAM pilots
• Roger Shrimpton – Consultant for the Multi-Sector Plan for Nutrition
ACCELERATING PROGRESS IN REDUCING MATERNAL AND CHILD UNDERNUTRITION IN NEPAL