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 Multi-Sectoral Plan for Nutrition

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**Acronyms**

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<th>Description</th>
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<tr>
<td>AAMA</td>
<td>Action Against Malnutrition through Agriculture</td>
</tr>
<tr>
<td>ACF</td>
<td>Action Contre La Faim International</td>
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<tr>
<td>ANC</td>
<td>antenatal care</td>
</tr>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>BCG</td>
<td>Bacillus Calmette-Guérin - vaccine against tuberculosis</td>
</tr>
<tr>
<td>BCC</td>
<td>behavior change communication</td>
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<tr>
<td>BMI</td>
<td>body mass index</td>
</tr>
<tr>
<td>BPP</td>
<td>Birth Preparedness Programme</td>
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<tr>
<td>BMS</td>
<td>breastmilk substitutes</td>
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<tr>
<td>CB IMCI</td>
<td>Community based Integrated Management of Childhood Illness</td>
</tr>
<tr>
<td>CB-NCP</td>
<td>Community based Neonatal Care Package</td>
</tr>
<tr>
<td>CBO</td>
<td>community based organization</td>
</tr>
<tr>
<td>CIHD</td>
<td>Centre for International Health and Development</td>
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<tr>
<td>CHD</td>
<td>Child Health Division</td>
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<tr>
<td>CIDA</td>
<td>Canadian International Development Agency</td>
</tr>
<tr>
<td>CAP</td>
<td>Community Action Process</td>
</tr>
<tr>
<td>CMAM</td>
<td>Community based management of acute malnutrition</td>
</tr>
<tr>
<td>CCT</td>
<td>conditional cash transfer</td>
</tr>
<tr>
<td>DALY</td>
<td>disability-adjusted life year</td>
</tr>
<tr>
<td>DACAW</td>
<td>Decentralized Action for Children and Women</td>
</tr>
<tr>
<td>DHS</td>
<td>Demographic Health Survey</td>
</tr>
<tr>
<td>DFID</td>
<td>UK Department for International Development</td>
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<tr>
<td>DHO</td>
<td>District Health Office</td>
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<tr>
<td>EHCS</td>
<td>essential health care services</td>
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<tr>
<td>ENA</td>
<td>Essential Nutrition Actions</td>
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<tr>
<td>EBF</td>
<td>exclusive breastfeeding</td>
</tr>
<tr>
<td>F/CA</td>
<td>food/cash for assets (WFP programme)</td>
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<tr>
<td>GDP</td>
<td>gross domestic product</td>
</tr>
<tr>
<td>GMP</td>
<td>growth monitoring and promotion</td>
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<tr>
<td>GoN</td>
<td>Government of Nepal</td>
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<tr>
<td>HKI</td>
<td>Helen Keller International</td>
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<tr>
<td>HMIS</td>
<td>health management information system</td>
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<tr>
<td>HFA</td>
<td>homestead food production</td>
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<tr>
<td>IFA</td>
<td>iron and folic acid</td>
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<tr>
<td>IYCF</td>
<td>infant and young child feeding</td>
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<tr>
<td>ICDS</td>
<td>Integrated Child Development Services</td>
</tr>
<tr>
<td>IMCI</td>
<td>Integrated Management of Childhood Illness</td>
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<tr>
<td>IMNMP</td>
<td>Intensification of Maternal and Neonatal Micronutrient Programme</td>
</tr>
<tr>
<td>LNS</td>
<td>Lancet Nutrition Series</td>
</tr>
<tr>
<td>LBW</td>
<td>low birth weight</td>
</tr>
<tr>
<td>MCHC</td>
<td>Maternal and Child Health Care</td>
</tr>
<tr>
<td>MCH</td>
<td>maternal and child health</td>
</tr>
<tr>
<td>MI</td>
<td>Micronutrient Initiative</td>
</tr>
<tr>
<td>MUAC</td>
<td>mid-upper arm circumference</td>
</tr>
<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>MAM</td>
<td>moderate acute malnutrition</td>
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<tr>
<td>MIRA</td>
<td>Mother and Infant Research Activities</td>
</tr>
<tr>
<td>MNPs</td>
<td>multiple micronutrient powders</td>
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<tr>
<td>MNSs</td>
<td>multiple micronutrient supplements</td>
</tr>
<tr>
<td>NNCC</td>
<td>National Nutrition Coordinating Committee</td>
</tr>
<tr>
<td>NPC</td>
<td>National Planning Commission</td>
</tr>
<tr>
<td>NTAG</td>
<td>National Technical Assistance Group</td>
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<tr>
<td>NCHS</td>
<td>National Centre for Health Statistics, US Centres for Disease Control</td>
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<tr>
<td>NFHP</td>
<td>Nepal Family Health Programme</td>
</tr>
<tr>
<td>NHSP II</td>
<td>Nepal Health Sector Program II (2010-2015)</td>
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<tr>
<td>NTDs</td>
<td>neural tube defects</td>
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<tr>
<td>NGO</td>
<td>non government organization</td>
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<tr>
<td>NAGA</td>
<td>Nutrition Assessment and Gap Analysis</td>
</tr>
<tr>
<td>OR</td>
<td>odds ratio</td>
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<tr>
<td>ORS</td>
<td>oral rehydration solution</td>
</tr>
<tr>
<td>ORT</td>
<td>oral rehydration treatment</td>
</tr>
<tr>
<td>OTP</td>
<td>outpatient treatment post</td>
</tr>
<tr>
<td>PSI</td>
<td>Population Services International</td>
</tr>
<tr>
<td>PNC</td>
<td>post natal care</td>
</tr>
<tr>
<td>PHCR</td>
<td>poverty headcount ratio</td>
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<tr>
<td>PP</td>
<td>post partum (woman)</td>
</tr>
<tr>
<td>ppm</td>
<td>parts per million</td>
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<tr>
<td>RUTFs</td>
<td>ready-to-use therapeutic foods</td>
</tr>
<tr>
<td>RUSFs</td>
<td>ready-to-use-supplementary foods</td>
</tr>
<tr>
<td>STC</td>
<td>Salt Trading Corporation</td>
</tr>
<tr>
<td>SUN</td>
<td>Scaling Up Nutrition</td>
</tr>
<tr>
<td>SLC</td>
<td>School Leaving Certificate</td>
</tr>
<tr>
<td>SD</td>
<td>standard deviation</td>
</tr>
<tr>
<td>SAM</td>
<td>severe acute malnutrition</td>
</tr>
<tr>
<td>SC</td>
<td>stabilization center</td>
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<tr>
<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>UCL</td>
<td>University College London</td>
</tr>
<tr>
<td>UIE</td>
<td>urinary iodine excretion</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>VDCs</td>
<td>Village Development Committee</td>
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<tr>
<td>VAS</td>
<td>vitamin A supplementation</td>
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<tr>
<td>WB</td>
<td>World Bank</td>
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<tr>
<td>WFP</td>
<td>World Food Programme</td>
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<td>WHO</td>
<td>World Health Organization</td>
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Executive Summary

Maternal and child mortality have declined significantly in Nepal to the extent that Nepal is on track to meet the Millennium Development Goals for maternal and child mortality. Similar improvements have also been made in nutrition, particularly in the last five years. Nevertheless undernutrition rates remain high and the second Nepal Health Sector Program (NHSP II, 2010-2015) therefore prioritizes nutrition. In addition, a Multi-sectoral Plan for Nutrition is under development, following a Nutrition Assessment and Gap Analysis in 2009 that highlighted the need for nutrition interventions in other sectors, in addition to health.

This review was undertaken in order to identify nutrition interventions in the health sector for which there is evidence of effectiveness, which address the priority causes of maternal and child undernutrition in Nepal and could be expected to be feasible for implementation in Nepal. The review categorizes the selected interventions into three categories: (i) those already being implemented in Nepal which should be maintained or strengthened, (ii) those which should be expanded or scaled up and (iii) those for which more evaluation is needed. The review also provides recommendations for implementation of the individual interventions and for their implementation as a comprehensive programme as part of the Nepal Health Sector Plan II.

The review primarily considered interventions identified by the 2008 Lancet Nutrition Series (LNS) as having sufficient evidence for implementation in all of the 36 developing countries where 90% of the world’s stunted children live. Nepal is one of these 36 countries. The review also considered an adaptation of this list proposed by a World Bank-funded exercise to cost the implementation of scaling up a package of essential interventions – Scaling Up Nutrition: What will it cost? Both lists focused on ‘short route’ interventions rather than interventions that produce results in a longer time frame, for example through sectors such as education, social protection/poverty reduction and agriculture. The Lancet Nutrition Series list 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 DALYs. All the identified interventions address maternal and child nutrition during the “1,000 days window of opportunity” ie from pre-pregnancy/conception to 24 months of age. This is now well accepted as the critical time for delivery of maternal and child nutrition interventions.

The Demographic Health Survey (DHS) of 2011 (Preliminary Report) indicates that 40.5% of under 5 children are stunted and 10.9% are wasted in Nepal and the DHS 2006 indicated that 24.4% of women aged 15-49 had BMI <18.5 and are therefore considered “thin”. Maternal undernutrition, stunting and wasting have all declined since the DHS 2001, stunting quite considerably, but wasting actually increased between 2001 and 2006. The DHS 2006 also indicated that 14% of babies weighed at birth were low birth weight (<2.5kg) and 19.2% of mothers reported that their babies were “very small” or “smaller than average”. In contrast available information on vitamin A status, urinary iodine excretion rate as a measure of iodine status, and anaemia prevalence all suggest significant improvements in micronutrient status. Causes of maternal and child undernutrition in Nepal appear to include basic causes such as poverty, low maternal education and possibly food security. Underlying causes include low access to health care and a healthy environment (such as sanitation), poor caring behaviours, including poor infant and young child feeding behaviours) and inadequate household food access to a diverse and quality diet. It is also important to note that DHS 2006 figures indicate that 40.7% of girls 19 years old 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.
The review of essential nutrition interventions revealed the following about Nepal’s experiences with these interventions and global evidence. Recommendations for future action are also noted below:

Promotion of breastfeeding and behaviour change communication for improved complementary feeding are both stated priorities of the MOHP but it appears that the quality of efforts to date have been insufficient and poorly designed and implemented. Particular problems in Nepal are low levels of early initiation of breastfeeding and early and late complementary feeding with a low quality complementary feeding diet. Exclusive breastfeeding rates did decline between 2001 and 2006 but improved significantly between 2006 and 2011. Global experience indicates that it is possible to improve breastfeeding rates although less evidence exists for improvements in complementary feeding practices. The LNS calculated that quality implementation of breastfeeding and complementary feeding interventions (possibly including supplementary food) could reduce infant mortality and stunting at 12 months by 11.6% and 19.8% respectively. It is therefore recommended that efforts to improve infant and young child feeding be rapidly and comprehensively scaled up in Nepal, including development of a comprehensive infant and young child feeding strategy and a strong, well designed behaviour change component based on quality counseling at community level.

Counseling on hand washing and hygiene practices also appears to have been a neglected area in Nepal despite the fact that these interventions could reduce stunting at 24 months by 2.4% through a 30% reduction in diarrhoea. The effect of hand washing on diarrhoea is comparative to the provision of clean water in low-income areas. Two surveys indicate that only 65-75% of women used soap for hand washing the previous day. Counseling to increase hand washing and improve hygiene behaviours should be included in all counseling on care or infant and young child feeding.

Nepal has experience in implementing vitamin A supplementation of children 6-59 months (with deworming of children 12-59 months), post partum women, pregnant women (as a pilot to treat night blindness) and neonatal children (as a pilot currently being evaluated). The Nepal programme for vitamin A supplementation and deworming of under five children is recognized as a global success story and has been credited with reducing child mortality, including inequalities in child mortality and anaemia in young children. Despite this, there remain some areas where the programme could be strengthened, for example, coverage of younger children. Coverage of post partum vitamin A is less impressive although it has increased to current levels of about 60%. The pilot on pregnancy supplementation suggested that it could be implemented in Nepal as an intervention to treat night blindness and the results of the neonatal supplementation pilot are not yet available. Globally, WHO has just released updated guidelines on vitamin A supplementation of all age groups. These take into account global data on impact which supports vitamin A supplementation for under five children but perhaps not other population groups. As a result, this review suggests that vitamin A supplementation and deworming for young children should be strengthened and maintained but that a decision on vitamin A supplementation for other groups should be postponed until a Nepali technical group can review the new WHO guidelines.

As in other countries, coverage of treatment of diarrhoea with zinc remains low, as does coverage of treatment with oral rehydration solution. This is despite significant efforts to implement this intervention. A key constraint appears to be lack of awareness of ORS and zinc as diarrhoea treatments and a propensity to consult with pharmacists and private practitioners for diarrhoea treatment. Globally sales of zinc have increased significantly but global data on coverage is not available. Diarrhoea treatment with zinc reduces the duration of acute and persistent diarrhoea. As the problem seems to be with diarrhoea treatment overall, the recommendation is to develop a comprehensive strategy to improve diarrhoea treatment in general, including the use of zinc, for national implementation.
The provision of multiple micronutrient powders, for addition to the complementary food of young children in order to increase micronutrient intake, was not included in the LNS. However evidence of the efficacy and effectiveness of this intervention has advanced rapidly in recent years. A Cochrane review found that they reduced anaemia by 32% and WHO has just released a “strong recommendation” to implement multiple micronutrient powders in all areas where childhood anaemia levels exceed 20%. Nepal has experience of small-scale implementation of this intervention including pilots in six districts to identify a suitable distribution methodology in Nepal. Programmes supported by WFP have recorded high coverage and compliance, some improvements in complementary feeding diversity and an impact on anaemia levels. Hence it is recommended that distribution of micronutrient powders be scaled up in Nepal, with strong infant and young child feeding counseling, as an additional intervention to address childhood anaemia.

Supplementation of pregnant and lactating women with iron and folate and deworming is a standard intervention in most countries. Nepal has succeeding in achieving higher coverage than many other countries particularly by adopting and strengthening a community-based distribution channel. This appears to have contributed to significant reductions in anaemia in pregnant women and, less explicably, non-pregnant women. Nevertheless there is the potential for further improvements including further increasing coverage, improving compliance and bringing coverage of deworming up to the same level as pregnancy supplementation. This intervention is therefore recommended for maintenance and strengthening. Meanwhile global data reconfirms the value of this intervention – it reduces anaemia during pregnancy and hence maternal mortality. It appears to also reduce low birth weight and neonatal death.

Another option for Nepal might have been to switch to providing multiple micronutrient supplements to pregnant women as several studies have shown these have an equal or greater impact on anaemia but a greater reduction in low birth weight. However WHO guidelines on this intervention have yet to be released and some studies have found increases in neonatal mortality. It thus appears prudent for Nepal to focus on strengthening the proven intervention of iron and folic acid supplementation, pending more information on the impact of multiple micronutrient supplements.

A small acceptability study on maternal supplementation with calcium has been implemented in Nepal and a one-district pilot is planned. Calcium supplementation has been shown to reduce pre-eclampsia which is an important cause of maternal mortality in developing countries. If the intervention proves to be feasible and cost-effective in Nepal it could be scaled up in future.

Wheat, maize and millet are the second staple cereals eaten in Nepal after rice. The government has thus recently issued legislation which makes roller mill flour fortification mandatory in Nepal. Unfortunately however only about 20-30% of all wheat is milled in large roller mills; the remainder is milled in small chakki and water mills. Two relatively small scale programmes are trying to develop feasible ways to support fortification by these small scale mills. As flour fortification in large roller mills has proven to be a highly cost effective strategy for preventing neural tube defects and for reducing anaemia, it is recommended to facilitate implementation of the new legislation. Meanwhile the programmes for small scale fortification should be evaluated to assess the effectiveness and determine if they too could be scaled up.

Salt iodization is touted as a success story in Nepal and indeed, coverage of iodized salt was almost 100% in 2007. In addition coverage of adequately iodized salt is now 80%. As salt iodization is the most effective way to improve iodine status it is thus recommended that this intervention needs to be maintained and strengthened. A programme review is recommended which should identify additional
ways to strengthen the programme. The review should also address a second problem – that of rather high levels of urinary iodine in some population groups.

Nepal has been implementing community based management of acute malnutrition (CMAM) on a pilot basis since early 2009 to test if the intervention is feasible for implementation in Nepal to address the high rates of severe wasting in the country. The results of the pilots suggest that community based treatment of SAM (CB SAM) is feasible and effective and could potentially be scaled up. Costs of the pilots also appear reasonable. As children with severe acute malnutrition are estimated to be nine times at greater risk of dying and because they number about 90,000 in Nepal (based on 2011 population figures and prevalence from the DHS 2011) it is recommended that CB SAM is scaled up in all sub-regions with wasting prevalence ≥10%. It is recognized however that it is not yet clear how to handle the approximately 300,000 children in Nepal who are moderately wasted; global guidance is still being developed on this issue and no data is available from the CMAM pilots in Nepal whether the counseling provided to moderately acutely malnourished children has ‘cured’ them or prevented them from progressing to severe acute malnutrition. Some potential interventions for this group of children are therefore suggested for ‘further evaluation’.

WFP is currently supporting a programme to provide women and children with a supplementary food if they attend maternal and child health services. The intervention has yet to be evaluated but internal monitoring data suggests increased attendance at services. WFP has also supported the roll out of a commercial fortified complementary food together with the Micronutrient Initiative. Unfortunately the project was not successful due to problems with the marketing strategy. Recommendations are therefore to evaluate the WFP MCH project and to try again with the commercial complementary food and evaluate the impact. Thus both interventions are recommended for ‘further evaluation’.

In late 2009, Nepal introduced a child grant for up to two children under five of all poor Dalit families and all families in the Karnali zone. In addition, UNICEF is supporting counseling on IYCF and encouragement of birth registration. The MOHP is also providing a food supplement for children in the Karnali zone. Conditional cash transfers are credited with significant improvements in nutritional status in Latin America, in particular, but there is some evidence that the conditionality, which is not present in the Nepal child grant programme, is not the key success factor of these programmes. It is therefore important that the impact of this intervention in Nepal is well evaluated to determine if it should be scaled up and to add to the global evidence base on the impact of child grants for improving nutrition.

The establishment of a community based growth monitoring and promotion (GMP) programme is being considered in Nepal and a pilot to compare GMP implemented by FCHVs vs health workers is planned. At the moment, growth monitoring only occurs in health facilities and within a community mobilization and empowerment programme called DACAW, supported by UNICEF in several districts. Data on the impact or value added of the growth monitoring in DACAW is inconclusive. Globally the evidence that growth monitoring adds value to growth promotion interventions is also inconclusive and growth monitoring was not one of the recommended interventions of the LNS. A number of reviews, including a paper released this year, suggest that community based nutrition programmes do not necessarily need to include growth monitoring and quality implementation of well-designed growth promotion programmes should be the focus. The establishment of a community based growth monitoring and promotion programme for Nepal is therefore not recommended. However, if there is strong interest in further exploring the relevant of GMP for Nepal, a potentially useful evaluation would be to compare the impact of a growth promotion intervention, such as IYCF counseling or MNPs, with and without growth monitoring.
The summary of recommendations for essential nutrition in Nepal is shown in the table below. Overall micronutrient interventions which are well-established in Nepal are recommended for maintenance and strengthening, new interventions for child growth, plus the ‘new global intervention’ of MNPs, are recommended for scale up and expansion and several interventions, including several for maternal nutrition, are recommended for further evaluation.

<table>
<thead>
<tr>
<th>Maintain/ Strengthen</th>
<th>Scale Up or Expand</th>
<th>More Evaluation</th>
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<tbody>
<tr>
<td>Vitamin A supplementation and deworming for U5</td>
<td>IYCF and hand washing/ hygiene counseling</td>
<td>Interventions to improve maternal nutrition</td>
</tr>
<tr>
<td>Diarrhoea treatment with zinc</td>
<td>MNPs</td>
<td>Iron suppl &amp; deworming adolescent girls</td>
</tr>
<tr>
<td>IFA and deworming for pregnant and post partum</td>
<td>Integrated management of SAM (community &amp; facility based)</td>
<td>Calcium supplementation during pregnancy</td>
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<tr>
<td>Salt iodization</td>
<td>Roller mill flour fortification</td>
<td>Prevention/treatment of MAM</td>
</tr>
<tr>
<td>Technical review</td>
<td>Commercial fortified CF</td>
<td></td>
</tr>
<tr>
<td>Vitamin A supplementation (pregnancy, post partum and neonatal)</td>
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<td>Small mill flour fortification</td>
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</tbody>
</table>

Based on discussion with the MOHP and various external assistance partners, a number of recommendations are also made as to how these interventions could be implemented as part of a comprehensive nutrition programme within the Health Sector Plan. IYCF counseling is recommended as an effective intervention but in terms of implementation it is recommended that it is implemented within a comprehensive multi-level, multi component IYCF strategy that includes components on legislation, health system support, community-based counseling, communications, possibly additional complementary feeding interventions and IYCF interventions for difficult circumstances, namely HIV and emergencies. It is also proposed that the concept of IYCF counseling at community level should be expanded into a comprehensive behaviour change strategy for both maternal and child undernutrition. It should thus include behaviour change communication (BCC) on all essential nutrition actions including IYCF practices, care of the sick child, hygiene behaviours, maternal diet and health seeking, accessing micronutrient services and commodities, child spacing and family planning, and smoking and smoke exposure. The package should use innovative and effective BCC methodologies and have strong links with other community-based initiatives such as the Birth Preparedness Package, the Community-based Neonatal Care Package and Community-based IMCI.

A further recommendation or ‘principle for implementation’ is that, to the extent possible, nutrition interventions should be integrated with existing or other health programmes in order to avoid duplication or repetition, to make more effective use of resources and contact opportunities with the community. Geographically, it is suggested that nutrition interventions are implemented where prevalence is high and where the largest numbers of affected people live. Final decisions on
geographical targeting of programmes should be based upon sub-regional data on nutritional status from the DHS 2011 which is expected to be available in early 2012. When numbers of people are taken into consideration, there is strong justification for including the terai in the geographical focus as this is where the majority of people live. For example, almost five times more stunted children live in the terai compared to the mountains.

It is recommended that community based treatment of SAM is scaled up on a priority basis in all sub-regions with ≥10% wasting and MNPs are scaled up in all sub-regions with ≥40% childhood anaemia. Using 2006 data pending the availability of 2011 data, by coincidence, except for the western hills where anaemia is 42%, the sub-regions that meet these criteria are exactly the same. Assuming this pattern remains when 2011 data is considered, it is suggested that a combined package of CB SAM, MNPs and BCC for nutrition is implemented in all areas with ≥10% wasting, in order to facilitate integration and implementation. The BCC package for nutrition should be implemented in the rest of the country. A phased implementation is suggested that would result in full coverage of the whole country by the end of 2014. A number of districts should be selected for evaluation so that data on the impact of the two packages is available by the end of the current Health Sector Plan in order to inform the development of the next Health Sector Plan.

With regards to maternal nutrition, this review envisages a number of interventions at varying stages of implementation. As discussed, existing interventions for iron and folic acid supplementation and deworming in pregnancy and lactation should be strengthened, as should family planning, especially focused on adolescents and young women. A number of new interventions are planned including the BCC Nutrition package which will include a strong maternal nutrition component. There will also be a pilot on calcium supplementation in pregnancy and a study to compare the impact of cash vs food with counseling on birth weight and other maternal indicators. It is also recommended that the WFP supplementation of pregnant women intervention is evaluated. Finally, two additional interventions could be piloted. One is an ‘adolescent health and nutrition programme’ based on an existing pilot of adolescent health services. Weekly iron folate supplementation and deworming could be added to this intervention, plus counseling on relevant topics such as avoidance of smoking and teenage pregnancy. A second potential intervention is currently being trialed in Dhanusha district. The trial has implemented a ‘mothers’ group’ intervention amongst about 210,000 women. The mothers groups have identified problems and implemented solutions related to maternal and newborn health and maternal and infant nutrition. The evaluation of the trial is on-going; if the results are positive, this intervention could potentially be implemented on a pilot basis to assess the feasibility for further scale up.

In conclusion, this review, which has drawn upon the experiences, expertise and ideas of a wide spectrum of stakeholders in Nepal, plus global evidence, has identified a number of effective interventions feasible for accelerated implementation in Nepal. The global evidence suggests that if they are implemented with quality and equity, on a large scale, significant reductions in maternal and young child nutrition could be expected.
I. The Problem of Undernutrition in Nepal

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

In late 2009 a Nutrition Assessment and Gap Analysis (NAGA) was undertaken in order to provide a synthesis of information necessary to develop a detailed Multi-sector Plan for Nutrition for the next five years. The NAGA reviewed and made recommendations on evidence-based and feasible interventions for health, agriculture, education and welfare sectors. The creation of a multisectoral nutrition architecture was proposed that would comprise a National Nutrition Coordinating Committee (NNCC) under the auspices of the National Planning Commission (NPC). The NNCC and NPC would oversee the development of a Multi-sectoral Plan for Nutrition under which interventions would be implemented by each sector but which, together, would combine to improve maternal and child nutrition in the optimal window of opportunity from conception to 24 months of age.

This review, which was commissioned by the World Bank, on behalf of the Ministry of Health and Population, 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 in the health sector that address the priority causes of maternal and child undernutrition in Nepal. It is envisaged that these interventions will be implemented within the NHSP II and the Multi-sectoral Plan for Nutrition. A similar review has been undertaken for nutrition interventions in other sectors, such as agriculture, social protection, environment and education. The identified interventions in these other sectors will be implemented under the Multi-sectoral Plan for Nutrition, in addition to those implemented by the health sector.
Figure 1: Changes in nutritional status of young children and women (1996-2011)

Maternal and Child Health and Nutrition in Nepal

Following impressive reductions in poverty and reductions in all forms of child mortality, and even maternal mortality, Nepal has experienced also impressive reductions in child undernutrition. Subsequent Demographic Health Surveys (DHS) in 1996, 2001, 2006 and 2011 indicate that rates of all forms of child and maternal mortality have approximately halved over the last 10 years – for example maternal mortality has declined from 530 in 1996 to 281 in 2006 and under 5 mortality from 118 to 54 between 1996 and 2011. However, the rate of decline has slowed considerably since 2006, and neonatal mortality is actually unchanged between 2006 and 2011.

Similarly child stunting has fallen from 57.1% in 2001 to 40.5% in 2011; an impressive fall of 1.7 percentage points per year. Wasting rates declined from 11.3% in 2001 to 10.9% in 2006; a comparatively minor improvement. 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. As underweight is essentially a composite indicator of stunting and wasting, these figures reflect significantly faster improvements in child nutritional status in the 2006-2011 period compared to 2001-2006. This contrasts with the slowdown in child mortality reduction in the last five years. As shown in Figure 1 above, stunting reduction was slightly faster in the later period (1.76 percentage points compared to 1.56 points in 2001-2006) and wasting rates actually rose from 11.3% to 12.7% between 2001-2006 and then fell by 1.8 points between 2006 and 2011. In contrast, 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 impressive reductions in stunting levels, prevalence remains high at 40%. Moreover, although there are some geographical and regional differences, stunting prevalence is consistently high.

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1. DHS 2001 and 2006
2. DHS 2011 Preliminary Report – Figure 4
3. As measured by maternal body mass index (BMI) <18.5
throughout the country. In 2006 when national prevalence was 49.3%, it was above 40% (considered ‘very high’\(^4\)) in all rural areas (where 85% of the population live); in all three ecological zones; in all five regions; and all sub-regions, save one. In 2011, national prevalence has fallen to 40.5%, still a level considered ‘very high’ by WHO cut-offs, but declines in prevalence have occurred equally across the country as shown in Figure 2.

Figure 2: Changes in stunting prevalence in urban/rural areas and ecological zones

Thus today, prevalence in the terai, has fallen below 40%, and prevalence in rural areas and the hills is only slightly above 40%. Data on the sub-regions is not yet available for 2011 but it is likely that the pattern 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 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. [data not shown]

Changes in wasting prevalence have been very inconsistent in contrast. Prevalence in urban areas although relatively low, is actually increasing overall; the rate in 2011 is 8.2% compared to 5.8% in 1996. In rural areas, where the majority of the population lives, it has zig-zagged up and down from a low of 9.7% in 2001 to a high in 2006 of 13.3%. In the ecological regions, it is highest overall in the terai and lowest in the hills but whereas wasting increased in the terai between 1996 and 2006 and has fallen since to a low of 11.2% in 2011, it has been increasing in the mountains and hills since 2001. [Figure 3] Overall, disparities across the different regions are decreasing and converging at around 10% and, positively, prevalence in the most populous areas, rural and the terai, has fallen significantly. However the rising trend in urban areas, the hills and the mountains is cause for concern.

\(^4\) WHO. Nutrition Landscape Information System (NLIS) Country Profile Indicators: Interpretation Guide. WHO 2010
Low birth weight is an important measure of undernutrition and is a significant problem in Nepal. Overall, the prevalence of low birth weight (LBW) in Nepal seems to be in the range of 15-30%. The DHS 2006 found that 17.2% of births were weighed and among children born in the five years before the survey with a reported birth weight, 14.3% were below 2.5kg, the World Health Organization (WHO) definition of low birth weight. This is unlikely to reflect the true situation however as so few babies are weighed at birth (because few births take place in health facilities) and 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 their babies were “very small” or “smaller than average” at birth. The National Plan of Action on Nutrition 2007 quoted 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 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 low birth weight 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 anaemic. Unfortunately, a dramatic decline in anaemia reduction seen between 2001 and 2006 has not been continued into 2011. How Nepal made these significant achievements and the implications of the slowdown in the reduction will be discussed below. Iron deficiency in young children can lead to losses of up to 25 IQ points.

http://www.childinfo.org/low_birthweight_profiles.php
Figure 4: Reductions in anaemia prevalence (1998-2011)


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 pre-school age children had night blindness and Bitot’s spots respectively. 16.6% and 32.3% of women and pre-school aged children respectively had sub-clinical vitamin A deficiency as measured by serum retinol rates <0.70 µmol/l. 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 1996. In contrast, the DHS 2006 reports that only 5.2% of women had night blindness in their last pregnancy. This suggests an improvement in vitamin A status in women. It is believed that vitamin A status of under 5 children has also improved due to a successful programme 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 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 of 100-199 µg/L. Iodine deficiency during pregnancy leads to an average of 13 IQ points in children.

Unfortunately, no national data is available on zinc or folic acid deficiency. A small study in Bhaktapur in 2000 found high levels of zinc deficiency in otherwise healthy women. The deficiency was associated with intake of phytate but not with dietary zinc implying that although women may consume zinc through their foods, high levels of phytate in the food, which bind zinc, were causing the zinc to be unavailable and so contributing to deficiency. Zinc deficiency often co-exists with iron deficiency.

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6 WHO. Nutrition Landscape Information System (NLIS) Country Profile Indicators: Interpretation Guide. 2010
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 of the causes of maternal and child undernutrition, developed by UNICEF in the 1990s, has been largely accepted as the best way to understand the different causes and different levels of causality of undernutrition. [Figure 5] 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, inadequate care practices (such as feeding) and inadequate 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 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.

Figure 5: Conceptual framework for analysing the causes of malnutrition

In trying to determine the causes of malnutrition in a given context, and therefore where in the hierarchy to intervene, it is necessary to follow a decision tree, such as the example given in Annex 1, which systematically considers each ‘requirement’ for nutrition. It is important to recognize however that whereas many of the basic causes may be important causes of undernutrition, their impact is mediated by the more proximate causes and reducing poverty, for example, will not automatically improve nutrition if causes higher up the hierarchy are not also addressed. Along the same lines, it has also been shown that it is possible to improve nutrition, at least in the short term, even without
significant improvements in all the basic causes. For example improving access to health services and improving care behaviours can improve nutrition even before poverty is reduced.\textsuperscript{10}

There is also a generational causality of undernutrition that is not well-reflected in the UNICEF causality framework. Small adult women are more likely to have low birth weight babies, in part because maternal size has an important influence on birth weight. Children born with low birth weight are more likely to have growth failure during childhood. Thus, in turn, girls born with a low birth weight are more likely to become small adult women. This cycle is accentuated by high rates of teenage pregnancy, as adolescent girls are even more likely to have low birth weight babies. The way of breaking the cycle is to improve the distribution of birth weights so that mean birth weight is increased.\textsuperscript{11}

**Figure 6: Intergenerational cycle of growth failure**

![Figure 6: Intergenerational cycle of growth failure](image)

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.\textsuperscript{12} 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.\textsuperscript{13} For these reasons birth weight is a strong predictor of height in early childhood.\textsuperscript{14} Dewey and Huffman use the following illustration. [Figure 7] In Malawian children, by 2

\textsuperscript{10} Headey and Chiu. Nutrition sensitive economic growth. IFPRI 2011
\textsuperscript{11} SCN. 6\textsuperscript{th} report on the world nutrition situation: Chapter 3 – Maternal nutrition and the intergenerational cycle of growth failure. United Nations System, Standing Committee on Nutrition, Geneva. 2010
\textsuperscript{13} 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)
years of age there is already a 9 cm difference in height from the WHO standards; an additional centimeter of difference develops between 2-3 years of age. 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 6 months of age, the infants are already 4 cm below the WHO standard; half of the deficit is attributable to low birth length and half to growth faltering after birth. In Cambodian children, the total deficit by 24-35 months of age is much less — 6 cm compared to 10 cm in Malawian children. Moreover, there is no deficit at birth and only a loss of 1 cm by 6 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 Malawi therefore, interventions that target only young children, will have a limited effect; equal emphasis is needed on pre-natal cause of growth faltering, ie maternal nutrition and preventing teenage pregnancies. 

The Causes of Maternal and Child Undernutrition in Nepal
The following section discusses in brief the potential causes of maternal and child undernutrition in Nepal using the UNICEF conceptual framework and the intergenerational cycle of growth monitoring.

In Nepal, as in many other countries, stunting prevalence is closely correlated with maternal education. Children of mothers with no education are more likely to be stunted than children of mothers who have achieved their School Leaving Certificate (SLC) or higher. As shown in Figure 8 however the extent of this correlation has varied over time; in 2006 children of mothers with no education were 3.7 times more likely to be stunted than those whose mothers had SLC or higher whereas in 2011 this difference has fallen to 1.9 times. The reduction in disparities has occurred as the prevalence of stunting in children of mothers with ‘no’ and ‘only primary’ education has declined. The pattern also exists for

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15 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)
wasting [data not shown] although, for some reason in Nepal, there is a higher prevalence of wasting in children of mothers with the highest level of education. Overall, looking at both stunting and wasting, women with higher education in Nepal appear to have a disproportionate amount 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. 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. (The 2001 rate was actually higher than the 1996 rate of 67.3%). Although the correlation between maternal education and poor child and maternal nutrition is certainly confounded by socioeconomic status – 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. For example, the prevalence of stunting in Brazil fell from 37.1% in 1974/5 to 7.1% in 2006/7, a decline of more than 80%. Two thirds of the decline have been attributed to improvements in four factors: maternal schooling, family purchasing power, maternal and child health care and coverage of water supply and sanitation services.

![Figure 8: Trends in child stunting prevalence by mothers’ education](image)

Nepal has been relatively more successful in reducing poverty; in the period 1995-96 to 2010 Nepal poverty headcount ratio (PHCR) reduced from 41.8% to 25.2%. Not surprisingly, wealth quintile of the household 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. [Figure 9]. This data is from the DHS 2006 because child and maternal nutrition rates by economic quintile for 2011 were not available at the time of writing this report.

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16 DHS 1996 (Table 2.4.2), DHS 2006 (Table 3.2.1) and DHS 2011 Preliminary Report (Table 2)
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). 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 which often makes it hard to tease out the extent to which poor household food availability and access is contributing to undernutrition compared to the other very important causes of health and care. Plus 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 not sufficient to meet national needs. Information from the Department of Agriculture indicates that since 2006 Nepal has been in a food deficit state nationally, on the basis of local production, and that 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 report that 44 districts were marginally to severely food deficit in the period 2007-2009. As shown in Figure 10, the main problem is therefore that the Terai, traditionally the bread basket of Nepal, has had declining production vis-à-vis requirements since 2004. It should be noted however that Figure 10 also shows that production has significantly improved since 2008 and Nepal is no longer in food deficit.

19 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.
Reasons for the insufficient domestic production include the small proportion (16%) of total land under agriculture and low yields per hectare\textsuperscript{21}, which are the result of insufficient inputs (irrigation, improved seeds, fertilizer, pesticides and mechanization), preponderance of small landholdings and value chain

\textsuperscript{21} Production and yield have fallen or remain 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.
complexities. In addition, the share of public investment in agriculture and infrastructure has been showing a declining trend. The shortfall in domestic production has therefore been offset by an increase in food imports, primarily from India. As a result, in terms of absolute availability, Nepal actually compares favourably to other South Asian countries; per capita cereal availability (kg/capita/year) is second only to Bangladesh amongst the five South Asian countries and per capita fruits and vegetables availability is highest and milk is second highest. Figure 12

By all accounts, a significant proportion of the Nepali population have problems with food access as a result 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 poverty is 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 therefore inextricably linked and nutritional status is significantly lower for the poor than the rich, and for rural populations. Overall therefore, it appears that absolute food availability is not always a primary cause of undernutrition, especially in young children, in consideration of the small amounts that they eat.

Figure 12: Per capita availability of foods in South Asian countries (kg/capita/year)


For example, lack of transport infrastructure limits access to markets while food trade across the open border with India may impact 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, for the marketing system to exploit this potential 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


It is beyond the scope of this paper to present a full analysis of food security, in particular food availability and access. For more detailed analysis, refer to International Food Policy Research Institute. Ensuring Food and Nutritional Security in Nepal: A
Although data is very limited, some amount of child, and certainly maternal nutrition, is likely to be due to cultural practices around intra-household food utilization. In patriarchal societies it is common for women to eat last and to give the highest quality food to the men. If there is a food shortage, women are more likely to go without. Meanwhile, in developing countries it is common to feed children, even young children, from the family pot. Hence it is hard to know exactly how much children are eating and special foods for young children may not be prepared. A annotated bibliography of *Food Utilization Practices, Beliefs and Taboos in Nepal* found reference to all of 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, skilled delivery and postnatal care are still relatively low, they have been increasing significantly, in particular between 2006 and 2011. Coverage of child immunization is near universal. Treatment of child illness, as demonstrated by treatment figures for ARI, has also been improving although it 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.  

More Nepalese have a healthier living environment in 2006 than they did in 2001; access to an improved water source has 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

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*Adhikari RK. Food Utilization Practices, Beliefs and Taboos in Nepal: annotated bibliography. USAID. May 2010*

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 electricity, toilet facilities and floor material there is also a large difference between rural and urban areas, for example 72.1% of urban residents have water on their premises compared to 44.4% of rural people and only 42.2% of rural people have electricity compared to 89.7% of urban dwellers. Only access to improved water is similar in both urban (90%) and rural (81.1%).

The incidence of disease is another important cause of undernutrition. The percentage of children under 5 with ARI, fever or diarrhea in the two weeks prior to data collection on the DHS 2006 was 5.3%, 16.9% and 11.9% respectively. This compares favourably to 22.8%, 32% and 20.4% respectively in 2001. However 2011 data suggest small increases in the incidence of fever and diarrhoea to 19% and 14% respectively, and no change in ARI (5%). Thus although incidence of common childhood illnesses, that 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{27}, shown in the table below, indicate the following:

- Overall care of women improved between 2001 and 2006 and appears to have 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 report being able to access contraception and the majority also reportedly eat vitamin A rich foods. Consumption of iron rich foods remains low however. It is also true to say that 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, remains inadequate and improvements in care practices are very limited. Although many more children are given extra liquids during diarrhoea, only about 1 in 10 are getting extra food and use of ORT fell rather than increased between 2001 and 2006 although there was a small improvement between 2006 and 2011.

- Hygiene care practices are also inadequate. More caregivers correctly disposed of child faeces in 2006 compared to 2001 but still, only half do so. 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, it should be noted that 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 6 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 still remain very low.

\[\begin{array}{|c|c|c|c|c|}
\hline
\text{Indicator} & \text{DHS 2001} & \text{DHS 2006} & \% & \text{DHS 2011} \\
\hline
\text{At the time of the report, only the Preliminary Report for DHS 2011 was available; hence 2011 data for many of the indicators was not available.}\n\end{array}\]
### Care of women

<table>
<thead>
<tr>
<th></th>
<th>(%)</th>
<th>(%)</th>
<th>improvement (%)</th>
<th>(%)</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>95%</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>-</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 using tobacco</td>
<td>-</td>
<td>19.6</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Care of sick children

<table>
<thead>
<tr>
<th></th>
<th>(%)</th>
<th>(%)</th>
<th>improvement (%)</th>
<th>(%)</th>
<th>improvement (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of oral rehydration therapy</td>
<td>46.5</td>
<td>40.7</td>
<td>-12%</td>
<td>44.9</td>
<td>10%</td>
</tr>
<tr>
<td>Additional liquids during diarrhoea</td>
<td>26.6</td>
<td>36.9</td>
<td>39%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Additional foods during diarrhoea</td>
<td>6.6</td>
<td>12.4</td>
<td>88%</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Hygiene practices

<table>
<thead>
<tr>
<th></th>
<th>(%)</th>
<th>(%)</th>
<th>improvement (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe disposal of child faeces</td>
<td>17.5</td>
<td>26</td>
<td>49%</td>
</tr>
<tr>
<td>Hand washing with soap (women)</td>
<td>-</td>
<td>64.1</td>
<td>-</td>
</tr>
</tbody>
</table>

### Infant feeding

<table>
<thead>
<tr>
<th></th>
<th>(%)</th>
<th>(%)</th>
<th>improvement (%)</th>
<th>(%)</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>

### Colour code: improvement

| (%) | 50% | 25-50% | <25% | <0% |

Overall, the above snapshot of selected care practices for women and children suggests 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.

Referring to the intergenerational cycle of growth failure, Nepal has a high prevalence of maternal malnutrition – 24.4% of women had a low BMI (<18.5) in 2006. This level of maternal undernutrition is categorized as a “high prevalence” and a “serious situation” by WHO. Nepal also had a high rate of

28 WHO. Nutrition Landscape Information System (NLIS) Country Profile Indicators: Interpretation Guide. WHO 2010
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 adolescent pregnancies and undernutrition in Nepali adolescent girls. Unfortunately data on low birth weight is lacking but 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.

29 DHS 2006. Table 11.1
II. Improving Nutrition in Nepal: a review of the evidence for essential interventions in the health sector

As discussed in the previous section, despite significant improvements in several aspects of child and maternal nutrition, overall nutritional status of Nepal women and children remains poor and continued and additional efforts are needed to maintain and accelerate improvements. The objective of this review is therefore to identify effective and feasible interventions within the health sector that will address 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 for review on the basis of the conceptual framework presented earlier and focused on ‘short-route’ interventions and those for which there were controlled trials although they also considered non-randomised 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 these countries. The review of interventions identified 14 interventions for which they felt there was enough evidence for implementation in all 36 countries and an additional 11 interventions which should be implemented in specific situational contexts, eg. areas of food insecurity or high malaria burden. The 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, these interventions would 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.
A major message of the LNS was that, while nutrition is complex and multi-faceted, 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’, ‘not doing the wrong things’, acting at scale and reaching those in need. Cross-cutting all of these was a 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 efforts on nutrition and one outcome was the formation of a ‘movement’ called Scaling Up Nutrition (SUN) which is enhancing coordination on nutrition and has developed a Framework for Action and a Roadmap for Scaling up Nutrition. Under the auspices of SUN, the World Bank funded a costing of the package of essential interventions. Taking into consideration new evidence on some key interventions and feasibility of implementation, the list of essential interventions of the LNS was slightly adapted, to provide, essentially, an ‘updated’ list of essential interventions. The updated ‘SUN list’ includes two new interventions and excludes several for reasons noted in the second table.

<table>
<thead>
<tr>
<th>SUN Interventions</th>
<th>LNS Interventions</th>
<th>Reason for deviation from Lancet (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behaviour 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 diarrhoea</td>
<td>Yes – zinc in management of diarrhoea 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 anaemia</td>
</tr>
<tr>
<td>Deworming</td>
<td>Yes (pregnancy and young children) SPECIFIC CONTEXTS</td>
<td></td>
</tr>
</tbody>
</table>

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Iron and folic acid supplements for pregnant women: Yes CORE

Iron fortification of staple foods: Yes – iron fortification and supplementation SPECIFIC CONTEXTS. Given the high prevalence of iron deficiency anaemia and low costs of iron fortification, a wider application is justified.

Salt iodization: Yes CORE

Iodized oil capsules: Yes – maternal iodine supplements SPECIFIC CONTEXTS.

**Complementary and therapeutic feeding interventions**

Prevention or treatment of moderately malnourished children 6-23 months using complementary foods: No – except that “additional food supplements in food-insecure areas” was included in the complementary feeding intervention. Added based on recent research and humanitarian imperative.

Treatment of severe acute malnutrition using a community based approach: Yes (community based approach was not specified) CORE. Community management of treatment added on the basis of new evidence.

The following interventions from the LNS were not included in the SUN list for the following reasons. However, the assumption was that several of them would be implemented through other programmes such as malaria or safe motherhood programmes.

| Effective Nutrition Interventions not Costed by the Scaling Up Nutrition Analysis |
|-----------------------------------------------|---------------------------------|
| **LNS Interventions** | **Reason not included in SUN** |
| Maternal supplements of multiple micronutrients CORE | Iron folate included as the maternal supplement intervention and because no costs available for MMS. |
| Maternal calcium supplementation CORE | No programmatic guidelines available; no WHO guidelines, no clear delivery mechanisms/platforms, compliance or cost information. |
| Interventions to reduce tobacco consumption or indoor air pollution CORE | Assume costs included in tobacco and climate change programmes. |
| Maternal supplements of balanced energy and protein SPECIFIC CONTEXTS | No programme guidelines available; no clear indication of targeting, quantity, nature of supplements; hence no cost estimates feasible for now. Will follow in later iterations. |
| Intermittent preventative treatment of malaria SPECIFIC CONTEXTS | Assume costs included in malaria programmes. |
| Insecticide-treated bednets (women and children) SPECIFIC CONTEXTS | Assume costs included in malaria programmes. |
| Neonatal vitamin A supplementation SPECIFIC CONTEXTS | WHO reviewing programmatic guidance. |
| Delayed cord clamping CORE | Assume costs included in maternal health programmes for safe delivery. |
| Zinc supplementation (preventative) CORE | 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

<table>
<thead>
<tr>
<th>Conditional cash transfer programmes (with nutrition education)</th>
<th>Costs of supply side included; cost of cash transfers per se not included</th>
</tr>
</thead>
</table>

The SUN interventions that would be implemented through the health sector, are reviewed below, taking into account Nepal’s experience, if any, their applicability and feasibility in Nepal and any new global experience on their effectiveness or implementation guidance. In addition, interventions that are currently being implemented in Nepal, that are endorsed by either the LNS or SUN list, are reviewed below.

Promotion of breastfeeding and behaviour change communication for improved complementary feeding

**Nepal experience:** Data from the DHS 2006 and 2011 indicates that IYCF practices in Nepal are fairly poor, and for some indicators, are deteriorating. Only a third of Nepal newborns were breastfed within an hour of birth in 2006 yet this practice could prevent 22% of neonatal deaths, which made up 54% of all under 5 deaths in 2006 and 61% of child deaths in 2011. In 2006, only 53% of children under 6 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 2 months, only 88% of infants were exclusively breastfed. Importantly however, exclusive breastfeeding increased significantly between 2006 and 2011 such that 69.6% of children 0-5 months exclusively breastfeed currently. The increase was mainly in children 2-5 months as the rate for children 0-1 in 2011 is essentially the same as that of children <2 months in 2006 [data not shown]. As noted above however, this improvement essentially brings Nepal back to the same situation as occurred in 2001 with regards to exclusive breastfeeding. 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 6 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 has 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. 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.

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36 DHS 2006. Figure 8.1
37 DHS 2011 Preliminary Report. Figure 4
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.\(^{38}\)

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 programme of the National Nutrition Policy and Strategy 2004 and a policy on IYCF has been developed. A National Strategy on Infant and Young Child Feeding was drafted in 2004 but it has not been finalized. A community based IYCF promotion package has been developed by UNICEF as part of a pilot to distribute multiple micronutrient powders (MNPs) together with IYCF counseling. The package, the core of which is a flip chart for the counseling of caregivers by health workers, in particular female community health volunteers (FCHVs), has been adopted by the government and is being rolled out in 45 districts. Adaptations of the same package are also being used by other agencies and NGOs within their programmes and for the IYCF counseling component in the community based management of acute malnutrition (CMAM) programme and in a child grant programme. Helen Keller International (HKI) has developed a training manual for FCHVs which involves a five-day training on essential nutrition actions, including IYCF, and behaviour change communication. The training approach is based on the principles of Behaviour Change Communication of small doable actions, and the widely acknowledged theory that adults learn best by reflecting on their experience.\(^{39}\) HKI has also developed its own flipchart. These materials are being used within HKI’s Action Against Malnutrition through Agriculture

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(AAMA) Project which is being implemented in two districts and aims to increase household food production (to increase access to micronutrient-rich foods) and behaviour change communication around essential nutrition actions. WHO has provided training to health workers on IYCF and mass media campaigns, including television and radio spots and chat shows, have been implemented, for example, on World Breastfeeding Week.

The UNICEF-developed IYCF flip chart, which forms the ‘cornerstone’ of several IYCF efforts in Nepal, is very focused on complementary feeding practices. This is because it was originally developed as the IYCF counseling component of a pilot to distribute MNPs. It was designed for use with caregivers who are starting to think about complementary feeding or whose children are already complementary feeding. 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 on what complementary foods to feed as 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 it is not currently functioning. It has also been noted that 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, in particular FCHVs, for counseling of caregivers during Mothers Groups, as community level health workers are considered to have the best access to caregivers and time for counseling and group discussions. Up to this point however there has been no evaluation on the effectiveness of this strategy and none of the programmes in which the community based package is being used have completed planned evaluations which will include assessment of changes in IYCF behaviour. It is not yet known if FCHVs are equally as skilled at counseling and promoting behaviour change, as they are at delivering specific interventions and commodities.

In contrast to the national situation, the Nepal Family Health Programme (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 significantly more children 6-23 months receive 3 or more food groups. However, contrary to the national situation since 2006, the prevalence of exclusive breastfeeding has fallen. HKI has also recorded some increase in willingness to feed eggs to young children in one of their AAMA project areas.

**Global experience:** The analysis of 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 for which an impact on either breastfeeding or complementary feeding have been shown 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). Breastfeeding and complementary feeding counseling that included individual or group counseling was effective at increasing rates of correct feeding and they 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

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40 A national Technical Committee on Nutrition is now (June 2011) now being re-established under the MOHP
41 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.
Nutrition Series, “feeding interventions (promotion of complementary feeding with supportive strategies)” is estimated to lead to the largest relative reduction in stunting by far. [Figure 15]

Figure 15: Effect of nutrition-related interventions on mortality and stunting at 12 months in 36 countries

Ref: Adapted from Table 13 of Bhutta et al. What works? Interventions for maternal and child undernutrition and survival.
* “Feeding interventions” include promotion of complementary feeding with supportive strategies.

Improving IYCF practices has long been recognized as a very important intervention for addressing undernutrition. A Global Strategy for Infant and Young Child Feeding was developed by UNICEF and WHO in 2003 and multiple materials and programmes have been produced to support implementation of the Global Strategy. New Programme Guidance on IYCF from UNICEF reports that between 1995 and 2008, the global rate of exclusive breastfeeding (EBF) has increased from 33 to 38%. Although this improvement is small, in countries which 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, Cambodia by 54 points and Sri Lanka by 59 points. 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 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 had received any complementary foods in the previous day.

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42 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 “behaviour change communication for improved complementary feeding, with additional food supplements in food-insecure populations”

43 In fact preliminary data from DHS 2010 indicates that EBF rates have increased even further to 73.5% which would mean an increase of 61.4 percentage points in ten years.


45 The new indicator for “introduction of complementary foods” includes the age group 6-8 months and breastfeed and non-breastfed children, as compared to the old indicator which included 6-9 months and only breastfed children.

The UNICEF Programming Guide provides a summary of evidence of effective interventions with full references.\textsuperscript{47} 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.

For improving complementary feeding, interventions of note 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 provision of complementary food was the most effective at improving linear growth. Increasing the energy density of complementary food and providing education about complementary feeding were also effective. The potential impact of providing complementary food may depend upon the food security situation and this intervention was more effective in Asia and Africa.

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\textsuperscript{47} UNICEF. Programming Guide: Infant and Young Child Feeding. Nutrition Section, Programmes, UNICEF New York, May 2011. (Section 1.5)
Provision of a food may also enhance the ability of caregivers to implement the education component of the intervention. Education interventions appeared to be most effective when they emphasized the addition of nutrient-rich animal-source foods, increased the energy density of complementary foods and targeted younger children.48

**Hand washing and hygiene counseling**

Although not necessarily a ‘health sector’ intervention, hand washing and hygiene counseling is reviewed here because it is in the LNS list of effective interventions and because occasions for counseling on IYCF can often be used for counseling on hand washing and hygiene.

**Nepal experience:** Overall it appears likely that behaviour change communication for hand washing and hygiene interventions, at least in health sector programmes, has been neglected. 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 behaviours, no data exists on whether the counseling so far provided has been successful in increasing hand washing or other hygiene behaviours. 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 2006.49 Nationally, the DHS 2006 records that 64.1% of women used soap for hand washing in the 24 hours prior to the survey.50

**Global experience:** The Lancet analysis included “hand washing or hygiene interventions” in the list of ‘core’ interventions. These interventions fall under the ‘disease prevention strategies’ category 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 diarrhoea.51 A systematic review and meta analysis of these interventions found that they all have similar impacts on diarrhoea with the relative risk estimates from the overall meta-analysis ranging from 0.63-0.75.51 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 0.58.53 A Cochrane review found the same - 32% reduction in diarrhoea episodes in children living in communities in low- or middle-income countries and relative risk of 0.68. The Cochrane review points out that this simple intervention has a comparable effect on diarrhoea to providing clean water in low-income areas.54 A study by Luby et al. in Pakistan gave intervention neighbourhoods plain or antibacterial soap and hand washing promotion through weekly home visits for one year. Children under 5 in intervention households had 50% lower incidence of pneumonia than controls and children less than 15 years old had 53% lower incidence of diarrhoea.55 Especially when implemented as part of a package of IYCF counseling, hygiene and hand washing counseling would have

49 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.
50 DHS 2006 Table 3.11
52 Fewtrell et al. Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. Lancet Infec Dis 2005; 5:42-52
55 Luby et al. Effect of hand washing on child health: a randomized controlled trial. Lancet 2005
a very high benefit cost ratio. Indeed, the World Bank costing exercise attributed no cost to this intervention as it was assumed to be included in the ‘community nutrition programme’.

As noted above, this intervention was included in the Lancet list because of its impact on stunting through reductions in diarrhoea. A pooled analysis of nine global studies with data on diarrhoea and growth, found that the probability of stunting at 24 months of age increased by 2.5% per episode of diarrhoea, and 25% of all stunting in 24 month old children was attributable to having five or more episodes of diarrhoea in the first 2 years of life.\textsuperscript{56} In Nepal, 12% of children had diarrhoea in the two weeks preceding the DHS 2006 survey and 14% in the 2011 survey. Diarrhoea remains the second leading cause of post-natal death, after pneumonia. It thus seems likely that diarrhoea is contributing to the high stunting levels in Nepal and interventions to further reduce diarrhoea 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 post partum 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{57} to test delivery options under permissive policies of the MOHP.

The Nepal **vitamin A supplementation (VAS) programme for young children** is held up as a global success story. It started in 1993 in 8 districts following a meeting in Kathmandu that considered three major research projects in Nepal in the late 1980s which all concluded that periodic dosing of children 6-60 months with high dose vitamin A resulted in significant reductions in child mortality\textsuperscript{58}. By the end of 1997 the programme was being implemented 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. An NGO, the National Technical Assistance Group (NTAG) was created, and initially completely funded by USAID, to support the programme by providing training to the FCHVs and conducting Mini Surveys after each distribution to verify coverage. The unique way in which NTAG trained and supported the FCHVs is

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\textsuperscript{56} Checkley et al. Multi-country analysis of the effects of diarrhoea on childhood stunting. Int J of Epid 2008; 37:816-830

\textsuperscript{57} 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.

considered a key reason for the success of the programme. Donors also provided all the capsules. The Mini Surveys, now called Micronutrient Surveys, undertaken by NTAG each year, have consistently recorded coverage to be about 90% and above and since 2007 it has been 98%.[Figure 17]

**Figure 17: Vitamin A and Deworming Coverage**

DHS 2006 data also supports these results; 87.5% of children received a vitamin A supplement in the six months preceding data collection. In 2000 the programme was calculated to be saving the lives of about 4,200 children under the age of five (at that time the programme was only covering 32 districts) and it was estimated that in the long term the programme would save about 7,500 lives per year. Cost per life averted was estimated at $345. DHS indicates that Nepal’s under 5 mortality rate declined from 118 in 1996, three years after the vitamin A programme started, to 61 in 2006 by which time the programme had been fully implemented for four years. Thapa et al. used 2001 DHS data to assess the effect of Nepal’s VAS programme 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 and the authors attributed this to additional health-related activities undertaken by the FCHVs as part of the vitamin A distribution activity (eg. nutrition education, contraceptive distribution, oral rehydration solution distribution). Another analysis on Nepal’s VAS programme concluded that “universal supplementation with vitamin A narrowed differentials in child death across gender and caste in rural Nepal”. Specifically they found that excess child mortality in girls compared to boys was almost completely attenuated and that VAS also narrowed mortality differentials among Hindu castes. There was no impact on different mortality across quintiles of asset ownership.

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60 Ibid
Deworming for children 12-59 months was ‘piggy-backed’ onto the vitamin A programme starting in 2000 and high coverage, matching - though slightly lower - than vitamin A capsule coverage, was achieved by 2002. [Figure 17] A deworming impact study, undertaken in 4 districts in 2003, recorded a 77% reduction in under 5 anaemia from a baseline of 47%, attributable to the deworming.63 [Figure 18] The Nepal Micronutrient Status Survey in 1998 and the DHS 2006 also record a reduction in under 5 anaemia during this period; nationally anaemia fell from 78% in 1998 to 48% in 2006. The deworming programme which was already nationally implemented and achieving high coverage from 2002 has been credited with this achievement. Anaemia levels in under five children have not declined further since 2006 however and it is possible that the full effect of deworming has already been achieved in Nepal. [Sub chart in Figure 18 and Figure 4] 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 have also been positive ‘side effects’ of the vitamin A programme. The VAS programme energized the FCHV programme by providing tangible interventions that had not existed since its establishment in 1988. The success of the programme 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’.64

The post partum VAS programme has been operating since 1995. The supplement is intended to be distributed by health workers during post natal 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 post partum dose is well below that for under 5 children. Overall, data from these three sources support each other and indicate that about 50-60% of post partum women receive the supplement, indicating there is significant room for improvement. [Figure 19] The data also indicate that coverage improved between October 2006 and

63 WHO and UNICEF. How to add deworming to vitamin A distribution. Chapter 3: Country Experiences. WHO, Geneva 2004
64 Houston et al. The Nepal Vitamin A Program: a strategic program review. Draft December 2007
November 2007, apparently as a result of the Intensification of Maternal and Neonatal Micronutrient Programme (IMNMP) which will be described in more detail below. The programme included the strengthening of a mechanism for delivering post partum vitamin A through FCHVs (ie community based distribution rather than facility based through postnatal checkups) and additional education of post partum 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 programme 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) programme is not yet operating (30%).

**Figure 19: Coverage with post partum vitamin A**

![Coverage with post partum vitamin A](image)

Although treatment for measles, xerophthalmia, prolonged diarrhea and severe malnutrition in young children with vitamin A is national policy and health workers have been trained on this intervention and are generally aware of it, it is unclear to what extent it is happening. Recording of doses is incomplete and there may be issues of forecasting and supplies of capsules.

Nepal’s prevalence of night blindness during pregnancy is estimated as 5.2% (of women with children below 5). A prevalence of greater than 5% is classified as moderate by WHO. 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 capsules for 4 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 and FCHVs were oriented to refer nightblind women for treatment. A study at the end of one year of implementation found that 10% of women were nightblind and 35% of

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66 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.
67 WHO. Nutrition Landscape Information System Country Profile Indicators: Interpretation Guide. 2010. NB. There is no higher category.
nightblind women were taking the capsules. All demonstrated good compliance. Efficacy was very high – 90% of women who completed four doses of treatment were cured.\(^{68}\) The low coverage was attributed to low awareness of the importance and availability of the treatment. It would also have been compounded by the low ANC coverage in Nepal – only 9.4% of women have four or more visits according to DHS 2006. The intervention is not currently being implemented.

On the back of studies in Indonesia\(^{69}\), India\(^{70}\) and Bangladesh\(^{71}\) which recorded reductions in infant mortality of 64%, 22% and 15% respectively, Nepal started a pilot study in mid 2009 of vitamin A supplementation of newborns (ie within the first 48 hours after birth) in four districts with the objective of identifying an optimal delivery mechanism – FCHV dosing and mother dosing. An evaluation of the pilot is underway and the results are expected in mid 2011. Recognizing that 77% of under five deaths in Nepal currently occur in the first year of life, there is significant interest among some MOHP officers and some donors in scaling up this intervention as soon as the evaluation of the pilot has been completed.

A detailed review of the Nepal vitamin A programme was undertaken in 2007.\(^{72}\) Based on the review and partner discussions, a five year workplan 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 (eg. central mountains, far-western hills and western terai) of the under 5 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 post partum women
- ‘Unknown’ coverage of vitamin A for clinical treatment of child illness
- Incomplete ownership of the under 5 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 5 VAS coverage – Micronutrient (Mini) Surveys by NTAG, often with donor funding

\(^{68}\) NTAG. Treatment of night blindness during pregnancy with low dose (25,000 IU) vitamin A capsules. Project Report. April 2006. Nepal Family Health Program
\(^{70}\) Rahmathullah et al. Impact of supplementing newborn infants with vitamin A on early infant mortality: community based randomized trial in southern India. BMJ 2003
\(^{71}\) Klemm et al. Newborn vitamin A supplementation reduced infant mortality in rural Bangladesh. Pediatrics 2008
\(^{72}\) Houston et al. The Nepal Vitamin A Program: a strategic program review. Draft December 2007
In order to address these issues, the draft strategy and workplan 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 5 VAS programme.</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 programme.</td>
</tr>
<tr>
<td>Phased in purchase of the vitamin A capsules and deworming tablets by the MOHP for the under 5 VAS programme.</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 re-packing 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 of 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 programme has started</td>
</tr>
<tr>
<td>Improve coverage of women post partum 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</td>
</tr>
</tbody>
</table>

73 Personal communication: Mr. Raj Kumar Pokharel, Nutrition Unit, Child Health Division, Department of Family Health Services, Ministry of Health and Population, Nepal
Improve use of vitamin A in case treatment through improved coordination within the health system and printing of the case treatment protocol.

Global experience: In 1997, WHO issued recommendations that in countries with under 5 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.

Supplementation of young children, and neonates in Asia only, are included in the list of ‘core’ interventions by the Lancet. On the basis of Beaton’s analysis, supplementation of under 5 children was assumed to have no impact upon stunting but to reduce the risk of mortality by 12% for one dose and 22% for two doses. Since the Lancet analysis a Cochrane review has re-affirmed the impact of VAS on child mortality; the review found a 24% observed reduction in the risk of all-cause mortality. Diarrhoea mortality was reduced by 28% and VAS also reduced incidence of diarrhea and measles morbidity. No effect was found on mortality rates of measles, respiratory disease or meningitis or incidence of respiratory disease.

In 2004, Pedro et al. released analysis from the Philippines that indicated that VAS only 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 and 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 whereas Central American countries (eg. Nicaragua) where sugar and wheat flour have been fortified with vitamin A, have reached and maintained low serum retinol. Despite such arguments, in mid 2011, WHO released updated recommendations on vitamin A supplementation 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 to reduce 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.
child morbidity and mortality. The recommendations take into account the above-mentioned Cochrane review and an additional one in HIV positive people. It also takes into account safety considerations.

Vitamin A gelatin capsules cost about US$ 0.02 each\(^82\) 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.\(^83\)

Neonatal vitamin A supplementation in Asia was also included in the Lancet list of ‘core’ interventions. It was assumed to reduce infant mortality by 21% between 2 days and 6 months\(^84\) on the basis of the same studies that influenced Nepal to start its pilot. In mid 2011 however, WHO released a “strong recommendation” NOT to undertake neonatal vitamin A supplementation to reduce infant mortality and morbidity because of contradictory results between available studies.\(^85\) The recommendation reviewed three trials conducted in Indonesia\(^86\), India\(^87\) and Bangladesh\(^88\) which showed a reduction in mortality during infancy and four other trials conducted in Nepal\(^89\), Zimbabwe\(^90\) and Guinea-Bissau\(^91,92\) 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\(^93,94,95\) which found no statistically significant reduction in infant mortality and some have reported some transient side effects, in particular bulging fontanelle which is benign and not associated with acute or long-term neuro-developmental effects.\(^96,97\) In making the recommendation, “high value was place on avoidance of harm, given the uncertainty of the evidence and the conflicting results of research studies, as well as costs and feasibility concerns. The recommendation notes that four randomized, double-blind, placebo-controlled trials that are currently on-going in Pakistan, India, Ghana and Tanzania to assess the feasibility of developing neonatal vitamin A supplements through health workers and to evaluate the

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\(^87\) Klemm RD et al. Newborn vitamin A supplementation reduced infant mortality in rural Bangladesh. Pediatrics. 2008, 122; e242-250


\(^92\) Kirkwood et al. Neonatal vitamin A supplementation and infant survival. Lancet 2010; 376: 1643-1644

\(^93\) Gogia S and Sachdev HS. Vitamin A supplementation for the prevention of morbidity and mortality infants six months of age or less. Cochrane Database of Systematic Reviews, 2011 (not yet published)

\(^94\) Haider BA and Bhutta ZA. Neonatal vitamin A supplementation for the prevention of mortality and morbidity in term neonates in developing countries. Cochrane Database of Systematic Reviews, 2011 (not yet published)


\(^96\) Humphrey JH and Ishord RN. Safety of vitamin A supplementation of postpartum women and young children. Food and Nutrition Bulletin 2001; 22:311-319
efficacy of neonatal vitamin A supplementation in improving child survival, “will provide further knowledge to help inform updates to this guideline in the future” and that “mothers should continue to be encouraged to exclusively breastfeed infants for the first six months to achieve optimal growth, development and health”.

In 2005, CIDA discontinued global provision of free capsules for post partum dosing on the basis that there was insufficient evidence that it impacted upon maternal or neonatal mortality. There are however proven impacts upon breastmilk 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, WHO has also issued new recommendations on post partum VAS. These indicate that post partum 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 post partum women. A 2007 UNICEF report indicates that two thirds of priority countries were implementing post partum vitamin A but only 12 were surpassing 50% coverage.

Low dose treatment of night blind women during pregnancy was recommended by WHO in 1998 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 recommendations on vitamin A. 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 anaemia. 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.” On the basis of 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 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

100 103 countries were considered high priority for vitamin A on the basis of under 5 mortality rates, vitamin A deficiency as a public health programme or history of programming.
102 WHO and MI. Safe vitamin A dosage during pregnancy and lactation; recommendations and report of a consultation. 1998
103 Van den Broek et al. Vitamin A supplementation during pregnancy Cochrane Database of Systematic Reviews 2002; 4. CD001996. DOI: 10.1002/14651858.CD001996
104 West et al. Effects of Vitamin A or Beta Carotene Supplementation on Pregnancy-Related Mortality and Infant Mortality in Rural Bangladesh: a Cluster Randomized Trial. JAMA 2011
where vitamin A deficiency is a severe public health problem\textsuperscript{106}, 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 were 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 anaemia. A systematic review by Dickson et al. found modest improvements in growth and inconclusive impacts on cognitive performance\textsuperscript{107} and another review on impacts on anaemia found a marginal increase in haemoglobin which could translate into a 5-10\% reduction in anaemia in populations with a relatively high prevalence of intestinal helminths. The majority of the studies examined were in pre-school 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 pre-school 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.\textsuperscript{108} Deworming has a benefit: cost ratio of 8:1 based on a cost of US\$0.25 per child per round per year (US\$0.5 per year).\textsuperscript{109} An increasing number of countries now have large scale programmes 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, WHO and UNICEF released a joint statement recommending changes in the clinical management of acute diarrhoea – 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) programme, 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” programme in three new districts (Sankhuwasabha, Gorkha and Bajura). The programme includes training of all health workers and FCHVs, strengthening of the government monitoring and reporting system, improved supply of zinc

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\textsuperscript{106} Vitamin A deficiency is considered a severe public health problem when serum or plasma retinol in pre-school age children is <0.70µmol/l in ≥20%. There is no cut-off available based on night blindness in pregnant women although a prevalence ≥5% is considered moderate. DHS 2006 indicates that in Nepal 5.2\% of women with children below 5 were nightblind.


\textsuperscript{109} Horton et al. Scaling Up Nutrition: What will it cost? World Bank 2010
supplements, introduction of ‘compliance cards’ and awareness raising through local radio channels. Private pharmacies were also oriented and encouraged to sell zinc supplements when approached for treatments of diarrhoea. An evaluation of this programme was undertaken of this programme in late 2010, about one year after the programme started. It indicates that overall the knowledge and awareness of mothers, FCHVs, health workers and pharmacists about the use of zinc to treat diarrhoea was better in intensified districts. In addition, a higher proportion of FCHVs, health workers and pharmacists reported providing zinc with ORS for diarrhoea 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 diarrhoeal episode. Although the difference was statistically significant, the coverage of zinc in diarrhoea 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 10 day course of zinc than mothers in non-intensified districts (38%). Overall the evaluation suggests that while the strategies implemented in the intensification programme have improved the situation slightly, more effort is still needed to achieve high coverage of treatment of diarrhoea cases with the full course of zinc and ORS.

Despite all the various efforts, available data on the use of zinc in diarrhoea treatment is not encouraging. HMIS data indicates that coverage in 2008/9 of ORS and zinc together was only 39.9%. This represented a small increase from 31.4% in the previous year and has taken place against a backdrop of falling coverage of ORS only; down from 88.5% in 2006/7 to 60% in 2008/9. [Figure 21]

Moreover, a USAID supported survey in 26 districts in 2008 found coverage to be only 15% and the Nepal Family Health Programme (NFHP II) Mid-term Evaluation in 40 districts in 2009 found coverage of

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only 7%. According to the DHS 2006, only 0.4% of children received zinc supplements - at the time it was only being implemented in 2 pilot districts. In the DHS 2011 Preliminary Report it was reported that 6.2% of children with diarrhoea in the two weeks preceding the data collection had been 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 programme was supposedly being implemented nationwide at the time of 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 diarrhoea, prefer to recommend antibiotics and anti-diarrhoeals 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 diarrhoea.111 This same analysis was used by the Lancet. The latest analysis (2009) corroborates these results; duration of both acute and persistent diarrhoea was reduced 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.112

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 overall is estimated to be low, due to the same kinds of problems as experienced in Nepal – overall low coverage of treatment of diarrhoea, 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 lipid, which prevents the micronutrients from oxidizing the food but dissolves in the stomach to enable absorption. Thus the colour 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 for addition 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 WHO, WFP and UNICEF.113 The sachet contents are sprinkled over complementary foods given to young children as a strategy to improve their micronutrient intake without requiring major behaviour change on the part of 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:** At the moment, three agencies are supporting the government with MNP implementation in Nepal—UNICEF, WFP and HKI. Overall, the objective of these pilots is to reduce anaemia 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 development of a local name for the MNS - “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 will test an FCHV delivery model in which 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 (ie one for every three days). They are identified as soon as possible after they turn 6 months and continue to receive the MNPs until they are two years old. This usually means they receive three distributions. The ‘health facility delivery model’ involves distribution of the MNPs and IYCF counseling by health workers and encouragement by FCHVs to 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 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. Numerous 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 six districts as follows: Palpa and Makwanpur – May 2010; Gorkha and Rasuwa – December 2010 and Rupandehi and Parsa – May 2011. A multi component supervision,

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114 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.
115 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.
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. External monitoring is carried out by government officials from the Child Health Division (CHD) and District Health Offices (DHOs). A 3-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. Anaemia 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 indicate 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 pilot study undertaken in 3 districts in 2009, WFP started distributing MNPs with food/cash for assets (F/CA) programmes in 17 districts in the mid and far west, considered as food insecure under their Protracted Relief and Recovery Operation (PRRO) with funds from 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 5 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 rounds of MNPs. All children 6-59 months are eligible for the MNPs and 90 sachets were distributed every three months (ie enough for 1/day). However, the dosage schedule changed in June 2011, to 90 sachets every 2 months (ie enough for 1 every 2 days). The social mobilizers who mobilize communities to participate in the food/cash for work programmes 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 established by MaxPro, the organization hired to support implementation of the programme, along the same lines as the UNICEF-supported pilot. The field supervisors visit caregivers in their homes within 3 months of MNP distribution to address...
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-March 2011 to function as a final evaluation. The results of the final evaluation are compared with baseline data collected from 6 districts. The endline assessed reductions in anaemia, improvements in growth and changes in IYCF behaviours.

The schedule for compliance and impact surveys in the WFP-supported implementation is shown 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></td>
<td>June-Sept 2009</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doti, Dadheldura, Darchula, Rolpa, Bajura, Udhayapur, Sindhuli, Kailali</td>
<td>March-May 2010</td>
<td>June-August 2010</td>
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</tbody>
</table>

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 programme with children under 5 have received MNPs. A key result from the three and six months compliance surveys is that the compliance\textsuperscript{117} is quite high in all districts and in most districts improved from the first survey to the second. (WFP’s target is 60% of targeted children 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 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]

\textsuperscript{117} Field supervisors ask the caregivers about consumption of the MNPs and review the compliance card.

![Figure 22: Compliance with MNPs in WFP-supported programme districts](image-url)
The compliance surveys also show the following:\textsuperscript{118}

- 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 7 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 reported liked 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 and 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 diarrhoea, vomiting, 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{119} rose from 20\% to 29\%, mainly due to improved dietary diversity, rather than adequate meal frequency, which was already high.

Preliminary results of the final evaluation indicate the following:

- A significant reduction in anaemia levels were found between baseline and endline in the mountains but not the hills. Meanwhile a small, non-significant increase in anaemia prevalence was noted in the control area. The mountain areas had the highest baseline anaemia 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.

Overall therefore the results are highly encouraging, suggesting high coverage, high compliance and high acceptance by caregivers of MNPs. Anaemia fell from 51.6 to 38.4\% in the mountain intervention communities measured by the endline although there was no significant difference in the hill communities. The relatively limited impact may be related to fact that anaemia prevalence was comparatively low - between 30-40\% on the non-mountain areas. The compliance data points to some areas where information to the caregiver could be strengthened to further improve the programme. In 2011 for example, 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) programme in Baitadi.

\textsuperscript{118} 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 201 compliance, baseline and endline surveys.
\textsuperscript{119} Study Group (IYCF Guideline, 2008)
The AAMA programme 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 programme 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, ie the ‘value-added’ of MNPs. In the MNP arm, all children 6-23 months will receive 60 sachets every 6 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 which will include measurement of anaemia, anthropometry and infections, internal or process monitoring by 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 Anaemia among Women and Children in Nepal (2005/6 – 2009/10) and the MOHP has a 2009 Programme 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 given as 6-23 months in general and 6-59 months “under the nutrition emergency programme” in areas with “food insufficiency”. The Strategy also mentions distribution of MNPs for adolescents and reproductive age women and pregnant and lactating women. Plus it talks about development of a public-private partnership approach and social marketing in the long-terms to ensure sustainability. It does not mention any linkage with IYCF counseling.

The design of the programmes 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 programmes are similar - based upon the community-based IYCF package that was prepared by UNICEF for the MNP pilots. The UNICEF programme is comparing two delivery models. As expected, initial coverage results indicate that the FCHV model is more effective. This is in line with expectations as FCHVs have already 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 programmes the principal method for ‘maintenance’ between distributions is FCHVs. Also all programmes start distribution at the first contact after the target child has turned 6 months; distribution is then repeated six months later. Therefore none of the programmes 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 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 3

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120 ENA include maternal nutrition, early initiation of breastfeeding, exclusive breastfeeding for 6 months, introduction of appropriate complementary foods at 6 months, continued breastfeeding through 2 years or beyond, nutritional care for the sick child, control of anaemia and intake of key micronutrients, especially iodine.

121 Full name: Multiple micronutrient vitamin and mineral and mineral mix powders supplementation and the community-based infant and child nutrition promotion programme strategy 2066 (2009).
distributions of sachets, a total of 180 sachets, during the period when he is 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 2 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 anaemia 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 anaemia and haemoglobin concentrations.\(^\text{122}\)

In addition, the evidence base of impact from large scale programmes is beginning to grow. A long-standing, large scale programme 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 programme recorded a decline in anaemia in children 6-59 months from 46% to 25% and also a reduction in stunting.\(^\text{123}\) On the back of these results, the government has decided to distribute MNPs nationwide starting at the beginning of 2010. Another large scale programme in one province in Kyrgyzstan recorded a 21% reduction in anaemia in children 6-23 months after one year of use.\(^\text{124}\) Improved care and feeding practices were also reported. The positive results are causing the programme to be scaled up nationwide. The Ministry of Health reports that the programme is very cost-effective; three year programmes 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”.\(^\text{125}\)

These results contrast those of an evaluation of the impact of MNP distribution by WFP and UNHCR in Bhutanese refugee camps in Damak district in Nepal. Children 6-59 months were given MNPs from March 2008. A 24 month evaluation undertaken in May 2010 found no significant change in anaemia (prevalence was 43.3% in Jan 2007 and 40.2% in May 2010) despite high acceptance, coverage and compliance. The principal investigators hypothesize that improvements in anaemia were not seen because older children (25-59 months), at less risk of anaemia, were included or because the anaemia was due to non-nutritional causes. They do raise the possibility however that MNPs could have contributed to a 40% reduction in stunting during the same period.\(^\text{126}\) Further research was recommended to understand the results but this study is an outlier in an increasingly large body of evidence for the efficacy of MNPs.

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\(^{122}\) Vist et al. Home fortification of foods with multiple micronutrient powders for health and nutrition in children under two years. Cochrane Database of Systematic Reviews 2011 Art No. CD008959 DOI:10.1002/14651858. CD008959 (submitted)


\(^{124}\) Preliminary, unpublished results of US CDC evaluation.

\(^{125}\) Ministry of Health, Kyrgyzstan

\(^{126}\) Bilukha O. et al. Effects of multimicronutrient home fortification on anaemia and growth in Bhutanese refugee children. FNB 2011; vol 32, no.3:264-276
An informal ‘inventory’ was undertaken of MNP programmes in Asia in 2009. It indicated that some 32 projects were operating (or had recently been operating) in 14 countries. At the time most of them were sub-national or large scale and two were operating on a national basis. Some were pilots or studies. The trend is definitely towards increasing implementation of this intervention on a large scale. This trend is likely to be accelerated by the issuance for WHO guidelines on MNPs in September 2011.  

The recommendations “strongly” recommend MNPs containing at least iron, vitamin A and zinc to improve iron status and reduce anaemia 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 anaemia, haemoglobin 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 programme.” The recommendation is based largely on the Cochrane review mentioned earlier and 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 anaemia is 20% or higher. WHO is also developing recommendations on intermittent iron supplementation of preschool and school age children in order 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 post natal care (PNC) has been a policy of the MOHP since 1998. However, as in other countries, coverage was low, in some 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 not known what percentage consumed tablets for 90+ days as recommended. In an attempt to improve the situation, the Intensification of Maternal and Neonatal Micronutrient Programme (IMNMP) was started in five districts in 2003 with the support of MI. The programme involved the establishment of community based distribution of IFA tablets through health workers and FCHVS. These staff were therefore trained, and awareness raising and counseling was provided for the community. In addition IFA tablets were re-packaged into smaller containers to facilitate community-based distribution and post partum VAS was also emphasized. The community-based distribution included counseling on pregnancy care including ANC attendance, deworming, dietary diversification and iodized salt consumption. On a small scale, a pilot of using school children and mothers’ groups to register pregnant women was implemented. There were also annual coverage and compliance surveys undertaken. Evaluation of this programme in 2004 found a 66% increase in coverage of IFA compared to the baseline. The programme 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 therefore further expanded over the next few years and is currently being implemented in 70 out of Nepal’s 75 districts with support coming primarily from MI, but also from a number of other agencies, including UNICEF. At present, the IMNMP is not being implemented in five districts. A third evaluation of the IMNMP is on-going and results are expected in late 2011.

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129 DHS 2001 Tables 9.1, 9.2 and 9.3

130 Tapeljung, Ilam, Terhathum, Dhankuta and Kathmandu
Meanwhile, starting in 2011, iron tablets are now procured in blister packs (as opposed to loose in a bottle) in order to make distribution easier, avoid loss of tablets at home and avoid changes in quality due to exposure when the bottle is opened. All IFA tablets are procured from government budget.

**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>68%</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>

Ref: Evaluation of Intensification of Maternal and Neonatal Micronutrient Program. AC Nielsen for MI, 2009

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]

**Figure 24: Coverage of IFA Supplements in Pregnancy**

Ref: Micronutrient Survey April 2010. NB. The Nepal policy is that women consume 180 tablets during their pregnancy and 45 post partum ie full dose would be 225 tablets.
An impressive reduction in anaemia prevalence in pregnant women has been attributed to this programme but it is notable that anaemia in non-pregnant women has also fallen. It is questionable whether the interventions of the IMNMP alone could have led to reductions in anaemia in non-pregnant women on the scale indicated by the DHS results.

Figure 25: Coverage of IFA in Pregnancy and Impact on Anaemia in Pregnant and Non-Pregnant Women

![Graph showing coverage of IFA in pregnancy and impact on anaemia in pregnant and non-pregnant women.]


It is also important to note that the compliance with IFA during pregnancy and coverage of IFA for post partum 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 post partum. 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 post partum. 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 post partum (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 post partum and deworming during pregnancy. Also in the DHS 2006, as already reported in the section on vitamin A supplementation, only 29.4% said they received vitamin A post partum.

Global experience: IFA supplementation of pregnant and lactating women has been a long-standing recommendation of WHO. Guidelines dated 1998 recommend that where the prevalence of anaemia in pregnancy equals or is greater than 40%, all women should receive supplements for 6 months during pregnancy and three months post partum. If prevalence of anaemia is less than 40%, supplementation
is only needed for 6 months during pregnancy.\textsuperscript{131} (In 2006, anaemia prevalence in pregnant women in Nepal was 42.4%.)

The Lancet included IFA supplementation of pregnant women in its list of core interventions on the basis of a pooled analysis of data from eight studies that suggested an increase of 12g/L in haemoglobin at term and a 73\% reduction in the risk of anaemia at term. They further estimated that this reduction in anaemia would reduce the risk of maternal death by 23\%.\textsuperscript{132} Data, including from a study in Nepal, is also accumulating that iron supplementation during pregnancy could reduce low birth weight and may do so without improving anaemia status in the mother.\textsuperscript{133,134,135} 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 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 \textbf{not} using these supplements.\textsuperscript{136}

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

\begin{footnotesize}
\begin{itemize}
  \item Stoltzfus R and Dreyfuss M. Guidelines for the use of iron supplements to prevent and treat iron deficiency anaemia. INACG, WHO and UNICEF. 1998
  \item Bhutta et al. What works? Interventions for maternal and child undernutrition and survival. Lancet 2008
  \item Christian et al. Effects of alternative maternal micronutrient supplements on low birth weight in rural Nepal: double blind randomized community trial. BMJ 2003; 326: S71-4
  \item Mishra et al. Effect of iron supplementation during pregnancy on Birthweight: Evidence from Zimbabwe. FNB 2005; 26 (4) 338-347
\end{itemize}
\end{footnotesize}
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, many countries have not attempted distribution of IFA supplements through community health workers; hence increasing coverage of IFA relies upon increasing coverage of ANC.

Deworming for under five children and pregnant women were included in the Lancet list of ‘optional’ interventions, for implementation in areas with high helminth infestation. Deworming in pregnancy was included because of anticipated improvements in haemoglobin 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 anaemia 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 foetus. This is despite the fact that WHO and UNICEF both recommend deworming for pregnant women. A WHO meeting in 2002 concluded that “pregnant and lactating women should be considered a high-risk group and included in treatment campaigns, as should women of childbearing age. This conclusion essentially repeated the conclusions of a Consultation in 1994 which also recommended deworming of pregnant women, but not in the first trimester. This recommendation was again repeated in a joint WHO and UNICEF statement issued in 2004. A review of data on deworming on pregnancy concluded the health benefits of treating pregnant women outweigh any risks to mother, unborn infant or breastfed infant and 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.

Maternal supplements of multiple micronutrients

_Nepal experience:_ Nepal has no experience in maternal supplements of multiple micronutrients in the sense that there are no MOHP policies for their distribution, they are not being distributed as part of routine health services and nor are they being distributed under small scale or pilot conditions. However two major trials of multiple micronutrient supplements (MMS) have been undertaken in Nepal in Dhanusha and Sarlahi districts in the central terai sub-region. As these trials have contributed to the global evidence base for multiple micronutrients in pregnancy, they will be discussed under Global Evidence.

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141 WHO Informal Consultation on hookworm infection and anaemia in girls and women, Geneva 1994.
142 WHO and UNICEF. Prevention and control of schistosomiasis and soil-transmitted helminthiasis: Joint Statement by WHO and UNICEF 2004
Global evidence: 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 9 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 birthweight babies, small-for-gestational-age babies and in maternal anaemia. 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. A later meta-analysis indicated a significant reduction in birthweight 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. A further meta-analysis found the following in comparison to iron folate supplementation (i) similar improvements in haemoglobin levels, although MMSs 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. The most recent meta-analysis also concludes “MNS was more effective than IFA at reducing the risk of low birthweight and small size for gestational age.” A number of studies have also suggested longer term benefits such as reduced stunting at 2 years in Viet Nam and slightly higher weight at 2.5 years in Nepal. 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 anaemia as IFA supplements and had greater impacts upon birthweight.

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. A trial in Pakistan also noted non-significantly higher early neonatal mortality in the MNS group 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. These suggestions of increased neonatal mortality have raised concerns and to date, 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

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147 Shrimpton et al. Multiple micronutrient supplementation during pregnancy in developing country settings: policy and programme implications of the results of a meta-analysis. FNB 2009 (supplement)
151 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 Programme and the United Nations Children’s Fund.
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.” 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, 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 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 Programme, to assess coverage and compliance and to examine whether or not 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 re-packaging if needed).

**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 pre-eclampsia. The meta-analysis found that calcium supplementation during pregnancy was a safe and relatively cheap way of reducing the risk of pre-eclampsia in women at increased risk and women from communities with low dietary calcium. Pre-eclampsia is a leading cause of newborn and maternal mortality and preterm birth. More evidence on the optimal dose is still needed however.

**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 bioavailable 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 at increasing consumption of the micronutrients in question. 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 going to be feasible to implement. The main staple food in Nepal is rice. Unfortunately however rice is milled in Nepal in numerous small mills and no efforts have been made to date 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 hence discussed below.

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156 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.

157 Personal communication - Stephanie Suhowatsky, Jhpiego

**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%\(^{159}\). 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 8 domestic productions in 2011, compared to only 2 in 2005. Nepalis ate an estimated 730 million packets of instant noodles in 2010, up from 430 million in 2007.\(^{160}\) The 2010 figure calculates out as approximately 15 packets per person per year on average.\(^{161}\) The Nepal Flour Millers Association estimates that average consumption of wheat flour as instant noodles is 13.5-15.5g/capita/day and growing.\(^{162}\) 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) is 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 and in August 2011 a Notification was passed under the existing Food Act making fortification of all roller mill flour mandatory. MI has, over the past few years, supported the industry to start 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 this new law with the support of the Nepal Roller Millers Association. However, wheat flour mills currently complain 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. Flour imports have therefore 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.

Besides support for initiating fortification in roller mills, MI has also been providing support for piloting fortification by small scale mills such as chakki and water mills operated in rural areas. In 2007, MI started a pilot on small mill fortification in one VDC of Lalitpur district. Based on the success of the pilot, the effort was expanded to a further 9 VDCs in 2009. MI developed an innovative gravity-powered fortification device suitable for water mills which is provided to the mills. The pilot also involves support to the small mills in the form of seed money for premix revolving fund, training and awareness creation. The programme is monitored by a paid NGO at community level. MI is evaluating the impact of this pilot project and the results are expected in August 2011. In a separate activity, an 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

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\(^{161}\) Based on estimated population of 28,043,744 in 2010 (2001 census estimates)

programme 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 microfeeders, 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 programme, and collect the fortification fee for the premix. Quality assurance checks will be carried out by health post staff. MI is providing technical support for implementation of the project. It was 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.\(^{163}\) Data is also available on the impact of iron fortification of flour on anaemia prevalence; for example Venezuela has recorded a reduction in anaemia in school children of 43%.\(^{164}\) The actual reductions in anaemia observed depend upon several variables including, (i) the type (and bioavailability of the fortificant), (ii) the baseline anaemia prevalence and (iii) the amount and duration of fortified wheat flour consumption. On the basis of available global evidence, WHO released, at the end of 2008, a recommendation for wheat and maize flour fortification and guidance on effective fortification levels.\(^{165}\) Currently 6 countries, including Nepal, have national legislation or decrees that mandate fortification of one or more types of flour with either iron or folic acid.\(^{166}\) Flour fortification is considered highly cost effective for the reduction of anaemia: 8:1.\(^{167}\)

It should be noted however that the above-mentioned guidelines are applicable only to flour milled in “industrial roller mills (ie. >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 programme; 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 programme 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.\(^{168}\) All salt in Nepal is imported, mainly from the Indian states Gujarat and Rajasthan, by the Nepal Salt Trading Corporation (STC), which also controls the salt trade and

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\(^{163}\) Berry et al. Fortification of flour with folic acid. FNB 2010 (supplement)

\(^{164}\) 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)


http://www.who.int/nutrition/publications/micronutrients/wheat_maize_fort.pdf

\(^{166}\) Flour Fortification Initiative. (Accessed 17 October 2011) http://www.sph.emory.edu/wheatflour/globalmap.php


distribution. Some salt is still smuggled across the border and, along with the large crystal “phoda” salt that is found in mountainous regions, is 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 and the STC has been implementing this policy, as the Universal Salt Iodization Programme, since 1973. In 1998, 82.5% of households had iodized salt. However in that same year, only 55.2% of households consumed adequately iodized salt (ie >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 below, 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 and India in 2007 found that coverage of adequately iodized salt had risen to 77%. 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 2007 (the most recent data available) was 202.8 µg/L, up

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170 Nepal Iodine Deficiency Disorders Status Survey 2005, MOHP, MI
from 188 µg/L in 2005 and 143.8 µg/L in 1998.\textsuperscript{172} 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”.\textsuperscript{173} 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. \textsuperscript{[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.\textsuperscript{174}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{iodine_levels.png}
\caption{Median urinary iodine levels of school age children (µg/L) (2007)}
\end{figure}

Ref: National Survey and Impact Study for IDD and Availability of Iodized Salt in Nepal 2007 (Tables 24, 25 and 27)

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 will also be collected by the Living Standards Survey 2011, which is currently on-going. It should be noted however that none of the past surveys, and 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 programme is

\begin{itemize}
  \item \textsuperscript{173} Assessment of iodine deficiency disorders and monitoring their elimination: A guide for programme managers. Third edition. WHO, UNICEF, ICCIDD 2007
  \item \textsuperscript{174} National Survey and Impact Study for Iodine Deficiency Disorders and Availability of Iodized Salt in Nepal 2007. Govt of Nepal, Govt of India and Alliance Nepal.
\end{itemize}
inadequately iodized salt, there would be considerable benefit in getting a quantitative assessment of the salt iodine content at the next opportunity.

**Global experience:** The universal salt iodization programme is often quoted as the most successful nutrition programme in the world. 36 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. 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, that prevalence of severe wasting can be high even in non-‘emergency’ situations 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 that cases of severe acute malnutrition (SAM) are identified early, through active screening in the community, and un-complicated cases are treated through out-patient services in the home. This means that children are less severely malnourished when they are identified and do not have to spend extended periods in health facilities for treatment which is often unfeasible for caregivers and places a heavy burden on health systems. The community based treatment of SAM includes feeding with ready-to-use therapeutic food (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. 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 2006 DHS, 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

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175 UNICEF. Tracking Progress on Child and Maternal Nutrition: A survival and development priority. UNICEF2009
178 Indicators are severe wasting as measured by weight for height (<-3 SD) or MUAC (<115mm) and/or oedema.
increased risk of death and in need of treatment. Prevalence of severe wasting appears to be highest in children below 24 months, and in particular in those below 12 months, and to be associated with being born small and to having an 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]

In recognition that treatment for severe malnutrition was only available through a small number of non-governmental organizations 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 – 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 in all cases are the ultimate implementers. 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 model of community based treatment of SAM (CB SAM) in Nepal is that community health workers, including MCH workers, village health workers and FCHVs, conduct sensitization and screening activities at community level using mid-upper arm circumference (MUAC) tapes and checks for oedema.
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. Here they are re-assessed using height and weight and a health check determines if there are any medical complications and if the child has appetite. Children are admitted for SAM treatment if they demonstrate at least one of the following: MUAC <115mm, wasting <3SD, or oedema. Children with 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 to monitor 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 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 in-patient 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 December 2010 and is shown in Figure 30 on the next page. 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 favourably 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 programme because of the active community screening. This is exactly the objective of CMAM. The proportion of defaulters is 11% on average across all pilots. This is well below the Sphere standard of 15% but was still a cause for concern of the programme 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 have been established in some districts to address this problem and improved follow up of admitted children between visits will take place. It has been agreed that stricter adherence to the protocol regarding children with no appetite must also happen.

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180 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.
There is possibly a problem of low coverage. Based upon initial baseline data for each pilot district on the prevalence of severe acute malnutrition, it appears that some SAM children are not being identified by the community screening process. In order 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 is considered to be feasible to phase out these roles in future, when the pilots are taken to scale. The monitoring, in particular, is recognized as a task that is specifically important for the pilots in order to identify problems but that would not continue in its current form in a scaled up programme. Some difficulties have been experienced with supplies. Many of the products, in particular RUTF, are currently sourced internationally; this therefore requires good long-term forecasting and timely ordering in order to ensure that stocks arrive on time. In addition, it is acknowledged that all supplies were provided by donors and that 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 received only counseling to improve their nutritional status. This is considered insufficient by many programme stakeholders in Nepal on the basis that caregivers of MAM cases often have limited resources and capacities to improve care of their child. In addition, health workers at the OTPs have insufficient time or capacity to adequately counsel MAM cases on top of managing the counseling and treatment of SAM cases. The numbers of MAM children are significantly higher than SAM (estimate just under 300,000 in Nepal based on estimated 2011 population figures) and hence the

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181 Global guidelines indicate that prevalence rate of SAM should be multiplied by 2 to get incidence rates and the expected number of cases for treatment. By these figures, the Nepal pilots are achieving coverage of approx 50-70%.
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 or not 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 in CMAM, including IYCF counseling. Running costs 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 favourably to ‘global costs’ of US$200 per child per episode with the food costing about US$50-70. While the food cost of the Nepal pilot is similar to global data, it appears that the running costs of the programme are considerably less. Using DHS 2011 prevalence data and estimated 2011 population data, the estimated incidence rate of SAM is 184,856 per year. Total cost of treating these children is thus approximately US$ 10,721,648 per year. As such a large proportion of the cost is the RUTF, Nepal is interested to look into local/regional production. However, while there may be several advantages of locally/regionally produced RUTF, cost is not necessarily one of them. The price for RUTF through UNICEF, for example, benefits from huge 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 currently 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. 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, WHO and UNICEF put out a joint statement on “WHO child growth standards and the identification of severe acute malnutrition in infant

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183 Global guidelines indicate that prevalence rate of SAM should be multiplied by 2 to get incidence rates and the expected number of cases for treatment.
and children”. This 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 2-4 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 programmes. In addition, experience was growing that CB SAM was feasible and effective; CB SAM has come to be 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 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, in the last five years, 46 countries have started community based management of SAM although often on a small scale. It is only now that programmes are starting to expand. Nepal is very much at the forefront of this evolution as 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. It is important to note also that although community based management of SAM is perceived as an ‘expensive’ intervention, it is very cost effective; US$ 41 per DALY saved. A new analysis from Malawi reaches a very similar figure; 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, programmes for the management of MAM in children have remained virtually unchanged for the past 30 years” – “although 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 is that which 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 programmes 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.”

191 Children with weight for height between -2 and -3SD are about 3 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 9 times greater than non-wasted children.
192 WHO, UNHCR, IFRC, WFP. The Management of Nutrition in Major Emergencies. WHO 2000
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\textsuperscript{193} 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 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. It was recognized that moderate malnutrition affects large numbers of children in poor countries and that they are at increased risk of mortality due to common diseases and that if not adequately treated, may worsen, resulting in severe acute malnutrition (wasting and/or oedema) and/or severe stunting. The meeting also concluded that in the absence of specific recommendations, it could be assumed that 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 could be applied to moderate and severe stunting and growth faltering. Outcomes and conclusions of the meeting, that are most relevant to the current discussions in Nepal, are listed below. Unless otherwise stated, the reference for the below points are the Proceedings of the Consultation.\textsuperscript{194}

- Tentative recommendations for the nutrient density of diets suitable for feeding children with moderate malnutrition were made\textsuperscript{195} and potential foods and ingredients were reviewed.\textsuperscript{196}
- 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, in order 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).

\textsuperscript{193} Black et al. Maternal and child undernutrition: global and regional exposures and health consequences. Lancet, 2008: 371:243-60. Table 2
\textsuperscript{194} Shoham J. and Duffield A. Proceedings of the WHO/UNICEF/WFP/UNHCR Consultation on the Management of Moderate Malnutrition in Children under 5 Years of Age. Food and Nutrition Bulletin 2009 (supplement)
\textsuperscript{195} Golden M. Proposed recommended nutrient densities for moderately malnourished children. Food and Nutrition Bulletin. 2009 (supplement)
\textsuperscript{196} Michaelsen et al. Choice of foods and ingredients for moderately malnourished children 6 months to 5 years of age. FNB 2009 (supplement)
Such foods also do not contain any dietary fibre and dairy products can have a specific effect on growth through the stimulation of IGF-1 secretion.\textsuperscript{197}

- 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.\textsuperscript{198}
- 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 the recommendations are made more specific and context appropriate.”\textsuperscript{199} 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 to successfully treat moderate malnutrition, for example in Malawi\textsuperscript{200} and Niger.\textsuperscript{201} 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 Supplementary 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 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, sub-optimal micronutrient content (even though these foods are fortified) and high bulk and viscosity.\textsuperscript{202} These foods are therefore being improved\textsuperscript{203} and their efficacy is currently being tested.

\textsuperscript{197} Michaelsen et al. Choice of foods and ingredients for moderately malnourished children 6 months to 5 years of age. FNB 2009 (supplement)
\textsuperscript{198} Ibid
\textsuperscript{199} Ashworth A. and Ferguson E. Dietary counseling in the management of moderate malnourishment in children. FNB 2009 (supplement)
\textsuperscript{200} Patel et al. Supplemental feeding with ready-to-use therapeutic food in Malawian children at risk of malnutrition. J Health Popul Nutrition 2005
\textsuperscript{201} Defourny et al. Management of acute malnutrition with RUFT in Niger. Field Exchange 2007
\textsuperscript{202} 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)
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 which provide protein or amino acids and micronutrients (iii) complementary foods supplements that have active ingredients (enzymes), (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 micronutrient powders on anaemia) have been tested as many of these foods are relatively new. One of the most successful pilot nutrition counseling programmes for moderate malnutrition was implemented in Bangladesh and provided micronutrient supplements, including zinc, in addition to counseling.

A study by Ruel was quoted 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 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. A strategy for a population is thus suggested – focus on preventing malnutrition through programmes that target pregnant and lactating women and children 0-23 months of age, and on treatment of moderate and severe wasting among children under 5 years of age.

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 makes this intervention the least cost-effective of the SUN interventions, by far. 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.

**Supplementary Food for Young Children and Pregnant Women**

In 2002 WFP started a programme 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 programme operates in 51 VDCs in 9 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 Nutrimix Plus, a micronutrient-fortified food supplement. 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 fibre and phytate, skimmed milk powder, sugar to provide up to 10% of energy and oil.


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)

blended food consisting of wheat, corn, soybeans and sugar, which provides 500kcals, 18.5g of protein and 7.5g of fat per each 125g serving. A 7kg package of Nutrimix Plus is provided to each beneficiary per month - 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 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 programme on maternal and child anaemia, child growth and coverage of health services.

WFP has provided information that the programme costs US$25 per pregnant women for 6 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 programme 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 was that the Champion brand of complementary food would be made widely available at pharmacies and retail outlets in major cities and that availability would gradually expand 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 programme, in charge of distribution and promotion. By August 2009, sales targets had not been met and the programme was ended. An evaluation was undertaken by Deloitte, on behalf of the MI in 2010. The evaluation revealed problems with the marketing strategy – “people didn’t know what it was for” -, plus it appears that the timeline for adequate production and distribution was not sufficient to ensure that the product was available. At the present time 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” on the basis that a Cochrane systematic review 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.\(^{208}\) 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%.\(^{209}\) Just under a quarter of Nepali women (15-49 years) have a BMI <18.5 and 26.3% of

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girls 15-19 have low BMI. It is not known what the proportion of pregnant women with low BMI is 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 behaviour 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) programme is just one large example in which pre-school aged children are provided with food at community centres. However child malnutrition rates in India remain largely unchanged. Overall, many programmes 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 programme, (iii) choice of supplementary food in terms of nutritional composition and/or acceptability to beneficiary and (iv) quality of programme implementation including poor implementation of additional interventions such as counseling, coverage, quality of services and monitoring.

Many countries and programmes have attempted to introduce a commercial, low-cost fortified complementary food. For example, ADB funded a programme 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. The plan was that members of the Viet Nam Women’s Union would sell the product and keep some of the profits for themselves. Prices would be set such that it was affordable for low-income, rural communities. The programme failed however because producers were not interested; the profit margins were not high enough to justify start up costs in purchase of machinery. 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. This was potentially because not enough of the food was eaten by the targeted children, either because the families did not receive enough (it was distributed free or sold at a subsidized rate by community health workers), because they shared it within the family or 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 not possible 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 comes 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, it was announced that a child grant was to be added to this list. In order to bring about improvement in the condition of child care 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.210 Funds for the child grant are

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210 The five districts are Dolpa, Humla, Jumla, Kalikot and Mugu and form the mid-west mountain sub-region.
from the government and the programme 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 programme in the Karnali zone with important capacity building and complementary measures to make it more effective. Key complementary measures are awareness raising about birth registration and 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 programme was intended to start).

Along with the birth registration campaign to initiate the grant, families have been receiving counseling on IYCF and essential hygiene behaviours, so that the grant can be optimally utilized towards improving 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 actual IYCF counseling is being provided by health staff from the Ilaka level and FCHVs, 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 will 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. Internal/process monitoring is being undertaken by the field supervisors along similar lines to the MNP intervention. Baseline data on child anthropometry and IYCF behaviour is available from district level nutrition surveys undertaken in all of the five Karnali districts between 2009 and 2010. A mid-line survey will be undertaken in 2011 to collect data on IYCF behaviors and household expenditure using the same methodology as the Living Standards Survey. The end line survey will be undertaken in 2014 and will collect data on IYCF behaviours, household expenditure and child growth.

As a somewhat separate activity, a food supplement is available in all five districts by 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 activity is being coordinated with the MOLD at central and district level and is linked also with the IYCF counseling. UNICEF and USAID have facilitated with the transport costs and will support the monitoring and evaluation but all other costs are covered by the MOHP. Anecdotal reports indicate that as the fortified flour has to be collected from health facilities and as there has been no awareness campaign, coverage may be low.

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 categorically to children and geographically. 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 programmes showed an improvement in care seeking and an associated increase in the value of total household consumption of goods and services. Several major programmes 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 1cm increase in height per year translating into a 10% reduction in the prevalence of stunting in children 12-36 months. Questions remain however on 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 behaviour 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 is already standard practice in Nepal and HMIS data records “growth monitoring coverage” as 60.1% of children under three in 2008/9. The average number of growth monitoring visits was 2.21 per child under 3 compared to a target of 6 visits by one third of children and 4 visits by two thirds of children under 3 (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 3 children”. In the year 2008/9, 4.6% of children were recorded as “malnourished”. On the assumption that the growth chart is monitoring weight for age and that this prevalence represents -3SD (ie severe underweight), this prevalence, which is likely to be in better-off

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children who are more likely to come for regular weighing, compares to DHS 2006 data indicating that 11% of children below 3 were severely underweight.

Community based growth monitoring is not currently implemented in Nepal except within a community mobilization programme supported by UNICEF. The goal of the “Decentralized Action for Children and Women” (DACAW) programme 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 programme 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 favour 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 also on a large community chart. This illustrates for the community, how many children are below the line and by comparing with previous community charts, they can see how the situation changes over time. 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. 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 has fallen from 43% in 1999 to 16% in 2007 in DACAW areas. However, as new communities have progressively been added to the DACAW programme over the years and older children have ‘graduated’ from the programme, 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 activities on nutrition has led to a discussion on whether or not Nepal should establish a programme of community based growth monitoring, which forms the focus of community-based nutrition programmes in many countries. A pilot is planned which will compare growth monitoring and promotion (GMP) undertaken by FCHVs with GMP undertaken by health workers to see which model is more effective in Nepal. Opinion within the MOHP and the external development community supporting nutrition activities appears to be divided on whether or not community based GMP should be established in Nepal.

Global experience: In the 1980 and early 1990s, community based growth monitoring formed the cornerstone of most large nutrition programmes. 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. Counseling of the caregiver by the health worker, using the chart, was supposed to help identify the causes of growth faltering so that caregivers could change their behaviour accordingly. And 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 that had time for child caring. In reality, numerous evaluations and reviews have struggled to prove that community based growth monitoring leads to growth promotion or behaviour change or improved growth. For example, a review by Ashworth et al. summarizes the evidence as follows:

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“There is evidence from small-scale studies in Nigeria, Jamaica, India (Narangwal and Jamkhed), and from large programmes 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 programme 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 programmes 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 that are effective, practical and sustainable “are not necessarily linked to growth monitoring” and that the consideration should therefore be on whether “community based programmes 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.” 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 GMP. 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 as ‘needing special attention’. Thus, the time-consuming process of weighting 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 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.

218 Mangaasaryan et al. Revisiting the concept of growth monitoring and its possible role in community-based nutrition programs. FNB 2011.
III. Recommendations for Evidence-based Nutrition Interventions in the Health Sector

Based on the above review, recommendations were developed by the author of this report on which interventions Nepal should maintain or strengthen, which should be scaled up or expanded and which need more evaluation. No interventions were recommended for discontinuation. A summary of the review and the recommendations were presented to a meeting of government representatives, in particular from the MOHP, and the international development assistance community in March 2011. The final decision of the meeting participants on future health sector interventions to improve maternal and child nutrition are shown in Figure 31. More detailed discussion on the recommendations and how each of the interventions could be implemented follow.

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 shows 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 a fundamental human right.

Looking at Figure 31 a pattern is clear; the majority of the interventions for maintenance or scale up are micronutrient interventions which are already known to be successful in Nepal. Interventions for scale up are predominantly those for child growth, which have been somewhat neglected in Nepal and are more complex than many of the micronutrient interventions. An exception is the proposed scale up of multiple micronutrients powders which are 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 global and Nepal evidence on what works is lacking for maternal nutrition, hence the need for evaluation in the context of Nepal.

Recommendation Categories

Maintain/Strengthen: intervention is already being implemented on a large scale. Needs to be maintained (in sustainable way) or ‘strengthened’ eg. 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 promising such 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.
### Figure 31: Table of Recommendations for Health Sector
(pending cost analysis – affordability & cost-effectiveness)

<table>
<thead>
<tr>
<th>Maintain/ Strengthen</th>
<th>Scale Up or Expand</th>
<th>More Evaluation</th>
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<tbody>
<tr>
<td>Vitamin A supplementation and deworming for U5</td>
<td>IYCF and hand washing/ hygiene counseling</td>
<td>Interventions to improve maternal nutrition</td>
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<tr>
<td>Diarrhoea treatment with zinc</td>
<td>MNP s</td>
<td>Iron suppl &amp; deworming adolescent girls</td>
</tr>
<tr>
<td>IFA and deworming for pregnant and post partum</td>
<td>Integrated management of SAM (community &amp; facility based)</td>
<td>Calcium supplementation during pregnancy</td>
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<td>Salt iodization</td>
<td>Roller mill flour fortification</td>
<td>Prevention/ treatment of MAM</td>
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<td>Child grant with IYCF counseling and food supplements</td>
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<td>Commercial fortified CF</td>
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<td>Technical review</td>
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<td>Small mill flour fortification</td>
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<td>Vitamin A supplementation (pregnancy, post partum and neonatal)</td>
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### Recommendations for Maintenance and Strengthening

**Vitamin A supplementation and deworming**

Taking into account the success of the Nepal programme for vitamin A supplementation of all children 6-59 months plus deworming of children 12-59 months and the new recommendations from WHO on vitamin A supplementation for this age group, under 5 vitamin A supplementation and deworming in Nepal should be maintained, in that coverage should be sustained in a cost-effective way and the intervention should become a routine activity of the health system. ‘Unfinished’ business should be addressed, in particular the transfer of full ownership, management and funding to the MOHP, while retaining NTAG for technical and emergency back up support. This should include procurement and management of all supplies; something 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 be the same level as vitamin A supplementation, and in 12-23 month old children in particular. A sustainable system for recording and verifying coverage is needed; this may be continuation of the Micronutrient Surveys, but undertaken by the DHOs, or it may be a new system altogether. Consideration might also be given to building upon the bi-annual contacts between caregivers and FCHVs for vitamin A and deworming to deliver other services.

The new WHO guidelines on vitamin A supplementation of post partum women, pregnant women and neonates should be reviewed by the Nutrition Technical Committee of the MOHP, taking into consideration the reasoning behind the recommendations and the Nepal context. The review should make decisions on whether post partum supplementation should be stopped, whether treatment of pregnant women with night blindness should be implemented and whether neonatal supplementation should be started.
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 improvements to forecasting based on prevalence of the relevant diseases, improved recording of dosing in the HMIS and procurement of capsules for this use through the essential drug system as opposed to with the twice yearly procurement for under 5 supplementation.

**Treatment of diarrhoea with zinc**

As already noted, treatment of diarrhoea 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-diarrhoeals 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 diarrhoea. Although it has been suggested that the severity of diarrhoea cases has fallen, diarrhoea remains the second cause of death, after pneumonia, in young children. Therefore general efforts are needed to prevent and optimally treat diarrhea, including:

- Retraining of health workers and FCHVs on treatment of diarrhoea
- Mobilization and awareness-raising of communities on optimal diarrhoea treatment. A mass media campaign might be considered to increase awareness of ORS and zinc as the optimal diarrhoea treatment.
- Increasing both ORS and zinc treatment in diarrhoea 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 diarrhoea 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 diarrhoea.
- Improving feeding during diarrhoea. 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 diarrhoea, such as hand washing.
- The findings of the MI evaluation of the zinc intensification project must also be taken into consideration.

**Iron and folic acid supplementation of pregnant and lactating women and deworming in 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 post partum components). Deworming during pregnancy is also much lower. The focus in future should therefore be on expanding the IMNMP to all districts (currently it is not being implemented in 5 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. Post partum vitamin A has also benefited from this programme. In 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 5 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 re-train health workers, in particular community health workers and FCHVs who
were trained in the first phase of the IMNMP back in 2003. An interesting finding of the IMNMP evaluation in 2009 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 on a general strategy to improve maternal nutrition which is a priority of the MOHP.

Salt iodization
The salt iodization programme 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 to something like 30ppm as is common in other countries.

Overall it is recommended that a review of the whole USI programme is undertaken and that an updated strategy for achieving and maintaining USI is developed. 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 behaviour-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, as presented, 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 to date. 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 re-established, 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 behaviours.

Detailed information about feeding behaviours, 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 therefore 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
Figure 32: Breastfeeding practices by age (2011 Preliminary Report)

Ref: DHS 2010 (Preliminary Report) – Table 11

Figure 33: Foods consumed by children <6 months and 6-9 months in 2001, 2006 and 2011

Ref: DHS 2011 – Table 10.2 and 2006 – Table 12.2
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 in 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 6 months
- From about six months give babies soft foods made with cereals. Add animal foods, nuts and 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 3 times per day from 9-23 months
• Cook special foods for young children and give your child his own bowl of food

In future, more refined, context specific messages may be needed and should be developed following formative research to understand existing IYCF behaviours and what foods and practices could feasibly be encouraged.

As part of the process of agreeing on core messages, a thorough comparison and review should be undertaken of all IYCF training and counseling tools currently being used in Nepal to create a more universal and standardized package. 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; that includes use of the updated “Indicators for assessment infant and young child feeding practices”\(^\text{220}\) 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 behaviours requires large scale implementation of comprehensive, multi-level, multi-component programmes with strong government leadership. A comprehensive IYCF strategy should include all of the below components with prioritization based on country context:\(^\text{221}\)

1. Legislation on the marketing of breastmilk substitutes and maternity protection
2. Skilled support by the health system – 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 – community based counseling services and capacity development of community workers and mother support groups
4. Communication for behaviour and social change through multiple channels
5. Possible additional complementary feeding interventions – 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 (eg. cash transfers)
6. IYCF interventions in difficult circumstances – HIV and emergencies

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

At this point in time in Nepal, 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 diarrhoea, all effective interventions to prevent and treat diarrhoea should be strengthened in Nepal. Several of these will be implemented outside of the health sector, including counseling for hand washing and hygiene behaviours. However, IYCF counseling and child care 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 behaviour change on hand washing and hygiene behaviours is incorporated into all efforts to improve IYCF and general child care behaviours. In particular hand washing before preparing food and after going to the toilet and safe disposal of child faeces 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 anaemia prevalence in the study communities with >40% anaemia at baseline. Taking into account the levels of childhood anaemia in Nepal, global data on the impact of MNPs on anaemia prevalence from efficacy studies and large scale programmes, and the high levels of coverage and compliance achieved so far in both the UNICEF and WFP-supported distributions, MNPs appear to be a feasible and potentially very effective intervention for Nepal.

It appears that the full potential impact of deworming of young children has already been achieved, considering that the programme has been universally implemented with high coverage for 8 years already and that anaemia prevalence in children did not decline further between 2006 and 2011. There can be no expectation that significant reductions in anaemia prevalence could be achieved in the short term through education for dietary diversity and greater consumption of iron-rich foods and staple food fortification, even when well implemented, is not a good strategy for reaching young children as their consumption of the staple foods that are commonly fortified is often not high enough. An additional intervention is therefore needed, to further reduce the still very high prevalence of anaemia 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 anaemia, there is little to no evidence of the impact of MNP distribution on IYCF practices. Theoretically it is very possible that when good counseling on IYCF, in particular on complementary feeding, is combined with distribution of MNPs, behaviour change may be more significant and more 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

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222 Presentation by WFP/New Era in May 2011 – Micronutrient Powder (MNP) Supplementation for children in food insecure districts of Nepal: Results from 201 compliance, baseline and endline surveys.

reject cultural norms and the advice of mothers-in-law for example, to feed her child differently. 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 behaviour changes to be maintained, rather than reverting to old practices when the novelty of the MNPs has worn off. This is all theory however; to date there appears to be no conclusive data to indicate that complementary practices improve more when IYCF education is given with MNPs. It is notable however, 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. It is possible that Nepal is the most advanced in terms of specifically and actively linking MNPs with IYCF counseling and in putting in place mechanisms to measure the behavior change.

![Figure 36: Prevalence of anaemia in 2006 in children under 5](image)

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 is the age group in which anaemia prevalence is highest in Nepal [Figure 36], it is the age group recommended by the WHO guidelines and because it would be unrealistic to think that MNPs could be scaled up for all children 6-59 months. This is also the age group that would benefit most from the IYCF counseling. MNP distribution should be targeted on the basis of under 2 anaemia prevalence, starting first in all areas where anaemia prevalence is ≥40%. Nationally, based on 2006 DHS data, anaemia 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 2s, 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

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224 Presentation by WFP/New Era in May 2011 – Micronutrient Powder (MNP) Supplementation for children in food insecure districts of Nepal: Results from 201 compliance, baseline and endline surveys.

225 The newly-issued WHO guidelines actually suggest MNPs are used where the prevalence of anemia in children under 2 is 20% or higher but this would be nationwide in Nepal and is not feasible for the initial phase of implementation.

226 Authors calculation from Table 12.9 of DHS 2006
no particular reason to focus on poorer families as anaemia 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.”227 The guidelines also recommend enough sachets are 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”.

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 programme, should be built into the scale up of the programme. 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 achievement high coverage, compliance, anaemia impact or improvements in IYCF practices. At a later stage, local production of MNPs might be considered.

Integrated management of severe acute malnutrition
In light of the high levels of acute malnutrition in Nepal, it seems imperative that community management of severe acute malnutrition must be scaled up, at least in high wasting areas, in the near future. The results of the CMAM pilots to date 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 (eg. 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 behaviours, logistic supplies arrangements and management, impact on programme 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 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 programme design and protocols. Community based treatment of SAM should then be scaled up relatively slowly with a strong monitoring and evaluation component in order to develop lessons learnt and improve implementation as programme experience develops. Most logically, community based treatment of SAM should be scaled up first 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. 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 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; this reveals that local flour mills are struggling with a number of issues which affect their production and profit margins. These problems could affect the success of the flour fortification programme 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, such as the Micronutrient Initiative, consider providing technical support to support government and industry efforts. Despite the above-mentioned problems, achieving the fortification of all roller mill flour appears very feasible. It needs to be remembered however that the majority of Nepal’s flour consumption, which is not high, is milled in small scale chakki and water mills. This intervention 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, in particular if focused on adolescents and young women, is 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.

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 programme.

In considering tobacco consumption and indoor air pollution - one fifth of all women in Nepal smoke (19.6%) and if they are poor (lowest wealth quintile) or have no education, this proportion rises to one third.228 In addition, as 56.5% of men in Nepal smoke,229 women who live in their households will be exposed to secondary smoke. Plus, it appears likely that exposure to household smoke from cooking is high, especially in rural areas. Overall therefore exposure to smoke may be an important cause of low birth weight in Nepal and interventions to reduce the exposure are important. Within the health sector, counseling for adolescent girls, pregnant women and mothers should include information about the dangers of smoking. Other sectors may be able to implement other interventions to reduce exposure to household smoke in particular. As few efforts have been made on this issue in the past, 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. 61% of households have bednets but there are large disparities; only 23.3% of households in the lowest quintile have a bednet and 14.4% in the mountain region.230 In addition, it is not known 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 anaemia, 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. WFP currently provides a significant amount of food aid to Nepal and is implementing a programme to provide food supplements to pregnant women attending MCHC services in a small number of VDCs in 9 districts considered food insecure. This would appear to be an ideal situation in which to assess the impact of this intervention in Nepal. This programme has been running since 2002 with little data on coverage or impact. A recommendation of this review would be to consolidate the resources available for this programme and to run a robust trial to evaluate the outcome of this intervention.

228 DHS 2006. Table 3.10.1
229 DHS 2006. Table 3.10.2
230 DHS 2006. Table 2.10.
A two-phase study comparing the impact of cash or food transfers plus enhanced nutrition counseling is planned with 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.\textsuperscript{231}

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 anaemia is above 20% and food fortification programmes are not in place. Nepal meets these criteria. A variety of evidence, including several programmatic interventions in East Asia, suggest that WIFS is effective at reducing anaemia with a dose response such that the longer a woman consumes the supplement pre-pregnancy, the less likely she is to be anaemic during the first and second trimesters of pregnancy. WIFS were not effective at eliminating anaemia in the third trimester but anaemia levels were lower than in a control group consuming daily IFA.\textsuperscript{232} India has also 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 anaemia after 1-2 years of implementation. The adolescent anaemia programme 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 centres 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.\textsuperscript{233}

In Uttar Pradesh the overall prevalence of anaemia was reduced from 73.3% to 25.4% in the adolescent girls involved in the programme 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 programme, which was called Uplifting Marriage Age, Nutrition and Growth (UMANG), reached all school girls and non-school girls with WIFS, deworming tablets at 6-month intervals and family life education. It was implemented by three government ministries – Health, Education and the Integrated Child Development Services (ICDS) plus a state-based NGO. Different approaches were used for reaching non-school girls and school girls.\textsuperscript{234}

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. Anaemia rates in

\textsuperscript{231} Personal communication – Luc Laviolette, World Bank South Asia
\textsuperscript{233} Dwivedi A and Schultink W. Reducing anaemia among Indian adolescent girls through once weekly supplementation with iron and folic acid. SCN News #31 2005
\textsuperscript{234} Vir et al. Weekly iron and folic acid supplementation with counseling reduces anaemia in adolescent girls: A large-scale effectiveness study in Uttar Pradesh, India. FNB 2008
adolescent girls (15-19) were 39% according to the DHS 2006; the highest of any age group. As the average age of first birth is 19.9 years\(^{235}\) and 40.9% of all 19 year-olds have begun child bearing,\(^{236}\) 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 awareness raising 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.\(^{237,238}\) The intervention has since been replicated in Jharkhand and Orissa states in India with a 45% reduction in neonatal mortality.\(^{239}\)

The partnership is currently replicating a similar, but more scalable and lower 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. A further 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 post-partum 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-5 mortality rates and still birth rate, maternal and newborn morbidity, health care seeking and home care practices in pregnancy and postpartum, eating behaviour in pregnancy and postpartum and breast feeding and infant feeding in the first 4 to 12 weeks of life. An endline survey currently being

\(^{235}\) DHS 2006 (Table 4.9)  
\(^{236}\) DHS 2006 (Table 4.10)  
\(^{238}\) Morrison et al. Understanding how women’s groups improve maternal and newborn health in Makwanpur, Nepal: a qualitative study. International Health. 2010  
\(^{239}\) Tripathy et al. Effect of a participatory intervention with women’s groups on birth outcomes and maternal depression in Jharkhand and Orissa, India; a cluster-randomized, controlled trial. Lancet 2010;
implemented will collect data on child and maternal anthropometry, breast feeding behaviour (incl. exclusive breast feeding to 6 months), complementary feeding and hygiene practices and postpartum nutrition, care and hygiene practices. Results are expected by the end of 2011.\textsuperscript{240}

This intervention, involving women’s groups is very interesting. It has proven to be effective in both Nepal and India and the methodology of the Dhanusha trial could potentially be scaled up by the government with the assistance of external assistance partners as 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 dove-tail 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 behaviours so improving dietary intake. As Nepal is considering the scale up of quality IYCF counseling and MNP distribution, it is possible that these two interventions together might be sufficient to address at least some of the moderate acute malnutrition, and indeed, some of the moderate stunting, currently seen in Nepal. A recommendation is that this hypothesis is tested in an area where MNP distribution with high quality IYCF counseling is being implemented. Specifically the study should aim to see 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.

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 are available with different cost and acceptability implications. It is therefore a recommendation 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 which Nepal already has significant experience with. 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 local context in relation to food security and poverty.

\textsuperscript{240} Personal communication – Naomi Saville, CIHD, UCL and MIRA
Child grant with IYCF counseling and food supplements

The child grant in Karnali has only been operating since mid-2010 (approx 1 year) 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 programme 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 see 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 due to the assumption that the cash and education provided will be used to increase access to foods, care and services that are required for good child nutrition. However if the food or services are not available in the community, and the cash does not increase the ability to improve care practices, the cash grant may have little impact on nutrition. As there is little data on the determinants of child nutrition in the Karnali region, it is unknown why stunting, but not wasting, rates are so high. Therefore, it would be very useful, if process monitoring and the mid and end-line surveys can be used to try to establish what the cash grant was used for, in order 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 programme 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 compared to those who collected it only occasionally.

- As with other programmes with an IYCF counseling component, this evaluation will hopefully provide important evidence that IYCF counseling can improve IYCF behaviours.

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 design of the programme – in particular how the product was marketed and how production and distribution was planned. There is thus an interest to ‘try again’ with a different implementing partner but using the same product that was developed previously. Lessons should be learnt from the evaluation of the first effort. New global experience, particularly from GAIN or Alive and Thrive, on the promotion of a commercial complementary food may also be available.

Small scale fortification of flour

As noted above, two pilots on small scale fortification of flour are currently being implemented in Nepal; one in Lalitpur with water and chakki mills supported by MI 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 systems of the pilots for monitoring the quality of fortification are effective, cost-effective and sustainable. These pilots, in particular the ADB-supported one because it is on a larger scale, will contribute significantly to the global experience on small scale flour fortification.
Community based growth monitoring and promotion

Overall, in line with the references quoted, it is not recommended that Nepal initiates community based growth monitoring and promotion (GMP). However, if there is high interest 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 eg. 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.
IV. Implementing the Interventions as a Comprehensive Nutrition Programme

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 programme, as part of the Nepal Health Sector Programme II.

The Nepal Health Sector Programme II and the Multi-Sectoral Plan for Nutrition

This report has reviewed the Nepal 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 inter-linked programmes in Nepal; the Nepal Health Sector Programme II (NHSP II) of the MOHP and the Multi-Sectoral 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 in order 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 Multi-Sectoral Plan for Nutrition, evidence-based interventions for nutrition from a variety of sectors will be implemented in a selected 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 Multi-Sectoral Plan for Nutrition.

Figure 37: Nepal Health Sector Plan II and the Multi-Sectoral Plan for Nutrition

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**Figure 37** above illustrates the overall plan. The remainder of this section of the report discusses implementation within the NHSP II. A separate report documents how the Multi-Sectoral Plan for
Nutrition will be implemented, including how interventions of the different sectors will be implemented at district and community level in a coordinated way.

**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 re-emerging diseases and addressing levels of non-communicable 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 programmes 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 (eg. strengthen involvement of pharmacies and private doctors and of CBOs and NGOs)

**Creation of a Community-Based Behaviour Change Communication Nutrition Package**

A significant focus of future action in nutrition will be to improve counseling and support provided to caregivers at community level. 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 behaviour change on key care practices that affect maternal and child nutrition. This package would put into practice the behaviour 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 behaviours 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
- Smoking and smoke exposure in the household to reduce risks to women and children

The package should use innovative and effective behaviour change communication methodologies, including, possibly, 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 Behaviour Change Communication package but a more attractive name might be developed in the future.
Integration of Nutrition Interventions into Existing Programmes

An important principle in strengthening nutrition programming in Nepal is to incorporate effective interventions into existing programmes, rather than trying to establish ‘stand-alone’ nutrition programmes. 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 programmes do not exist. Another important principle is that a balance is needed between community-based, outreach and facility based services. Figure 38 below suggests how the identified nutrition interventions might be integrated into existing programmes in Nepal.

Figure 38: Integration of Interventions into Existing Programmes

<table>
<thead>
<tr>
<th>Nutrition Intervention</th>
<th>Programme</th>
<th>Type of Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A supplementation and deworming for U5</td>
<td>CB-IMCI</td>
<td>Outreach</td>
</tr>
<tr>
<td>Diarrhoea treatment with zinc</td>
<td>Safe Motherhood (ANC &amp; PNC) and IMNMP</td>
<td>Facility based and outreach</td>
</tr>
<tr>
<td>IFA, deworming and VAS for pregnant and post partum</td>
<td>Nutrition BCC package</td>
<td>Community-based</td>
</tr>
<tr>
<td>Salt iodization</td>
<td>Nutrition BCC package</td>
<td>Community-based and outreach</td>
</tr>
<tr>
<td>IYCF and hand washing counseling</td>
<td>Nutrition BCC package</td>
<td>Community-based</td>
</tr>
<tr>
<td>MNPs</td>
<td>Nutrition BCC package</td>
<td>Community-based and outreach</td>
</tr>
<tr>
<td>Roller mill flour fortification</td>
<td>Nutrition BCC package</td>
<td>Facility based, outreach and community based</td>
</tr>
<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>

The importance of integration 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 programmes 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 programmes. 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. Taking into account effective interventions identified for maternal, neonatal and child survival and sexual health, Kerber et al. developed 8 integrated packages of essential interventions organized along the continuum of care by lifecycle and place of service delivery. Figure 39 shows the 8 integrated packages, with evidence-based nutrition interventions added in red, based on the Lancet Series on Nutrition published after the Kerber article, in 2008.

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Kerber et al. Continuum of care for maternal, newborn and child health: from slogan to service delivery. Lancet. 2007

242 Effective interventions were identified in four Lancet articles on the stated topics between 2003 and 2006. See references of Kerber article for more details.
Public health programmes in Nepal, as in most other countries, do not follow this model. Many programmes 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 programme, separate processes for district planning, training, logistics supply, recording and reporting, supervision and refresher training all exist, creating inefficiencies, overlap, redundancies and contradictions. It is probably unrealistic to consider changing the existing set up in order to adopt the 8 packages proposed by Kerber et al. 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 ie. 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 programmes, for example harmonization and reinforcement of messages between programmes.

**Geographic targeting of nutrition interventions**

At present, many social development and nutrition programmes prioritize the far west and the mountain regions of Nepal. While there may be some justification for this by some indicators, stunting and wasting prevalence do not support this geographical focus. As Figures 40 and 41 below show, although, in 2006, stunting was highest in the western mountains and mid western hills (66.8% and 65.5% respectively), stunting prevalence was ≥40% in every sub-region except the eastern terai and

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243 Extracted from presentation made by Core Group Members of Child Health in Nepal on “Integrated Approach for Newborn, Child Health and Nutrition.”
urban populations (and even in these areas it is more than 35%). Preliminary data from the DHS 2011 indicates improvements throughout the country; nevertheless prevalence remains ≥40% in the mountains and the hills. It is not known yet what prevalence is in the sub-regions. If a cut off of ≥30% is selected, the terai should also be targeted. WHO categorizes prevalence above 30% as “high prevalence” and ≥40% as “very high prevalence”.244 While stunting obviously needs to be addressed

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nationwide in the long run, it would seem appropriate to initially 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 below shows the numbers of under 5 children who are anaemic, stunted, wasted and severely wasted and the numbers of women with low BMI and anaemia. 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. A major recommendation of this review is therefore 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.

Figure 42: Nos of children wasted, stunted and anaemic and women with low BMI and anaemic, in the Eco Zones of Nepal

MNPs and community based management of SAM will be scaled up in Nepal to address, primarily, childhood anaemia and severe wasting respectively. It is therefore recommended that MNPs are scaled up in all sub-regions in which the prevalence of anaemia 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 WHO cut-offs for public health significance; anaemia prevalence ≥40%
is categorized as a “severe public health problem” and wasting prevalence 10-15% is “serious”.\textsuperscript{245} 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.\textsuperscript{246}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure43}
\caption{Community based treatment of SAM in Sub-regions with >10% wasting (DHS 2006)}
\end{figure}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure44}
\caption{MNPs in Sub-regions with >40% anaemia in children <5 (DHS 2006)}
\end{figure}

\textsuperscript{245} WHO. Nutrition Landscape Information System (NLIS) Country Profile Indicators: Interpretation Guide. WHO 2010
\textsuperscript{246} WHO, UNHCR, IFRC, WFP. The management of nutrition in major emergencies. 2000
As mentioned, data on sub-regional prevalence of anaemia and wasting from the 2011 DHS should be used for targeting implementation. It should be noted that the DHS surveys only present data to the sub-regional level; data on anaemia, 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. At the time of writing this report however, sub-regional data is not yet available from the 2011 DHS. Therefore an **indicative plan** is suggested below based on 2006 sub-regional data. The figures above show the sub-regions that meet these two criteria based on data from the DHS 2006. By coincidence the sub-regions with anaemia $\geq 40\%$ and wasting $\geq 10\%$ are almost exactly the same except that the western hills are included in the anaemia $\geq 40\%$ 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 anaemia prevalence is only 42\% - just over the 40\% cut-off. 2006 data would therefore suggest 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 2 million under 5 children (59\% of the U5 population; estimated 2011 population data from the 2001 census). Within this area, it is suggested that community based treatment of SAM and MNPs are scaled up over three years, starting first in the sub-regions with highest levels of wasting. Figure 45

<table>
<thead>
<tr>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB SAM &amp; MNPs &amp; Nutrition BCC+</td>
<td>Central terai and far-western terai</td>
<td>Far western hills, western terai and mid-western terai</td>
</tr>
<tr>
<td></td>
<td>• 9 districts</td>
<td>• 10 districts</td>
</tr>
<tr>
<td></td>
<td>• 805,721 children U5</td>
<td>• 691,173 children U5</td>
</tr>
<tr>
<td></td>
<td>• 49% of CB SAM target</td>
<td>• 37% of CB SAM target</td>
</tr>
<tr>
<td></td>
<td>• 38% of MNP target</td>
<td>• 33% of MNP target</td>
</tr>
<tr>
<td>Nutrition BCC</td>
<td>Mid western hills, central hills, central mountains and eastern mountains</td>
<td>Eastern hills and western hills</td>
</tr>
<tr>
<td></td>
<td>• 22 districts</td>
<td>• 19 districts</td>
</tr>
<tr>
<td></td>
<td>• 714,621 children U5</td>
<td>• 731,620 children U5</td>
</tr>
<tr>
<td></td>
<td>• 49% of BCC Nutrition target</td>
<td>• 51% of BCC Nutrition target</td>
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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
Preparation Activities in 2011 for Maintenance/Strengthening and Expansion/Scaling Up in 2012

The above plan envisages starting to implement the new interventions in 2012. In addition, work needs to start on maintaining/strengthening existing interventions. These will require a significant amount of preparation to be undertaken in the remaining part of 2011. 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 programmes (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 of 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

Figure 46: By the end of 2014........
(Based on DHS 2006 sub-regional data)
9. Plan strategies for improving diarrhoea 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 programme

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

The Strategy for Improving Maternal Nutrition
Improving maternal nutrition is a high priority for the Nepali government. There is a frustration that while interest and commitment to address maternal nutrition is high, there is limited information on what is feasible to implement at scale in Nepal. This review however, and the work on the Multi-Sectoral 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 need 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 behaviours 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 it has been proposed to evaluate the impact of food supplements for pregnant women distributed by WFP as part of the MCHC programme.

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. Plus several of the studies planned, could potentially be scaled up in 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 Multi-Sectoral 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 programmes. Specifically, a final decision needs to be made on whether or not 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 selected districts that will implement the Nutrition BCC package only and those 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 to answer. A key question 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 take on 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.
Annexes

Annex 1: NAGA priority determinant model

Food is available

- Yes
  - Food is affordable
    - Yes
      - Quality of food is good
        - Yes
          - Nutrition behaviors are good
            - Yes
              - Infection is minimized
                - No
      - No
        - Focus on improving micronutrient content, food diversity and increased use of animal source foods
    - No
      - Focus on poverty alleviation efforts to increase household income and direct its use toward nutrition goals
  - No
    - Focus on agricultural, market and infrastructure interventions to increase household food availability and use

Ref: Nepal Nutrition Assessment and Gap Analysis, November 2009
Annex 2: Agenda and List of Participants to 16-17 March 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 nutrition 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. A consultancy has been supported by the World Bank to undertake a review of the status of the essential nutrition interventions in Nepal and these pilots to date and make recommendations to the Ministry of Health and Population (MoHP) on those activities that need to be tested further and those for which we now have significant evidence to be taken to scale, which would enable 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 16 March**

<table>
<thead>
<tr>
<th>Time</th>
<th>Agenda Item</th>
<th>Presenter</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 Multi-Sectoral 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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<tr>
<td>14.30</td>
<td>Feedback and response by the MOHP</td>
<td>Dr Raj Kumar Pokharel</td>
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<tr>
<td>14.45</td>
<td>Coffee break</td>
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<tr>
<td>15.00</td>
<td>Discussion and consensus development – organized by</td>
<td>Facilitated by Dr. Ramesh Kant</td>
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<tr>
<td>Time</td>
<td>Agenda Item</td>
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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>
</tr>
<tr>
<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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<tr>
<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>
</tr>
<tr>
<td>11.00</td>
<td>Discussion and Conclusions on Capacity Development</td>
<td>Facilitated by Dr. Ramesh Kant Adhikari</td>
</tr>
<tr>
<td>12.30</td>
<td>Lunch</td>
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<tr>
<td>13.30</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>
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<tr>
<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>
</tr>
<tr>
<td>15.30</td>
<td>Next steps for MOHP</td>
<td>MOHP</td>
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<td>15.45</td>
<td>Next steps for NCP</td>
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<td>16.00</td>
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<td>World Bank</td>
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<td>16.15</td>
<td>End of meeting</td>
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**List of Participants**

<table>
<thead>
<tr>
<th>Name</th>
<th>Designation</th>
<th>Organisation</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>
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<tr>
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<td>MOHP</td>
</tr>
<tr>
<td>Dr. Ms. Kiran Regmi</td>
<td>Director/Family Health Division-DoHS</td>
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</tr>
<tr>
<td>Mr. Arjun Bahadur Singh</td>
<td>Health Training Centre-DoHS</td>
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</tr>
<tr>
<td>Dr. Chop Lal Bhusal</td>
<td>Director/National, Executive Chairman/</td>
<td>MOHP</td>
</tr>
<tr>
<td>Name</td>
<td>Position/Institution</td>
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<tr>
<td>Dr. K.K. Rai</td>
<td>Director/National Centre for Aids and STD Control (MOHP)</td>
<td></td>
</tr>
<tr>
<td>Dr. Chet Raj Pant</td>
<td>Member, NPC and Chairman NNSC (NPC)</td>
<td></td>
</tr>
<tr>
<td>Mr. Bhagwan Aryal</td>
<td>Program Director, Health (NPC)</td>
<td></td>
</tr>
<tr>
<td>Mr. Atma Ram Pandey</td>
<td>Secretary, NNSC (NPC)</td>
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<tr>
<td>Dr. Ramesh Kant Adhikari</td>
<td>Professor and Head, Department of Paediatrics (KIST Medical College)</td>
<td></td>
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<tr>
<td>Dr. A.T. Sherpa</td>
<td>KIST Medical College</td>
<td></td>
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<tr>
<td>Dr. Tirtha Rana</td>
<td>Nutrition Expert, Consultant (IOM)</td>
<td></td>
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<tr>
<td>Dr. Madhu Devkota</td>
<td>Professor, Nutrition (NNA)</td>
<td></td>
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<tr>
<td>Ms. Sushila Malla</td>
<td>President, NNA</td>
<td></td>
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<tr>
<td>Dr. Amit Bhandari</td>
<td>DFID</td>
<td></td>
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<tr>
<td>Ms. Saba Mebrahtu</td>
<td>Chief of Nutrition (UNICEF)</td>
<td></td>
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<tr>
<td>Naveen Paudyal</td>
<td>Project officer, UNICEF</td>
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<tr>
<td>Praduman Dahal</td>
<td>Project officer, Nutrition (UNICEF)</td>
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<tr>
<td>Anirudra Sharma</td>
<td>Project officer, UNICEF</td>
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<tr>
<td>Ms. Pooja Pandey Rana</td>
<td>Director of Programs (HKI)</td>
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<td>Mr. Debendra Adhikari</td>
<td>Health and Nutrition Officer (HKI)</td>
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<td>Mr. Robin Houston</td>
<td>Deputy Director, NFHP</td>
<td></td>
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<tr>
<td>Dr. Jaganath Sharma</td>
<td>Senior Project officer, NFHP</td>
<td></td>
</tr>
<tr>
<td>Ms. Sophiya Upreti</td>
<td>Program officer, WFP</td>
<td></td>
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<tr>
<td>Ms. Jolanda Hogenkamp</td>
<td>Director of Programs, WFP</td>
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<tr>
<td>Ms. Marina Kalisky</td>
<td>Nutrition Officer, WFP</td>
<td></td>
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<tr>
<td>Mr. Hari Koirala</td>
<td>Program Specialist, USAID</td>
<td></td>
</tr>
<tr>
<td>Anne Macaulay</td>
<td>M&amp;E Specialist, USAID</td>
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<tr>
<td>Han Kang</td>
<td>Deputy Director, HFP, USAID</td>
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<tr>
<td>Amy Prevatt</td>
<td>Food Security Expert, USAID</td>
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<tr>
<td>Ms. Latika Pradhan</td>
<td>AusAID</td>
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<td>Mr. Nastu Sharma</td>
<td>AusAID</td>
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<tr>
<td>Mr. Ashok Bhurtyal</td>
<td>WHO</td>
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<tr>
<td>Mr. Mandip Rai</td>
<td>FAO</td>
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<tr>
<td>Dr. Maureen Dariang</td>
<td>Director, Nepal Health Sector Support Programme (NHSSP)</td>
<td></td>
</tr>
<tr>
<td>M. R. Maharjan</td>
<td>Micronutrient Initiative</td>
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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 anaemia in children, wasting and stunting. DHS does not differentiate between Far Western, Mid Western and Western Mountains. So in DHS these three regions are considered 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 1 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 1 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 no of children based on 2x severe wasting prevalence

**MNPs:** In all sub-regions with > 40% anaemia. Sub-regions with >40% anaemia: 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 recognising that anaemia 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></th>
<th>BF within 1 hour</th>
<th>Stunting</th>
<th>BMI &lt;18.5</th>
<th>Wasting</th>
<th>Anaemia</th>
<th>Phasing of Nutrition BCC</th>
<th>Phasing of CB SAM and MNPs</th>
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<td>57.3</td>
<td>12.7</td>
<td>6.1</td>
<td>32.4</td>
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<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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<td>EM</td>
<td>33.3</td>
<td>55.5</td>
<td>9.6</td>
<td>8</td>
<td>33.8</td>
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<td>CH</td>
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<td>42.4</td>
<td>13.9</td>
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<tr>
<td>FWH</td>
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<td>58.3</td>
<td>25.6</td>
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<tr>
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<td>42.1</td>
<td>26.3</td>
<td>15.7</td>
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<td>11.2</td>
<td>53.9</td>
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<td>2014</td>
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<td>49.3</td>
<td>24.4</td>
<td>12.6</td>
<td>48.4</td>
<td></td>
<td></td>
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Global cut off: <40% >20% >10% >40%

Top 3rd: >50 <47 <19
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 Districts</th>
<th>Prev of SAM (prev)</th>
<th>No of SAM (incidence)</th>
<th>&gt;40% anaemia Districts</th>
<th>No of children 6-24 months</th>
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<tbody>
<tr>
<td>Nutrition BCC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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>443</td>
<td>887</td>
<td>14,778</td>
</tr>
<tr>
<td>Central mountain</td>
<td>3</td>
<td>49,260</td>
<td>0</td>
<td>0.0%</td>
<td>-</td>
<td>-</td>
<td>14,778</td>
</tr>
<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>92,415</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>3,466</td>
<td>6,931</td>
<td>103,967</td>
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<tr>
<td>Western hill</td>
<td>11</td>
<td>423,569</td>
<td>0</td>
<td>1.0%</td>
<td>4,236</td>
<td>8,471</td>
<td>127,071</td>
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<tr>
<td>Mid-western hill</td>
<td>7</td>
<td>269,544</td>
<td>0</td>
<td>2.4%</td>
<td>6,469</td>
<td>12,938</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>433,872</td>
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</table>

| CMAM and MNPs               |                 |                   |                         |                   |                       |                         |                           |
| Far-west mountain           | 3               | 49,260            | 1                       | 4.7%              | 2,315                 | 4,630                   | 14,778                    |
| Mid-west mountain           | 5               | 82,100            | 1                       | 4.7%              | 3,859                 | 7,717                   | 24,630                    |
| Western mountain            | 2               | 32,840            | 1                       | 4.7%              | 1,543                 | 3,087                   | 9,852                     |
| Far-western hill            | 4               | 154,025           | 1                       | 4.4%              | 6,777                 | 13,554                  | 46,208                    |
| Eastern terai               | 5               | 447,623           | 1                       | 0.7%              | 3,133                 | 6,267                   | 134,287                   |
| Central terai               | 7               | 626,672           | 1                       | 4.6%              | 28,827                | 57,654                  | 188,002                   |
| Western terai               | 3               | 268,574           | 1                       | 4.2%              | 11,280                | 22,560                  | 80,572                    |
| Mid-western terai           | 3               | 268,574           | 1                       | 3.7%              | 9,937                 | 19,874                  | 80,572                    |
| Far-western terai           | 2               | 179,049           | 1                       | 4.8%              | 8,594                 | 17,189                  | 53,715                    |
| Sub total for CMAM and MNPs | 34              | 2,108,718         | 9                       | 3.9%              | 76,267                | 152,533                 | 632,615                   |

| Phasing by year:            | 2012            | 2013              | 2014                     |                   |                       |                         |                           |
| Total US                    |                 |                   |                         |                   |                       |                         |                           |
| Total US CMAM MNPs Nut BCC |                 |                   |                         |                   |                       |                         |                           |
| Far-west mountain           | 32,840          | 3,087             | 9,852                    |                   |                       |                         |                           |
| Mid-west mountain           | 82,100          | 7,717             | 24,630                   |                   |                       |                         |                           |
| Western mountain            | 32,840          | 7,717             | 24,630                   |                   |                       |                         |                           |
| Far-western hill            | 447,623         | 6,267             | 134,287                  |                   |                       |                         |                           |
| Eastern terai               | 154,025         | 13,554            | 46,208                   |                   |                       |                         |                           |
| Central terai               | 268,574         | 22,560            | 80,572                   |                   |                       |                         |                           |
| Western terai               | 268,574         | 19,874            | 80,572                   |                   |                       |                         |                           |
| Far-western terai           | 179,049         | 17,189            | 53,715                   |                   |                       |                         |                           |
| Eastern mountain            | 346,557         | 308,050           |                         |                   |                       |                         |                           |
| Central mountain            | 423,569         | 269,544           |                         |                   |                       |                         |                           |
| Western hill                | 2012            | 2013              | 2014                     |                   |                       |                         |                           |
| Total 805,722               | 74,843          | 241,717           | 734,621                  | 691,173           | 55,989                | 207,352                  | 731,620                   |
| % of Total Target           | 23%             | 49%               | 49%                      | 19%               | 37%                   | 33%                      | 51%                       |
| No of districts             | 9               | 9                 | 22                       | 10                 | 10                    | 19                       | 15                        |

Population Estimates (2011, medium fertility variant, CBS)

<table>
<thead>
<tr>
<th>Region</th>
<th>0-4 population</th>
<th>No of districts</th>
<th>Av pop/district</th>
</tr>
</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>19</td>
<td>82,506</td>
</tr>
<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>
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</table>

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 16-17 March and 19 May 2011, iii) provided comments to drafts of the report.

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- Amrit Gurung – Programme Officer, WFP
- Siti Halati – Programme Officer, World Food Programme
- Ashok Bhurtyal - WHO
- Macha Raja Maharjan – Director, MI Nepal
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- Stephanie Suhowatsky – Jhpiego
- Neena Khadka – Save the Children
- Neera Sharma – Save the Children
- Mark Arnoldy – Fullbright 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