PART 2: EFFECTIVE PROGRAM INTERVENTIONS HAVING AN IMPACT ON UNDERNUTRITION

I. EVIDENCE FOR EFFECTIVE INTERVENTIONS: GUIDELINES, SYSTEMATIC REVIEWS, AND SELECTED RECENT REPORTS

- **A. Lancet MCH/Nutrition Series. p. 3-8**
- **B. World Bank p. 9-28**
- **C. WHO ENA & eLENA p. 29-36**
- **D. UN Decade of Action on Nutrition**
- **E. USAID, USDA & USG**

II. NUTRITION-SPECIFIC STRATEGIES AND PROGRAMS

- **A. Food incentives for TB treatment & adherence**
- **B. Direct food aid, commodity food distribution, agricultural surplus**
- **C. Nutrition targeting pregnancy and early childhood**
  1. **Maternal nutrition**
  2. **Maternal nutrition education**
  3. **Breastfeeding - exclusive breastfeeding to 6 m.**
  4. **Transitional feeding with continued breastfeeding to 24 m.**
- **D. Adolescent health**
- **E. Cash transfer / micro-finance**
- **F. Examples, Case Studies, Successful Programs**
  1. **WHO 2013 review of 32 programs**
  2. **WHO 2013 case studies of 32 programs**
  3. **Cash transfer programs**
  4. **Nutrition for Growth**
  5. **World Bank 2006 - success cases**
  6. **World Bank 2013 - Kenya / HSNP**
  7. **USAID**

III. IMPACT OF COVID-19

IV. TB- SPECIFIC & IMPLEMENTATION CONSIDERATIONS

- **A. Practicable under TB program conditions**
- **B. Types of nutrients and costs**
- **C. Impact on TB**
- **D. Impact on health other than TB**
- **E. Impact of Covid-19 on nutrition**
- **F. Key obstacles and how to address them**
- **G. Potential partners / stakeholders for implementation**
- **H. Potential interventions / pilot projects strategies and designs**

PART 2: EFFECTIVE PROGRAM INTERVENTIONS TARGETING UNDERNUTRITION

(Non-emergency situations, excludes famine and emergency relief)

I. SYSTEMATIC REVIEWS AND SELECTED RECENT REPORTS ON EFFECTIVE NUTRITION INTERVENTIONS

A. LANCET SERIES ON NUTRITION

1. What works? Interventions for maternal and child undernutrition and survival

*Bhutta ZA, et al. Lancet. **2008** Feb 2;371(9610):417-40. doi: 10.1016/S0140-6736(07)61693-6. PMID: 18206226*

We reviewed interventions that affect maternal and child undernutrition and nutrition-related outcomes. These interventions included promotion of breastfeeding; strategies to promote complementary feeding, with or without provision of food supplements; micronutrient interventions; general supportive strategies to improve family and community nutrition; and reduction of disease burden (promotion of handwashing and strategies to reduce the burden of malaria in pregnancy).

- Strategies for breastfeeding promotion have a large effect on survival, their effect on stunting is small.
- In populations with sufficient food, education about complementary feeding increased height-for-age Z score by 0.25 (95% CI 0.01-0.49)
- In populations with insufficient food, provision of food supplements (with or without education) increased height-for-age Z score by 0.41 (0.05-0.76).
- Management of severe acute malnutrition according to WHO guidelines reduced the case-fatality rate by 55% (risk ratio 0.45, 0.32-0.62), and recent studies suggest that newer commodities, such as ready-to-use therapeutic foods, can be used to manage severe acute malnutrition in community settings.
- Effective micronutrient interventions for pregnant women included supplementation with iron folate (which increased hemoglobin at term by 12 g/L, 2.93-21.07) and micronutrients (which reduced the risk of low birthweight at term by 16%, relative risk 0.84, 0.74-0.95).
- Recommended micronutrient interventions for children included strategies for supplementation of vitamin A (in the neonatal period and late infancy), preventive zinc supplements, iron supplements for children in areas where malaria is not endemic, and universal promotion of iodized salt.

We used a cohort model to assess the potential effect of these interventions on mothers and children in the 36 countries that have 90% of children with stunted linear growth. The model showed that existing interventions that were designed to improve nutrition and prevent related disease could reduce stunting at 36 months by 36%; mortality between birth and 36 months by about 25%; and disability-adjusted life-years associated with stunting, severe wasting, intrauterine growth restriction, and micronutrient deficiencies by about 25%. To eliminate stunting in the longer term, these interventions should be supplemented by improvements in the underlying determinants of undernutrition, such as poverty, poor education, disease burden, and lack of women's empowerment.

2. Effective international action against undernutrition: why has it proven so difficult and what can be done to accelerate progress?

*Saul S Morris, et al. for the Maternal and Child Undernutrition Study Group. Lancet **2008**; 371: 608–21 doi: 10.1016/S0140- 6736(07)61695-X*

Many transnational organizations work to support efforts to eliminate maternal and child undernutrition in high-burden countries. Financial, intellectual, and personal linkages bind these organizations loosely together as components of an

international nutrition system. In this paper, we argue that such a system should deliver in four functional areas: stewardship, mobilization of financial resources, direct provision of nutrition services at times of natural disaster or conflict, and human and institutional resource strengthening. We review quantitative and qualitative data from various sources to assess the performance of the system in each of these areas, and find substantial shortcomings. Fragmentation, lack of an evidence base for prioritized action, institutional inertia, and failure to join up with promising developments in parallel sectors are recurrent themes. Many of these weaknesses can be attributed to systemic problems affecting most organizations working in the field; these are analyzed using a problem tree approach. We also make recommendations to overcome some of the most important problems, and we propose five priority actions for the development of a new international architecture.

3. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost?

Bhutta ZA, et al. Lancet Nutrition Interventions Review Group, the Maternal and Child Nutrition Study Group. Lancet. ***2013*** *Aug 3;382(9890):452-477. doi: 10.1016/S0140-6736(13)60996-4.. Erratum: Lancet. 2013 Aug 3;382(9890):396.*

Thanks to progress with interventions implemented at scale and further evidence since the 2008 Lancet Series on Maternal and Child Undernutrition, that report was comprehensively updated in 2013 using standard methods to assess emerging new evidence for delivery platforms. We modeled the effect on lives saved and cost of these interventions in 34 countries having 90% of the world's children with stunted growth. We also examined the effect of various delivery platforms and delivery options using community health workers to engage poor populations and promote behavior change, access and uptake of interventions. Our analysis suggests the current total of deaths in children younger than 5 years can be reduced by 15% if populations can access ten evidence-based nutrition interventions at 90% coverage. Additionally, access to and uptake of iodized salt can improve health outcomes. The estimated total additional annual cost for scaling up access to these ten direct nutrition interventions in the 34 focus countries is Int$9·6 billion per year. If this improved access is Linking to nutrition-sensitive approaches in other sectors—e.g., agriculture, food systems, education, education of girls and women's empowerment, social protection and safety nets--can greatly accelerate progress.

Selection of interventions for review

We selected several nutrition-specific interventions across the lifecycle for assessment of evidence of benefit (figure 1) with special attention to those affecting adolescents, women of reproductive age, pregnant women, newborn babies, infants, and children. We also reviewed the evidence for delivery platforms for nutrition interventions and other emerging interventions of interest for nutrition of women and children. We identified and relied on the most recent reviews with good quality methods for all interventions and updated the evidence by incorporating newer studies, when available. For other identified interventions, when we did not find any relevant review, we did a de-novo review using the methodology described in panel 1.5 Additionally, we consulted the electronic library on nutrition actions (eLENA) for existing evidence used by WHO for development of guidelines and policies for action. Interventions were classified into the following categories and reviewed in the corresponding second-level subcategories as enumerated below. One can find the specific risk ratios (95%CL) for each intervention in each group for each outcome at: doi: 10.1016/S0140-6736(13)60996-4. PMID: 23746776.

Effective Interventions

Based on systematic reviews and meta-analysis of all available randomized controlled trials and, in some cases, quasi-experimental studies, the following interventions have consistently proven to be effective. These effects are summarized for each intervention and population group in the tables that follow. All of the statistics, methods and complete results are available at doi: 10.1016/S0140-6736(13)60996-4. PMID: 23746776.

Effective interventions in women of reproductive age and during pregnancy (Table 1)

- Folic acid supplementation
- Iron or iron+folic acid supplementation
- Maternal multiple micronutrient supplementation
- Maternal calcium supplementation
- Maternal iodine supplementation / fortification
- Balanced energy and protein supplementation for Maternal wasting and food insecurity

Effective Nutrition interventions in neonates (Table 2)

- Delayed cord clamping
- Neonatal vitamin K administration

- Neonatal vitamin A supplementation
- Kangaroo mother care

Table 1. Evidence-base for nutrition interventions for women of reproductive age and during pregnancy

Nutrient & population	Evidence reviewed	Estimates of effect
Folic acid supplementation		
Women of reproductive age	Sys. review 5 trials periconceptual folic acid supplementation	Reduced neural tube defects RR 0.28, 95% CI 0.15–0.52, recurrence of NTDs RR 0.32, 95% CI 0.17–0.60
Pregnant women	Systematic review of 31 trials	Increased mean birthweight mean difference 136 gm, 95% CI 48–224, reduced incidence of megaloblastic anaemia RR 0.21, 95% CI 0.11–0.38
Iron & iron-folate supplementation		
Women of reproductive age	Systematic review of 21 RCTs and quasi-experimental studies	Intermittent iron supplementation : reduced anaemia (RR 0.73, 95% CI 0.56–0.95), increased serum hemoglobin concentration (MD 4.58 g/L, 95% CI 2.56–6.59) and serum ferritin concentration (MD 8.32, 95% CI 4.97–11.66)
Pregnant women	Systematic review of 43 RCTs and quasi-experimental studies (34 iron alone, 8 iron-folate)	Daily iron-alone supplementation : reduced low birthweight (RR 0.81, 95% CI 0.68–0.97), increased birthweight (MD 30.81 g, 95% CI 5.94–55.68) and hemoglobin concentration at term (MD 8.88 g/L, 95% CI 6.96–10.80), reduced anemia at term (RR 0.30, 95% CI 0.19–0.46), iron deficiency (RR 0.43, 95% CI 0.27–0.66), iron deficiency anemia (RR 0.33, 95% CI 0.16–0.69), but had some side-effects (RR 2.36, 95% CI 0.96–5.82) Iron-folate supplementation : increased birthweight (MD 57.7 g, 95% CI 7.66–107.79), reduced anemia at term (RR 0.34, 95% CI 0.21–0.54), increased serum hemoglobin concentration at term (MD 16.13 g/L, 95% CI 12.74–19.52)
Multiple micronutrient supplementation		
Pregnant women	Systematic review of 21 RCTs	Reduced low birthweight (RR 0.88, 95% CI 0.85–0.91), reduced small-for-gestational-age (SGA) (RR 0.89, 95% CI 0.83–0.96), and reduced preterm birth (RR 0.97, 95% CI 0.94–0.99)
Calcium supplementation		
Pregnant women	Systematic review of 15 RCTs	Reduced pre-eclampsia (RR 0.48, 95% CI 0.34–0.67), birthweight 85 g (95% CI 37–133) and preterm birth (RR 0.76, 95% CI 0.60–0.97)
Iodine: salt iodization		
Pregnant women	Systematic review of 5 RCTs	Reduced cretinism at 4 years of age (RR 0.27, 95% CI 0.12–0.60), improved developmental scores 10–20% higher in young children, birthweight 3.82–6.30% higher
Maternal balanced energy protein supprementation		
Pregnant women	Systematic review of 16 RCTs and quasi-experimental studies	Reduced SGA (RR 0.66, 95% CI 0.49–0.89), stillbirths (RR 0.62, 95% CI 0.40–0.98, birthweight (MD 73g, 95% CI 30–117)
Adapted from: Bhutta ZA, et al. Lancet 2013;382(9890):452-477		

Effective Nutrition interventions in infants and children (Table 3)
- Promotion of breastfeeding and supportive strategies
- Promotion of dietary diversity and complementary feeding
- Vitamin A supplementation in children
- Iron supplementation in infants and children
- Multiple micronutrient supplementation in children
- Preventive zinc supplementation in children

Disease prevention and management
- WASH
- Deworming, maternal, child
- Feeding practices in diarrhea
- Zinc therapy for diarrhea
- IPTp/ITN for malaria in pregnancy
- Malaria prophylaxis in childrenPrevention and treatment of severe acute malnutrition
- Facility-based management of SAM according to the WHO protocol
- Community-based management of SAM & MAM

Delivery platforms and strategies for implementation of nutrition-specific interventions
- Fortification of staple foods and specific foods
- Cash transfer programs
- Community-based platforms for nutrition education and promotion
- Integrated management of childhood illnesses
- School-based delivery platforms
- Child health days

Emerging interventions that need further evidence
- reduce household air pollution,
- maternal vitamin D supplementation,
- maternal zinc supplementation,
- omega 3 fatty acids
- supplementation in pregnancy,
- antenatal psycho social assessment and cognitive behavior therapy for depression,
- emollient and massage therapy for preterm infants,
- vitamin D supplementation in children,
- zinc therapy for pneumonia, and
- lipid-based nutrient supplements.
- Some of the evidence around these interventions is summarized in panel 5 of the original report.

Modeling the effect of scaling up nutrition interventions in countries with the highest burden (Table 5)
We used the Lives Saved Tool (LiST) to model the potential effect on child health and mortality in 2012 of scaling up a set of ten nutrition-specific interventions that could affect stunting and severe wasting. Although included in costing, we did not model the promotion and use of iodized salt. Our model suggested that if these ten nutrition interventions were scaled up to 90% coverage, mortality in children younger than 5 years could be reduced by 15% (range 9–19), with a 35% (19–43) reduction in diarrhea specific mortality, a 29% (16–37) reduction in pneumonia specific mortality, and a 39% (23–47) reduction in measles-specific mortality (figure 4). The analysis also showed fewer deaths attributable to congenital anomalies and birth asphyxia related to periconceptual folic acid use and a reduction in SGA (figure 4; appendix pp 23–24). This scale up had a little effect on maternal mortality (data not shown). Scaling up of all ten interventions to 90% coverage was also associated with a mean 20.3% (range 10.2–28.9) reduction in stunting and a 61.4% (35.7–72) reduction in severe wasting. The maximum effect for severe wasting was noted in children in the 12–23 months age group (appendix p 25). The analysis suggested that the interventions with the largest potential effect on mortality in children younger than 5 years are management of SAM, preventive zinc supplementation, and promotion of breastfeeding (figure 5). Analysis of community support strategies for breastfeeding suggested that achieving 90% coverage of breastfeeding promotion could increase exclusive breastfeeding by 15% (7–22) in children younger than 1 month and by 20% (13–26) in children aged 1–5 months.

Implementation of nutrition-specific packages of care (Table 5)
We also assessed the potential effect of nutrition-specific packages of care by scaling up these interventions to 90% coverage. Four packages were assessed for effect on child survival: optimum maternal nutrition during pregnancy (maternal multiple micronutrients, use of iodised salt, calcium, and balanced energy protein supplementation), an infant and young child nutrition package (breast feeding promotion and appropriate complementary feeding education or provision), micronutrient supplementation (preventive zinc and vitamin A supplementation), and management of acute malnutrition (management of MAM, management of SAM). Analysis of these nutrition-specific packages showed that the most lives could be saved by the therapeutic feeding for severe acute malnutrition, followed by the infant and young child nutrition package (table 5).

Cost analysis (Table 6)
Our analysis shows that the estimated total additional cost involved to achieve 90% coverage of the population in need in the 34 focus countries with the selected set of ten nutrition interventions is Int$9.6 billion per annum (table 6). Of this $9.6 billion, $3.7 billion (39%) is for micronutrient interventions, $0.9 billion (9%) for educational interventions, and $2.6 billion (27%) for SAM management. The amount required for provision of supplementary food for pregnant women and

Table 2. Evidence reviewed for nutrition interventions in neonates

Nutrient & population	Evidence reviewed	Estimates of effect
Delayed cord clamping		
Term neonates	Systematic review of 11 RCTs	Increased newborn hemoglobin concentration (MD 2.17 g/dL, 95% CI 0.28–4.06), but associated with an increased requirement for phototherapy for jaundice
Preterm neonates	Systematic review of 15 RCTs	Reduced need for blood transfusion (RR 0.61, 95% CI 0.46–0.81), decrease in intraventricular hemorrhage (RR 0.59, 95% CI 0.41–0.85), reduced risk of necrotising enterocolitis (RR 0.62, 95% CI 0.43–0.90), but peak bilirubin concentration higher with delayed cord clamping (MD 15.01 mmol/L, 95% CI 5.62–24.40)
Neonatal vitamin K administration		
Neonates	Systematic review 2 RCTs for i.m. vitamin K and 11 RCTs for oral vitamin K	One dose of intramuscular vitamin K reduced clinical bleeding at 1–7 days and improved biochemical indices of coagulation status. Oral vitamin K also improved coagulation status
Vitamin A supplementation		
Very low birthweight infants	Systematic review of 9 RCTs	Reduced number of deaths and oxygen requirement at 1 month of age.
Term neonates	Systematic review of 5 RCTs and quasi-experimental studies	Reduction in infant mortality at 6 months (RR 0.86, 95% CI 0.77–0.97)
Kangaroo mother care for promotion of breastfeeding and care of preterm and SGA infants		
Healthy neonates	Systematic review of 34 RCTs44	Increase in breastfeeding at 1–4 months after birth (RR 1.27, 95% CI 1.06–1.53), increased breastfeeding duration (MD 42.55 days, 95% CI 1.69–86.79)
Preterm neonates	Systematic review of 16 RCTs45	Reduction in the risk of mortality (RR 0.60, 95% CI 0.39–0.93), reduction in nosocomial infection and sepsis (RR 0.42, 95% CI 0.24–0.73), reduction in hypothermia (RR 0.23, 95% CI 0.10–0.55), reduced length of hospital stay (MD 2.4 days, 95% CI 0.7–4.1)
Adapted from: Bhutta ZA, et al. Lancet 2013;382(9890):452-477		

Table 3. Evidence reviewed for nutrition interventions in infants and children

Nutrient & population	Evidence reviewed	Estimates of effect
Breast feeding promotion in infants	Systematic review of 110 RCTs and quasi-experimental studies	Educational or counseling interventions : increased EBF by 43% (95% CI 9–87) at day 1, by 30% (19–42) till 1 month, and by 90% (54–134) from 1–6 months. Reduced rates of no breastfeeding; 32% (13–46) at day 1, 30% (20–38) 0–1 month, and 18% (11–23) for 1–6 months
Complementary feeding promotion in children 6–24 months of age	16 RCTs and quasi-experimental studies	Nutrition education in food secure populations : increased height gain (SMD 0.35; 95% CI 0.08–0.62), HAZ (SMD 0.22; 95% CI 0.01–0.43), weight gain (SMD 0.40, 95% CI 0.02–0.78) Nutrition education in food insecure populations : improved HAZ (SMD 0.25, 95% CI 0.09–0.42), stunting (RR 0.68, 95% CI 0.60–0.76), WAZ (SMD 0.26, 95% CI 0.12–0.41) Complementary food provision with or without education in food insecure populations : HAZ (SMD 0.39, 95% CI 0.05–0.73), WAZ (SMD 0.26, 95% CI 0.04–0.48)
Preventive vitamin A supplementation in children 6 months to 5 years of age	Systematic review of 43 RCTs	Reduced all-cause mortality (RR 0.76, 95% CI 0.69–0.83), reduced diarrhea-related mortality (RR 0.72, 95% CI 0.57–0.91), reduced incidence of diarrhea (RR 0.85, 95% CI 0.82–0.87), reduced incidence of measles (RR 0.50, 95% CI 0.37–0.67)
Iron supplementation in children	Systematic review of 33 RCTs and quasi-experimental studies	Intermittent iron supplementation : decreased anaemia (RR 0.51, 95% CI 0.37–0.72), decreased iron deficiency (RR 0.24, 95% CI 0.06–0.91), increased hemoglobin concentration (MD 5.20 g/L, 95% CI 2.51–7.88), increased ferritin concentration (MD 14.17 mcg/L, 95% CI 3.53–24.81)
	Systematic review of 17 RCTs	Increased mental development score (SMD 0.30, 95% CI 0.15–0.46), increased intelligence quotient scores (≥8 years age; SMD 0.41, 95% CI 0.20–0.62)
MMN supplementation including iron in children	Systematic review of 18 trials	MMN supplementation : increased length (MD 0.13, 95% CI 0.06–0.21), increased weight (MD 0.14, 95% CI 0.03–0.25). MMN might be associated with marginal increase in fluid intelligence and academic performance in healthy school children
	Systematic review of 17 RCTs	Micronutrient powders : Reduced anaemia (RR 0.66, 95% CI 0.57–0.77), reduced iron deficiency anaemia (RR 0.43, 95% CI 0.35–0.52), reduced retinol deficiency (RR 0.79, 95% CI 0.64–0.98). Improved hemoglobin concentrations (SMD 0.98, 95% CI 0.55–1.40). MNP associated with a significant increase in diarrhea (RR 1.04, 95% CI 1.01–1.06).
Zinc supplementation in children	Systematic review of 18 RCTs	Preventive zinc supplementation : mean height improved by 0.37 cm (SD 0.25) in children supplemented for 24 weeks, diarrhea reduced by 13% (95% CI 6–19), pneumonia reduced by 19% (95% CI 10–27)
Adapted from: Bhutta ZA, et al. Lancet 2013;382(9890):452-477		

Table 5. Estimated effects of packages of nutrition interventions at 90% coverage		
Optimum maternal nutrition during pregnancy	**Number of Lives Saved**	**Cost per life-year saved**
Maternal multiple micronutrient supplements to all Calcium supplementation to mothers at risk of low intake Maternal balanced energy protein supplements as needed Universal salt iodisation	102 000 (49 000–146 000)	$571 (398–1191)
Infant and young child feeding		
Promotion of early and exclusive breastfeeding for 6 months and continued breastfeeding for up to 24 months Appropriate complementary feeding education in food secure populations and additional complementary food supplements in food insecure populations	221 000 (135 000–293 000)	$175 (132–286)
Micronutrient supplementation in children at risk		
Vitamin A supplementation between 6 and 59 months age Preventive zinc supplements between 12 and 59 months of age	145 000 (30 000–216 000)	$159 (106–766)
Management of acute malnutrition		
Management of moderate acute malnutrition Management of severe acute malnutrition	435 000 (285 000–482 000)	$125 (119–152)
Adapted from: Bhutta ZA, et al. Lancet 2013;382(9890):452-477		

for children aged 6–23 months in poor households (those with <$1.25 per person per day) constitutes the remaining $2.3 billion (24%). When these costs are broken down by region, $3.4 billion is needed in the 20 countries included from sub-Saharan Africa, $4.8 billion in the four in south Asia plus Myanmar (Burma), $1.0 billion for the six in eastern Mediterranean, and $0.5 billion for the three remaining countries (Vietnam and the Philippines in western Pacific region, plus Guatemala; appendix p 32). The $9.6 billion estimate for the nutrition interventions is lower than the 2008 SUN estimate of $11.8 billion.194 The SUN figure included $1.2 billion for capacity building and monitoring and assessment, which we excluded from the present analysis because we do not have a mechanism to allocate this cost by region or country and category.

Table 6. Total additional annual cost of achieving 90% coverage with nutrition interventions, excluding management of moderate acute malnutrition, in 34 countries with more than 90% of the burden	
Nutrient & population	**Cost (US$ millions)**
Salt iodisation	$68
Multiple micronutrient supplementation in pregnancy (includes iron-folate)	$472
Calcium supplementation in pregnancy	$1914
Energy-protein supplementation in pregnancy	$972
Vitamin A supplementation in childhood	$106
Zinc supplementation in childhood	$1182
Breastfeeding promotion	$653
Complementary feeding education	$269
Complementary food supplementation	$1359
SAM management	$2563
Total	$9559
Adapted from: Bhutta ZA, et al. Lancet 2013;382(9890):452-477	

B. WORLD BANK

Primary sources:

1. **2006 Repositioning Nutrition as Central to Development**
2. **2010 Scaling Up Nutrition:What Will it Cost?**
3. **2014 Learning from World Bank History (Agriculture)**
4. **2017 An Investment Framework for Nutrition**

Citations for primary World Bank sources

1. 2006: **Repositioning Nutrition as Central to Development: A Strategy for Large-Scale Action Overview.** *The World Bank, Directions In Development Series. Washington, DC: International Bank for Reconstruction and Development / The World Bank, 2006.*

2. 2010: **Scaling Up Nutrition:What Will it Cost?** *Horton, S., M. Shekar, C. McDonald, A. Mahal, and J. K. Brooks. Directions in Development Series. Washington, DC: World Bank, 2010.*

3. 2014: **Learning from World Bank History: Agriculture and Food-Based Approaches for Addressing Malnutrition.** *World Bank. World Bank Report Number 88740-Glb. Washington, DC: International Bank for Reconstruction and Development / The World Bank, 2014.*

4. 2017: **An Investment Framework for Nutrition: Reaching the Global Targets for Stunting, Anemia, Breastfeeding, and Wasting**. *Meera Shekar, Jakub Kakietek, Julia Dayton Eberwein, and Dylan Walters. Directions in Development Series. Washington, DC: International Bank for Reconstruction and Development / The World Bank, 2017.*

1. World Bank 2006: Repositioning Nutrition as Central to Development: A Strategy for Large-Scale Action Overview

*The World Bank, Directions In Development Series. Washington, DC: International Bank for Reconstruction and Development / The World Bank, **2006**.*

This report summarizes the epidemiology of malnutrition, its causes and consequences, its impact on individual and national development, and identifies "short" and "long" routes to better nutrition. These provide a useful summary of the categories of nutrition-specific and nutrition-sensitive actions that were later demonstrated to be effective through systematic reviews / meta-analyses of RCTs (summarized in this section). The summary table is reproduced on the next page.

This report makes the economic arguments and the investment case for investing in nutrition. By setting out the World Bank's position and priorities, it was the pivotal work among the World Bank's nutrition-related research and reports, signaling its focus on nutrition for development. In terms of evidence for specific effective nutrition interventions, unlike later works, this report describes program experience with specified interventions, integrating narrative comparisons with published evidence. Therefore, germane sections of World Bank 2006 are described in more detail below in section VIII. Nutrition-Specific Strategies and Programs and in Section IX. Examples, Case Studies, Successful Programs.

Table 3.1 Routes to better nutrition

Supply-side incentives	*Demand-side incentives*	*Demand-side behavior change*
Long routes		
• Primary health services (such as family planning) and infectious disease control • Safe water and sanitation • Policies on marketing breast milk substitutes • Food and agricultural policies to increase supply of safe and healthy food, or of healthier foods • Food industry development and market incentives (disincentives) for developing healthy (unhealthy) food • Fruit and vegetable production • Parks, bike paths, recreation centers	• Economic development (incomes of the poor) • Participatory programs and policy development • Employment creation • Fiscal and food price policies to increase poor peoples' purchasing power for the right kind of foods • Marketing regulation of unhealthy foods	• Improving women's status • Reducing women's workload, especially in pregnancy • Increasing women's education
Short routes		
• Community-based nutrition and health services (community growth promotion programs, community Integrated Management of Childhood Illnesses [C-IMCI]) • Facility-based nutrition and health services (health and nutrition services, and antenatal care) • Micronutrient supplements • Micronutrient fortification • Targeted food aid • Biofortification	• Conditional cash transfers • Microcredit cum nutrition education • Food supplementation • Micronutrient supplements • Food stamps • Targeted food aid	• Maternal nutrition, knowledge, and care-seeking during pregnancy and lactation • Infant and young child feeding • Weight control education • Hygiene education • Promoting healthy life styles (increase physical activity; consume more fruits and vegetables and less salt, sugar, and fat, and so on)

Map 2.1 The 36 Countries with the Highest Burden of Undernutrition and 32 Smaller High-Burden Countries with Rates of Child Stunting or Underweight Greater Than 20 Percent

2. World Bank 2010: Scaling Up Nutrition: What Will it Cost?

*Horton, S., M. Shekar, C. McDonald, A. Mahal, and J. K. Brooks. Directions in Development Series. Washington, DC: World Bank, **2010**.*

What resources are needed to fight undernutrition? This report offers a preliminary answer by estimating the cost of scaling up a minimal package of 13 proven nutrition interventions from current coverage levels to full coverage of the target populations in the 36 countries with the highest burden of undernutrition (see map, next page). These countries account for 90 percent of stunted growth in children. Adding another 32 smaller high-burden countries with levels of stunting and/or underweight exceeding 20 percent would increase these cost estimates by 6 percent.

This report focuses on the costs of scaling up nutrition programs identified by the 2008 Lancet series on maternal and child undernutrition (Black et al. 2008). The cost of different delivery platforms is calculated separately to allow for increased flexibility in applying these estimates to different settings. To the extent possible, these estimates are accompanied by estimates of the cost of inaction (benefits forgone by pursuing a "business as usual" scenario) based on a review of the literature.

The majority of interventions costed here can be delivered using three main delivery platforms—primary health care, market-based mechanisms, and community nutrition programs. The primary health care system includes antenatal and delivery care, neonatal programs and extension efforts such as child health days. Other interventions such as food fortification use market-based mechanisms for delivery, but will need some investments through the public sector for regulation and policy changes. A third critical delivery platform for nutrition is community nutrition programs. We include here costs for the market-based mechanisms and for community nutrition programs because they are not covered by other sectors or programs. Although conditional cash transfers can be used to support nutrition improvement, we have covered the supply-side costs of these programs, but have not included the cost of the actual cash transfers in our estimates, since they often aim to address multiple objectives. However, in situations where conditional cash transfers are instituted, incorporating components which strengthen the demand for nutrition services is highly desirable.

Program experience methodology: Renewed Efforts Against Childhood Hunger, or REACH (2008), uses the program experience approach to estimate nutrition program costs. Their estimate for a dozen interventions (five direct nutrition

Table 1.2 Annual unit costs of nutrition programs

Intervention	*Unit cost per participant ($)*
Community-based growth promotion[a]	1.60–10.00 without supplementary food 11.00–18.00 with targeted supplementary feeding
Food supplementation[b]	36.00–172.00 to provide 1,000 Kcal/day
Early child development/child care[c]	250.00–412.00 with food (Bolivia) 2.00–3.00 without food (Uganda)
Nutrition education[d]	2.50
Breastfeeding promotion in hospitals[e]	0.30–0.40 if infant formula removed from maternity 2.00–3.00 if not
Microcredit cum nutrition education[f]	0.90–3.50 (cost of nutrition education only)
Conditional cash transfers[g]	70.00–77.00
Vitamin A supplements to preschool children[h]	1.01–2.55
Vitamin A fortification of sugar[i]	0.69–0.98
Iron supplementation[j]	0.55–3.17
Salt iodization[k]	0.20–0.50

interventions, five interventions to improve diarrhea/parasite control, plus two measures directed at household food security) is US$36 per year per child under five years of age, excluding the conditional cash transfers needed to increase household food security. When full program costs are included, this estimate increases to US$47 per year per child (i.e., when fortification costs, which benefit the whole population, are attributed only to children under five years of age). With conditional cash transfers included, the costs rise to US$47–104 per child under five years of age ("direct costs") and US$75–217 ("full program costs")

South Asia accounts for more than half of the annual estimated financing needs (US$5.90 billion), followed by Sub-Saharan Africa (US$2.78 billion), with the balance for East Asia and Pacific (US$1.07 billion), Latin America and the Caribbean (US$0.15 billion), Middle East and North Africa (US$0.56 billion) and Europe and Central Asia (US$0.13 billion). In addition, US$0.5 billion is required for technical assistance for iron fortification of staple foods and salt iodization, US$1.0 billion for regional and country-level capacity development for program delivery, US$0.2 billion for monitoring and evaluation and operations research and technical support for program delivery across all regions. Thus, the total estimated financing needs are of the order of US$11.8 billion, of which approximately US$1.5 billion is expected to be raised from private resources (see figure ES.1), and the financing gap of US$10.3 billion would be needed from public resources, including national governments and donors.

A Program of Proven Interventions (see T2.3, T2.4)

The 13 direct nutrition interventions selected for this costing exercise have ***demonstrated effectiveness in many countries*** by reducing child mortality, improving nutrition outcomes, and protecting human capital. The interventions fall into three broad groups:

- ***Behavior change interventions*** that include promotion of breastfeeding, appropriate complementary feeding practices (excluding provision of food), and proper hygiene, specifically hand-washing. It is assumed that the majority of these

services are delivered one-on-one at the community level through platforms such as community nutrition programs (Mason et al. 2006).

- ***Micronutrient and deworming interventions*** that provide a range of supplements for children under the age of five (periodic vitamin A supplements, therapeutic zinc supplements to manage diarrhea, multiple micronutrient powders, and deworming drugs); for pregnant women (iron-folic acid supplements, as well as iodized oil capsules where iodized salt is not available); and for the general population (iron fortification of staple foods and salt iodization).
- ***Complementary and therapeutic feeding interventions*** that provide micronutrient-fortified and/or -enhanced complementary foods for the prevention and treatment of moderate malnutrition among children 6–23 months of age, and community-based management of severe acute malnutrition among children under five years of age.

This set of interventions was agreed upon with partners in a side meeting organized at the UNICEF Innocenti Research Centre in September 2008 (see next page). These interventions represent a modified package of the interventions listed in the 2008 Lancet undernutrition series. Some new interventions have been added based on emerging evidence since the Lancet series was published. Other interventions have been deferred for now because there are no clear protocols for the interventions, data on compliance and delivery mechanisms are unclear, no cost data exist to estimate scaling-up costs, or because capacities for scaling up are still to be developed. As these interventions are added, additional benefits will accrue. Most of these interventions need to be implemented in partnership with the health sector and will complement the efforts at health systems strengthening that are currently underway in many countries.

Methodology Based on Experience

These estimates are based on the actual costs of current programs, adjusted to allow for cost variations across regions using multipliers based on WHO data. As far as possible, delivery costs for the proposed interventions are based on documented field-generated numbers and experience. A little less than half of the total US$11.8 billion is needed for nutrition education and delivery mechanisms (of which salaries are a large component); less than half is for targeted food supplements, micronutrients, and deworming medication; and the rest is for capacity development, monitoring and evaluation, operations research for program delivery, and technical assistance.

The majority of interventions costed here can be delivered using the primary health care system, supplemented through outreach efforts, community nutrition programs, and child health days. For these programs and interventions, it is critical to build strong links with ongoing efforts for health systems strengthening. Other costed interventions, such as food fortification, use market-based mechanisms for delivery, but will need some investment through the public sector for regulation and policy changes. The following two paragraphs in smaller font explain what was not included in these estimates.

Although conditional cash transfers can be used to support nutrition, we have included the supply-side costs of these programs, but have not included the cost of the actual cash transfers in our estimates, because they often aim to address multiple objectives. However, in situations where conditional cash transfers are instituted, incorporating components that strengthen the demand for nutrition services is highly desirable.

Assumptions about Coverage and Delivery

The financing needs estimated here are based on increasing coverage from current levels to 100 percent of the target populations (except treatment of severe acute malnutrition for which 80 percent is considered the currently feasible maximum). We recognize that in practice these investments are, at best, likely to reach only 90 percent of the target populations, because it is difficult and expensive to reach the last 10 percent of households. However, we also believe that stronger links with health systems strengthening efforts will allow for greater coverage than previously feasible. The relative costs of reaching the last 20% and 10% of the population were estimated by Mulligan et al. in 2005 and by The Micronutrient Initiative in 2007 (refs).

We include delivery costs in the unit costs and provide information separately on the costs of the capsules, micronutrient powders, and other inputs. Typically, delivery costs account for the majority of expenditures for interventions targeting

individuals through public provision of services, but a considerably lower proportion for fortification, which is delivered using markets. A large proportion of the delivery costs for fortification are borne by private sector and passed on to consumers.

For micronutrient interventions, we estimate that the delivery costs account for about one-third of the overall cost (96 percent for vitamin A supplements, 90 percent for iron-folic acid supplements, 20 percent for therapeutic zinc supplements, 50 percent for multiple micronutrient powders, and less than 5 percent for iron fortification and salt iodization). For community nutrition programs for behavior change, virtually all costs included are for nutrition education. For complementary feeding (the area with the least developed delivery systems and capacities for implementation) estimated delivery costs are 12 percent of the total (probably an underestimate; further research is needed), and for community-based management of acute malnutrition, 70 percent of the cost is for inputs other than food (Laurent Gadot, Médecins Sans Frontières, personal communication). Overall, a little less than half of the total US$11.8 billion estimate is for delivery mechanisms and nutrition education, less than half is for targeted food supplements, micronutrients, and deworming medication, and the rest is for capacity development, monitoring and evaluation, operations research, and technical assistance.

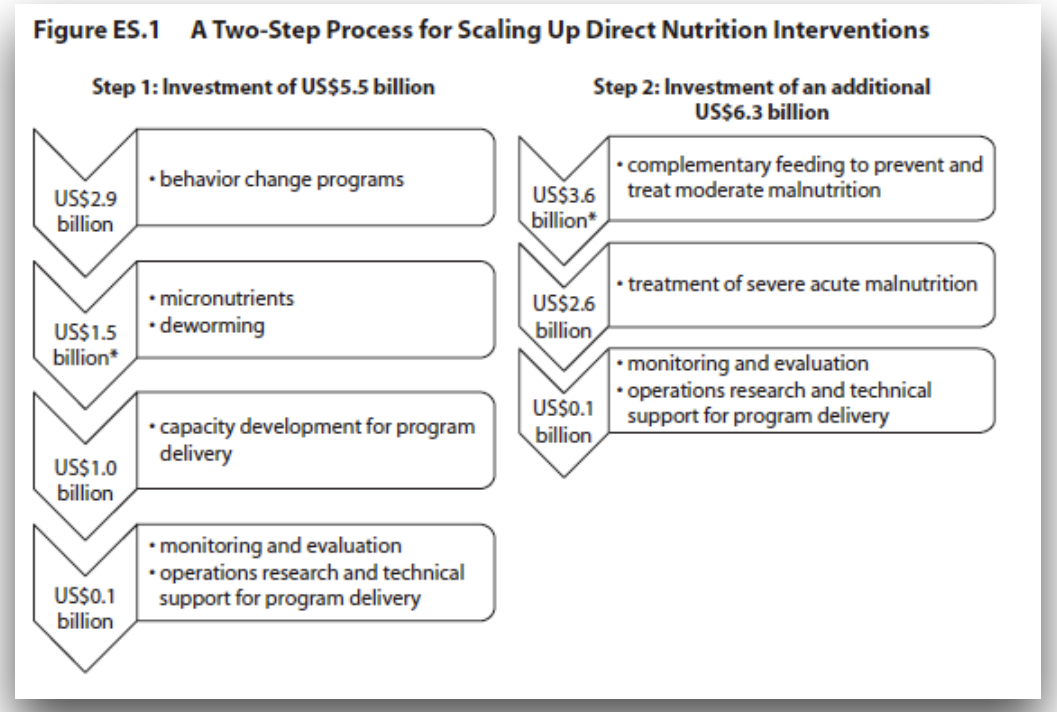
Estimated Resource Needs

We estimate the total financing needs to scale up the selected interventions to be US$11.8 billion per annum. As an overview, Of the US$11.8 billion annually, micronutrients (supplementation and fortification) and deworming account for about one-eighth of the total, community nutrition programs for one-quarter, complementary feeding for one-quarter, and treatment of severe acute malnutrition for one-fifth (figure 3.1). Of this, US$1.5 billion will be financed from private household resources, leaving an estimated financing gap of US$10.3 billion from public resources. Cost-per-child estimates are detailed below.

Given our estimate of the target population of 356 million children under the age of five in the 36 countries, our estimates translate to an annual additional cost of US$30 per child from public resources. This compares to an annual additional cost of US$36 per child estimated by REACH (2008), including delivery costs and not including costs of conditional cash transfers. In both cases the estimates do not include the cost of fortification for the population five years of age and older.

We propose that the scale-up process occurs in two steps:

Figure ES.1 A Two-Step Process for Scaling Up Direct Nutrition Interventions



Step 1, which will distribute slightly less than half of the total annual investment (US$5.5 billion), includes US$1.5 billion for micronutrients and deworming (US$5 per child), US$2.9 billion for behavior change interventions (US$7.50 per child), and an additional US$1.0 billion to build capacities to start the scale-up of more complex and targeted food-based programs for delivering these services, starting with areas that have especially high rates of undernutrition. US$0.1 billion is added for rigorous monitoring and evaluation of large-scale programs and operations research for delivery strategies, and for technical support.

Behavior Change is 2.9/11.8 = 24.6% of the budget.

Community nutrition programs: Additional investment allows for US$15 per household for community health or nutrition volunteers or similar workers (potentially linked to the primary health care system or similar national structures) to facilitate community organization; educate households about breastfeeding, complementary feeding, and hand-washing; and to distribute micronutrient powders and perhaps iron-folic acid supplements. They would also refer cases of faltering growth and severe acute malnutrition to the formal health system.

Micronutrient and deworming interventions are 1.5/11.8 = 12.7% of the budget, including

Vitamin A supplementation: Additional investment allows for US$1.20 per child 6–59 months of age per year to scale up coverage with vitamin A capsules. Additional cost = 346/1500 and 346/11800

Therapeutic zinc supplementation for management of diarrhea: Additional investment allows for US$1 per child per year for children 6–59 months of age for two to three courses of therapeutic zinc sulfate to reduce diarrhea-related mortality and morbidity. Additional cost 346/1500 and 346/11800

Multiple micronutrient powders: Additional investment allows US$3.60 per child 6–23 months of age per 60-day course of micronutrients, which has been shown to be an efficacious approach for micronutrient status (Dewey et al. forthcoming; Zlotkin et al. 2005).Current consensus is that children receive this once between 6 and 11 months of age, once between 12 and 17 months of age, and once between 18 and 23 months of age. The multiple micronutrient powders would be given to children who are not receiving targeted complementary food supplements for moderate or severe malnutrition. As modeled, about one-third of children receive micronutrient powders, and two-thirds receive complementary or therapeutic feeding. Additional cost 216/1500 and 216/11800

Deworming: The estimated cost per child 12–59 months of age is US$0.25 per round of treatment per year (Hall et al. 2009; note that Hall et al.'s estimates are for children 24–59 months of age. There are no cost estimates currently available for the 12–24 month age group, which requires syrups that are more costly both to purchase and to deliver). Deworming is a highly relevant intervention given its close association with micronutrient status and child growth. The benefit:cost ratio is approximately 6:1 (Horton et al. 2008). Guidelines recommend one or two rounds per year depending on prevalence. Given the range of national prevalence rates, our estimate assumes an average of 1.5 rounds of treatment per year in Africa and South Asia. Additional annual cost = US$80 million.

Iron-folic acid supplementation during pregnancy: Additional investment allows for US$2.00 per pregnancy for women to be protected with iron and folic acid. The unit cost and coverage data are very weak. Follow-on research for these estimates and alternative delivery mechanisms would be valuable. Additional annual cost = US$85 million.

Iron fortification of staples and other foods: Additional investment allows for US$0.20 per person per year to fortify a staple food. This estimated cost of US$0.20 per capita will allow some additional fortification of other vehicles (e.g., soy sauce or adding iron to iodized salt) to reach those not consuming wheat or maize flour. Our estimate also allows US$30 million per year for 10 years for technical assistance, social marketing, and initial premix subsidy to initiate large-scale fortification through the private sector. Additional annual cost = US$599 million.

Universal salt iodization: Additional investment allows for US$0.05 per person per year to iodize salt (this is the additional amount needed: currently 58 percent of households already have access to iodized salt in the 36 countries considered (calculated from UNICEF [2009]). The estimate also allows US$20 million per year for 10 years for technical assistance, social marketing, and initial premix subsidy to complete salt iodization through the private sector Additional annual cost = US$80 million.

Step 2, in which the remaining US$6.3 billion will be spent, will scale-up complementary and therapeutic feeding programs after capacities to deliver these interventions in resource-poor settings are built up in the previous step. The largest single cost item in this step is complementary food to prevent and treat moderate malnutrition among children under two years of age (US$40–80 per child; US$3.6 billion per year). The most resource-intensive intervention per child treated (US$200 per episode per child; US$2.6 billion per year) is treatment of severe acute malnutrition. Prevention is preferable to treatment; however, the human and economic costs involved make addressing current levels of severe acute malnutrition imperative to save lives. As with step 1, an additional US$0.1 billion will be needed for stepping up rigorous monitoring and evaluation of large-scale programs and operations research for delivery strategies.

Behavior change interventions

Intervention	Description	Target Population	Delivery Platform
Breastfeeding promotion and support			
	• Early initiation of breast feeding • Exclusive breast feeding x 6 mos. • Continued breast feeding x 2 yrs.	Pregnant women, mothers of infants	• Community nutrition programs • Antenatal and delivery care • Neonatal outreach programs, including those that advocate delayed cord-clamping after delivery • Mass media approaches • Conditional cash transfers
Complementary feeding promotion (provision of food is outlined in intervention 12)			
	• Behavior change promotion to follow international best practices	Pregnant mothers and parents of infants and young children under two years of age	• Community nutrition programs
Hand washing with soap and promotion of hygiene behaviors			
	• Delivery of educational messages	Pregnant mothers and parents of young children under five years of age	• Community nutrition programs • Market-based delivery systems plus social marketing • Hygiene promotion programs
Adapted from: World Bank 2010, p. 14			

Complementary feeding and targeted therapeutic feeding. US$6.2 billion 6.2/11.8=??%

Provision of complementary food for the prevention and treatment of moderate malnutrition: Additional investment is the cost of allocating about US$0.11 per child per day (including distribution/delivery costs) averaged over the year, for a small amount of micronutrient fortified and/or enhanced complementary food to enrich the nutrient density of complementary food for selected children 6–23 months of age, in countries or regions where global acute malnutrition (i.e. weight-for-height z score < –2) is less than 10 percent. In countries or regions where global acute malnutrition exceeds 10 percent, outside of South Asia, US$0.22 per child per day is allocated to double the amount of fortified and/or enhanced complementary food. In South Asia, US$0.14 per child per day is allocated to use Indian ready-to-use food (for

Micronutrient and deworming interventions			
Intervention	**Description**	**Target Population**	**Potential Platform**
Vitamin A supplementation	• Semiannual doses for children	Children 6–59 months of age	• Child health days • Vitamin A campaigns • Routine health care visits combined with outreach
Therapeutic zinc supplements	• As a part of diarrhea management	Children 6–59 months of age	• Primary health care system • Child health days • Market-based delivery systems plus social marketing
Multiple micronutrient powders	Micronutrient powders for in-home fortification of foods (e.g., "sprinkles")	Children 6–23 months of age	• Community nutrition programs • Child health days • Primary health care system
Deworming	• One round of treatment per year in areas where the prevalence of soil-transmitted helminthiasis is 20 percent; two rounds per year where the prevalence is > 50 percent	Children 12–59 months of age	• Child health days • Vitamin A campaigns • Primary health care system
Iron-folic acid supplements for pregnant women	• Iron-folic acid supplements	Pregnant women	• Antenatal care • Community nutrition programs • Neonatal outreach and safe motherhood programs, including those that advocate delayed cord-clamping after delivery • Child health days • Conditional cash transfers
Iron fortification of staples	• Fortification of wheat and maize flour and other centrally processed staples with iron, (folic acid and zinc could also be added where desired)	Entire population	• Market-based delivery systems • Social marketing, particularly if voluntary
Salt iodization	• Salt iodization	Entire population	• Market-based delivery systems
Iodine supplements	• Iodized oil capsules	Pregnant women in highly endemic pockets if iodized salt is unavailable	• Antenatal care • Community nutrition programs
Adapted from: World Bank 2010, p. 15-16			

further explanation, see appendix D). In countries where this intervention is adopted, it would have to build upon an existing mechanism (such as community-based programs that may or may not use growth monitoring and health

promotion) or some other appropriate mechanism for identifying underweight children. Targeting might be geographic (for all children in selected regions or emergency "hot spots") or include the provision of coupons to at-risk households to purchase complementary food commercially (a highly conditional cash transfer) or could use other appropriate delivery mechanisms through community-based programs or market-based delivery systems. If targeting is done for individual children (e.g., using growth monitoring), then costs could be significantly higher. Current coverage with micronutrient-fortified and/or -enhanced complementary foods is negligible. Additional annual cost = US$3.6 billion.

Community-based management of severe acute malnutrition: This is an expensive intervention, which costs US$200 per child treated. The prevalence of severe acute malnutrition is 4.8 percent across the 36 countries in the 6–59 months age group (implying an incidence of 9.6 percent, using the incidence: prevalence ratio of 2:1). We assume that if all the other interventions are funded, that prevalence of severe acute malnutrition will fall to 50 percent of present levels (Isanaka et al. 2009, reporting on the effect of an intensive complementary feeding program). Additional annual cost =US$2.6 billion.

For capacity development, M&E and technical assistance US$1.2 billion 1.2/11.8=10.2%

Capacity development for program delivery : Country capacities to implement even the basic interventions are weak, and for the more complex interventions, implementation and stewardship capacities are even weaker (see, for example, the recent United Nations [2009]). While it is not possible to estimate exactly what it will cost to build these capacities, recognizing the magnitude of this task and the centrality of capacity development for the delivery of all the interventions, we allocate US$1 billion for this effort across all regions. In doing so, we assume that the capacity development for health-related interventions will be closely aligned with the ongoing efforts at health systems strengthening. Additional annual cost = US$1.0 billion.

Monitoring and evaluation, and operations research and technical assistance for program delivery: We allocate US$200 million for monitoring and evaluation of large-scale programs (starting with US$100 million in step 1, and adding another US$100 million in step 2 as more programs are scaled up). The focus of the research effort costed here will be on evaluation of large-scale programs, and on "delivery science" so we can learn more about how to deliver services more effectively and efficiently. The knowledge and learning from these investments will represent a global public good that will benefit all regions and countries. Additional annual cost = US$200 million

This two-step process is neither meant to be a straight-jacket, nor to be suggestive of a linear "one-size-fits-all" approach to scaling-up. Country situations are diverse and they need to follow diverse paths. However, in countries where program delivery capacities are constrained, an explicit investment in capacity development is a prerequisite to the proposed scale-up. This is one of the key recommendations from the High Level Taskforce on Innovative International Financing for Health Systems to strengthen the capacity of governments to secure better performance and investment from private, faith-based, community, NGO and other non-state actors in the health sector. It also reiterates the critical role of governance arrangements for maximizing the impact of health spending and ensuring poor, vulnerable, and marginalized groups benefit most from increased resources. Strengthened leadership and stewardship backed by stronger management systems including financial and human resources management is vital.

Since current global spending on nutrition is minimal (US$0.25 to 0.3 billion) and coverage rates are low for most interventions, these estimates are the costs needed to scale up from these very low current coverage levels to full coverage for the 13 interventions. The US$10.3 billion therefore represents the total additional financing needs for this scale-up, to be raised from national and international resources. Further, these estimates include the cost of instituting community nutrition programs and some investments in market-based delivery strategies, but depend on complementary and critical investments from the health sector to build stronger health systems to support delivery of several of the 13 interventions.

The demand-side costs for conditional cash transfers are not included in our cost estimates, although they can be an effective complement to the supply-side interventions costed here. The costs per household for conditional cash transfers are quite significant, even if the amount of the transfers in South Asia and Africa can be correspondingly lower than in Latin America and the Caribbean. Conditional cash transfers typically need to transfer approximately 20 percent of a household's income to have an impact (Bassett 2008). In Latin America, three of the programs reviewed demonstrated improvements in height-for-age z scores, from 0.13–0.15. In Mexico, an effect of about double this magnitude was achieved in the younger age group (12–36 months of age). However, Mexico also had direct supply-side nutritional inputs (fortified milk for children 4–24 months of age and a food supplement for pregnant and lactating women). Conditional cash transfers imply substantial resource trans fers, but not necessarily increased real resource expenditures (other than program administration and monitoring costs.

Complementary and therapeutic feeding interventions			
Intervention	**Description**	**Target Population**	**Potential Platform**
Prevention or treatment of moderate malnutrition in children 6–23 months of age	• Identification of circumstances in which food supplementation is needed • Provision of complementary food in these circumstances	Populations with high prevalence of children 6–23 months of age with weight-to-age z scores <–2	• Service delivery through community nutrition programs or primary health care system or market-based delivery systems (e.g., using coupons)
Treatment of severe acute malnutrition	• Identification of severe acute malnutrition • Community/clinic-based management • Therapeutic feeding with ready-to-use foods	Children 6–59 months of age with weight-to-height z scores <–3 (with or without edema) or with mid-upper arm circumference <110mm	• Identification of children through primary health care; referral through community nutrition programs or child health days • Service delivery via community-based management of acute malnutrition, referral to primary health care system if necessary
Adapted from: World Bank 2010, p. ??			

Documented improvements are promising. The Progresa Program (now called Oportunidades) in Mexico provided a transfer equal to about 20 percent of household expenditure, which resulted in additional consumption of 7.8 percent more calories overall, including 16.7 percent more fruits and vegetables and 30 percent more animal products in beneficiary house holds (surveyed in Bassett [2008]).

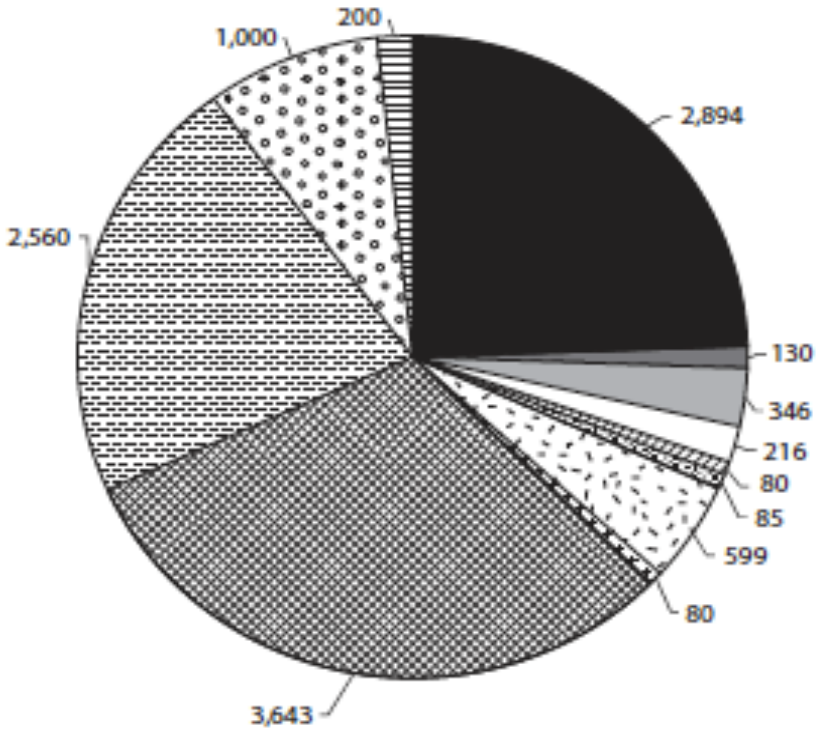
Conditional cash transfers have successfully changed behavior in more affluent developing countries at a cost that is feasible in these countries. New pilot programs in some of the 36 countries covered here could show how the approach works in low-income developing countries. If cash transfers in some form already exist or if cash transfers were intended for other outcomes, it would be worthwhile to incorporate conditions that could support and enhance demand for nutrition interventions.

Expected Outcomes are tabulated on the next page.

Many researchers have found evidence of substantial benefits from nutrition interventions (table 2.8). Bhutta et al. (2008) provide the most detailed and recent estimates. They estimate that of the 8 million child deaths occurring annually in the 36 countries (80 percent of the child deaths globally), that one-quarter, or 2 million deaths, could be averted by the package they propose. Their package includes elements that could not be costed at the present time (such as neonatal vitamin A in Asia, for which WHO technical guidance is still awaited, and a range of other interventions during pregnancy for which programmatic guidance is unclear) as well as health interventions such as malaria treatment, which is costed in health intervention packages. Their package does not include community-based management of acute malnutrition, although facility-based treatment is included. Nor does their package include preventive complementary feeding interventions. A comparison between the two is included in appendix B.

Bhutta et al. (2008) estimate about 57.5 million disability-adjusted life-years could be saved by the end of three years of implementation of their package of interventions, at 90 percent coverage. With the estimated US$10.3 billion public costs this works out to approximately $180 per disability- adjusted life-year. Bhutta et al. (2008) estimate that after 36 months of implementation the intervention package would reduce stunting by 36 percent, although as much as half of this could be due to preventive zinc supplementation which we have not costed since there is no existing delivery mechanism for this intervention, and since compliance is unknown. Isanaka et al. (2008) found that one intensive complementary feeding program reduced wasting by 36 percent. It seems plausible that the number of underweight children under five years of age might be reduced by between one-fifth and one-third with this package of interventions (this is the authors' estimate and not a scientifically estimated number). The estimated benefits (a one-fifth to one-third decrease in stunting and a one-fifth decrease in mortality among children under five years of age) would assist substantially in achieving the Millennium

Figure 3.1 Estimated Additional Costs for Scaling Up Nutrition Interventions to Full Coverage in the 36 Countries with the Highest Burden of Undernutrition
(US$ million)



intervention (additional financing needs $US million)

- community nutrition programs for behavior change (2894)[a]
- vitamin A supplements (130)
- therapeutic zinc supplements (346)
- micronutrient powders (216)
- deworming (80)
- iron-folic acid during pregnancy (85)
- iron fortification of staples (599)
- salt iodization (80)
- complementary food (3643)
- severe acute malnutrition (2560)
- capacity development for program delivery (1000)
- monitoring and evaluation; operations research and technical support for program delivery (200)

Source: Authors' calculations using table 3.1.

Development Goals of halving the number of children underweight (Goal 1) and decreasing child mortality by two-thirds (Goal 4).

Although we have not yet quantified the precise impact of this scale-up on human capital, the evidence base for these benefits is strong. For example, we know that boys in Guatemala who participated in a nutrition program before the age of three grew up to have wages that were 46 percent higher than controls. The effects of iron and iodine fortification alone outweigh the cost of scaling up the delivery of all micronutrients and behavior change interventions. Thus, in addition to

the reduced mortality and nutritional benefits listed above, we also expect significant productivity benefits, particularly because these investments include community-based preventative programs to reduce relapse rates and prevent the irreversible effects of early undernutrition. Further work is needed to estimate more precisely the overall gross domestic product impact of this package of interventions.

Table 3.2 Estimated Benefits from Scaling Up Nutrition Interventions

Intervention	*Estimated benefit: cost savings or cost-effectiveness*	*Source*
Behavior change (through community nutrition programs for behavior change	US$53–153 per disability-adjusted life-year saved	Ho (1985: Tamil Nadu) Waters et al. (2006: Peru)
Vitamin A supplements	US$3–16 per disability-adjusted life-year saved	Ching et al. (2000); Fiedler (2000); Horton and Ross (2003)
Therapeutic zinc supplements	US$73 per disability-adjusted life-year saved	Robberstad et al. (2004)
Micronutrient powders	US$12.20 per disability-adjusted life-year saved (zinc) 37:1 benefit: cost ratio (iron)	Sharieff et al. (2006)
Deworming	6:1 benefit:cost ratio	Horton et al. (2008)
Iron-folic acid supplements	US$66–115 per disability-adjusted life-year saved (iron; no estimates known for folic acid)	Baltussen et al. (2004)
Iron fortification of staples	8:1 benefit:cost ratio	Horton and Ross (2003, 2006)
Salt iodization	30:1 benefit:cost ratio	Horton et al. (2008)
Complementary foods	US$500–1,000 per disability-adjusted life-year saved	Authors' rough estimates[a]
Community-based management of acute malnutrition	US$41 per disability-adjusted life-year saved	Bachmann (2009)

a. Based on Caulfield et al.'s (1999) estimate that increased intake of 71–164 kcal per day for children younger than one year of age, as a result of complementary feeding, could decrease deaths due to malnutrition by 2–13 percent, depending on underlying presence of malnutrition in the community.

3. World Bank 2017: An Investment Framework for Nutrition: Reaching the Global Targets for Stunting, Anemia, Breastfeeding, and Wasting

Meera Shekar, Jakub Kakietek, Julia Dayton Eberwein, and Dylan Walters. Directions in Development Series. Washington, DC: International Bank for Reconstruction and Development / The World Bank, **2017**.

The 2017 report adds to the previous work in three unique ways: by providing a more comprehensive estimate of financing needs, by linking financing needs to impacts, and by laying out a potential financing framework. This report:

- Focuses on the costs of and returns from investing in specific nutrition intervention and achieving specific outcomes
- Estimates the costs of reaching the global nutrition targets, including the SDG targets
- Systematically links the costs with the potential for impact and the interventions' returns on investment
- Assesses the financing shortfall between what is required and what is currently being spent at the global level
- Presents a comprehensive global analysis of domestic financing from governments and official development assistance.

It does not review the evidence for effective nutrition interventions, relying instead on established evidence in this respect. Instead, it lists those interventions then goes on to estimate total and unit costs and returns on each one. The effects of the proposed interventions are estimated on prevalence of stunting among children, anemia in women, and rates of exclusive breastfeeding for infants, along with their impacts on mortality. Benefit-cost analyses are conducted for each intervention,. Recent experience from several countries suggests that meeting these targets is feasible.

In 2012, in an effort to rally the international community around improving nutrition, the 176 members of the World Health Assembly endorsed a Comprehensive Implementation Plan on Maternal, Infant, and Young Child Nutrition (WHO 2014a). The plan includes the first-ever global nutrition targets, focusing on six areas: stunting, exclusive breastfeeding, wasting, anemia, low birth-weight, and overweight.

The 2017 WB report focuses on three of them: (1) reducing stunting, (2) maternal anemia, and (3) breastfeeding. For these three targets, the analyses focus on costing a package of primarily preventive nutrition-specific interventions, which have proven to be efficacious in averting stunting and anemia, enhancing breastfeeding, and reducing child mortality. Further, the analyses were limited to low- and middle-income countries because this is where the undernutrition problem is concentrated.

There is strong evidence regarding interventions that affect the proximal determinants of stunting—the nutrition-specific interventions. Two Lancet Series on Maternal and Child Nutrition (in 2008 and 2013) provide a summary of global evidence based on systematic literature reviews and meta-analyses.

Evidence-Based Interventions and Delivery Platforms

Two key principles guided the selection of interventions: (1) a strong evidence base must exist for effectiveness in reducing stunting in children under five years of age, reducing anemia in women of reproductive age, increasing exclusive breastfeeding, and reducing wasting; and (2) the interventions must be relevant for a substantial portion of low- and middle-income countries or, as is the case with intermittent presumptive treatment of malaria in pregnancy, applicable across a specific region as a result of a high prevalence of malaria. High-impact interventions are identified on the basis of the 2013 Lancet Series on Maternal and Child Nutrition and the 2016 Lancet Series on Breastfeeding. For stunting, wasting, and anemia, literature reviews were conducted to identify any additional evidence reviews and meta-analyses published after the publication of the Lancet series. The literature reviews do not identify any additional interventions that should be included in the study.

1. Stunting

Seven key interventions have strong evidence of effectiveness in reducing stunting. Table 3.1 shows the pathways and estimates of the impact each intervention has on the likelihood of stunting. Four of these interventions are directed at pregnant women and mothers of infants and young children; three are directed at infants and young children (table 3.1). For women, antenatal micronutrient supplementation and infant and young child nutrition counseling would be scaled up for all pregnant women, balanced energy-protein supplementation would be scaled up for all pregnant women living under

the poverty line, and intermittent presumptive treatment of malaria would be scaled up only for pregnant women living in malaria-endemic regions. 3 Vitamin A supplementation and prophylactic zinc supplementation would be scaled up for all children 6–59 months of age, and the public provision of complementary food would be scaled up for all children living under the poverty line. The poverty line is defined as persons living on less than $1.90 per day (World Bank 2009).

Table 3.1 Interventions to Reach the Stunting Target

Intervention	Target population	Description and delivery method	Evidence of effectiveness
Antenatal micronutrient supplementation[a]	Pregnant women	Includes iron and folic acid, and at least one additional micronutrient, for approximately 180 days per pregnancy. Delivered as part of antenatal care.	Recent reviews of multiple micronutrient supplementation (Haider and Bhutta 2015) show significant reductions in low birthweight and small-for-gestational age of 10 percent (or effectiveness 0.10).
Infant and young child nutrition counseling	Mothers of children 0–23 months old	This intervention comprises individual or group-based counseling sessions to promote exclusive breastfeeding delivered in the community and/or health facility, depending on country context.	Reanalysis by Sinha et al. (2015) for LiST shows that receiving breastfeeding promotion increased exclusive breastfeeding in infants age 0–5 months [OR 2.5 in health system, OR 2.61 in home/ community setting]. Lamberti et al. (2011) shows that infants 0–5 months had an increased relative risk of diarrhea if they are predominantly breastfed [RR 1.26, 95% CI 0.81–1.95], partially breastfed [RR 1.68, 95% CI 1.03–2.76], or not breastfed at all [RR 2.65, 95% CI 1.72–4.07]. Children 6–23 months have more than twice the risk of diarrhea if not breastfed at all [RR 2.07, 95% CI 1.49–2.88].
Balanced energy-protein supplementation for pregnant women[a]	Undernourished pregnant women living under the poverty line ($1.90/ day)	This intervention provides food supplementation during pregnancy to at-risk women (with no more than 25 percent energy content contributed by proteins). Some existing delivery mechanisms are through community-based programs.	This intervention reduces the risk of low-birthweight infants and infants born small for gestational age, and as such has an indirect impact on stunting. Ota et al. (2015) have found an increase in mean birthweight [MD +40.96 g, 95% CI 4.66–77.26] and a significant reduction in the incidence of infants born small for gestational age [RR 0.79, 95% CI 0.69–0.90] with balanced energy-protein supplementation.
Intermittent presumptive treatment for malaria in pregnancy in malaria-endemic regions	Pregnant women (in malariaendemic regions only)	This intervention provides at least two doses of sulfadoxine-pyrimethamine during pregnancy. Delivered as part of antenatal care.	Among first and second pregnancies in malaria-prevalent areas, prevention interventions such as intermittent presumptive treatment for malaria in pregnancy are found to have a pooled protective efficacy of 35 percent [95% CI 23–45%] on reducing low birthweight (Eisele, Larsen, and Steketee 2010).
Vitamin A supplementation for children	Children 6–59 months old	This intervention distributes two doses per year (100,000 international units (IU) for children age 6–11 months and 200,000 IU for children age 12–59 months), either through mass campaigns or in health facilities.	Vitamin A indirectly affects stunting by influencing diarrheal incidence and mortality. Vitamin A supplementation has been shown to reduce diarrheaspecific incidence [RR 0.85, 95% CI 0.82–0.87; 13 studies] and mortality [RR 0.72, 95% CI 0.57–0.91; 7 studies] (Imdad et al. 2011).
Prophylactic zinc supplementation for children[a]	Children 6–59 months old	This intervention provides zinc (10 mg/ day); 120 packets per child per year. Currently no delivery platforms exist at scale. Delivery cost estimates are based on costs to deliver multiple micronutrient powder supplementation programs.	Supplementation with 10 mg zinc/day for 24 weeks increases mean gain in height (cm) [0.37, 95% CI 0.12–0.62; 16 studies] compared with a placebo intervention (Imdad and Bhutta 2011). Zinc supplementation also reduces diarrheal incidence [RR 0.87, 95% CI 0.81–0.94] in the intervention group compared with a control group (Yakoob et al. 2011).
Public provision of complementary foods for children	Children 6–23 months old living under the poverty line ($1.90/ day)	Food supplementation for children (100–1,500 kcal per day), typically including micronutrients. Some existing delivery mechanisms are through community-based programs.	Bhutta et al. (2008) find that, in food secure settings, 6–12 month old children of mothers who are not given nutrition education are 1.43 times more likely to become stunted. In food insecure settings, complementary food supplements with or without maternal nutrition education increases child stunting OR to 1.60; and no supplements or education further increases child stunting OR to 2.39.

2. Anemia

Approximately half of anemia in high-burden countries is the result of iron deficiency, but figures vary by context. A Cochrane review of daily iron supplementation during pregnancy estimates a 70 percent reduction in anemia among pregnant women (Peña-Rosas et al. 2012). Antenatal multiple micronutrient supplements, such as the United Nations Children's Fund (UNICEF) Multiple Micronutrient Preparation (UNI MAP) supplement that contains 14 micronutrients, may provide additional benefits to neonatal outcomes and early childhood stunting, although there is no difference in its effectiveness for reducing maternal anemia compared to iron and folic acid supplementation (Haider and Bhutta 2015). Therefore, despite the two to three times higher costs, prioritizing the scale-up of antenatal multiple micronutrient supplementation may deliver the best long-term benefits for both mother and child. For nonpregnant women, an intermittent (weekly) dosage of iron and folic acid supplementation is estimated to lead to a 27 percent reduction of anemia (Fernández-Gaxiola and De-Regil 2011; WHO 2011a). In areas of high prevalence (greater than 40 percent), the WHO recommends daily iron supplementation for this group (WHO 2016). Three other emerging supplementation interventions need to be evaluated and the evidence fully considered: micronutrient powders, small quantity lipid-based nutrient supplements, and vitamin A supplementation.

Food-based approaches—fortification of staple grains and cereals and, less commonly, salt, sauces, and milk products—have also shown to be effective in reducing anemia in women (Gera, Sachdev, and Boy 2012). Population level data are mixed, but it appears that fortification can prove beneficial for large-scale reduction in anemia in general populations, particularly among nonpregnant women (Barkley, Wheeler, and Pachon 2015). Interventions to improve iron intake

through greater dietary diversity of food produced on the homestead, biofortification, and increasing meal frequency have potential for future impact but limited evidence of impact at scale to date (Cercamondi et al. 2013; Olney et al. 2009).

In areas of moderate-to-high risk of malaria transmission, particularly Sub-Saharan Africa, WHO recommends all pregnant women receive intermittent presumptive treatment with sulfadoxine-pyrimethamine at each scheduled antenatal care visit starting as early in the second trimester as possible, but coverage remains low (WHO 2014). Intermittent presumptive treatment of malaria in pregnancy has shown to reduce the risk of moderate-to-severe anemia by 40 percent and the risk of any anemia by about 17 percent among women in their first or second pregnancy (Radeva-Petrova et al. 2014). In general, preventing anemia by reducing malaria transmission can be effective for pregnant women. Although hookworm infection and human immunodeficiency virus (HIV) are associated with anemia, deworming and antiretroviral therapy have not been shown to reduce anemia.

The cost analyses estimate the costs and impact of scaling up a minimum core set of interventions that (1) are applicable to all countries, (2) have a strong evidence base for effectiveness in preventing anemia, and (3) together can plausibly achieve the proposed target. Applying these criteria in consultation with the Technical Advisory Group, the analyses focus on four core anemia prevention interventions: (1) antenatal micronutrient supplementation, (2) intermittent presumptive treatment of malaria in pregnancy in malaria endemic regions, (3) iron and folic acid supplementation in nonpregnant women 15–49 years of age, and (4) staple food fortification (wheat flour, maize flour, and rice) with iron for the general population at WHO guideline levels (see table 4.3). Because targeting the fortification of staple foods to a subgroup of women would not be feasible, nor is it recommended, and because anemia affects men as well, the target beneficiaries for staple food fortification are the entire general population (males and females of all ages).

3. Breastfeeding

Interventions That Effectively Promote Breastfeeding

Having a comprehensive breastfeeding strategy at the national level is the most effective way to influence the powerful social, economic, and cultural forces affecting a mother's decision to breastfeed (Rollins et al. 2016) (see figure 5.1). A comprehensive breastfeeding strategy is composed of several types of interventions; the exact mix varies from country to country, depending on the local context. For the purposes of these analyses, two interventions for pregnant women and mothers of young children (1) infant and young child nutrition counseling and (2) maternity leave cash benefits plus two interventions directed at the entire society (3) pro-breastfeeding social policies and (4) national

Composite of Tables 3.2, 3.4. Unit costs and cost per outcome for each intervention against stunting						
Intervention	Target population	Unit cost Mean	Unit cost Min	Unit cost Max	Cost / case averted ($)	Cost / death prevented ($)
Antenatal micronutrient supplementation	Pregnant women	2.80	1.80	7.55	3,637	7,376
Infant and young child nutrition counseling (complementary feeding education and breastfeeding promotion)	For pregnant women and mothers of infants	6.62	0.07	12.00	467	7,353
Complementary feeding education	For pregnant women and mothers of infants	n/a	n/a	n/a	273	16,122
Breastfeeding promotion	For pregnant women and mothers of infants	n/a	n/a	n/a	4,761	4,347
Balanced energy-protein supplementation for pregnant women	For pregnant women and mothers of infants	24.07	16.93	54.72	29,949	37,054
Intermittent presumptive treatment malaria in pregnancy in malaria-endemic regions	For pregnant women and mothers of infants	2.27	2.27	2.27	1,535	6,594
Vitamin A supplementation for children	For infants and young children	0.32	0.03	4.81	266	4,270
Prophylactic zinc supplementation for children	For infants and young children	3.89	2.40	6.19	988	23,642
Public provision of complementary food for children	For infants and young children	42.93	29.03	115.28	1,724	67,787
Adapted from World Bank 2017, p. 56, 61						

breastfeeding promotion campaigns are assumed to make up a minimum core four of the comprehensive strategy applicable to most contexts, which can be adapted and added to as need be.

Counseling for Mothers and Caregivers on Good Infant and Young Child Nutrition and Hygiene Practices

This intervention includes individual or group-based counseling sessions delivered in the community and/or health facility to promote exclusive breastfeeding, depending on country context. Breastfeeding counseling or education delivered at the community level may be required in countries with weak health systems and lack of access to health facilities. A review by Haroon et al. (2013) demonstrates that breastfeeding counseling results in a 90 percent increase in rates of exclusive breastfeeding in infants age 0–5 months.

Pro-Breastfeeding Social Policies

Pro-breastfeeding social policies are designed to create an enabling environment for breastfeeding and motivate maternal and household decision making toward optimal child care and feeding practices. Among countries with low breastfeeding rates, those with pro-breastfeeding social policies are seeing increases in exclusive breastfeeding by 1 percent per year, or five times higher than countries with low ratings on such policies (Rollins et al. 2016). Adoption and enforcement of national legislation in line with the World Health Organization (WHO) International Code on Marketing of Breastmilk Substitutes is considered necessary to address aggressive marketing of breast milk substitutes (Baker et al. 2016). Access to maternity leave is associated with higher rates of breastfeeding (Sinha et al. 2015) and even lower infant mortality in some countries (Nandi et al. 2016). For new mothers who are working, one study found that national policies guaranteeing breastfeeding breaks in the workplace were associated with an increase in the rate of exclusive breastfeeding of infants younger than six months of age by 8.9 percentage points (Rollins et al. 2016). Although countries have maternity leave and protection policies, only a few have adequate enforcement or sustainable financing.

Table: Interventions effective against anemia in women

Intervention	Target population	Description and delivery method	Evidence of effectiveness
Antenatal micronutrient supplementationa	Pregnant women	This is broadly defined as a micronutrient supplementation that contains iron and at least two or more micronutrients. The cost is calculated for supplementation containing 15 micronutrients/ vitamins, including iron and folic acid, for 180 days per pregnancy. Supplementation is delivered through antenatal care programs.	A review by Peña-Rosas et al. (2012) finds that daily iron supplements in pregnancy lead to a 70 percent reduction in maternal anemia [RR 0.30, 95% CI 0.19–0.46]. Although antenatal multiple micronutrient supplementation is not more effective at reducing anemia than iron and folic acid supplementation alone, it is recommended because of its effectiveness in improving birth outcomes (it prevents low birthweight and newborns who are small for gestational age) and thereby preventing childhood stunting (see table 3.1in chapter 3).
Intermittent presumptive treatment of malaria in pregnancy in malaria-endemic regions	Pregnant women in malaria-endemic regions	This intervention provides at least two doses of sulfadoxine-pyrimethamine during pregnancy. Treatment is delivered through antenatal care.	Radeva-Petrova et al. (2014) estimate that intermittent presumptive treatment of malaria in pregnancy results in a 17 percent reduction in the risk of any anemia [RR 0.83, 95% CI 0.74–0.93].
Iron and folic acid supplementation for nonpregnant women	Nonpregnant women age 15–49 years	Delivery of weekly iron and folic acid supplement in school-based programs for girls age 15–19 enrolled in school, and delivery via community health workers, health facility outpatient visits, and/or via private marketplace for all others.	A review by Fernández-Gaxiola and De-Regil (2011) finds that weekly iron and folic acid supplementation results in a 27 percent reduction in anemia [RR 0.73, 95% CI 0.56–0.95].
Staple food fortification	General population	Fortification of wheat flour, maize flour, and rice with iron at WHO guideline levels and delivered through the marketplace.	A review of wheat flour fortification programs by Barkley, Wheeler, and Pachon (2015) finds that fortification at WHO guideline levels is associated with a 2.4 percent reduction in the odds of anemia in nonpregnant women per year [prevalence odds ratio 0.976, 95% CI 0.975–0.978]. A similar impact of fortification of maize and rice is assumed.

The Baby Friendly Hospital Initiative,

established in 1991 by WHO and the United Nations Children's Fund (UNICEF) as a broad program designed to strengthen the culture of breastfeeding in hospitals (Labbok 2012), may also be a policy option for certain countries. The integration of WHO's Ten Steps of Successful Breastfeeding (WHO 1998) into existing hospital accreditation systems is an important policy approach in that direction. The specific orientation of pro-breastfeeding social policies in each country will vary because of country context, but the core policies that foster a culture that supports breastfeeding need resources for development, legislation, monitoring, and enforcement.

Extension of Maternity Leave Benefits

Maternity leave cash benefits refer to a cash transfer to the woman, from public funds or private employers, for a stipulated duration and level of compensation, which varies widely by country. Cash benefits reduce the opportunity cost for mothers of taking maternity leave for caregiving of newborns and infants. Sinha et al. (2015) show that maternity leave is associated with a 52 percent increase in exclusive breastfeeding, but this is not specific to the effect of the extension of maternity leave cash benefits or to certain durations or levels of cash transfers. Furthermore, the high rates of informal sector work in low- and middle-income countries adds to the low coverage of maternity leave cash benefits and, therefore, limits the population reach of these benefits. However, these benefits will be more and more important for working mothers as wealthier and transitioning economies develop (Rollins et al. 2016).

National Breastfeeding Promotion Campaigns

Evidence suggests that mass media campaigns to promote breastfeeding are important elements in increasing national breastfeeding rates. Sinha et al. (2015) show that strategies with media intervention integrated with counseling

From Tables 4.5 & 4.7: Mean, min, max unit costs of interventions against anemia; cost to prevent 1 case and 1 death (US$)						
Intervention	Target population	Mean	Min	Max	Cost / case averted	Cost / death prevented
Antenatal micronutrient supplementation	Pregnant women	2.99	1.80	7.55	11	6,740
Intermittent presumptive treatment of malaria in pregnancy	Pregnant women in malaria endemic regions	2.06	2.06	2.06	62	4,531
Iron and folic acid supplementation School-based delivery Community health delivery Hospital/nurse delivery Private retailer delivery	Non-pregnant , reproductive age girls and women	0.55 0.73 1.78 0.24	0.46 0.21 0.54 0.24	0.63 1.78 5.54 0.24	10	26,914
Staple food fortification Wheat flour Maize flour Rice	General population	0.18 0.13 0.74	0.08 0.09 0.08	0.29 0.29 1.41	7	—

and community mobilization may have a significant effect on increasing exclusive breastfeeding rates. As an example of what is possible, the integrated Alive & Thrive program in Vietnam (see box 9.3 in chapter 9)—which includes a mass media campaign at scale in addition to infant and young child nutrition counseling and advocacy for pro-breastfeeding social policies—demonstrated a total 28.3 percentage point increase in exclusive breastfeeding for the first six months compared to control sites over the period 2010–14 (Walters et al. 2016). There are positive signs that investing in large-scale media promotion and social marketing are important for counteracting the influence of marketing for breastmilk substitutes and developing a culture that supports optimal breastfeeding.

4. Treatment of Severe Acute Malnutrition

has a strong and well-established evidence base (see Lenters et al. 2013 for areview). The analyses included in this chapter focus on estimating the costs of treating severe acute malnutrition and mitigating its impacts. In the context of the global target for wasting, these analyses provide an estimate of the costs of not reaching the wasting target. In the absence of effective prevention strategies, the world will need to invest in an expansion of treatment programs in order to avoid deaths among children suffering from severe acute malnutrition. WHO recommends outpatient treatment of children with uncomplicated severe acute malnutrition (85–90 percent of cases) using ready-to-use therapeutic food and a seven-day preventive course of antibiotics (WHO 2013). This treatment has been shown to reduce mortality and lead to recovery in about 80 percent of cases (Hossainet al. 2009; Khanum, Ashworth, and Huttly 1994, 1998; Lenters et al. 2013).Although the treatment of severe acute malnutrition has been proven to behighly effective, the scale-up of these interventions is limited: only about15 percent of children with severe acute malnutrition have access to treatment(WHO 2014). One of the reasons for low access to treatment is its relatively high cost (see, for example, Bhutta et al. 2013; Horton et al. 2010). A number of studies examine different strategies for reducing costs and improving cost effectiveness of severe acute malnutrition treatment interventions. Several authors compare outpatient and inpatient-based treatment regimens (Bachmann 2009, 2010; Greco et al. 2006; Puett et al. 2013; Sandige et al. 2004). Some authors compare the costs and cost-effectiveness of using locally produced ready-to-use therapeutic food products (Greco et al. 2006; Singh et al. 2010). This chapter presents an analysis of the investments needed to expand the current coverage of this intervention to reach 90 percent of children suffering from severe acute malnutrition in low- and middle-income countries by 2025 and the impact of such scale-up on child mortality. A benefit-cost analysis is also included here, along with a comparison of the investment costs and the estimated economic benefits resulting from the treatment of severe acute malnutrition in children.

From Table 5.1 & 5.2				Unit costs to meet breastfeeding target		
Intervention	Target population	Description and delivery method	Evidence of effectiveness	Mean	Min	Max
Infant and young child nutrition counseling	Pregnant women and mothers of infants 0-11 mos.	This intervention comprises individual or group-based counseling sessions to promote exclusive breastfeeding delivered in the community and/or health facility, depending on country context.	Reanalysis by Sinha et al. (2015) for LiST shows that receiving breastfeeding promotion increased exclusive breastfeeding in children age 0–5 months [OR 2.5 in health system, OR 2.61 in home/community setting].	7.32	0.70	13.35
Maternity leave benefits	Pregnant women and mothers of infants 0-11 mos.	This consists of an extension of maternity leave cash benefits from the level and duration of benefits provided at baseline to six months at 67 percent wage level from public payer in line with International Labour Organization recommendations.	Sinha et al. (2015) show that maternity leave is associated with a 52 percent increase in exclusive breastfeeding [RR 1.52, 95% CI 1.03–2.03], but this is not specific to the effect of the extension of maternity leave cash benefits or to certain durations or levels of cash transfers. This intervention is included in the costing analysis but not the impact model.	273.64	0.00	1,401.96
Pro-breastfeeding social policies	General population	This intervention consists of policies, legislation, and monitoring and enforcement of policies related to the WHO's International Code on Marketing of Breastmilk Substitutes, the WHO Ten Steps of Successful Breastfeeding integration into hospital accreditation, and maternity protection/leave.	This intervention is included in the costing analysis but not the impact model.	n.a.	100,000	1,000,000
National breastfeeding promotion campaigns	General population	This intervention uses mass advertising and campaigns to promote breastfeeding.	Sinha et al. (2015) show that strategies with media intervention integrated with counseling and community mobilization may have a significant effect on increasing exclusive breastfeeding rates [RR 1.17, 95% CI 1.01–1.14]. This intervention is included in the costing analysis but not the impact model.	n.a.	2,000,000	8,000,000
p. 100, 107						

Table. Comparison Of Benefit-Cost Ratios For Three Targets				
Classification	Category	STUNTING	ANEMIA	BREAST FEEDING
Region	Sub-Saharan Africa	4.2	13.1	18.2
	South Asiaa	15.1	14.0	37.0
	East Asia and the Pacific	15.8	10.9	33.8
Country Income Group	Low-income countries	1.7	4.2	6.3
	Lower-middle-income countries	12.6	15.2	27.7
	Upper-middle-income countries	21.6	10.9	46.3
Pooled	Pooled	10.5	12.1	34.7
Combined from Tables 3.5 (p.62), 4.8 (p.90), 5.4 (p.112)				

C. WHO: ESSENTIAL NUTRITION ACTIONS (ENA) & Electronic Library of Effective Nutrition Actions (eLENA)

1. Essential Nutrition Actions: improving maternal, newborn, infant and young child health and nutrition. Geneva: World Health Organization, 2013.

The evolution of evidence for the effects of nutrition interventions, 1960–2010

Systematic scientific studies of the nature and causes of malnutrition in children and mothers in low-income societies were brought into early focus by Scrimshaw and colleagues (1), based largely on work in Central America. A number of prospective studies, of which one of the most influential was conducted in Narangwal, India (2), established that nutrition interventions were efficacious in contributing to child health, survival, growth and development. The authors of a synthesis of ten such studies (3) concluded that health and nutrition interventions do have a positive impact on children's nutrition. Primary health care, as conceived at the Alma Ata conference (4), included nutrition interventions, as did Child Survival programs (5) and similar initiatives, as brought together at the World Summit for Children (6). These interventions were bundled (e.g. by UNICEF with growth monitoring, oral rehydration, breastfeeding, immunization, female education, family spacing and food supplements) and applied on a large scale, but evaluations of impact were scarce. The evidence for designing effective programs continued to be based primarily on the efficacy of individual interventions in experimental conditions. A few large-scale programs which started in the 1980s, such as the Tamil Nadu Integrated Nutrition Programme (TINP) supported by the World Bank, and the Iringa Joint Nutrition Support Programme (JNSP), supported by UNICEF and WHO, were carefully monitored, and the evidence continues to be relevant.

A considerable variety of interventions have been regarded as part of nutrition programs (and many are also included in health-related programs, such as the Integrated Management of Childhood Illness – IMCI (7)). The content ranged from feeding programs and behavioral change, to immunization and medical interventions. The scope of this review was set by considerations of efficacy studies, and experience of programs either defined as strictly nutrition, or with substantial nutrition components or objectives. For example, the Lancet nutrition series (8) evaluated 20 separately-defined interventions. As described in Part I of this document, an independent but similar set of ENAs may be grouped as addressing general nutrition, micronutrients and disease control. The main routes or platforms for interventions targeting mothers and young children are community based, usually linked to health facilities (or government outreach activities), and/or campaigns such as child health days/weeks. Cash transfer programs, conditional or unconditional (CCTs or CTs) have recently increased in coverage and importance in addressing health and nutrition problems; usually they constitute programs (or platforms) themselves, with conditionality linked to health, nutrition and education (see later section).

Evidence for the impact of nutrition actions from experimental studies (i.e. efficacy trials) has shown that child (and less often maternal) nutritional status can benefit from direct interventions (9, 10, 11). However, scaling-up based on efficacy results requires caution, as operational programs have different conditions than efficacy trials, and priority should be given to evaluating effectiveness under operational conditions. This approach requires alternative, rigorous methods, beyond randomized trials (12), that have so far rarely been applied and carried through. While a number of large-scale programs were undertaken starting in the 1970s (see Table II-1), only a few included impact evaluation. Program development continued without a solid evidence base, both as large-scale investments from the World Bank (e.g. in Bangladesh, Madagascar and Senegal), and as development of national programs (e.g. in Thailand and Vietnam). The Thailand program was developed after rejecting conventional externally-driven plans (13). The drive to proceed in the relative absence of positive evaluation results was widely noted, for example by Save the Children-UK (14).

Evaluations and assessments of operational programs gradually built up from findings from large-scale programs as they expanded from the 1980s on. Some of the early projects, such as the Narangwal study, tended towards efficacy trials, and they provide a basis for later work. Reviews by Gwatkin and colleagues (3) and Berg (15) drew on the same projects, and were significant in catalyzing the expansion of large-scale programs starting in the 1980s (16). Eleven commissioned

country case studies provided additional information (17). A regional planning project sponsored by the Asian Development Bank and UNICEF assessed programs in seven Asian countries (18, 19). An assessment of nutritional trends associated with nine programs (20) was carried out as part of the Combating malnutrition: time to act study (21), which included four in-depth country investigations.

The Lancet nutrition series (11) contains many of the efficacy results reported in Part I, as well as drawing on a number of the same set of established large-scale projects in Table II-1 (24). Nonetheless, the paucity of rigorous effectiveness evaluations of large-scale programs was highlighted by the comprehensive Lancet exercise. The World Bank sponsored re-evaluation in at least two cases – for Bangladesh (25) and Madagascar (26), as well as an evaluation of their Senegal program (27). The Independent Evaluation Group published a synthesis of 28 evaluations (some large-scale, some experimental) (28). This review failed to elicit a clear pattern of activities linked to impact. However, it did not include estimates of intensity of resource use, which is likely to account for some differences. It acknowledged the likely impact of a number of the programs reviewed, and where feasible estimated effect sizes. (This relation between input levels – 'intensity' – and size of effect has been rarely examined until recently.) Several external agencies, such as the World Bank, the United States Agency for International Development, the Swedish International Development Agency and UNICEF supported these programs. The reviews that synthesized these experiences (Table II-1) relied mainly on implementation and management aspects, since few evaluation data were available.

1. Interventions targeted at young infants (0–5 months)

1.1 Early initiation of breastfeeding
1.2 Exclusive breastfeeding
1.3 Feeding of low-birth-weight infants
1.4 Infant feeding in the context of HIV

Specific actions: The evidence for these 4 interventions, detailed on p. 11-19, comes from programs that implemented the following actions:

(a) Counseling and support at facility and community level (attention to LBW or HIV as appropriate),
(b) Implementation of Baby-Friendly Hospital Initiative,
(c) Implementation of International Code of Marketing of Breast-milk Substitutes,
(d) Maternity protection

2. Interventions targeted at infants and young children (6–23 months)

2.1 Continued breastfeeding
2.2 Complementary feeding
2.3 Multiple micronutrient powders for home fortification of foods for infants and children 6–23 months
2.4 Vitamin A supplementation for children under five years
2.5 Vitamin A supplementation in children with measles
2.6 Daily iron supplementation for children 6–23 months
2.7 Zinc supplementation for diarrhoea management
2.8 Reaching optimal iodine nutrition in young children
2.9 Management of children with severe acute malnutrition
2.10 Management of children with moderate acute malnutrition
2.11 Nutritional care and support of HIV-infected children 6 months to 14 years
2.12 Nutritional care and support during emergencies

Specific actions: The evidence for 2.1-2.2 (p.20-37) comes from programs that implemented

(a) Counseling and support at facility and community for continued breast feeding and for complementary feeding when appropriate,
(b) Implementation of International Code of Marketing of Breast-milk Substitutes,
(c) Maternity protection.
(d) Evidence for 2.3-2.8 is based on giving specific supplements to each of the target groups, including multi-micronutrient powders, vitamin A, iron, zinc, and iodine.

(e) Evidence for 2.9 and 2.10 depends on implementing both protocols and practices for the management of clinically apparent malnutrition in the hospital, in the ambulatory clinic, and in the community.
(f) The two remaining interventions are based on providing direct nutritional care and support to children either with HIV or in emergencies.

3. Intervention targeted at women of reproductive age

3.1 Prevention and treatment of iron and folic acid deficiency by providing iron and folic acid supplementation in menstruating women.

4. Interventions targeted at pregnant women

4.1 Daily supplementation with iron and folic acid for women during pregnancy
4.2 Intermittent iron and folic acid supplementation for non-anaemic pregnant women
4.3 Vitamin A supplementation in pregnant women
4.4 Calcium supplements in pregnant women
4.5 Reaching optimal iodine nutrition in pregnant and lactating women
4.6 Nutrition care and support for pregnant women during emergencies

Specific actions for pregnant women, detailed on p. 38-48, include
(a) Providing specific supplements and
(b) Providing specific nutritional care and support for pregnant and lactating women in emergency situations.

5. Global intervention

5.1 Wheat and maize flour fortification

6. Non-nutrition health interventions (e.g., deworming, bed nets, family planning, hand washing, WASH) having an impact on nutrition, health, and infectious diseases.

7. Non-health interventions (e.g., fortification, agriculture, economic development, social safety nets, education of girls and women, cash transfers) having an impact on nutrition and health.

2. WHO/eLENA: e-Library of Effective Nutrition Actions

WHO's eLENA is an electronic database of effective nutrition actions. Each one is hot-linked to WHO guidelines and recommendations, associated documents, and the primary publications providing the evidence.

From the total database, I selected all interventions related to infectious diseases for this report. Apart from these, in terms of health conditions, the remaining evidence focuses on anemia, undernutrition itself, diabetes and other noncommunicable diseases, and obesity. Rather than copy/pasting pages and pages of WHO documents into this report, each intervention is hot-linked to its own web page describing the intervention with further links to the evidence supporting that intervention, WHO recommendations and documents. At the eLENA website, these same interventions can be categorized by 1) recommendations and strength of evidence, 2) life course (as in the preceding page), 3) specific nutrients, 4) intervention type, and 5) global targets: www.who.int/elena/categories/en/.

For tuberculosis specifically, interventions include treatment of moderate and severe acute malnutrition, micronutrient supplementation, and individualized nutritional assessment and counseling. To the extent USAID wants to provide nutritional support to malnourished TB patients in the form of food and supplements, these are the specific recommendations and evidence to support those types of projects - expanded starting on the next page.

Diarrhea

- Deworming in children
- Deworming in non-pregnant adolescent girls and women of reproductive age
- Deworming in pregnant women
- Therapeutic feeding of children 6–59 months of age with severe acute malnutrition and acute or persistent diarrhoea
- Water, sanitation and hygiene interventions to prevent diarrhoea
- Zinc supplementation in the management of diarrhoea

Ebola virus disease

- Nutritional care of children and adults with Ebola virus disease in treatment centres

HIV/AIDS

- Infant feeding for the prevention of mother-to-child transmission of HIV
- Macronutrient supplementation in people living with HIV/AIDS
- Management of HIV-infected children under 5 years of age with severe acute malnutrition
- Micronutrient supplementation in HIV-infected women during pregnancy
- Nutrition counselling for adolescents and adults with HIV/AIDS
- Nutritional care of HIV-infected children
- Vitamin A supplementation in HIV-infected adults
- Vitamin A supplementation in HIV-infected infants and children 6–59 months of age
- Vitamin A supplementation in HIV-infected women during pregnancy

Malaria

- Daily iron and folic acid supplementation during pregnancy in malaria-endemic areas
- Daily iron supplementation in children 24–59 months of age in malaria-endemic areas
- Daily iron supplementation in children 6-23 months of age in malaria-endemic areas
- Daily iron supplementation in children and adolescents 5–12 years of age in malaria-endemic areas
- Insecticide-treated nets to reduce the risk of malaria in pregnant women
- Intermittent iron and folic acid supplementation during pregnancy in malaria-endemic areas
- Intermittent iron and folic acid supplementation in adult women and adolescent girls in malaria-endemic areas
- Intermittent iron supplementation in preschool and school-age children in malaria-endemic areas
- Intermittent preventative treatment to reduce the risk of malaria during pregnancy
- Iron supplementation with or without folic acid to reduce the risk of postpartum anaemia in malaria-endemic areas

Respiratory conditions

- Use of antibiotics in the outpatient management of children 6-59 months of age with severe acute malnutrition
- Vitamin A supplementation in children with respiratory infections
- Vitamin D supplementation and respiratory infections in children
- Zinc supplementation in children with respiratory infections

Tuberculosis - Expanded Below

- Management of moderate undernutrition in individuals with active tuberculosis
- Management of severe acute malnutrition in individuals with active tuberculosis
- Micronutrient supplementation in individuals with active tuberculosis
- Nutrition assessment and counselling in individuals with active tuberculosis

Zika virus disease

- Infant feeding in areas of Zika virus transmission

TUBERCULOSIS - Expanded

Management of moderate undernutrition in individuals with active tuberculosis

WHO recommendations

- Children who are under 5 years of age with active TB and moderate undernutrition should be managed as any other children with moderate undernutrition, including provision of supplementary foods*, in order to restore appropriate weight-for-height.
- Pregnant women with active TB and moderate undernutrition, or with inadequate weight gain, should be provided with supplementary foods*, as necessary to achieve an average weekly minimum weight gain of approximately 300 g in the second and third trimesters.
- Patients with active multi-drug resistant TB (MDR-TB) and moderate undernutrition should be provided with supplementary foods*, as necessary to restore normal nutritional status.

* locally available nutrient-rich or fortified supplementary foods

Management of moderate undernutrition in individuals with active tuberculosis

WHO recommendations

- School-age children and adolescents (5–19 years of age), and adults, including pregnant and lactating women, with active TB and severe acute malnutrition should be treated in accordance with the WHO recommendations for management of severe acute malnutrition (IAMI manual, Technical note; see 'WHO documents' below).
- Children who are less than 5 years of age with active TB and severe acute malnutrition should be treated in accordance with the WHO recommendations for the management of severe acute malnutrition in children who are less than 5 years of age (updated guideline on management of SAM; see 'WHO documents' below).

Micronutrient supplementation in individuals with active tuberculosis

WHO recommendations

- A daily multiple micronutrient supplement at 1× recommended nutrient intake* should be provided in situations where fortified or supplementary foods should have been provided in accordance with standard management of moderate undernutrition (IAMI manual, Technical note; see 'WHO documents' below), but are unavailable.
- All pregnant and lactating women with active TB should receive multiple micronutrient supplements that contain iron and folic acid and other vitamins and minerals, according to the United Nations Multiple Micronutrient Preparation (UNICEF, WHO, UNU joint report; see 'WHO documents' below) to complement their maternal micronutrient needs.
- In settings where calcium intake is low, calcium supplementation as part of antenatal care is recommended in pregnant women with active TB for the prevention of pre-eclampsia, particularly among those pregnant women at higher risk of developing hypertension

Nutrition assessment and counseling in individuals with active tuberculosis

All individuals with active TB should receive: *i*) an assessment of their nutritional status, and *ii*) appropriate counselling based on their nutritional status at diagnosis and throughout treatment.

Guidelines Review Committee-approved evidence-based official WHO guidelines

Nutritional care and support for patients with tuberculosis 2013

Guidance for national tuberculosis programs on the management of tuberculosis in children: second edition 2014

Technical note: Supplementary foods for the management of moderate acute malnutrition in infants and children 6–59 months of age 2012

Updates on the management of severe acute malnutrition in infants and children 2013

IMAI district clinician manual: hospital care for adolescents and adults. Guidelines for the management of common illnesses with limited resources, volumes 1 and 2 2011

Guidance for national tuberculosis programs on the management of tuberculosis in children: second edition 2014

Calcium supplementation in pregnant women 2013 and WHO recommendations for prevention and treatment of pre-eclampsia and eclampsia

Systematic reviews used to develop the guidelines

Nutritional supplements for people being treated for active tuberculosis
Sinclair D, Abba K, Grobler L, Sudarsanam TD. Cochrane Database of Systematic Reviews. 2011; Issue 11. Art. No.: CD006086.

Nutritional supplements for people being treated for active tuberculosis
Grobler L, Nagpal S, Sudarsanam TD, Sinclair D. Cochrane Database of Systematic Reviews 2016, Issue 6. Art. No.: CD006086.

The effectiveness of interventions to treat severe acute malnutrition in young children: a systematic review
Picot J, Hartwell D, Harris P, Mendes D, Clegg AJ, Takeda A. Health Technology Assessment. 2012; 16(19):1-316.

Related Cochrane reviews

Specially formulated foods for treating children with moderate acute malnutrition in low- and middle-income countries
Lazzerini M, Rubert L, Pani P. Cochrane Database of Systematic Reviews. 2013; Issue 6. Art. No.: CD009584.

Calcium supplementation during pregnancy for preventing hypertensive disorders and related problems
Hofmeyr GJ, Lawrie TA, Atallah ÁN, Duley L, Torloni MR. Cochrane Database of Systematic Reviews. 2014; Issue 6. Art. No.: CD001059.

Calcium supplementation (other than for preventing or treating hypertension) for improving pregnancy and infant outcomes
Buppasiri P, Lumbiganon P, Thinkhamrop J, Ngamjarus C, Laopaiboon M, Medley N. Cochrane Database of Systematic Reviews 2015, Issue 2. Art. No.: CD007079.

Calcium supplementation during pregnancy for preventing hypertensive disorders and related problems
Hofmeyr GJ, Lawrie TA, Atallah ÁN, Torloni MR. Cochrane Database of Systematic Reviews. 2018; Issue 10. Art. No.: CD001059.

Related guidance documents

Composition of a multi-micronutrient supplement to be used in pilot programs among pregnant women in developing countries: report of a United Nations Children's Fund (UNICEF), World Health Organization (WHO), United Nations University (UNU) workshop 1999

Cost & cost-effectiveness analyses

The cost-effectiveness of forty health interventions in Guinea
Jha P, Bangoura O, Ranson K. Health Policy Plan. 1998; 13(3):249-62.

Should women be advised to use calcium supplements during pregnancy? A decision analysis
Meertens LJE, Scheepers HCJ, Willemse JPMM, Spaanderman MEA, Smits LJM. Matern Child Nutr. 2018; 14(1).

Cost effectiveness of a community based prevention and treatment of acute malnutrition program in Mumbai slums, India
Goudet S, Jayaraman A, Chanani S, Osrin D, Devleesschauwer B, Bogin B, et al. PLoS One. 2018; 13(11):e0205688.

Costs, cost-effectiveness and financial sustainability of community-based management of acute malnutrition in northern Nigeria
Frankel S, Roland M, Makinen M. Washington DC: Results for Development Institute; 2015.

Economic Cost of Community-Based Management of Severe Acute Malnutrition in a Rural District in Ghana
Abdul-Latif A-M C, Nonvignon J. Health. 2014; 6: 886-899.

Cost-effectiveness of the community-based management of severe acute malnutrition by community health workers in southern Bangladesh
Puett C, Sadler K, Alderman H, Coates J, Fiedler JL, Myatt M. Health Policy Plan. 2013; 28(4):386-99.

Cost-effectiveness of community-based management of acute malnutrition in Malawi
Wilford R, Golden K, Walker DG. Health Policy Plan. 2012; 27(2):127-37.

Cost effectiveness of community-based and in-patient therapeutic feeding programs to treat severe acute malnutrition in Ethiopia
Tekeste A, Wondafrash M, Azene G, Deribe K. Cost Eff Resour Alloc. 2012; 10:4.

Cost effectiveness of community-based therapeutic care for children with severe acute malnutrition in Zambia: decision tree model
Bachmann MO. Cost Eff Resour Alloc. 2009 Jan; 7:2.re

D. U.N. Decade of Action on Nutrition, 2016-2025

On 1st of April 2016, the General Assembly proclaimed the United Nations Decade of Action on Nutrition, 2016-2025. UNSCN, together with its members, welcomes this important step towards mobilising action to eradicate malnutrition in all its forms in all countries.

The UN Decade of Action on Nutrition is a commitment of Member States to undertake ten years of sustained and coherent implementation of policies and programs, following the recommendations and commitments of the ICN2 Framework for Action and the 2030 Agenda for Sustainable Development. The Decade will increase visibility of nutrition action at the highest level and ensure coordination, strengthen multi-sectoral collaboration, create synergies and measure progress towards sustainable food systems and food and nutrition security for all.

Progress to reduce undernourishment and micronutrient deficiencies has been far too slow and uneven across regions, countries and populations groups. The prevalence of overweight and obesity is increasing in nearly all countries. On the other end, 821 million people remain chronically undernourished, 149 million children under 5 years of age are stunted,

over 49.5 million children under 5 years are wasted, over two billion people suffer from micronutrient deficiencies and 2 billion people are affected by overweight (almost a third of adults worldwide) of whom around 678 million are obese. The resolution recognises the need to eradicate hunger and prevent all forms of malnutrition worldwide.

The UN Decade of Action on Nutrition will provide an umbrella for a wide group of actors to work together to address these and other pressing nutrition issues in order to achieve the goals set out in the 2030 Agenda. The General Assembly calls upon WHO and FAO to lead the implementation of the UN Decade of Action on Nutrition, in collaboration with the World Food Programme, the International Fund for Agricultural Development and the United Nations Childrens Fund, and to identify and develop a work program, using coordination mechanisms such as UNSCN, the UN System Standing Committee on Nutrition. (From https://www.unscn.org/en/topics/un-decade-of-action-on-nutrition, 17Mar2021).

E. USAID, USDA, White House & other USG Sources **

(1) Nutrition and Tuberculosis: A review of the literature and considerations for TB control programs
Papathakis P, Piwoz E for Africa's Health in 2010 project. Washington, DC: USAID, April 2008
USAID Contract No. RLA-C-00-05-00065-00 with Academy for Educational Development (AED)

(2) Multi-Sectoral Nutrition Strategy (MSNS) 2014-2025
Abott S, Egan R, Thurbur M, Bradley S, Peniston A on behalf of Technical Working Group, Management Group, Advisory Committee, and Consultants. Washington, DC: USAID, May 2014

(3) USAID Technical Guidance Briefs

a. MSNS: Role Of Nutrition In Preventing Child And Maternal Deaths
b. MSNS: Nutrition Scale-Up: Learning From Experience
c. MSNS: Interventions For Addressing Vitamin And Mineral Inadequacies
d. MSNS: Intensive Nutrition Programming
e. MSNS: The 1,000-Day Window of Opportunity
f. MSNS: Effective At-Scale Nutrition Social And Behavior Change Communication
g. MSNS: Gender Considerations For Achieving Nutrition Outcomes Through Agriculture
h. MSNS: Nutrition, Food Security And HIV
i. MSNS: Introduction To Nutrition Budget And Expenditure Analysis
j. MSNS: Nutrition Costing
k. WASH: WASH and its Links to Nutrition

(4) U.S. Government Global Nutrition Coordination Plan FY 2016-2021
Writing Group: Vorkoper S, NIH; Anderson E, Peace Corps; Abbot S, Thurber M and Quick T, USAID; Buckingham E, Dept of State; Chen H, OSTP; Wood Y, et al. USDA. Washington, DC, June 2016

(5) U.S. Government Global Food Security Strategy FY 2017-2021
Washington, DC, September 2016

(6) **Thinking Strategically About Nutrition: Key Issues in the Context of HIV and Tuberculosis.** David K. Hales, MEASURE Evaluation USAID/PEPFAR/MEASURE, April 2019

(7) Nourishing Lives & Building The Future: The History Of Nutrition At USAID.
Anderson MA, et al. Washington, DC: USAID, June, 2019. USAID Contract No. AID-OAA-C-14-00067 (no. 404)

(8) USG Websites

www.feedthefuture.gov
www.usaid.gov/global-health/health-areas/nutrition
www.usaid.gov/…/office-food
www.fns.usda.gov
www.fas.usda.gov

(9) Video Interviews with Tim Quick (USAID/Nutrition-ret.) and Mija Ververs (JHU/CDC, former USAID consultant)

Overall Summary:

Based on its extensive experience described in these reports, USAID articulated seven Essential Nutrition Actions based on evidence of effectiveness, feasibility and cost. Examples of effective USAID-supported programs are provided in VI.F.7. p. 76-78 below.

- Promotion of optimal breastfeeding during the first 6 months
- Promotion of optimal complementary feeding starting at 6 months with continued breastfeeding to 2+ years of age
- Promotion of optimal nutritional care of sick and severely malnourished children
- Promotion of optimal nutrition for women
- Prevention of vitamin A deficiency in women and children
- Promotion of adequate intake of iron and folic acid and prevention and control of anemia for women and children
- Promotion of adequate intake of iodine by all members of the household

Item by Item Summary

(1) Nutrition and Tuberculosis: A review of the literature and considerations for TB control programs

Papathakis P, et al. Washington, DC: USAID, April 2008

This well-researched and well-reasoned book concentrates mostly on nutritional support to patients with active TB disease. Nutritional considerations in the management of patients with TB were updated, supported by a systematic review, and published by WHO in 2013—still considered an international standard reference in this respect. I do not presume to repeat the evidence that was previously summarized are reported to USAID in a similar format in 2008. Therefore, the present review concentrates on evidence after that report was published.

(2) Nourishing Lives & Building The Future: The History Of Nutrition At USAID.

Anderson MA, et al. Washington, DC: USAID, June, 2019.

USAID's Multi-Sectoral Nutrition Strategy, ch. 5, p. 56-57

While Feed the Future was revitalizing USAID's commitment to agriculture-led economic growth and improved nutrition, USAID's global health efforts focused on high-level goals to prevent child and maternal deaths, recognizing that undernutrition contributes to an estimated 45% of under-5 mortality and anemia to about 20% of maternal mortality.[61] Nutrition became the nexus connecting these two high-level goals for USAID. In May 2014, USAID released its first Multi-Sectoral Nutrition Strategy, which describes an integrated, Agency-wide approach to addressing global malnutrition through 2025.[62] Guided by this strategy, USAID's nutrition programming seeks to reduce malnutrition—and address its

determinants— in women of reproductive age (15-49) and in children, with a specific focus on the 1,000-day window from conception to the child's second birthday. This is to be realized through Feed the Future action, USAID's global health programs and USAID's Food for Peace development activities. USAID has also been a leading member of the U.S. Government's international nutrition working groups, task forces and coordination bodies, and a leader in both the preparation and implementation of the U.S. Government Global Nutrition Coordination Plan. Launched in 2016, this cross-government effort draws experts from 11 agencies that are committed to advancing nutrition research, action and learning to address critical domestic and global nutrition concerns, leveraging existing resources to do so. Since its launch, this coordination mechanism has guided the creation of formal leadership and structure to advance progress towards U.S. Government nutrition goals and has advanced research, information exchange and learning in multiple priority areas for nutrition action. Specific examples of USAID/Nutrition recent successful projects and programs are detailed below in Section VI, subsection F, number 7 starting on p. 75.

II. NUTRITION-SPECIFIC STRATEGIES AND PROGRAMS

A. **Food or nutrition incentives for TB treatment adherence**
B. **Direct food aid, commodity food distribution, and agricultural surplus**
C. **Nutrition in pregnancy and early childhood**
D. **Adolescent health**
E. **Cash transfer / micro-finance**
F. **Examples and case studies of successful programs**

A. Food or nutrition incentives for TB treatment adherence

Adherence interventions and outcomes of tuberculosis treatment: A systematic review and meta-analysis of trials and observational studies.

Background Incomplete adherence to tuberculosis (TB) treatment increases the risk of delayed culture conversion with continued transmission in the community, as well as treatment failure, relapse, and development or amplification of drug resistance. We conducted a systematic review and meta-analysis of adherence interventions, including directly observed therapy (DOT), to determine which approaches lead to improved TB treatment outcomes.

Methods and findings We systematically reviewed Medline as well as the references of published review articles for relevant studies of adherence to multidrug treatment of both drug-susceptible and drug- resistant TB through February 3, 2018. We included randomized controlled trials (RCTs) as well as prospective and retrospective cohort studies (CSs) with an internal or external control group that evaluated any adherence intervention and conducted a meta-analysis of their impact on TB treatment outcomes. Our search identified 7,729 articles, of which 129 met the inclusion criteria for quantitative analysis. Seven adherence categories were identified, including DOT offered by different providers and at various locations, reminders and tracers, incentives and enablers, patient education, digital technologies (short message services [SMSs] via mobile phones and video-observed therapy [VOT]), staff education, and combinations of these interventions. When compared with DOT alone, self-administered therapy (SAT) was associated with lower rates of treatment success (CS: risk ratio [RR] 0.81, 95% CI 0.73–0.89; RCT: RR 0.94, 95% CI 0.89–0.98), adherence (CS: RR 0.83, 95% CI 0.75– 0.93), and sputum smear conversion (RCT: RR 0.92, 95% CI 0.87–0.98) as well as higher rates of development of drug resistance (CS: RR 4.19, 95% CI 2.34–7.49). When compared to DOT provided by healthcare providers, DOT provided by family members was associated with a lower rate of adherence (CS: RR 0.86, 95% CI 0.79–0.94). DOT delivery in the community versus at the clinic was associated with a higher rate of treatment success (CS: RR 1.08, 95% CI 1.01–1.15) and sputum conversion at the end of two months (CS: RR 1.05,95% CI 1.02–1.08) as well as lower rates of treatment failure (CS: RR 0.56, 95% CI 0.33– 0.95) and loss to follow-up (CS: RR 0.63, 95% CI 0.40–0.98). Medication monitors improved adherence and treatment success and VOT was comparable with DOT. SMS reminders led to a higher treatment completion rate in one RCT and were associated with higher rates of cure and sputum conversion when used in combination with medication monitors. TB treatment outcomes improved when patient education, healthcare provider education, incentives and enablers, psychological interventions, reminders and tracers, or mobile digital technologies were employed. Our findings are limited by the heterogeneity of the included studies and lack of standardized research methodology on adherence interventions.

Conclusion TB treatment outcomes are improved with the use of adherence interventions, such as patient education and counseling, incentives and enablers, psychological interventions, reminders and tracers, and digital health technologies. Trained healthcare providers as well as community delivery provides patient-centered DOT options that both enhance adherence and improve treatment outcomes as compared to unsupervised, SAT alone.

Alipanah N, Jarlsberg L, Miller C, Linh NN, Falzon D, Jaramillo E, et al. (2018) PLoS Med 15(7): e1002595. https://doi.org/10.1371/journal.pmed.1002595

Interventions to tackle malnutrition and its risk factors in children living in slums: a scoping review

Reviewed 22 intervention trials and 38 risk factor studies in South and SE Asia, Kenya, Brazil, and others; mostly in slums; half targeting children <5 y.o, 8 studies of school-aged children. . Interventions included school feeding, nutrition supplements, nutrition promotion, treatment of severe or moderate malnutrition, general child health, and WASH interventions. 16 of 22 (73%) of intervention trials judged to be effective, decreasing wasting (6), less underweight (5), less stunting (8), more weight gain (6), and less anemia (3). Conditional cash transfers improved nutritional status and decreased morbidity of young children. Treatment of moderate and severe acute malnutrition were successful, both inpatient and community based. These findings are consistent with the assertion that nutrition interventions are more effective among very impoverished groups, in this case mainly urban slums.

Goudet S, et al. Ann Human Bio. 2017;44(1):1–10. http://dx.doi.org/10.1080/03014460.2016.1205660

B. Direct food aid and nutritional supplements

Systematic review and meta-analysis of the effects of high protein oral nutritional supplements

Disease-related malnutrition is common, detrimentally affecting the patient and healthcare economy. Although use of high protein oral nutritional supplements (ONS) has been recommended to counteract the catabolic effects of disease and to facilitate recovery from illness, there is a lack of systematically obtained evidence to support these recommendations. This systematic review involving 36 randomised controlled trials (RCT) (n = 3790) (mean age 74 years; 83% of trials in patients >65 years) and a series of meta-analyses of high protein ONS (>20% energy from protein) demonstrated a range of effects across settings and patient groups in favour of the high protein ONS group. These included reduced complications (odds ratio (OR) 0.68 (95%CI 0.55–0.83), p < 0.001, 10 RCT, n = 1830); reduced readmissions to hospital (OR 0.59 (95%CI 0.41–0.84), p = 0.004, 2 RCT, n = 546); improved grip strength (1.76 kg (95%CI 0.36–3.17), p < 0.014, 4 RCT, n = 219); increased intake of protein (p < 0.001) and energy (p < 0.001) with little reduction in normal food intake and improvements in weight (p < 0.001). There was inadequate information to compare standard ONS (<20% energy from protein) with high protein ONS (>20% energy from protein). The systematic review and meta-analysis provides evidence that high protein supplements produce clinical benefits, with economic implications.

A.L.Cawood, M.Elia, R.J.Stratton. Aging Research Reviews 2012;11(2):278-296. https://doi.org/10.1016/j.arr.2011.12.008

Impact of education and provision of complementary feeding on growth and morbidity in children less than 2 years of age in developing countries: a systematic review

Background: About one third of deaths in children less than 5 years of age are due to underlying undernutrition. According to an estimate, 19.4% of children <5 years of age in developing countries were underweight (weight-for-age Z score <-2) and about 29.9% were stunted in the year 2011 (height-for-age Z score <-2). It is well recognized that the period of 6-24 months of age is one of the most critical time for the growth of the infant.

Methods: We included randomized, non-randomized trials and programs on the effect of complementary feeding (CF) (fortified or unfortified, but not micronutrients alone) and education on CF on children less than 2 years of age in low and middle income countries (LMIC). Studies that delivered intervention for at least 6 months were included; however, studies in which intervention was given for supplementary and therapeutic purposes were excluded. Recommendations are made for input to the Lives Saved Tool (LiST) model by following standardized guidelines developed by Child Health Epidemiology Reference Group (CHERG).

Results: We included 16 studies in this review. Amongst these, 9 studies provided education on complementary feeding, 6 provided complementary feeding (with our without education) and 1 provided both as separate arms. Overall, education on CF alone significantly improved HAZ (SMD: 0.23; 95% CI: 0.09, 0.36), WAZ (SMD 0.16, 95% CI: 0.05, 0.27), and significantly reduced the rates of stunting (RR 0.71; 95% CI: 0.56, 0.91). While no significant impact were observed for height and weight gain. Based on the subgroup analysis; ten studies from food secure populations indicated education on CF had a significant impact on height gain, HAZ scores, and weight gain, however, stunting reduced non-significantly. In

food insecure population, CF education alone significantly improved HAZ scores, WAZ scores and significantly reduced the rates of stunting, while CF provision with or without education improved HAZ and WAZ scores significantly.
Conclusion: Complementary feeding interventions have a potential to improve the nutritional status of children in developing countries. However, large scale high quality randomized controlled trials are required to assess the actual impact of this intervention on growth and morbidity in children 6-24 months of age. Education should be combined with provision of complementary foods that are affordable, particularly for children in food insecure countries
Zohra S Lassi, et al. BMC Public Health. 2013;13 Suppl 3:S13. doi: 10.1186/1471-2458-13-S3-S13. PMID: 24564534

Systematic Review of Complementary Feeding Strategies amongst Children Less than Two Years of Age

Nearly 20% of children less than five years of age in LMIC were underweight (weight−for−age [WAZ] Z score <−2) and about 30% were stunted in 2011 (height−for−age [HAZ] Z score <−2). Malnutrition is preventable through effective complementary feeding practices. Several strategies have been employed to improve complementary feeding practices. These include nutritional education to mothers designed to promote healthy feeding practices; provision of complementary food offering extra energy (with or without micronutrient fortification); and increasing energy density of complementary foods through simple technology.

In this review, we have included randomised controlled trials (RCTs) and non−RCTs that assessed the impact of complementary feeding and education on complementary feeding on linear growth, weight gain, iron status, and morbidity. Broadly, interventions were classified as education on complementary feeding and complementary feeding with or without nutrition education. We have also mentioned the costs of the interventions given in the included studies and other complementary foods available globally.

All available papers/reports on the effect of complementary feeding (fortified or unfortified, but not micronutrients alone) and education on complementary feeding on children less than two years of age in Low and middle income countries (LMIC) were included. Studies that delivered intervention and assessed outcome for at least six months were included. We excluded all those studies in which intervention was given for supplementary and therapeutic purposes and those that assessed the impact of micronutrients alone.

We included 11 randomised controlled trials (RCTs) and 7 non−RCTs. We conducted meta−analysis on RCTs. Amongst all RCTs, eight were on nutritional education only. We found significant impact of nutritional education on linear growth (height−for−age Z scores: SMD 0.22; 95% Confidence Interval [CI]: 0.08, 0.37, n=1,486, 4 studies; stunting: risk ratio (RR) 0.72; 95% CI: 0.57, 0.93, n=1445, 2 studies) and weight (weight−for−age [WAZ] Z scores: SMD 0.20; 95% CI: 0.07, 0.33, n=1673, 4 studies). On the other hand, we found four trials in which children were provided with complementary feeding with or without nutrition education. We found that complementary feeding with or without education had a non− significant impact on HAZ scores (SMD 0.46; 95% CI: −0.24, 1.17, 4 studies, n=500), and WAZ (SMD 0.15; 95% CI: −0.09, 0.40, 2 studies, n=262).We also performed a meta−analysis based on the type of food, but we are unable to conclude which types of foods are the most effective in preventing undernutrition because the numbers of studies in each subtype were few. These interventions had a significant impact on reducing the prevalence of respiratory illness (RR 0.68; 95% CI: 0.48, 0.97, 2 studies, n=629). However, there was no difference in fever and diarrhea episodes.

We also attempted to gather data on cost of the interventions, food products, and complementary feeding strategies used in the included studies. Most papers did not mention estimates of cost and thus, we contacted the authors with the request to provide us with cost data. We have also included cost estimates of various complementary foods that were not used in any of the interventions included in this review but can potentially have an impact in reducing undernutrition. The cost of different baby food products, including cereals, porridge, and biscuits produced by different manufacturers were identified via web search.

The scarcity of available studies and their heterogeneity as well as the variety in complementary feeding interventions make it difficult to determine one particular type of complementary feeding intervention as the most effective. Nonetheless, the results of this review indicate that effectively implemented provision of complementary feeding and education on complementary feeding have a potential to prevent undernutrition in children. Our review also found that nutritional education and complementary feeding (either individually or combined) both have the potential to reduce morbidity from respiratory infections. However, further high−quality studies need to be conducted which report consistent outcome measures and similar interventions in order to accurately map out which interventions, if scaled up, can be effective. Moreover, these trials should consider using standardised types of food in the intervention so that

evidence can be formulated on which type of food is most effective. It is ideal to keep the duration of intervention for at least six months since anthropometric improvements are gradual. Trials should report consistent outcomes and also include morbidity outcomes. Despite clear evidence of the disastrous consequences of childhood nutritional deprivation in the short and long terms, nutritional health remains a low priority. Therefore, enhanced and rigorous actions are needed to deliver and scale up nutritional education and complementary feeding interventions.
Zohra S. Lassi, Guleshehwar Zahid, Jai K. Das, Zulfiqar A. Bhutta.
Available at: assets.publishing.service.gov.uk/media/57a08a38ed915d3cfd000654/Revised-Complementary-Feeding-desk-study_5-13-2013.pdf (accessed 24 March 2021). Update of BMC Public Health 2013;13(Suppl 3):S13.

Treatment of severe and moderate acute malnutrition in low- and middle income settings: a systematic review, meta-analysis and Delphi process

Background: Globally, moderate acute malnutrition (MAM) and severe acute malnutrition (SAM) affect approximately 52 million children under five. This systematic review evaluates the effectiveness of interventions for SAM including the World Health Organization (WHO) protocol for inpatient management and community-based management with ready-to-use-therapeutic food (RUTF), as well as interventions for MAM in children under five years in low- and middle-income countries.
Methods: We systematically searched the literature and included 14 studies in the meta-analysis. Study quality was assessed using CHERG adaptation of GRADE criteria. A Delphi process was undertaken to complement the systematic review in estimating case fatality and recovery rates that were necessary for modelling in the Lives Saved Tool (LiST).
Results: Case fatality rates for inpatient treatment of SAM using the WHO protocol ranged from 3.4% to 35%. For community-based treatment of SAM, children given RUTF were 51% more likely to achieve nutritional recovery than the standard care group. For the treatment of MAM, children in the RUSF group were significantly more likely to recover and less likely to be non-responders than in the CSB group. In both meta-analyses, weight gain in the intervention group was higher, and although statistically significant, these differences were small. Overall limitations in our analysis include considerable heterogeneity in many outcomes and an inability to evaluate intervention effects separate from commodity effect. The Delphi process indicated that adherence to standardized protocols for the treatment of SAM and MAM should have a marked positive impact on mortality and recovery rates; yet, true consensus was not achieved.
Conclusions: Gaps in our ability to estimate effectiveness of overall treatment approaches for SAM and MAM persist. In addition to further impact studies conducted in a wider range of settings, more high quality program evaluations need to be conducted and the results disseminated.
Lenters et al. BMC Public Health 2013, 13(Suppl 3):S23 http://www.biomedcentral.com/1471-2458/13/S3/S23

Effects of dietary interventions on neonatal and infant outcomes: a systematic review and meta-analysis

Background: Nutrition plays a fundamental role in fetal growth and birth outcomes.
Objective: We synthesized effects of dietary interventions before or during pregnancy on neonatal and infant outcomes.
Design: Randomized controlled trials that assessed the whole diet or dietary components and neonatal or infant outcomes were included. Two authors independently identified articles to be included and assessed the methodologic quality. A meta-analysis was conducted separately for each outcome by using a random-effects model. Results were reported by dietary intervention as follows: 1) counseling, 2) food and fortified food products, or 3) a combination (counseling plus food) intervention, and 4) collectively for all dietary interventions. Results were subanalyzed by the nutrient of interest, country income, and BMI.
Results: Of 2326 abstracts screened, a total of 29 randomized controlled trials (31 publications) were included in this review. Food and fortified food products were effective in increasing birth weight [standardized mean difference (SMD): 0.27; 95% CI: 0.14, 0.40; $P < 0.01$] and reducing the incidence of low birth weight (SMD: -0.22; 95% CI: -0.37, -0.06; $P < 0.01$). All dietary interventions and those focused on macronutrient intake also increased birth weight ($P < 0.01$) and length ($P < 0.05$) and reduced the incidence of low birth weight ($P < 0.01$). Dietary interventions in low-income countries and underweight or nutritionally at-risk populations increased birth weight ($P < 0.05$) and reduced the incidence of low birth weight ($P = 0.01$). No effects were seen for the following other outcomes: placental weight, head circumference, macrosomia, Apgar score, small for gestational age, large for gestational age, and perinatal mortality.

Conclusion: Additional high-quality randomized controlled trials that test different dietary interventions are required to identify maternal diet intakes that optimize neonatal and infant outcomes.
Ellie Gresham, et al. Am J Clin Nutr. 2014 Nov;100(5):1298-321. doi: 10.3945/ajcn.113.080655. PMID: 25332328

Maternal nutrition interventions to improve maternal, newborn, and child health outcomes
Maternal undernutrition affects a large proportion of women in many developing countries, but has received little attention as an important determinant of poor maternal, newborn, and child health (MNCH) outcomes such as intrauterine growth restriction, preterm birth (PTB), and maternal and infant morbidity and mortality. We recently evaluated the scientific evidence on the effects of maternal nutrition interventions on MNCH outcomes as part of a project funded by the Gates Foundation to identify critical knowledge gaps and priority research needs. A standardized tool was used for study data abstraction, and the effect of nutrition interventions during pregnancy or of factors such as interpregnancy interval on MNCH outcomes was assessed by meta-analysis, when possible. Several nutrient interventions provided during pregnancy have beneficial effects on MNCH outcomes, but are not widely adopted. For example, prenatal calcium supplementation decreases the risk of PTB and increases birthweight; prenatal zinc, omega-3 fatty acids and multiple micronutrient supplements reduce the risk of PTB (<37 weeks), early PTB (<34 weeks) and low birthweight (LBW), respectively. Among currently implemented interventions, balanced protein-energy and iron-folic acid supplementation during pregnancy significantly reduce the risk of LBW by 20-30% in controlled settings, but variable programmatic experiences have led to questionable effectiveness. Early age at pregnancy and short interpregnancy intervals were also associated with increased risk of PTB, LBW and neonatal death, but major gaps remain on the role of women's nutrition before and during early pregnancy and nutrition education and counseling. These findings emphasize the need to examine the benefits of improving maternal nutrition before and during pregnancy both in research and program delivery.
Usha Ramakrishnan , et al. Nestle Nutr Inst Workshop Ser. 2014;78:71-80. doi: 10.1159/000354942. PMID: 24504208

The effect of balanced protein energy supplementation in undernourished pregnant women and child physical growth in low- and middle-income countries: a systematic review and meta-analysis
The beneficial effect of balanced protein energy supplementation during pregnancy on subsequent child growth is unclear and may depend upon the mother entering pregnancy adequately nourished or undernourished. Systematic reviews to-date have included studies from high-, middle- and low-income countries. However, the effect of balanced protein energy supplementation should not be generalised. This review assesses the effect of balanced protein energy supplementation in undernourished pregnant women from low- and middle-income countries on child growth. A systematic review of articles published in English (1970-2015) was conducted via MEDLINE, Scopus, the Cochrane Register and hand searching. Only peer-reviewed experimental studies analysing the effects of balanced protein energy supplementation in undernourished pregnant women from low- and middle-income countries with measures of physical growth as the primary outcome were included. Two reviewers independently assessed full-text articles against inclusion criteria. Validity of eligible studies was ascertained using the Quality Assessment Tool for Quantitative Studies (EPHPP QAT). In total, seven studies met the inclusion criteria. All studies reported on birthweight, five on birth length, three on birth head circumference, and one on longer-term growth. Standardised mean differences were calculated using a random-effects meta-analysis. Balanced protein energy supplementation significantly improved birthweight (seven randomised controlled trials, n = 2367; d = 0.20, 95% confidence interval, 0.03-0.38, P = 0.02). No significant benefit was observed on birth length or birth head circumference. Impact of intervention could not be determined for longer-term physical growth due to limited evidence. Additional research is required in low- and middle-income countries to identify impacts on longer-term infant growth.
Briony Stevens, et al. Matern Child Nutr. 2015 Oct; 11(4): 415–432. doi: 10.1111/mcn.12183. PMID: 25857334

Supportive interventions for enhancing dietary intake in malnourished or nutritionally at-risk adults
Background: Supportive interventions such as serving meals in a dining room environment or the use of assistants to feed patients are frequently recommended for the management of nutritionally vulnerable groups. Such interventions are

included in many policy and guideline documents and have implications for staG time but may incur additional costs, yet there appears to be a lack of evidence for their efficacy.
Objectives: To assess the effects of supportive interventions for enhancing dietary intake in malnourished or nutritionally at-risk adults.
Search methods: We identified publications from comprehensive searches of the Cochrane Library, MEDLINE, Embase, AMED, British Nursing Index, CINAHL, SCOPUS, ISI Web of Science databases, scrutiny of the reference lists of included trials and related systematic reviews and handsearching the abstracts of relevant meetings. The date of the last search for all databases was 31 March 2013. Additional searches of CENTRAL, MEDLINE, ClinicalTrials.gov and WHO ICTRP were undertaken to September 2016. The date of the last search for these databases was 14 September 2016.
Selection criteria: Randomised controlled trials of supportive interventions given with the aim of enhancing dietary intake in nutritionally vulnerable adults compared with usual care.
Data collection and analysis: Three review authors and for the final search, the editor, selected trials from titles and abstracts and independently assessed eligibility of selected trials. Two review authors independently extracted data and assessed risk of bias, as well as evaluating overall quality of the evidence utilising the GRADE instrument, and then agreed as they entered data into the review. The likelihood of clinical heterogeneity amongst trials was judged to be high as trials were in populations with widely different clinical backgrounds, conducted in different healthcare settings and despite some grouping of similar interventions, involved interventions that varied considerably. We were only able, therefore, to conduct meta-analyses for the outcome measures, 'all-cause mortality', 'hospitalisation' and 'nutritional status (weight change)'.
Main results: Forty-one trials (10,681 participants) met the inclusion criteria. Trials were grouped according to similar interventions (changes to organisation of nutritional care (N = 13; 3456 participants), changes to the feeding environment (N = 5; 351 participants), modification of meal profile or pattern (N = 12; 649 participants), additional supplementation of meals (N = 10; 6022 participants) and home meal delivery systems (N = 1; 203 participants). Follow-up ranged from ‘duration of hospital stay’ to 12 months. The overall quality of evidence was moderate to very low, with the majority of trials judged to be at an unclear risk of bias in several risk of bias domains. The risk ratio (RR) for all-cause mortality was 0.78 (95% confidence interval (CI) 0.66 to 0.92); P = 0.004; 12 trials; 6683 participants; moderate-quality evidence. This translates into 26 (95% CI 9 to 41) fewer cases of death per 1000 participants in favour of supportive interventions. The RR for number of participants with any medical complication ranged from 1.42 in favour of control compared with 0.59 in favour of supportive interventions (very low-quality evidence). Only five trials (4451 participants) investigated health-related quality of life showing no substantial differences between intervention and comparator groups. Information on patient satisfaction was unreliable. The effects of supportive interventions versus comparators on hospitalisation showed a mean difference (MD) of -0.5 days (95% CI -2.6 to 1.6); P = 0.65; 5 trials; 667 participants; very low-quality evidence. Only three of 41 included trials (4108 participants; very low-quality evidence) reported on adverse events, describing intolerance to the supplement (diarrhoea, vomiting; 5/34 participants) and discontinuation of oral nutritional supplements because of refusal or dislike of taste (567/2017 participants). Meta-analysis across 17 trials with adequate data on weight change revealed an overall improvement in weight in favour of supportive interventions versus control: MD 0.6 kg (95% CI 0.21 to 1.02); 2024 participants; moderate-quality evidence. A total of 27 trials investigated nutritional intake with a majority of trials not finding marked differences in energy intake between intervention and comparator groups. Only three trials (1152 participants) reported some data on economic costs but did not use accepted health economic methods (very low-quality evidence).
Authors' conclusions: There is evidence of moderate to very low quality to suggest that supportive interventions to improve nutritional care results in minimal weight gain. Most of the evidence for the lower risk of all-cause mortality for supportive interventions comes from hospital-based trials and more research is needed to confirm this effect. There is very low-quality evidence regarding adverse effects; therefore whilst some of these interventions are advocated at a national level clinicians should recognise the lack of clear evidence to support their role. This review highlights the importance of assessing patient-important outcomes in future research.
Citation: BaldwinC, KimberKL, GibbsM, WeekesCE. Supportive interventions for enhancing dietary intake in malnourished or nutritionally at-risk adults. Cochrane Database of Systematic Reviews 2016, Issue 12. Art. No.: CD009840. DOI: 10.1002/14651858.CD009840.pub2.

Review of the importance of nutrition during the first 1000 days: maternal nutritional status and its associations with fetal growth and birth, neonatal and infant outcomes among African women

Maternal nutritional status (MNS) is a strong predictor of growth and development in the first 1000 days of life and may influence susceptibility to non-communicable diseases in adulthood. However, the role of nutrition during this window of developmental plasticity in Africa is unclear. This paper reviews published data to address whether maternal nutrition during the first 1000 days is important for Africa, with a focus on MNS and its associations with fetal growth and birth, neonatal and infant outcomes. A systematic approach was used to search the following databases: Medline, EMBASE, Web of Science, Google Scholar, ScienceDirect, SciSearch and Cochrane Library. In all, 26 studies met the inclusion criteria for the specific objectives. MNS in Africa showed features typical of the epidemiological transition: higher prevalences of maternal overweight and obesity and lower underweight, poor diet quality 1 and high anaemia prevalence. Maternal body mass index and greater gestational weight gain (GWG) were positively associated with birth weight; however, maternal overweight and obesity were associated with increased risk of macrosomia and intrauterine growth restriction. Maternal anaemia was associated with lower birth weight. Macro- and micronutrient supplementation during pregnancy were associated with improvements in GWG, birth weight and mortality risk. Data suggest poor MNS in Africa and confirms the importance of the first 1000 days as a critical period for nutritional intervention to improve growth, birth outcomes and potential future health risk. However, there is a lack of data beyond birth and a need for longitudinal data through infancy to 2 years of age.

S V Wrottesley, et al. J Dev Orig Health Dis. 2016 Apr;7(2):144-62. doi: 10.1017/S2040174415001439. PMID: 26279311

Community-based supplementary feeding for food insecure, vulnerable and malnourished populations - an overview of systematic reviews.

Background: Supplementary feeding may help food insecure and vulnerable people by optimizing the nutritional value and adequacy of the diet, improving quality of life and improving various health parameters of disadvantaged families. In low- and middle-income countries (LMIC), the problems supplementary feeding aims to address are entangled with poverty and deprivation, the programs are expensive and delivery is complicated.

Objectives: 1. To summarize the evidence from systematic reviews of supplementary feeding for food insecure, vulnerable and malnourished populations, including children under five years of age, school-aged children, pregnant and lactating women, people with HIV or tuberculosis (or both), and older populations. 2. To describe and explore the effects of supplementary feeding given to people in these groups, and to describe the range of outcomes between reviews and range of effects in the different groups.

Methods: In January 2017, we searched the Cochrane Database of Systematic Reviews, MEDLINE, Embase and nine other databases. We included systematic reviews evaluating community-based supplementary feeding, and concerning food insecure, vulnerable and malnourished populations. Two review authors independently undertook selection of systematic reviews, data extraction and 'Risk of bias' assessment. We assessed review quality using the AMSTAR tool, and used GRADEpro 'Summary of findings' tables from each review to indicate the certainty of the evidence for the main comparisons. We summarised review findings in the text and reported the data for each outcome in additional tables. We also used forest plots to display results graphically.

Main results: This overview included eight systematic reviews (with last search dates between May 2006 and February 2016). Seven were Cochrane Reviews evaluating interventions in pregnant women; children (aged from birth to five years) from LMIC; disadvantaged infants and young children (aged three months to five years); children with moderate acute malnutrition (MAM); disadvantaged school children; adults and children who were HIV positive or with active tuberculosis (with or without HIV). One was a non-Cochrane systematic review in older people with Alzheimer's disease. These reviews included 95 trials relevant to this overview, with the majority (74%) of participants from LMIC.The number of included participants varied between 91 and 7940 adults, and between 271 and >12,595 children. Trials included a wide array of nutritional interventions that varied in duration, frequency and format, with micronutrients often reported as co-interventions. Follow-up ranged from six weeks to two years; three trials investigated outcomes at four to 17 years of age. All reviews were rated as high quality (AMSTAR score between eight and 11). The GRADE certainty ratings ranged from very low to moderate for individual comparisons, with the evidence often comprising only one or two small trials, thereby resulting in many underpowered analyses (too small to detect small but important differences). The

main outcome categories reported across reviews were death, anthropometry (adults and children) and other markers of nutritional status, disease-related outcomes, neurocognitive development and psychosocial outcomes, and adverse events. Mortality data were limited and underpowered in meta-analysis in all populations (children with MAM, in children with HIV, and in adults with tuberculosis) with the exception of balanced energy and protein supplementation in pregnancy, which may have reduced the risk of stillbirth (risk ratio (RR) 0.60, 95% confidence interval (CI) 0.39 to 0.94; 5 trials, 3408 women). Supplementation in pregnancy also improved infant birth weight (mean difference (MD) 40.96 g, 95% CI 4.66 to 77.26; 11 trials, 5385 participants) and reduced risk of infants born small-for-gestational age (RR 0.79, 95% CI 0.69 to 0.90; 7 trials, 4408 participants). These effects did not translate into demonstrable long-term benefits for children in terms of growth and neurocognitive development in the one to two trials reporting on longer-term outcomes. In one study (505 participants), high-protein supplementation was associated with increased risk of small-for-gestational age babies. Effects on growth in children were mixed. In children under five years of age from LMIC, one review found that supplementary feeding had a little or no effect on child growth; however, a more recent review in a similar population found that those who received food supplementation gained an average of 0.12 kg more in weight (MD 0.12 kg, 95% CI 0.05 to 0.18; 9 trials, 1057 participants) and 0.27 cm more in height (MD 0.27 cm, 95% CI 0.07 to 0.48; 9 trials, 1463 participants) than those who were not supplemented. Supplementary food was generally more effective for younger children (younger than two years of age) and for those who were poorer or less well-nourished. In children with MAM, the provision of specially formulated food improved their weight, weight-for-height z scores and other key outcomes such as recovery rate (by 29%), as well as reducing the number of participants dropping out (by 70%). In LMIC, school meals seemed to lead to small benefits for children, including improvements in weight z scores, especially in children from lower-income countries, height z scores, cognition or intelligence quotient tests, and maths and spelling performance. Supplementary feeding in adults who were HIV positive increased the daily energy and protein intake compared to nutritional counselling alone. Supplementation led to an initial improvement in weight gain or body mass index but did not seem to confer long-term benefit. In adults with tuberculosis, one small trial found a significant benefit on treatment completion and sputum conversion rate. There were also significant but modest benefits in terms of weight gain (up to 2.60 kg) during active tuberculosis.The one study included in the Alzheimer's disease review found that three months of daily oral nutritional supplements improved nutritional outcomes in the intervention group.There was little or no evidence regarding people's quality of life, adherence to treatment, attendance at clinic or the costs of supplementary feeding programs.

Authors' conclusions: Considering the current evidence base included, supplementary food effects are modest at best, with inconsistent and limited mortality evidence. The trials reflected in the reviews mostly reported on short-term outcomes and across the whole of the supplementation trial literature it appears important outcomes, such as quality of life and cost of programs, are not systematically reported or summarised. Update of doi: 10.1002/14651858.CD010578.

Visser J, et al. Cochrane Database Syst Rev. 2018 Nov 9;11(11):CD010578. doi: 10.1002/14651858.CD010578.pub2. PMID: 30480324.

C. Nutrition in Pregnancy and Early Childhood

Intervention strategies to address multiple micronutrient deficiencies in pregnancy and early childhood

Deficiencies of multiple micronutrients are prevalent among women of reproductive age and young children, and represent a risk factor for increased morbidity and mortality in these women and children. The role of multiple micronutrient supplementation during pregnancy and early childhood has been evaluated in randomized trials. Multiple micronutrient supplementation during pregnancy has a positive effect on birthweight and reduces prevalence of low birthweight and small for gestational age babies. It had comparable effects on prevalence of anemia regarding iron-folate supplementation. Multiple micronutrient supplementations in children have been shown to improve linear growth, weight, hemoglobin, serum zinc, serum retinol levels and motor development. Some of the most commonly used strategies to deliver multiple micronutrients include powders (e.g. Sprinkles®), crushable tablets (e.g. Foodlets), etc. Multiple micronutrient supplementation during pregnancy and early childhood seems to be an effective way of prevention of micronutrient deficiencies and has a significant protective effect against adverse outcomes related to their deficiencies. Their use on a larger scale should be considered to improve the survival and decrease morbidity and mortality in children and women.

Aamer Imdad, Zulfiqar A Bhutta. Nestle Nutr Inst Workshop Ser. 2012;70:61-73. doi: 10.1159/000337441. PMID: 25825296

Evidence-based interventions for improvement of maternal and child nutrition in low-income settings

Purpose of review

Maternal and child malnutrition continues to disproportionately affect low and middle-income countries, contributing to high rates of morbidity, mortality, and suboptimal development. This article reviews evidence from recent systematic reviews and studies on the effectiveness of interventions to improve nutritional status in these especially vulnerable populations.

Recent findings

Macronutrients provided to expectant mothers in the form of balanced protein energy supplements can improve fetal growth and birth outcomes, and new research suggests that lipid nutrient supplements can reduce both stunting and wasting in newborns. Maternal multiple micronutrient supplementations can also improve fetal growth, and reduce the risk of stillbirth. Nutrition education and supplementation provided to pregnant adolescents can also improve birth outcomes in this vulnerable population. New evidence is broadening our understanding of the development of gut microbiota in malnourished infants, and the possible protective role of breastmilk.

Summary

The reviewed evidence on nutrition interventions reinforces the importance of packaging interventions delivered within critical windows throughout the life course: before conception, during pregnancy, and in childhood. Emerging evidence continues to refine our understanding of which populations and contexts benefit from which intervention components, which should allow for more nuanced and tailored approaches to the implementation of nutrition interventions.

Vaivada, T, et al. Current Opinion in Clinical Nutrition and Metabolic Care: May 2017 - Volume 20 - Issue 3 - p 204-210 doi: 10.1097/MCO.0000000000000365

Effects of nutrition interventions during pregnancy on low birth weight: an overview of systematic reviews

Introduction Low birth weight (LBW, birth weight less than 2500 g) is associated with infant mortality and childhood morbidity. Poor maternal nutritional status is one of several contributing factors to LBW. We systematically reviewed the evidence for nutrition-specific (addressing the immediate determinants of nutrition) and nutrition-sensitive (addressing the underlying cause of undernutrition) interventions to reduce the risk of LBW and/or its components: preterm birth (PTB) and small-for- gestational age (SGA).

Methods We conducted a comprehensive literature search in MEDLINE, EMBASE, CINAHL and the Cochrane Database of Systematic Reviews (September 2015). Systematic reviews of randomised controlled trials focusing on nutritional interventions before and during pregnancy to reduce LBW and its components were eligible for inclusion into the overview review. We assessed the methodological quality of the included reviews using A Measurement Tool to Assess Reviews (AMSTAR), PROSPERO: CRD42015024814.

Results We included 23 systematic reviews which comprised 34 comparisons. Sixteen reviews were of high methodological quality, six of moderate and only one review of low quality. Six interventions were associated with a decreased risk of LBW: oral supplementation with (1) vitamin A, (2) low-dose calcium, (3) zinc, (4) multiple micronutrients (MMN), nutritional education and provision of preventive antimalarials. MMN and balanced protein/energy supplementation had a positive effect on SGA, while high protein supplementation increased the risk of SGA. High-dose calcium, zinc or long-chain n-3 fatty acid supplementation and nutritional education decreased the risk of PTB.

Conclusion Improving women's nutritional status positively affected LBW, SGA and PTB. Based on current evidence, especially MMN supplementation and preventive antimalarial drugs during pregnancy may be considered for policy and practice. However, for most interventions evidence was derived from a small number of trials and/or participants. There is a need to further explore the evidence of nutrition- specific and nutrition-sensitive interventions in order to reach the WHO's goal of a 30% reduction in the global rate of LBW by 2025.

da Silva Lopes K, Ota E, Shakya P, et al. BMJ Glob Health 2017;2:e000389. doi:10.1136/ bmjgh-2017-000389

Reducing stunting by improving maternal, infant and young child nutrition in regions such as South Asia: evidence, challenges and opportunities

Abstract is not informative, but specific studies and evidence for impact are described in the full review.

Meeting the high nutrient needs of pregnant and lactating women and their young children in regions such as South Asia is challenging because diets are dominated by staple foods with low nutrient density and poor mineral bioavailability. Gaps in nutritional adequacy in such populations probably date back to the agricultural revolution ~10 000 years ago. Options for improving diets during the first 1000 days include dietary diversification and increased intake of nutrient-rich foods, improved complementary feeding practices, micronutrient supplements and fortified foods or products specifically designed for these target groups. Evidence from intervention trials indicates that several of these strategies, both prenatal and post-natal, can have a positive impact on child growth, but results are mixed and a growth response is not always observed. Nutrition interventions, by themselves, may not result in the desired impact if the target population suffers from frequent infection, both clinical and subclinical. Further research is needed to understand the mechanisms underlying both prenatal and post-natal growth restriction. In the meantime, implementation and rigorous evaluation of integrated interventions that address the multiple causes of stunting is a high priority. These intervention packages should ideally include improved nutrition during both pregnancy and the post-natal period, prevention and control of prenatal and post-natal infection and subclinical conditions that restrict growth, care for women and children and stimulation of early child development. In regions such as South Asia, such strategies hold great promise for reducing stunting and enhancing human capital formation.

Kathryn G. Dewey. Maternal & Child Nutrition (2016), 12 (Suppl. 1), pp. 27-38

Estimating the cost of delivering direct nutrition interventions at scale: national and subnational level insights from India

India's national nutrition and health programs are largely designed to provide evidence-based nutrition specific interventions, but intervention coverage is low due to a combination of implementation challenges, capacity and financing gaps. Global cost estimates for nutrition are available but national and subnational costs are not. We estimated national and subnational costs of delivering recommended nutrition-specific interventions using the Scaling Up Nutrition (SUN) costing approach. We compared costs of delivering the SUN interventions at 100% scale with those of nationally recommended interventions. Target populations (TP) for interventions were estimated using national population and nutrition data. Unit costs (UC) were derived from programmatic data. The cost of delivering an intervention at 100% coverage was calculated as (UC*projected TP). Cost estimates varied; estimates for SUN interventions were lower than estimates for nationally recommended interventions because of differences in choice of intervention, target group or unit cost. US$5.9bn/year are required to deliver a set of nationally recommended nutrition interventions at scale in India, while US$4.2bn are required for the SUN interventions. Cash transfers (49%) and food supplements (40%) contribute most to costs of nationally recommended interventions, while food supplements to prevent and treat malnutrition contribute most to the SUN costs. We conclude that although such costing is useful to generate broad estimates, there is an urgent need for further costing studies on the true unit costs of the delivery of nutrition-specific interventions in different local contexts to be able to project accurate national and subnational budgets for nutrition in India.

Purnima Menon, et al. Maternal & Child Nutrition (2016), 12 (Suppl. 1), pp. 169-185.

D. Adolescents

Systematic review on evidence-based adolescent nutrition interventions

Adolescence is a critical stage in the life cycle, and adequate nutrition is necessary for the proper growth and development of individuals and their offspring. Here, we comprehensively review all published systematic reviews (through October 2016) on adolescents (10–19 years) and women of reproductive age, including pregnant women, which targeted interventions related to nutrition. For interventions where there was no existing systematic review on adolescents, we reviewed primary studies/trials. We included interventions on micronutrient supplementation (iron, folic acid, iron–folic acid (IFA), calcium, vitamin D, vitamin A, zinc, iodine, and multiple micronutrients), food/protein energy

supplementation, nutrition education for p regnant adolescents, obesity prevention and man- agement, and management of gestational diabetes. We identified a total of 35 systematic reviews, of which only five were conducted on adolescents, and 107 primary studies on adolescents. Our review suggests that iron alone, IFA, zinc, and multiple micronutrient supplementation in adolescents can significantly improve serum hemoglobin concentration. While zinc supplementation in pregnant adolescents showed improvements in preterm birth and low birth weight, we found a paucity of trials on calcium, vitamin D, vitamin A, and iodine supplementation. We found limited evidence on food/protein energy supplementation in adolescents. Interventions to prevent and manage obesity showed a non-significant impact on reducing body mass index. This review underscores the importance of adolescent nutrition interventions. It is imperative that countries design nutritional interventions, particularly for adolescents.
Zohra S. Lassi, et al. Ann. N.Y. Acad. Sci. 2017; 1393: 34–50. doi: 10.1111/nyas.13335

E. Cash transfer / conditional cash transfer / micro-finance

Cash transfer programs, conditional (on health/nutrition related actions, CCTs) or unconditional (CTs) have expanded rapidly in recent years, and are of increasing importance for improving nutrition. They are highly complementary to other nutrition actions, and involve establishing eligibility, usually based on low income. Hence, they are positively targeted towards the poor and most vulnerable. The level of resources/head is much higher than for typical nutrition programs – but the objectives are broader – and the scale in terms of coverage equal or higher. Their effect on nutrition is both through increasing resources (income), and, for conditional programs, enhancing use of services such as immunization and education. The impact on nutritional status of children is potentially both through maternal nutrition and hence intra-uterine growth and development, and through infant and young child feeding, care, and use of health services.

Sixteen case studies of CCTs and CTs that have been described and evaluated were drawn from the literature, agency reports, and other documents for this section. CCTs are usual in Latin America, while CTs are the norm in Africa. See Annex 2, p. 94-99, in WHO 2013 for a table that compares row by row all of the CT/CCT in terms of location, eligibility, benefits, coverage, and outcomes. Programs in Brazil, Colombia, Malawi, Mexico, Nicaragua, South Africa, and Zambia all had quantified positive impact. Cash transfer programs provide assistance in the form of money in order to increase household income generally targeting poor households. Transfers may be given without requirements that household members meet specified conditions, or be contingent upon compliance with a specified set of conditions. CCTs have increased in popularity in recent years due to their perceived ability to create long-term benefits through encouraging behavior that improves well-being, and investing in human capital (62). Programs may directly affect nutrition (e.g. providing supplements), or connect to nutrition outcomes less directly (e.g. through increasing use of health services, antenatal care or education). Conditionalities may include periodic health visits, growth monitoring, vaccination when applicable, antenatal care, and attendance at education sessions by mothers (63).

In sub-Saharan Africa overall approximately 137 programs were in operation in 37 countries in 2009 (64). Transfer programs in Latin American countries are mostly CCTs, which have dramatically increased in popularity in comparison to CTs, as well as expanded to other regions, in the past 10 years (63). Several programs, such as Oportunidades in Mexico, Bolsa Familia in Brazil, and Red de Protección Social in Nicaragua include requirements for receipt of transfers specific to addressing nutritional concerns, including group nutrition education sessions and growth monitoring and promotion accompanied by more personalized counselling. Conditionalities aimed at improving micronutrient status may be employed in CCT programs through provision of essential micronutrients and food or supplements to supply both macro- and micronutrients, though the latter has been limited to Mexico's Progresa (65). Conditionalities in programs with nutrition objectives may be determined based on country context and nutrition actions for which there is evidence of efficacy. CCTs that are intended to improve nutritional outcomes should be "well coordinated with the existing priorities guiding a country's nutrition policy" (65).

General agreement exists as to which interventions are the most efficacious, therefore guiding conditional requirements in CCT programs. The efficacy of these ENAs are described in Part I of WHO 2013 and include: exclusive breastfeeding for six months, appropriate complementary feeding, appropriate nutritional care of sick and severely malnourished children,

adequate intake of vitamin A and iron for women and children and adequate intake of iodine by all household members (65, 66).

Various mechanisms by which CCT programs work to improve maternal and child nutrition have been proposed:

- As women typically receive the cash transfer, program beneficiaries may be empowered to prioritize care for both themselves and their children during the CCT program and even after it ends (65).
- An increase in household purchasing power for food and health services may result from CCT programs (65). Due to the multifactoral nature of undernutrition, complementary interventions need to be supplied and maintained in addition to income provision for real improvement (67).
- Direct provision of micronutrients and/or energy supplements may be provided to mothers and children as part of the program, though this practice has not been widespread in CCT programs thus far (65).
- Conditionalities such as growth monitoring for children, antenatal care for mothers, and participation in nutrition education sessions for both may improve maternal and child nutrition by addressing behavioural determinants of undernutrition (65).

An important consideration of the ability of CCTs to improve nutritional status involves determining the effects of providing both demand- and supply-side incentives. Transfers offered to families can increase demand for health and nutrition services. CCTs aimed at increasing demand for preventive services may also have positive spillover effects, thus furthering long-term benefits for beneficiaries (62). Inadequate or poor quality supply of services limits the effectiveness of demand-side CCTs. Therefore some programs are implementing supply-side transfers in addition to those typically provided directly to beneficiaries. For example, the Programa de Asignación Familiar (PRAF) provides health centres with approximately US$ 6000 annually for meeting quality improvement and service standards at rural health posts, including nutrition training for mothers (68).

Coverage and resource intensities

In CCT programs providing both demand and supply-side incentives the effects on health and nutritional outcomes of each as well as the combination should be distinguished. For example, an evaluation of Honduras's PRAF demonstrated that demand-side transfers resulted in the largest ppt increase in healthcare visits among children under three years of age, as well as attendance at growth monitoring within the same age group as compared to controls. The combination of demand- and supply-side benefits increased utilization of both health visits and growth monitoring to a lesser extent, but supply-side incentives alone failed to increase utilization of either. The demand- and supply-side benefits individually and in combination resulted in improvements in antenatal care attendance (five or more sessions), although supply-side incentives resulted in the lowest percentage point increase (65). This example may be flawed since health facilities received slightly more than one half of their expected incentives, but it is reasonable to assume that supply side incentives may be beneficial only when demand-side transfers are offered concurrently.

Cash transfer programs vary in implementation stage as pilots, early or small-scale programs or national coverage (see Table II-5 and details in Annex 1). Among pilot and early or small-scale programs, mostly CTs in sub-Saharan Africa and CCTs in Latin America, coverage ranges from approximately 4000 beneficiaries, as in Zambia's Kalomo Pilot Social Cash Transfer Scheme (69) to 165 000 beneficiaries in Nicaragua's RPS (70). This coverage represents less than 1% and 3% of the populations respectively. Large-scale CCT programs, mostly in operation in Latin American countries, range in coverage from about 1 million participants, as in Honduras's PRAF (68), to 45 million participants in Brazil's BF Programme (65). About 15% and 25% of the population (100% of the targeted poor) are covered with these programs respectively. Estimates of program intensity are based on the amount of transfer provided to beneficiaries. Among CT programs, transfers range from US$ 6/household per month in Mozambique's National Institute of Social Action (INAS) Food Subsidy Programme (PSA) (71) to US$ 25/ household per month in South Africa's Child Support Grant (CSG) (72). Among CCT programs, the lowest estimate of expenditure was US $4/household per month in Honduras's PRAF, or less than 10% of average household consumption (73). In contrast, the highest expenditure was US$ 60/household per month in Brazil's BF program (65) or approximately 15% of average household consumption (73). It should be noted that among BF beneficiaries not all households receive this amount as transfers are dependent upon the level of poverty and number of children.

Effect on nutrition outcomes

Effectiveness of CCTs is estimated mostly from programs in Latin America. It is based on data for various age groups of children and a variety of outcomes, thus making comparisons with large scale nutrition programs themselves (as in this document) problematic. However, impacts on child growth, birth weight, as well as on food expenditure and consumption have been estimated (see Annex 2, last column). Mexico's Oportunidades has multiple evaluations reporting an approximate 1.0 cm increase in height among children ages 0–6 months and 12–36 months, all as compared to controls (62). Improvement in HAZ scores as compared to controls of 0.13 (Brazil's BF, children less than 7 years of age), 0.25 (South Africa's CSG, children less than 36 months), 0.161 (Colombia's FA, children less than 24 months), and 0.17 (Nicaragua's RPS, children less than 5 years) were reported (62, 72). Increase in birth weight of 0.13 kg was reported among beneficiaries as compared to controls in Mexico's Oportunidades (74). Additionally, an increase of 0.58 kg in "newborn" weight was reported for beneficiaries in Colombia's FA, although this should be interpreted with caution since the program was targeted to children rather than mothers. Although mixed results have been found, there is evidence that CCT programs can have a positive impact on child nutritional status. To date most CCT programs designed to improve nutritional and health outcomes have targeted children rather than mothers, resulting in a lack of data available on changes in maternal nutritional status (65).

Linkage to direct nutrition programs

Both types of cash transfer programs offer a link to existing nutrition programs within a country. Furthermore, they may work to bolster both demand- and supply-side improvements in nutrition services at the community level. When considering implementation of a cash transfer program designed to improve undernutrition, several rules for determining appropriatenessof using nutrition-related conditionalities have been proposed. An unconditional CT program should be used when nutrition programs of good quality are in place and utilized extensively. In contrast, a CCT program is more useful when current nutrition programs are not well-utilized, but quality is good. CCTs in addition to supply-side incentives should be considered when both quality and utilization of nutrition programs is poor. Finally, when a country does not have an existing nutrition program a CCT should be considered only when both services of appropriate quality can be introduced and when beneficiaries are able to utilize the services (65).

A number of important factors are likely to affect the positive impact of CCTs on maternal and child nutrition outcomes. Programs should focus on the window of opportunity for nutrition impact, pregnancy through two years of age, and therefore target beneficiaries in this range. Conditionalities should be specific to nutrition, based on best practices, including ENAs, for which there is evidence of efficacy. Supply-side transfers should be provided when needed in order to maintain quality and quantity of health and nutrition services, thus increasing the ability of CCTs to improve the nutritional status of mothers and children.

F. Examples And Case Studies Of Successful Programs

1. WHO 2013 - Review and Summary of Programs

Some 32 projects were reviewed for WHO's 2013 report, representing most of the programs they considered relevant over about the last 30 years, based on searching published reports. The review was extended to include estimates of resources (intensity, as resources/head per year), coverage, outcomes and other key factors, for 15 programs (22). Of these, 21 were reviewed in detail, and for 11 programs, sufficient data on both outcome (underweight,1 ppt/year) and intensity of resources (CHNWs per 1000 households, and US$/household per year) were identified and further reviewed to explore associations. Initial identification of these programs was by country; within countries, data on individual programs were then investigated further. For each country and program, the estimates for reduction in underweight and resource intensity were made from available materials.

For 32 programs, components were delivered by one or more of four routes shown in Table II-3. Community nutrition centers were the main route, usually as a base for CHNWs who may carry out home visits. The distribution of routes was similar between the 32 programs with this information (Table II-3a), the 21 programs which were described in detail (Table II-3b), and the 11 programs for which quantitative data were available (Table II-3c). At least 70% of the programs were community based, with CHNWs operating from a local nutrition centre. Tables II-3a, II-3b, and II-3c indicate that those analysed quantitatively (Table II-3c), selected because of data availability, were not substantially different from the larger groups from which they were drawn. Regardless of platform, all programs reviewed were multi-component.

From Table II-3: Frequency of platform/route used for provision of program components			
	a. N=32	b. N=21	c. N=11
Health facility	3 (9%)	1 (5)	0
Community nutrition center	23 (72%)	19 (90)	10 (91)
Community home based	4 (12%)	4 (19)	1 (9)
Conditional/Cash transfer	6 (19%)	1 (5)	0

Of the 32 programs, 60% or more implemented supplementary feeding (usually targeted), growth monitoring and counseling (support for breastfeeding, complementary feeding or pregnancy, alone or in combination) (see Table II-4a); 80% or more of the 21 programs described in detail implemented these components (Table II-4b). All programs for which quantitative data were available included the three components (Table II-4c), with counseling as the intervention most frequently provided. More than one half of programs reviewed implemented micronutrient supplementation and one third or more reported referral or treatment, which may have included community-based treatment of malnutrition.

From Table II-4: Frequency of types of components in programs reviewed			
	a. N=32	b. N=21	c. N=11
Counseling (BF, CF, preg.)	28 (87)	21 (100)	10 (91)
Supplementary feeding	19 (59)	17 (81)	10 (91)
Growth monitoring	25 (78)	19 (90)	10 (91)
Micronutrient supplements	17 (53)	12 (57)	6 (54)
Referral, treatment	11 (34)	9 (43)	3 (27)

Estimates of changes in preschool children's underweight prevalences were calculated for 11 of the programs examined (see last column of Table II-1) where both outcome results (underweight change) and resources (intensity as CHNWs/1000, and US$/child per year) were available. In Figure II-1 the rate of underweight reduction (y-axis) is plotted with the CHNWs/1000 children, part-time equivalents. The rate (y-axis) is probably more dependable than the intensity, although both are somewhat uncertain. Above about 30 CHNWs/1000 children there are improvements of 1–2 ppt/year. It has not been possible to extract the underlying (without program) rate in most cases; however, it would usually not be more than -0.5 ppt/year. Most of the rate estimates are reasonably well known – Thailand and Vietnam are from national programs, Tanzania/Iringa and TINP have been widely reported and Bangladesh, Madagascar and Senegal have been estimated by World Bank evaluators. The Ethiopia figure is from recent data and unpublished, but appears to be a fairly conservative estimate. The Indonesia rate appears low; however, the financial data (45) (see Figure II-2) have been a long-standing low outlier which may also explain the relatively low improvement rate. Financial data (Figure II-1) seem to show little relation of effect with financial resources. At the lower end of resources the Vietnam figure does not include local costs, and (as above) the Indonesia figure may be an underestimate. While most programs probably require a minimum of US$ 10/child per year to show impact, how the funds are used may be more important than the amount per child.

Figure II-1 **Population sustained rate of underweight reduction (ppts/yr) compared to programme intensity estimated as CHNWs per 1000 children, as part-time equivalents (0.1 FTEs)**

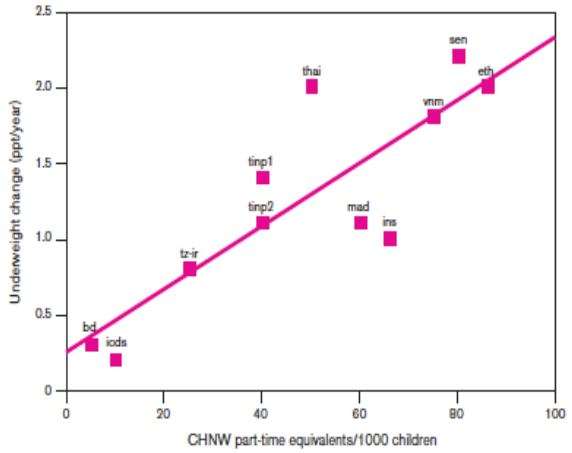
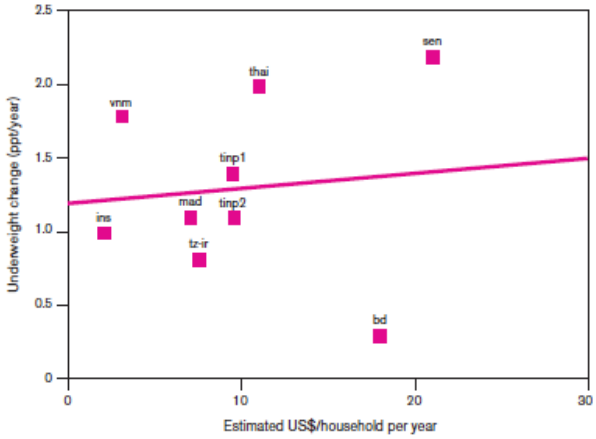


Figure II-2 **Population sustained rate of underweight reduction (ppts/year) compared to programme intensity estimated as programme expenditures, running (not start-up) costs, US$/household per year**



Key

bd	Bangladesh Integrated Nutrition Project
eth	Ethiopia Community Based Nutrition Programme
icds	India Integrated Child Development Services Project I
ins	Indonesia Family Nutrition Improvement Programme
mad	Madagascar Second Community Nutrition Project
sen	Senegal Community Nutrition Programme
thai	Thailand National Nutrition Programme
tinp1	Tamil Nadu Integrated Nutrition Programme I
tinp2	Tamil Nadu Integrated Nutrition Programme II
tz-ir	Tanzania Iringa Joint Nutrition Support Programme
vnm	Vietnam Protein-Energy Malnutrition Control Programme

In terms of input-output, two important non-linear effects should be noted. First, the initial rate of reduction in malnutrition, soon after launch, tends to be much faster than the sustained rate; thus, the prevalence curve is steep and then flattens. The reasons are not well established, but it seems likely that a more severely affected part of the population responds first and improves rapidly. Longer term causes of underweight may be different for other segments of the population – for example, feeding practices or food insecurity – and they may improve less rapidly. It is the sustained rate that will eventually bring long-term nutrition improvement.

Second, a non-linear relation between improvement rates and financial resources applied has been proposed: a threshold of US$5–US$10/head per year is needed to bring an additional 1–2% /y improvement in underweight. Below this it does not improve. A threshold level must be reached before improvement starts. When intensity of input is measured in terms of community health/nutrition worker (CHNW) numbers per 1000 households (Fig. II-1), underweight appears to

decrease linearly as the number of CHNW/1000 increases, including substantial variability, allowing estimation of what resources are needed to achieve an effect.

2. Narrative case studies and program evaluations

1. Brazil - Bolsa Familia Program (BFP)
2. Colombia - Hogares Comunitarios
3. Ethiopia - CBN / NNP
4. Honduras - AIN-C
5. India - TINP-1,2, ICDS-1
6. Indonesia - UPGK
7. Madagascar - SEECALINE
8. Mexico - Oportunidades
9. Senegal - CNP
10. Tanzania - JNSP, CSD, IMCI
11. Thailand - NNP
12. Vietnam - PEM Control Program

Brazil

The Bolsa Alimentacão program (covering 1.5 million people from 2001-2003) was incorporated into the Bolsa Familia Program (BFP) in 2003. BFP coverage in 2006 was 11.1 million families (46 million persons), approximately 100% of the poor and 25% of the total Brazilian population. Public expenditure for the BFP in 2005 was US$ 3.2 billion, equivalent to 0.36% of GDP (6). World Bank support for the program was about US$ 562 million from 2003–2009, or approximately US$ 93.7 million/year (8). The entire BFP is overseen by the Ministry of Social Development, while the health component is managed by the MoH. Monthly cash transfers range from US$ 7–US$ 45 per family depending upon eligibility as determined by monthly per capita income ceilings of US$ 57 (moderately poor) and US$ 29 (extremely poor). Targeting of pregnant and lactating mothers and children less than 7 years of age and health conditions for receipt of the transfer remain as they did in Bolsa Alimentacão. Evaluation data from the BFP is limited, but a positive impact has been reported; stunting among beneficiary children aged 6–11 months was 3.3 ppt lower (2 versus 5.3) than nonbeneficiary children. However, the results are questionable due to selection bias. Study results may also be limited (especially for children aged 12–36 months) by supply-side constraints restricting health services, irregular growth monitoring despite the conditionality, and lack of information on timing of enrollment (7).

Columbia

Hogares Comunitarios is a national community nursery program that started in 1986 and at the time of writing is still in operation. It is funded principally by the Colombian government but also to a very small part by the parents of the children who participate through a monthly fee (US$ 4) used to provide a small salary to the community mother who runs the nursery. Funding for the program is US$ 250 million annually. Children six years of age and younger in poor neighborhoods are targeted. In 2004, approximately 80 000 Hogares Comunitarios were in operation nationally, with an average of 12 children attending each (maximum 15); about 1 million children 6 years of age and younger attend. Supplementary feeding is a major program component, as children are provided lunch and two snacks daily in addition to a supplemental beverage; in total 70% of daily caloric needs are provided (9). Evaluation data for Hogares Comunitarios reported an increase in HAZ in children 0–72 months based on variables of program attendance/participation (0.486), of number of months in the program (0.013), and of the exposure (number of months adjusted by age of child) to Hogares Comunitarios (0.78). Changes in WAZ were not significant

Ethiopia

The Community Based Nutrition Programme (CBN), as part of the National Nutrition Programme, was initiated in 2008 and continues today (36). Population coverage in target areas (now approximately 250/640 woredas (districts)) is approximately 40% and intensity of CHWs is about 1:23 children, estimated as 0.2 FTEs, i.e. 86:1000 households (37). CBN is focused on children under two and uses monthly growth monitoring and promotion to involve families and

community members in assessing health and nutrition-related problems, analysing causes of these problems, taking action and monitoring progress. Other important processes in CBN include strengthened referral of severely underweight children to TFPs (Therapeutic Feeding Program) and/or TSFs (Targeted Supplementary Feeding) as required; control of micronutrient deficiencies through biannual vitamin A supplementation and deworming; and quarterly screening for acute malnutritionEstimates of reduction in underweight from the CBN program are preliminary, derived from an initial analysis of weighing program data from mid-2008 to mid-2010. The initial high rate of improvement among participants (estimated at approximately 8.0 ppt/year) is difficult to distinguish from the sustained rate. However, this latter rate appears to be approximately 5.0 ppt/year; with estimated 40% coverage this gives a sustained population rate of 2.0 ppt/year.

Honduras

The national Atención Integral a la Niñez en la Comunidad (AIN-C) began in the mid-1990s and remains in operation at the time of writing as a community-based expansion from the original AIN program. AIN-C is supported by the Honduran MoH, and received major funding from United States Agency for International Development from 1998–2005 (initial planning and support began in 1991). Coverage of the program by area was 24 of 42 health areas (>50%) in 2006 (18), and by population was 90% of children less than 24 months of age. Intensity as measured by CHNWs:children is 3:25, where CHNWs work part-time for 3.5 hours weekly. Financial resource intensity is US$ 6.43/child per year (18). The program is targeted at children less than 24 months of age and sick children 24–60 months of age. Activities of the AIN-C are carried out at monthly growth monitoring and promotion sessions at the community centre, although home visits are provided for children who do not attend. Components of the program include nutrition counselling for EBF less than 6 months of age, complementary feeding less than 24 months of age, and hygienic practices; micronutrient distribution for children (iron and vitamin A); medication distribution for illness; antenatal care (newborn visits); and referral to the health facility as needed (19). Evaluation of the AIN-C was planned as a pre- and post-intervention, project and control comparison study, but the design was altered due to extensive contamination of control communities, non-equivalent groups, and reduced intensity of program implementation due to changes in funding. A cross-sectional study using baseline data compared AIN-C participants to non-participants. Improved caring practices were reported among AIN-C mothers. A 15.8 ppt difference in EBF at 6 months was found (55.8% AIN-C, 40% non- AIN-C). With regard to receiving iron and vitamin A supplementation, differences of 36.1 ppt (65.6% AIN-C, 29.5% non-AIN-C) and 6.8 ppt (94.3% AIN-C, 87.5% non-AIN-C) respectively, were reported for children. Mean height-for-age was lower in the AIN-C group as compared to non-participants at less than six months of age. At 6–11 months and 12–23 months of age, there was no difference between AIN-C children and nonparticipants, suggesting a protective effect of AIN-C against growth faltering. Since a pre-/ post- comparison was not possible, this conclusion cannot be certain (20). Intensity of participation in the program was based on percentage of possible weighings attended by the child; after controlling for household assets and age of child, for every 1% increase in participation intensity, weight-for-age increased 0.005 z-score (20).

India

The Tamil Nadu Integrated Nutrition Programme I (TINP I) was implemented from 1980 to 1989 with approximately 46% coverage by area (173/373 rural blocks in 11 districts). CHW intensity for TINP I was reported as 1:150 households (38), or 40:1000 households. Resource intensity of TINP I was previously estimated at US$ 9.50/household per year (38). Reduction in underweight in TINP areas was approximately 1.4 ppt/year (38) or 1.5 ppt/year (39). The Tamil Integrated Nutrition Programme II (TINP II) ran from 1990–1997, and coverage was approximately 80% by area (316/385 rural blocks). TINP II intensity of CHWs and resources was the same as TINP I (22). The sustained rate of reduction in population underweight attributed to TINP II was 1.1 ppt/year (40). The Integrated Child Development Services Project I (ICDS I) was supported by the World Bank and other donors from 1990-1997, with population coverage of approximately 2.5% (41). The intensity of CHNWs, known as Anganwadi workers (ANWs) (estimated at 20% FTE) was 1:1000 persons, i.e. approximately 1:200 children (19) or 10:1000 households. While there are no definitive evaluations, most reports on ICDS 1 (1990-1997) estimate that the change in underweight attributable to the program was slight (41, 42); the rate is plotted as 0.2 ppt/year.

Indonesia

The Family Nutrition Improvement program (UPGK), also known as the Posyandu (weighing post) program, started around 1979 and expanded to national coverage, continuing until constrained by an economic crisis in the late

1990s. UPGK (centred on Posyandus) projects were based on the strategy of consistent monthly weight gain in healthy children targeting children under five and their mothers. The activities included weighing, education, micronutrient supplementation and supplementary feeding in combination with other health interventions through weighing posts managed by community leaders and volunteers (25). The cost per beneficiary was US$2 for weighing screening and US$11 per beneficiary for weighing-feeding. From 1975–1990 coverage was approximately 90% by area (58 000/65 000 villages) (22, 43, 44). In all regions, 58 355 villages received access to weighing posts and coverage reached 17 million children or 80% of the under-5 population. The number of children per posyandu was about 60.1 Rohde (45) refers to five CHNWs per posyandu, nearly one million in total. However, they had limited training (3 days) and high turnover, and on evaluation only a small percentage was able to provide meaningful counselling. At 4 CHNWs per posyandu, this gives 66 CHNWs/1000. Recurrent costs, which may be seen as those needed for sustained activities, were estimated at approximately US$ 1/household per year (45), but this figure may not include all local costs. The reduction in underweight ascribed to UPGK activities based on previous research was approximately 1.0 ppt/year (22). Both process and impact evaluations were performed on UPGK. A longitudinal study showed positive changes in health practices. However the degree to which these changes, or any change in nutritional status of the program target population, can be attributed to the program cannot be defined. Inclusion of too many other health issues may have diluted the nutrition interventions (27). Other evaluation results indicate high program access and initial coverage above 80% but reduced active participation over time. A lack of baseline data makes impact difficult to assess.

Madagascar

The Second Community Nutrition Project (SEECALINE) was supported by the World Bank and others from 1999–2003. The program objective was to improve the nutritional status of children under three, PLW, and school-aged children. Ultimately, coverage was approximately 3600 sites and 50% of children under 3 years in each area (56/111 districts) (46). SEECALINE targeted communities with poorer nutritional status as sites for implementation. Thus, communities with the program had higher baseline levels of malnutrition. Services are contracted out and provided by local NGOs in the target area. Activities were coordinated by a paid CNW in each program site. Each site (and each CNW) serves between 200 and 500 women and children. SEECALINE intensity of CHWs was estimated as 1:125 households to 1:225 households (21, 47), or 60:1000 households. Resource intensity for the project was estimated at US$10/household per year based on project documents (21). The rate of underweight reduction was reported as 0.86-1.25 ppts/year (47), or approximately 1.1 ppt/year for the population sustained rate. SEECALINE was evaluated by the World Bank in two different ways: First, Galasso and Yau (31) utilized monitoring data to estimate improvements in the nutritional status of child participants. Over the course of 3 years, there was approximately a 7–9 ppt decrease in underweight prevalence among programme participants (2.33– 3.0 ppt/year). Galasso and Yau (31) found that “the returns are decreasing as time and duration increase, though they do not dissipate to zero.” Results also showed higher differential returns in poorer areas and areas more vulnerable to disease. Second, Galasso and Umapathi (32) utilized two nationally representative surveys to calculate the improvements in child nutritional status in programme areas rather than among programme participants. Between the 1997/98 and 2004 surveys, they found a 5.2–7.5 ppt decrease in underweight prevalence in programme areas (0.86–1.25 ppt/year).

Mexico

Oportunidades (known as Progresa from 1997–2002) is a CCT program in operation at the time of writing. The program is funded by the government of Mexico with support from the World Bank (US$ 1.5 billion in 2009). It was initiated in rural areas and expanded to include urban areas beginning in 2002, although approximately 70% of program participants reside in rural areas. Total coverage in 2007 was 5 million families, or 20% of the population. Targeting for Oportunidades is based on both geography, through identification of localities with high marginality indices, and socioeconomic status, through proxy means testing. Approximately 60% of households in the bottom decile of per capita expenditures are participants, suggesting effective targeting of the poorest (33). The health and nutrition transfer component of Oportunidades is US$ 15/household per month, about 20% of average monthly household expenditures (7), and is intended for PLW, all children less than 2 years of age, and children less than 5 years of age with low WAZ scores. Receipt of transfer is conditional upon regular health visits for all children in which growth monitoring is included, pre- and postnatal care for women, and adult (greater than 15 years of age) participation in health and nutrition education sessions. Iron supplementation and nutrition supplements are provided as well. The nutrition supplement is intended to provide 20% of daily caloric and 100% of daily micronutrient requirements.

Multiple evaluations of Oportunidades have been conducted with data demonstrating significant improvements in nutritional outcomes. In 2004, Rivera and colleagues (34) reported an increase in height in children 0–6 months of 1.1 cm (26.4 cm versus 25.3 cm) in program beneficiaries compared to a control group 35). In rural children ages 12–24 months, a significant increase in mean hemoglobin of 0.37 g/dl was found after 12 months in the program; 11.12 g/dl in the treatment group compared to 10.75 g/dl in the controls. Corresponding anaemia prevalence among beneficiary children was 44.3% compared to 54.9% among control children, a significant 10.6 ppt decrease. Even with improvement, nearly half of beneficiary children were still anaemic (34). Gertler (36) reported a significant increase in height of 0.96 cm in children 12–36 months in the treatment as compared to the control group, though there was no significant impact on the odds of being stunted. Anaemia prevalence was evaluated in rural children aged 12–48 months after 12 months in the program; a significant difference of 48.3% in beneficiary children compared to 41.1% in comparison children was found 36). A 2005 evaluation by Behrman and Hoddinott, as reviewed by Lagarde and colleagues (37), found a significant increase in height of 1.016 cm in children 12–36 months, although this occurred in children whose mothers had greater than 5 years of schooling. Leroy and colleagues ((12) found a significant impact on height in children 0–6 months; an increase of 1.53 cm was seen in treatment children compared to control children. The mean HAZ gain of 0.41 cm in this age group was also significant. When income/poverty tertiles were considered, a significant increase in height of 0.27 cm in the poorest tertile was found (35). Barber and Gertler (38) also reported positive impact of Oportunidades on nutritional outcomes in 2008. They found a significantly higher birthweight of 127.3 g in program beneficiaries and a 4.6 ppt reduction in LBW. When evaluated based on average beneficiary time, program impact was 68.3 g, which was significant. Programme impact from cash received was not significant at 78.2 g (35).

Senegal

The Community Nutrition Program (CNP) operated from 1995–2001 in poor urban and peri-urban areas with coverage of approximately 20% of children under 3 years of age (48). Activities were coordinated by the NGO Agence d'Exécution des Travaux d'Intérêt Public contre le sous-emploi (AGETIP), and other local NGOs were contracted out to provide services at community nutrition centres (CNC) in target areas. At the end, there were 292 centres serving approximately 457 000 beneficiaries in 37 communes. According to interim data collected early in the program cycle (June 1996), there were approximately 465 beneficiaries being served at each CNC. Services were provided by micro-enterprises composed of four young people from the target community. These groups were supervised by maîtres d'oeuvre communautaires employed by AGETIP. Each supervisor was responsible for five micro-enterprises. Members of micro-enterprises were paid salaries and worked on the project six days per week. Intensity of CHWs was about 1:124 households (48), i.e. 80:1000 households. Approximately 98% of beneficiaries were reached, and therefore the rate for participants is about equivalent to that of the population as a whole. Resource intensity of the CNP was approximately US$ 40/household per year based on 6 months of participation for children (48). Estimated reduction in population underweight was 2.2 ppt/year (48).

Tanzania

The Tanzania Iringa Joint Nutrition Support Programme (JNSP) ran from 1984–1991, and was supported by WHO and UNICEF. The JNSP operated in 6/7 districts covering about 250 000 persons, 46 000 of whom were children (73% participation). Children less than 5 years of age and women were targeted, and selection was not based on socioeconomic status. Resource intensity of the JNSP ranged from US$ 8–US$ 17/child per year (US$ 30/child per year total cost, equivalent to US$ 6 million). Intensity as measured by personnel was 2 village health workers/village (1220 total) or 1:40 children. JNSP evaluation data demonstrated a decrease in underweight from 50% to 35% (1984– 1988), or 4.5 ppt/year for the first 4 years of the program. The decrease occurring in the first 2 years of the program was even greater at 8 ppt/year, although the sustained decline in underweight in the population was 0.8 ppt/year (for years 2–7). The JNSP had components such as systems development and support, health services and water facilities, but these were not in place when the initial improvements in nutritional outcomes were seen. The reduction in malnutrition was attributed to increased feeding frequency, especially of severely underweight children at established child feeding posts, improved health care in families and communities and provision of information.

Following the success of the JNSP, the Child Survival and Development (CSD) Programme was initiated in 1985 and ran until 1995 with support from the World Bank. The program coverage was about 45% (9/20 regions), with approximately 12 million beneficiaries, 2 million of whom were children. Resource intensity was US$ 2–US$ 3/child per year (46). Although coverage of the CSD program was much greater than the JNSP and resource intensity was less,

evaluation demonstrates comparable results to those of the JNSP; an initial reduction in malnutrition of about 8 ppt/year for 1–2 years, then a continued decrease of 1–2 ppt/year following the initial rapid decline. The difference in resource intensity may be due to the fact that supplementary feeding was not a component of the CSD program.

IMCI was initiated in 1995 and is presently in operation with a goal of national coverage. It is both facility- and community-based and supported by WHO and UNICEF. Coverage at the time of writing is varied. All 114 districts have received orientation and the majority (83% in 2005) had carried out at least initial training. Resource intensity of IMCI is approximately US$ 11/child/year (US$ 1.70/child per year for routine care). IMCI has various components (47). Evaluation data from IMCI show a decrease in stunting, as measured by improvement in concentration indices in children aged 24–59 months in IMCI districts (-0.102 to -0.032) in relation to comparison districts (-0.122 to -0.133) from 1999–2002 (48). Overall stunting decreased from 59% to 43% in IMCI districts versus 51% to 40% in comparison districts. Improvement in underweight was also seen in IMCI districts (-0.071 to -0.057) as compared to non-IMCI districts (-0.136 to -0.166). Corresponding percentage changes for underweight were 30%–23% in IMCI districts versus 27%–10% in comparison districts (49). Further studies demonstrating effectiveness of the program have not yet been conducted. Several reported challenges in implementation have occurred, as the main activity remains training of health care workers without significant expansion to community-based practices.

Thailand

The National Nutrition Program (NNP) began in 1975 and continues at the time of writing, with reportedly about 100% coverage by area reached in 1990 (51). The components were seen as a menu from which villages could select priorities. These included antenatal care, breastfeeding support, growth monitoring and counseling, micronutrient provision, limited supplementary foods (including use of vouchers) plus group feeding, hygiene, basic health services and others. Social mobilization, awareness and community participation were the key features, linked to evolving primary health care, while lessening reliance on direct top-down service delivery. A set of Basic Minimum Needs indicators, self-assessed by communities, helped prioritize and monitor activities through a structure of facilitators (local officers in health or other sectors), community leaders, and ‘mobilizers’ (village health communicators and village health volunteers).

Thailand’s nutrition interventions, which have provided an important model for community based programs in general, contributed to a reduction in child underweight from around 30% (converted to WHO standards) in 1987 to 7% in 2005, averaging 1.3 ppt/year. However, in the early stages this rate was probably 2–3 ppt/year for the population and above 4 ppt/year for participants in the various interventions. In fact the rates from growth monitoring data and the recent national survey (2005/06) are somewhat vague, but the overall major improvement is clear. Attribution of improved child nutrition to program activities has not been made through formal evaluations. Nutrition improvement started (1982–85) before rapid economic growth (51,52), and while no-one doubts the success and contribution of the Thai nutrition program (e.g.53,54) no attempt can be found in the literature to actually ascribe the improvement to the program.

Estimates of CHNW intensity are 1:20 households (13), i.e. 50:1000 households. Resource intensity is estimated as US$ 11/household per year (22, 52). Thai underweight estimates for 1982–1990 are found in a case study (52). Data for calculating the rate come from both the weighing program (1982–90) and a number of surveys, which use both National Center for Health Statistics (NCHS) and local Thai standards. The sustained rate (1986–90) was 1.9 ppt/year (52) from the weighing program, during which time coverage was around 90%; the rate in 1984–90 was 2.8 ppt/year. Using NCHS standards, the rate during 1987-95 was 1.5 ppt/year (53). Another report (54) gave underweight estimates of 40.6% for 1986 and 31.3% for 1995 using national standards, i.e. 1.0 ppt/year. The sustained population rate during the program was 2.0 ppt/year.

Vietnam

The Protein-Energy Malnutrition (PEM) Control Programme was initiated in 1994/95 with coverage reported as approximately 100% (55). By 2005 an estimated 100 000 CHNWs (nutrition collaborators) were in place for an intensity of approximately 1 CHNW per 70 households, i.e. 75:1000 households. The components were counseling for breastfeeding and complementary feeding; vitamin A campaigns; iron in pregnancy; hygiene, sanitation and deworming for kindergartens; growth monitoring; and nutrition products for malnourished children. Resource intensity was about US$ 0.70/household per year, excluding district and commune costs. Reduction in underweight, as the population sustained rate, was about 1.5–2.0 ppt/year from 1994–1998 from repeated surveys and from 1999–2005 data from the weighing program (55, 56). During this period there were also rapid economic growth and poverty alleviation programs, and iodized salt was adopted. Stunting reduction began at least by 1985. The portion of the recent nutrition improvement

that can be ascribed to the PEM Control Programme has not been evaluated. A small-scale trial (55) indicated minor effects on child anthropometry.

3. Cash Transfer Programs

The impact of conditional cash transfers on health outcomes and use of health services in low and middle income countries

Background: Conditional cash transfers (CCT) provide monetary transfers to households on the condition that they comply with some pre-defined requirements. CCT programs have been justified on the grounds that demand-side subsidies are necessary to address inequities in access to health and social services for poor people. In the past decade they have become increasingly popular, particularly in middle income countries in Latin America.
Objectives: To assess the effectiveness of CCT in improving access to care and health outcomes, in particular for poorer populations in low and middle income countries.
Search methods: We searched a wide range of international databases, including the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE and EMBASE, in addition to development studies and economic databases. We also searched the websites and online resources of numerous international agencies, organisations and universities to find relevant grey literature. The original searches were conducted between November 2005 and April 2006. An updated search in MEDLINE was carried out in May 2009.
Selection criteria: CCT were defined as monetary transfers made to households on the condition that they comply with some pre-determined requirements in relation to health care. Studies had to include an objective measure of at least one of the following outcomes: health care utilisation, health expenditure, health outcomes or equity outcomes. Eligible study designs were: randomised controlled trial, interrupted time series analysis, or controlled before-after study of the impact of health financing policies following criteria used by the Cochrane Effective Practice and Organisation of Care Group.
Data collection and analysis: We performed qualitative analysis of the evidence.
Main results: We included ten papers reporting results from six intervention studies. Overall, design quality and analysis limited the risks of bias. Several CCT programs provided strong evidence of a positive impact on the use of health services, nutritional status and health outcomes, respectively assessed by anthropometric measurements and self-reported episodes of illness. It is hard to attribute these positive effects to the cash incentives specifically because other components may also contribute. Several studies provide evidence of positive impacts on the uptake of preventive services by children and pregnant women. We found no evidence about effects on health care expenditure.
Authors' conclusions: Conditional cash transfer programs have been the subject of some well-designed evaluations, which strongly suggest that they could be an effective approach to improving access to preventive services. Their replicability under different conditions - particularly in more deprived settings - is still unclear because they depend on effective primary health care and mechanisms to disburse payments. Further rigorous evaluative research is needed, particularly where CCTs are being introduced in low income countries, for example in Sub-Saharan Africa or South Asia.
Lagarde M, Haines A, Palmer N. Cochrane Database of Systematic Reviews 2009, Issue 4. Art. No.: CD008137. DOI: 10.1002/14651858.CD008137.

Cash transfer and microfinance interventions for tuberculosis control: review of the impact evidence and policy implications

Objective: To quantify the impact of cash transfer and microfinance interventions on a selected list of tuberculosis (TB) risk factors and assess their potential role in supporting TB control.
Data source: Published and unpublished references identified from clinical and social electronic databases, grey literature and web sites.
Methods: Eligible interventions had to be conducted in middle- or low-income countries and document an impact evaluation on any of the following outcomes: 1) TB or other respiratory infections; 2) household socio-economic position; and 3) factors mediating the association between low household socio-economic position and TB, including inadequate

health-seeking behaviours, food insecurity and biological TB risk factors such as human immunodeficiency virus (HIV) and adult malnutrition. Interventions targeting special populations were excluded.
Results: Fifteen cash transfer schemes (four unconditional and 11 conditional) and seven microfinance programs met the eligibility criteria. No intervention addressed TB or any other respiratory infection. Of 11 cash transfer and four microfinance interventions, respectively seven and four reported a positive impact on indicators of economic well-being. A positive impact on household food security was documented in respectively eight of nine and three of five cash transfer and microfinance interventions. Improved health care access was documented respectively in 10 of 12 cash transfer and four of five microfinance interventions. The only intervention evaluating impact on HIV incidence was a microfinance project that found no effect. No cash transfer or microfinance interventions had an impact on adult malnutrition.
Conclusions: Cash transfer and microfinance interventions can positively impact TB risk factors. Evaluation studies are urgently needed to assess the impact of these social protection interventions on actual TB indicators.
D Boccia, et al. Int J Tuberc Lung Dis. 2011 Jun;15 Suppl 2(Suppl 2):37-49. doi: 10.5588/ijtld.10.0438. PMID: 21740658

Tuberculosis in Brazil and cash transfer programs: A longitudinal database study of the effect of cash transfer on cure rates.

INTRODUCTION: Cash transfer programs have become an important strategy in Brazil fight inequalities as part of comprehensive poverty alleviation policies. This study was aimed at assessing the effect of being a beneficiary of a governmental cash transfer program on tuberculosis (TB) treatment cure rates.
METHODS: We conducted a longitudinal database study including people ≥18 years old with confirmed incident TB in Brazil in 2015. We treated missing data with multiple imputation. Poisson regression models with robust variance were carried out to assess the effect of TB determinants on cure rates. The average effect of being beneficiary of cash transfer was estimated by propensity-score matching.
RESULTS: In 2015, 25,084 women and men diagnosed as new tuberculosis case, of whom 1,714 (6.8%) were beneficiaries of a national cash transfer. Among the total population with pulmonary tuberculosis several determinants were associated with cure rates. However, among the cash transfer group, this association was vanished in males, blacks, region of residence, and people not deprived of their freedom and who smoke tobacco. The average treatment effect of cash transfers on TB cure rates, based on propensity score matching, found that being beneficiary of cash transfer improved TB cure rates by 8% [Coefficient 0.08 (95% confidence interval 0.06-0.11) in subjects with pulmonary TB].
CONCLUSION: Our study suggests that, in Brazil, the effect of cash transfer on the outcome of TB treatment may be achieved by the indirect effect of other determinants. Also, these results suggest the direct effect of being beneficiary of cash transfer on improving TB cure rates.
Reis-Santos B, et al. PLoS One. 2019 Feb 22;14(2):e0212617. doi: 10.1371/journal.pone.0212617. PMID- 30794615

The impact of a cash transfer program on tuberculosis treatment success rate: a quasi-experimental study in Brazil.

BACKGROUND: Evidence suggests that social protection policies such as Brazil's Bolsa Família Programme (BFP), a governmental conditional cash transfer, may play a role in tuberculosis (TB) elimination. However, study limitations hamper conclusions. This paper uses a quasi-experimental approach to more rigorously evaluate the effect of BFP on TB treatment success rate.
METHODS: Propensity scores were estimated from a complete-case logistic regression using covariates from a linked data set, including the Brazil's TB notification system (SINAN), linked to the national registry of those in poverty (CadUnico) and the BFP payroll.
RESULTS: The average effect of treatment on the treated was estimated as the difference in TB treatment success rate between matched groups (ie, the control and exposed patients, n=2167). Patients with TB receiving BFP showed a treatment success rate of 10.58 percentage points higher (95% CI 4.39 to 16.77) than patients with TB not receiving BFP. This association was robust to sensitivity analyses.
CONCLUSIONS: This study further confirms a positive relationship between the provision of conditional cash transfers and TB treatment success rate. Further research is needed to understand how to enhance access to social protection so to optimise public health impact.

J Carter, Daniel, et al. BMJ Glob Health. 2019 Jan 24;4(1):e001029. doi: 10.1136/bmjgh-2018-001029. PMID-30740248

Cash transfers to enhance TB control: lessons from the HIV response.
BACKGROUND: The World Health Organization prioritises a more holistic global response to end the tuberculosis (TB) epidemic by 2030. Based on experiences in the HIV response, social protection, and in particular cash transfers, show promise for contributing to this. Currently, individual-level evidence for the potential of cash transfers to prevent TB by addressing the structural social determinants of disease is lacking. To identify priority actions for the TB research agenda, we appraised efforts by the HIV response to establish the role of cash transfers in preventing HIV infection.
MAIN BODY: The HIV response has evaluated the effects of cash transfers on risky sexual behaviours and HIV incidence. Work has also evaluated the added effects of supplementing cash transfers with psychosocial support. The HIV response has focused research on populations with disproportionate HIV risk, and used a mix of explanatory evaluations, which use ideal conditions, and pragmatic evaluations, which use operational conditions, to generate evidence that is both causally valid and applicable to the real world. It has always collaborated with multiple stakeholders in funding and evaluating projects. Learning from the HIV response, priority actions for the TB response should be to investigate the effect of cash transfers on intermediary social determinants of active TB disease, and TB incidence, as well as the added effects of supplementing cash transfers with psychosocial support. Work should be focused on key groups in high burden settings, and look to build a combination of explanatory and pragmatic evidence to inform policy decisions in this field. To achieve this, there is an urgent need to facilitate collaborations between groups interested in evaluating the impact of cash transfers on TB risk.
CONCLUSIONS: The HIV response highlights several priority actions necessary for the TB response to establish the potential of cash transfers to prevent TB by addresing the structural social determinants of disease.
Rudgard, William E, et al. BMC Public Health. 2018 Aug 22;18(1):1052. doi: 10.1186/s12889-018-5962-z. PMID-30134870

Modeling the impact of social protection on tuberculosis: the S-PROTECT project.
BACKGROUND: Tackling the social determinants of Tuberculosis (TB) through social protection is a key element of the post-2015 End TB Strategy. However, evidence informing policies are still scarce. The S-PROTECT consortium aimed to develop an innovative mathematical modelling approach to better understand the role of social protection to improve TB care, prevention and control.
METHODS: S-PROTECT used a three-steps approach: 1) the development of a conceptual framework; 2) the extraction from this framework of three high-priority mechanistic pathways amenable for modelling; 3) the development of a revised version of a standard TB transmission model able to capture the structure of these pathways. As a test case we used the Bolsa Familia Programme (BFP), the Brazilian conditional cash transfer scheme.
RESULTS: Assessing one of these pathways, we estimated that BFP can reduce TB prevalence by 4% by improving households income and thus their nutritional status. When looking at the direct impact via malnutrition (not income mediated) the impact was 33%. This variation was due to limited data availability, uncertainties on data transformation and the pathway approach taken. These results are preliminary and only serve as illustrative example of the methodological challenges encountered in this first modeling attempt, nonetheless they suggest the potential added value of integrating TB standard of care with social protection strategies.
CONCLUSIONS: Results are to be confirmed with further analysis. However, by developing a generalizable modelling framework, S-PROTECT proved that the modeling of social protection is complex, but doable and allowed to draw the research road map for the future in this field.
Boccia D, et al. BMC Public Health. 2018 Jun 26;18(1):786. doi: 10.1186/s12889-018-5539-x. PMID: 29940906

For more detailed information on cash transfer programs, the reader is referred to WHO 2013 Essential Nutrition Actions, Annex 1 and Annex 2, pp 92-100, which compare the main characteristics of 32 known cash transfer / conditional cash transfer programs in a succinct but detailed tabular format that is too large to reproduce here. Summarizing briefly, among 32 programs, the components included counseling in 28, growth monitoring in 25,

supplemental food in 19, micronutrients in 17, referral for growth faltering (etc.) in 12, food-for-work or cash-transfer in 6, and immunizations in 3. The platforms upon which these components were deployed included 22 in community nutrition centers, 6 in health facilities, 6 conditional / cash transfer, and 4 home-based community health workers.

4. Nutrition For Growth (N4G): Program Examples And Success Stories

At the first N4G Summit in 2013, 110 stakeholders committed to prevent at least 20 million children from being stunted – saving at least 1.7 million lives by 2020. These commitments deliver much-needed action on policy and financing commitments to the Sustainable Development Goal (SDG) 2—Ending Hunger in All its Forms—which is an underlying driver of 12 of the 17 SDGs.

Specific implications for designing future programs and sustaining existing ones

When assessed in successful programs, it appears that the initial improvement in underweight prevalence in participants is quite rapid, reducing by up to 10 ppt in the first year or so. At the same time, severe malnutrition also falls rapidly to low levels (e.g. 10% to 2%). This pattern was seen in, for example, Bangladesh (early BNIP), Ethiopia, Senegal, Tanzania (Iringa), Thailand and other places. The reasons for this initial response are not known, and are likely to be in part from treatment of diseases and immunization. The sustained rate, over a number of years, is what presumably makes a long-term difference. An expected dose-response is seen roughly in the sustained rate (Figure II-1), measuring the resources as CHNWs/1000 households (or children). The results suggest that a level of around 30 CHNWs/1000 (1 CHNW:33 children, estimated as part time, 0.1 FTEs) is needed for an improvement rate of 1 ppt/year or higher in underweight.

The most important implication is that community-based nutrition programs can be effective, and that adequate resources – for example, enough CHNWs, trained and supported – must be put into these, and sustained over years, for them to provide a substantial impact on child nutrition. For example, a with-program improvement rate of 1.5 ppt/year is typical; current subregional child underweight prevalences are 13%–23% in Africa, with change rates of 0.1 to -0.2 ppt/year; in Asia these figures are 18%–33%, with change rates of -0.3 to -1.0 ppt/year. A rate of 1.5 ppt/year over 10 years reduces these prevalences by 15 ppt, i.e. to 0%–7% in Africa and 3%–18% in Asia (57). Thus, sustaining these activities at the required intensity for 10 years or so would substantially reduce child malnutrition, as has been seen in several countries with national programs (e.g. Thailand, Vietnam). The finances needed show no such relation (Figure II-2), partly because of difficulties in estimating financial resources. This finding may also reflect that it is how funds are used that counts: investing in local organizations, and especially appropriate training, support, and incentives for community workers, are crucial. The precise details of the interventions (counseling, referral, micronutrients, etc.) may not be the most essential factor, although of course they must be relevant and appropriate to the context. The extent of contact between trained, familiar community workers and mothers with children may be more crucial. It could be argued that the impact comes not primarily from delivering services, but from fostering the collective efficacy of communities: mothers obtain more control over their families' health and survival, and increase their own effective efforts. This is catalysed and supported by the community-based program structure.

Ghana Nutrition Improvement Project: A Genuinely Synergistic Public Private Partnership

According to the latest Ghana Demographic and Health Survey (2014), nearly 1 in 5 children under age 5 is stunted. The Ghana Nutrition Improvement Project (GNIP) aims to solve the problem of stunting during the weaning period (from 6 months to 2 years of age), which is caused mainly due to the insufficient content of essential nutrients in the traditional complementary food "koko" (fermented corn porridge). The mission of GNIP is to create a "Social Business Model" for improving child nutrition in a sustainable way without continuous aid. The Ajinomoto Foundation (TAF), a public interest foundation, acquired GNIP in 2017, after its launch in 2009 by Ajinomoto Co. Inc.,1 a global food and amino acid company. TAF is not involved in business but supports local partners to establish sustainable business.

TAF has been working to improve the nutritional status of infants in Ghana through the introduction of a complementary food supplement named "KOKO Plus." KOKO Plus is produced locally using locally available ingredients (soybean) supplemented with micronutrients and lysine to improve the amino acid balance. KOKO Plus is an evidence-based product (World Food Programme [WFP] registers KOKO Plus as a "Nutritious powder" in its food basket) and is designed to meet local needs: it is affordable (USD 0.10 /sachet /day); acceptable (for local tradition and preferences); and accessible (available in kiosks near health facilities and with a one-year shelf life).

A sustainable social business model should be scalable and inclusive, meaning that all processes from product development, production, and distribution would be primarily carried out by local people. GNIP officially collaborated with Ghana Health Service (GHS) (concluding Memorandum of Cooperation in 2018) to co-create nutrition education tools and design a behavior-change process that applies the private sectors' marketing intelligence. The process centers on a cycle of Awareness, Understanding, and Action. Health workers monitor and record children's nutritional status (Awareness), and then they use simple pictures to educate mothers about basic nutrition knowledge and introduce KOKO Plus as a practical solution to improve child nutrition (Understanding). Once mothers understand the importance of nutrition and how to improve it, they get interested in KOKO Plus, and they purchase it from shops at the nearest health facility (Action).2 Mothers continue to use KOKO Plus once they see their children's improved growth, and they become more confident. This cycle (Awareness, Understanding and Action) continues monthly and reinforces the mother's behavior change.

Collaboration with GHS started in 2018, and in 2019, an estimated 47,000 beneficiaries (children fed KOKO Plus) and 3,000 nurses participated in the collaboration. The number of beneficiaries is expected to increase to 450,000 children by 2023. The growth in the number of beneficiaries has been significantly accelerated. The following factors contributed to this success:

- A science-based product respecting local needs
- Promoting inclusiveness of businesses and increasing local employment (including women entrepreneurs in rural areas: in collaboration with an international NGO in the Northern Region)
- Creating an effective behavior change cycle for mothers by applying marketing strategies
- Establishing value chain of the product to reach mothers who are educated about nutrition knowledge.

For the successful duplication or scaling up of the public-private partnership (PPP) model, it is important to establish a memorandum of understanding/cooperation at the national level; additionally, to execute the collaborative activities, it is also essential to have mutual communication on the ground at the regional and district levels. By openly sharing challenges/problems and understanding the competencies/assets of each party, we could work together successfully and produce genuinely synergistic impacts. We believe our efforts with KOKO Plus will contribute to strengthening the nutrition services of GHS's health facilities, and after scaling up in Ghana, will eventually contribute to establishing Universal Health Coverage by duplicating this PPP model in other countries, which is an ultimate goal of Sustainable Development Goal 3.
https://nutritionforgrowth.org/ghana-nutrition-improvement-project-a-genuinely-synergistic-public-private-part/

Impacting nutrition: The World Food Programme (WFP) Fresh Food Voucher Programme—Ethiopia

Malnutrition remains a key challenge in Ethiopia, where 37% of children under the age of five are stunted, 21% are underweight and 7% are wasted. Concurrently, overweight and obesity in children and adolescents is increasing. Only 13% of children in Ethiopia consume the minimum acceptable diet. The United Nations World Food Programme's Fresh Food Voucher (FFV) initiative is aimed at contributing to a reduction in stunting through improving child and maternal diets and care practices. It targets vulnerable households enrolled in the national social protection program in Ethiopia's Amhara region, one of the regions with the highest prevalence of stunting at 43%. The key indicators being monitored are Minimum Acceptable Diet (MAD) and Minimum Diet Diversity for Women (MDD-W).

Every month, in seven districts of the Amhara Region, 27,000 enrolled households receive an e-voucher via SMS on their analogue mobile phone that can be redeemed for fruits, vegetables, and eggs at enrolled food retailers' kiosks in remote rural markets. The program trains and provides technical support to the retailers to maximize their profits and increase the safety of their items. Additionally, a Social and Behavioral Change (SBCC) campaign, based on formative research and tailored for the program, includes one-on-one sessions for health and agriculture extension workers, supported by market theatre performances, radio-based broadcasts, SMS-vocal messaging, and other components, all aligned with Ministry of Health (MoH) guidelines. The ultimate goal is to offer robust evidence to inform policy and program decision makers, leverage the transfer value and the cost / non affordability of healthy diet analysis, train the Government of Ethiopia MoH in this approach, and apply it to other critical areas of the Ethiopian food system.

The program recently saw children and mothers increasing their diet diversity from 13 to 80%, and 1 to 95%, respectively, despite the COVID-19 pandemic programmatic adjustments. The initiative can easily be replicated in other contexts, taking into consideration crucial elements, such as: market functionality, including availability of nutrient dense foods; the development of a SBCC strategy well-informed by formative research; and access to mobile phones and network connectivity. The critical lessons learnt showed need to address not only the 'access' (voucher) and the 'demand/ utilization' (SBCC) of nutrient-dense foods, but also their 'availability' (ag-production, processing and supplying) to address the entire food system.
https://nutritionforgrowth.org/impacting-nutrition-the-world-food-program-wfp-fresh-food-voucher-program-ethiopia/

EU Nutrition Commitments: An Example of Concrete Achievements in Mozambique

The European Union made two ambitious commitments in 2012 and in 2013 related to its work on nutrition:

1. To support partner countries to reduce by 7 million the number of stunted children <5y.o. by 2025
2. To allocate €3.5 billion for nutrition between 2014 and 2020.

Progress achieved towards these nutrition commitments is highlighted in the annual reports. At the country level, these commitments have translated into multi-sectoral actions such as the Programme to accelerate progress towards MDG1.C in Mozambique (2013-2019). Despite its economic performance, Mozambique's nutrition situation remains poor: stunting (43%) as well as women and child anaemia are very high, while overweight and obesity is increasing. The estimated GDP loss is 11% each year to child stunting alone, equivalent to $1.6 billion. The MDG1.C Programme aimed to address the prevailing high levels of food insecurity and malnutrition, particularly in rural areas.

By targeting areas with high agricultural potential but poor nutrition in Beira and Nacala corridors, the specific objectives of MDG1.C Programme were to (i) improve agricultural and fisheries production; (ii) increase access to food; and, (iii) enhance the nutrition status of vulnerable groups and low-income households, with a focus on women and young children. The interventions included agricultural and fisheries value chains strengthening, e-vouchers, home gardens, food fortification, market information systems, nutrition education and social behavior change. More than 80,000 people, including women, adolescent girls and schoolchildren, benefitted from nutrition and home gardening and nutrition education interventions alone.

Beneficiaries' lives improved considerably in terms of food security, diets (including of women and adolescent girls) and nutritional status of children, as compared to control groups (see table). In particular, the prevalence of stunting fell by five percentage points at district level and exclusive breastfeeding doubled over a period of five years.

Outcomes	2013	2018
Stunting	45%	40%
Food insecurity	31%	16%
Coping Strategy Index	45%	20%
Exclusive Breastfeeding	27%	54%
Children's Diet	30%	35%

Success factors included:

- Holistic package tackling multiple causes: Gains in food and nutrition security were much greater for those households reached by the most comprehensive range of interventions.
- Community-based delivery of services through networks of local workers who were more trusted and efficient in reaching not only mothers but other influential people (family members, local leaders).
- Culturally sensitive nutrition messages based on in-depth formative research, including traditional knowledge and participatory elaboration of education materials.

There are lessons to be learned from achieving such a multi-sectoral approach at scale:

- It is critical to include nutrition objectives into agriculture/market-based interventions from the outset at design stage; and
- The program must adapt to different and specific contexts, at the same time strengthening local nutrition governance and developing the capacities of service providers at every level.

Some best practices, including social behavior change and nutrition education in schools, were incorporated into national food and nutrition security policies and programs. Lessons learned also informed the 2014-2020 EU rural development strategy in Mozambique maintaining a key focus on food and nutrition security and targeting nutrition sensitive investments through both long-term approaches and post-cyclones recovery and resilience programs.

In Zimbabwe, a tradition of collaboration is streamlined with support from the UN Network

Stunting is one of Zimbabwe's main nutrition challenges, affecting boys and girls, particularly from impoverished households. Estimated at 27 percent nationally, there are vast geographic disparities that call for further concern.1 Cognizant that stunting is a detriment to good health and wellbeing, a hinderance to sustainable development and can be passed down from one generation to the next, Zimbabwe was among the first countries to join the Scaling Up Nutrition (SUN) Movement in 2011.

The country's UN Network (UNN) was formalized in 2014, opening the door for more structured cooperation among the United Nations agencies. That same year, FAO, UNICEF, WFP and WHO decided to jointly tackle stunting in the rural Mutasa district, near the border with Mozambique. This district was chosen, along with three others, because it is one of the top ten districts with the highest number of stunted children,2 approximately 40 percent. The collaboration encompassed nutrition-specific and sensitive actions across programming areas, building on the comparative advantage of each agency. WHO provided technical expertise, and UNICEF supported direct nutrition interventions as well as water, sanitation and hygiene (WASH) improvements. FAO facilitated nutrition centers and agricultural assistance, and WFP focused on food security, behavior change communication and livelihoods. "Within this one district, we ended up having geographical convergence, but also a programmatic convergence," explained Kudzai Mukudoka a UNICEF Nutrition Officer working in the country.

As a result, stunting levels decreased from 42 to 31 percent since the program started in 2014.3 FAO Nutrition Officer and Food Safety Specialist, Delilah Takawira, was a part of this process. "If you look at Mutasa, we've really made an impact on minimum dietary diversity. This district is now ahead of the others, which I attribute to the joint programming work. We would like to do this in more districts and come up with a joint program going forward to 2020." The statistics are compelling; minimum dietary diversity increased from 6 to 39 percent (highest in the country) and the proportion of households with access to safe drinking water rose from 60 to 68 percent.4 Moreover, the statistically significant reduction of stunting was achieved in a relatively short time span.

Building on this success, the approach was scaled up to fifteen districts in 2016 and 32 in 2019 through the Multi-sectoral Community Based Model (MCBM) for food and nutrition security with a focus on stunting reduction. Under this model, government ministries, development partners, traditional leaders, civil society and the private sector meet monthly. Capacity development has been a core means for scale up, targeting ward-level food and nutrition committees and raising awareness about the importance of cohesive action at the community level. An additional feature of the program is hosting

food fairs, with cooking demonstrations and talks on infant and young child feeding, which have helped bring technical nutrition issues down to a personal level.

Improved data management and action-oriented analytics have proved to be other enablers. As part of the UNN convergence, the Near Real Time Monitoring System was established in 2017, led by UNICEF which co-chairs the Network in Zimbabwe. All nutrition-related data are recorded with tablets at the ward level so stakeholders can swiftly take corrective action. Furthermore, UNN analytical tools, such as UN Nutrition Inventory and the Nutrition Stakeholder and Action Mapping identified gaps and overlaps, leading to additional joint efforts in Harare and other urban areas. The UNN-REACH Facilitator helped orchestrate these third-generation joint programming discussions, capitalizing on her extensive experience with the United Nations agencies and close contact with government to ensure a needs-based approach was employed. While tacit, the presence of a neutral UNN-REACH facilitator further helped to create an environment conducive to partnership for shared goals.

1Global Nutrition Report, Zimbabwe Country Profile. Available at https://globalnutritionreport.org/media/profiles/3.0.3/pdfs/zimbabwe.pdf.

VALID's Commitment and Positive Impact Towards Improving Nutrition Outcomes in the Developing World

Despite huge investment and best efforts to date, the humanitarian community is unfortunately failing starving children at an appalling rate. The reality in a pre-COVID-19 context is that less than 10% of children affected by wasting are being reached (comparing coverage to annual incidence). VALID Nutrition ("VALID") believes that our collective failure to address wasting at scale is not primarily a strategic failure, but rather, a failure to execute a treatment strategy effectively. This failure relates to implementation and is also relevant to other forms of malnutrition, wherein the models, markets and products to deliver treatment are not fit for purpose and/or have not evolved over the past decades. They are too expensive, poorly targeted, donor/supply-side focussed, and critically, do not engage the capacity of the private sector at real scale.

In 2005, the VALID charity established Valid Nutrition Malawi ("VNM") to support their development of locally sourced, effective and innovative ready-to-use food products for the prevention and treatment of various forms of malnutrition. Since establishment and until recent decommissioning (in preparation for the construction of a new purpose-built facility), VNM has acted as a progressive and innovative research and development hub supporting VALID's broader objectives. This has included the development (spanning three RCTs in Zambia, DRC and Malawi over 15 years) of an efficacious, amino-acid enhanced and highly cost-effective, plant-based (Soya, Maize, Sorghum – SMS) RUTF recipe in 2016. In 2018 VNM supported a collaboration with World Vision Malawi generating additional operational evidence of effectiveness (through a Community-based Management of Acute Malnutrition pilot program) of VALID's new recipe.

This is the first successful step in a progressive program designed to harness the capacities of public/private partnerships and to start a process of creating (currently absent) market infrastructure that will deliver autonomy and real food choices at scale to individuals affected by malnutrition. In summary:

- For the first time ever, VALID has successfully delivered an efficacious and more cost-effective (20-30%), plant-based alternative, RUTF recipe.
- Due to the absence of milk, the recipe is superior to the standard product at treating iron deficiency anaemia and replenishing iron stores.
- Made from local ingredients, it delivers genuine competition and enables more competitive local manufacturing.
- In addition to the value-adding benefits to economies and societies in developing countries, the product significantly increases treatment coverage within existing donor budgets.
- The added value of this product is highly relevant in a post COVID-19 world where centralized manufacture and logistics have been demonstrably vulnerable and maladapted to the new circumstances.

Launching VALID's new product and scaling up similar products for the treatment of moderate acute malnutrition and chronic malnutrition involves changing the status quo by gaining approval from the WHO for evidence-based, non-milk RUTF recipes in the first instance; as well as creating the infrastructure to support "real" demand from poor people for products they desire and need. VALID's approach involves extending beyond supply-based and corporate social responsibility-driven solutions to malnutrition. It involves some calculated risk, but by targeting and aligning "real" demand with supply, it also offers higher social rewards and return. To create the step change (in both coverage and impact) required, our objective is to work with stakeholders to scale up recipe development and manufacturing in Africa for the elimination of malnutrition.
https://nutritionforgrowth.org/story-of-valid-nutritions-commitment-and-positive-impact-towards-improving-nutrition-outcomes-in-the-developing-world/

5. World Bank 2006 Specific Program Examples

Unlike the 2010 report, this seminal 2006 World Bank report did not rely on systematic review and meta-analysis of evidence, but took the evidence as given based on successful programs. From there, the report proceeds to describe that programmatic experience, highlighting factors contributing to its success. This report introduced the terminology of "long routes" and "short routes" to better nutrition. Although both long and short routes are important and should be part of national strategies, this report focuses on the short routes and emphasizes the importance of improving child feeding and caring practices in pregnancy and infancy, for the following reasons:

- Malnutrition's most serious and lasting damage is either during pregnancy or to very young children (chapter 2).
- Several short route interventions can improve child nutrition fast— in two to five years, within the time frame in which politicians need to see results.
- These interventions are affordable at scale by all but the very poorest countries.
- Reducing income poverty or improving the food supply without changing the way young children are cared for often does little to improve nutrition (box 3.1 and see table 1.4).
- Most countries have invested more in food and health than in improving mothers' knowledge and practice of child care and feeding.

From Overview:
We recommend that when developing strategies specific to a country or region, countries and their development partners pay special attention to the following:

1. Focusing strategies and actions on the poor so as to address the non-income aspects of poverty reduction that are closely linked to human development and human capital formation.
2. Focusing interventions on the window of opportunity before pregnancy through the first two years of life— because this is when irreparable damage happens.
3. Improving maternal and child care practices to reduce the incidence of low birthweight and to improve infant-feeding practices, including exclusive breastfeeding and appropriate and timely complementary feeding, because many countries and development partners have neglected to invest in such programs.
4. Scaling up micronutrient programs because of their widespread prevalence, their effect on productivity, their affordability, and their extraordinarily high benefit-cost ratios.
5. Building on country capacities developed through micronutrient programming to extend actions to community-based nutrition programs.
6. Working to improve nutrition not only through health but also through appropriate actions in agriculture, rural development, water supply and sanitation, social protection, education, gender, and community-driven development.
7. Strengthening investments in the short routes to improving nutrition, yet maintaining balance between the short and the long routes.
8. Integrating appropriately designed and balanced nutrition actions in country assistance strategies, sector-wide approaches (SWAps) in multiple sectors, multicountry AIDS projects (MAPs), and Poverty Reduction Strategy Papers (PRSPs).

Selected passages of interest / relevance

Aside from the importance of targeting pregnant women and children under two years of age, those most vulnerable to malnutrition, key lessons about designing growth promotion programs include the following:

1. Female community workers are the best people to deliver services because they are less expensive than skilled health workers, on the spot, and able to communicate with mothers better than men. Low levels of formal education are not an impediment to workers' effectiveness so long as they are well trained.
2. Because moderate and mild malnutrition are not readily apparent, regular monitoring of children's weights on a growth chart is important, so mothers know whether their children are growing properly and can see the benefits of changes in practices; however, growth monitoring and promotion only work where programs can provide good training and effective supervision in weighing, recording, and counseling mothers, as well as other options for establishing regular contact with mothers.
3. Well-designed and consistent nutrition education, aimed at changing specific practices, is crucial. There are two ways to ensure that recommended child feeding and care practices make sense for poor people in their cultural and economic context (box 3.3).

From ch. 1 Why Invest in Nutrition?: The final argument for investing in nutrition is that there are tried and tested models and experiences for reducing most forms of malnutrition— models and experience that have not been adequately exploited and scaled up (see chapter 4). In some exceptional countries, nutrition programs have virtually universal coverage (Chile, Costa Rica, Cuba, and Thailand) and malnutrition has declined rapidly (see figure 2.12). But other countries with large nutrition programs still have significant gaps in coverage and quality. Most countries have not invested at a scale large enough to get tested technologies to those who will benefit from them most. In addition, many countries have invested in less effective and less strategic interventions (such as school feeding), or have not paid attention to implementation quality.

From ch. 3 Routes to Better Nutrition. This chapter summarizes what we know about the main interventions for improving nutrition, on both the demand and the supply side, and identifies areas where we need to know more. It outlines two routes to improving nutrition—the long route via birth spacing, food policies, and women's education, and the shorter route via health and nutrition services, micronutrient supplementation, conditional cash transfers, and nutrition education. This chapter also draws two main conclusions about nutrition programs. When it comes to dealing with low birth- weight, overweight, and diet-related noncommunicable diseases (NCDs), and with the complex interactions between malnutrition and HIV/AIDS, there are no tried and tested models for effective large-scale programs; action research and learning-by-doing are the priority in these areas. Large-scale HIV initiatives must incorporate attention to nutrition if they are to succeed. By contrast, when it comes to tackling child undernutrition and micronutrient malnutrition, there are several examples of large-scale programs that have led to substantial improvements in nutrition and health behavior and outcomes; scaling up such programs in other countries is the obvious next step. More attention needs to be paid to the policy process, to ensure that paper policies get translated into action, and more attention needs to be focused on the unintended effects on nutrition of macroeconomic policies and sectoral policies outside nutrition because they often have haphazard or negative effects that work against the objectives of improving nutrition.

Annex 1 lists more than 25 countries/programs, providing details on different short route interventions that have been successful—and some not successful. The remainder of this section discusses some key lessons learned in four types of short route programs—growth promotion programs for young children, low birth-weight prevention programs, micronutrient programs, and food assistance and social protection programs

Community-Based Growth Promotion Programs Program experience

Successful, large-scale child growth promotion programs were established as long ago as the 1980s in India's Tamil Nadu state,1 Indonesia,2 and Thailand,3 and continue in Bangladesh,4 Honduras,5 Madagascar,6 and Senegal,7 among other countries. Such programs lead to a sharp decline in severe malnutrition in the first one to two years, with a slower rate of decline in moderate and mild malnutrition thereafter. A recent cross-country review of successful programs

concludes that they led to an average fall in young child malnutrition of one to two percentage points a year—two to four times the 0.5 percent rate calculated as the average trend in the absence of such programs.8

Low-Birthweight Prevention Programs Program experience

Recent evaluation results from the large-scale Bangladesh Integrated Nutrition Project (BINP) project suggest that BINP improved selected knowledge and practices related to pregnancy by 20 to 40 percentage points. There is some evidence that one of these practices (eating more during pregnancy) is associated with an 88-gram increment in birthweight among those reporting the practice. The evidence suggests little or no additional effect on pregnancy weight gain or birthweight for the population as a whole; however, consistent with theoretical expectations, subgroup analysis suggests sizable effects on birthweight among women who report that they eat more during pregnancy (an additional 88 grams), and a greater impact among destitute who report they eat more during pregnancy (an additional 270 grams).

Such large effects have not been demonstrated in effectiveness trials, primarily because few studies have looked at the mother-child dyad as a combination, instead focusing on the effect on either the mother or the child. Also, most evaluations have looked at a population as a whole, rather than at groups that have a potential to benefit. In the United States, the Women, Infants, and Children Program has successfully reduced low birth-weight through a combination of providing food coupons and linking pregnant women to prenatal health care akin to conditional cash (food) transfers, albeit not the same. Its applicability to less developed countries still needs to be tested. Results from the recent community trials of micronutrient supplementation in Nepal also demonstrated that iron and folic acid supplementation can reduce low birthweight by 16 percent, with mixed results on the added value of multiple micronutrient supplementation.13

Most mother-child food supplementation programs have documented more success with the child than with the mother. Until recently, the effect of food supplementation on birthweight has been demonstrated primarily in research settings (Narangwal in India, Four Village Study in Guatemala, Dunn Nutrition Centre studies in The Gambia, milk fortification in Chile).14 The size of this effect was 50 grams of birthweight for every 10,000 additional calories in pregnancy (in Guatemala and Indonesia). Programs have tried creative ways to overcome the cultural resistance to eating more during pregnancy or to resting during pregnancy. The Tamil Nadu Integrated Nutrition Project (TINP) project in India provided a supplementary snack food to pregnant women, which was accepted largely because of its timing, convenience, and image as a snack, though there is little documented evidence of improvements in birthweight in TINP.15

Family planning, antismoking, malaria prevention, adolescent health, and reproductive health programs have all had some success, sometimes at large scale, but primarily as vertical efforts. The challenge in preventing low birthweight at large scale is to combine forces, collaborate across departmental lines within and beyond ministries of health, and overcome the formidable problems of health service access, cultural barriers, and women's powerlessness and lack of self-confidence, while combining preventive, therapeutic, and behavioral change approaches. Although this approach has not been demonstrated at scale yet, the potential for success through such integrated programming is there, especially as countries move from projects to programmatic and sector-wide approaches.

Micronutrient Programs

Fortifying foods and providing vitamin and mineral supplements are inexpensive ways to address the widespread problem of micronutrient malnutrition. They can improve economic productivity and economic growth, enhance child and maternal survival, and improve mental development and intelligence in children (chapter 1). "No other technology offers as large an opportunity to improve lives at such low cost and in such a short time."18

Several countries have successfully iodized their salt supplies, thus reducing goiter and cretinism, preventing mental retardation and subclinical iodine deficiency disorders (IDD), and contributing to improving national productivity. Iodized salt coverage rates of more than 75 percent have been achieved in 26 countries. Success with salt iodization, as with other forms of fortification, depends partly on how many manufacturers there are, especially small-scale producers—the smaller the number, the easier it is to develop and regulate the program; how strong the legislative and regulatory system in the country is; and what proportion of the vulnerable have access to commercially fortified foods.

Developed countries have long fortified milk and breakfast cereals with vitamin A (and other vitamins and minerals), but in developing countries sugar has so far been the most successful vehicle. In Central America, Guatemala's sugar fortification program has virtually eliminated vitamin A deficiency; big reductions have also been seen in El Salvador and Honduras, where fortification was combined with supplementation.20 Sugar fortification and vitamin A supplementation were also combined in Zambia beginning in 1998, with demonstrated success so far in urban areas.21 But in much of Africa and Asia the poor do not consume as much sugar as they do in Latin America, so other countries are experimenting with fortifying wheat flour, cooking oil, and MSG (monosodium glutamate) with vitamin A. Research has shown that vitamin A supplementation can reduce young child mortality in deficient populations by an average of 23 percent.22 Vitamin A supplements lend themselves to distribution through a campaign approach because children require only two annual doses. Countries as different as Nicaragua,23 Niger,24 and Nepal25 have reached coverage levels of more than 80 percent (see map 1.3). Most campaigns were originally attached to National Immunization Days, but as these are phased out in favor of immunization as a routine part of health services, countries have found other focuses for campaigns—for example, piggybacking on the Day of the African Child and World AIDS Day in Tanzania,26 or creating twice- yearly National Micronutrient Days, following the example of the Philippines and Niger.

Iron programs to combat anemia have been less successful than iodized salt and vitamin A programs, yet models exist here too. Flour fortification with iron has substantially improved iron status across all population groups in Chile and Venezuela,27 and rice fortification with iron improved the iron status of school children in the Philippines.28 A promising large-scale trial of fortifying soy sauce in China also showed that it is a cost-effective way to reduce the prevalence of anemia ($0.0007 per person per year)29 among all population groups. Several small-scale community-based trials on home fortification with sprinkles for young children in Africa and in Asia have demonstrated that such innovations are feasible and as effective as commonly used ferrous sulphate drops in reducing the prevalence of anemia.30 The challenge of scaling up these programs remains.

Where anemia is serious and widespread, as in much of South Asia, fortification may not meet the iron needs of vulnerable groups such as pregnant women, and supplementation is also required. Iron supplementation has proved more challenging than vitamin A supplementation because the supplement has to be taken daily and sometimes has perceived side effects. Consequently, there have been problems with the logistics of supply and sometimes with compliance. Indonesia and Thailand have made the most progress in reducing anemia. A practical publication called "What Works in Anemia Control"31 provides guidelines based on their experience and that of more than 20 other countries that have programs with aspects worth replicating.

Last but not least, the Harvest Plus program is a promising initiative in which the international agricultural and research centers have begun to develop new breeds of staple foods that are rich in key vitamins and minerals using a new approach to fortification termed biofortification (see www.harvestplus.org for details).

Food and Social Protection Programs

Food assistance and social protection programs can be either long or short routes to improving nutrition. There are lessons about what does and what does not work.

Two types of food assistance seldom work as nutrition interventions. General food subsidies can increase the food consumption of the poor, but they are a prohibitively expensive way to reduce malnutrition (box 3.4). School feeding programs can sometimes be justified in terms of providing an incentive for children to go to school and to perform better, but they are seldom a cost-effective nutrition intervention simply because undernutrition does its principal damage to preschoolers. Yet many governments try to justify school feeding for its nutritional benefits; if this means that school feeding comes out of the health and nutrition budget rather than the education budget, it can have big opportunity costs for programs that improve the nutrition of preschoolers. Nutrition education, iron supplements, and deworming are usually better school nutrition investments than school feeding. Iron supplements and deworming have been shown to improve schooling outcomes as well.32

By contrast, food subsidies that are regular and significant, but tightly targeted to poor, malnourished populations, can be a cost-effective way to improve household food security—provided they are coupled with counseling services to help ensure that the additional food gets to the most vulnerable household members.35 Targeting is often best achieved by subsidizing foods that are unattractive to non-poor people. Furthermore, it has been found that subsidies in the form of food stamps do more to increase food consumption than the equivalent cash transfer. Yet improving household food security is usually a long route to better nutrition, for the reasons given in box 3.1. When can food or cash transfers be short routes to improving nutrition? Experience suggests this happens mainly in three situations:

- When food assistance is made rapidly available to families who have suffered a serious food security shock, such as a crop failure. In such circumstances, it can safeguard children's as well as mothers' nutrition.36 But such aid needs to be well targeted and timely, so success depends on an effective early warning system, easily applicable targeting criteria, and a good storage and distribution network.
- When food coupons or cash transfers to poor families are made conditional on beneficiaries using health and nutrition services. Conditional transfers were first tried in Honduras to protect the poor from the shock of structural adjustment, and then adopted by other Latin American countries as human development programs.37 Evaluations in Mexico,38 Colombia,39 and Nicaragua40 show that conditional transfers, though costly, work when there is political commitment and when they target the right population with the right combination and quality of services (box 3.5). An important lesson is that these programs rapidly increase demand; hence, it is crucial to invest ahead of time in increasing service coverage for the poor, so supply can meet demand. In that context, conditional cash transfer programs can be an important component of both demand-side behavior change and supply-side interventions (see table 3.1).
- When food supplements for children aged 6 to 24 months are used to educate mothers about the benefits of feeding small, affordable, additional amounts. As India's experience with food supplementation shows (see technical annex 4.1A), such programs need to be carefully designed if they are to improve home feeding practices and families' self-reliance, rather than becoming welfare entitlements that increase dependence on government.
- Conditional cash transfers may be an expensive option for effective nutrition interventions in poorer countries. An argument may be made that where governments may have decided for other reasons to make these transfers, adding a conditional element and linking it to enhanced supply of services may make supply-side interventions more effective. Yet another variant of conditional cash transfers, a strategy that has not been tried at any large scale, is conditional transfers of food.

Malnutrition and HIV/AIDS Programs

Uganda has led the way in incorporating nutrition considerations into counseling for people living with HIV/AIDS with an excellent set of guide- lines for service providers. A wide range of other nutrition–HIV/AIDS policy options including social protection and rural livelihood interventions are reviewed by Gillespie and Kadiyala (2005), but there is little or no evidence about the cost-effectiveness of the options or experience with their implementation at scale. However, there are inherent programmatic efficiencies in combining services because the vulnerable groups are similar and a common infrastructure will strengthen coordination, reduce fragmentation of limited service delivery capacity, and increase the quality of program delivery. RENEWAL (Regional Network on HIV/AIDS, Rural Livelihoods, and Food Security), a recently launched international partnership, aims to raise awareness, fill knowledge gaps, and help main-stream nutrition considerations into HIV/AIDS policy and HIV/AIDS considerations into nutrition policy (see www.ifpri.org/renewal). The U.S. Agency for International Development (USAID), through its Food and Nutrition Technical Assistance Project (FANTA) and Support for Analysis and Research in Africa (SARA) project, has been instrumental in keeping nutrition issues in the forefront of the development agenda for HIV research. The World Bank is starting an initiative to include nutrition interventions in Multi-country AIDS Projects (MAPs), starting with Kenya and Mozambique. The objective is to learn from this experience and to scale up to other countries in the region as well as to other non- MAP initiatives, such as President's Emergency Plan for AIDS Relief (PEPFAR). Although we are still learning how to combine HIV/AIDS and nutrition interventions, neither the virus nor programs to combat it wait for the science. Large-scale HIV programs are being implemented in many countries, even as research is being carried out and

policies developed. The challenges are to speed up research and to incorporate what we know about nutrition and HIV/AIDS as soon as possible into these large-scale programs.

6. World Bank: The Hunger Safety Net Programme (HSNP) — a social protection project being conducted in the Arid and Semi-Arid Lands of northern Kenya.

Adapted from: The Hunger Safety Net Programme Executive Summary

The HSNP is an unconditional cash transfer program that aims to reduce poverty in northern Kenya. During the pilot phase the HSNP delivered regular cash transfers to beneficiary households (for community-based targeting (CBT) and dependency ratio (DR) beneficiaries) or to individuals (for social pension (SP) beneficiaries) in the counties of Mandera, Marsabit, Turkana and Wajir. The pilot program operated under the Ministry of State for the Development of Northern Kenya and Other Arid Lands and was delivered by several contracted service providers, with financial support from the UK Department for International Development (DFID).

Study design

The impact of the HSNP has been assessed using rigorous scientific methods. Using a randomised controlled trial approach, a number of geographical areas (sub-locations) were randomly chosen to be assessed by the evaluation. These sub-locations were then randomly assigned to be either 'treatment' areas, where the program began to operate straight away, or 'control' areas, in which the program did not start for two years (the duration of the impact evaluation). The program's selection process was implemented (prior to the baseline survey) identically in both treatment and control areas. Impact was then assessed by comparing HSNP beneficiary households in treatment areas with households in control areas that were selected for the program but who would not come into the program for two years. For the final impact analysis there were 20 treatment and 20 comparison (control) sub-locations, with 1,224 HSNP households (the treatment group) and 1,212 control group households. Qualitative research was also conducted in four HSNP treatment sub-locations in each greater district. Qualitative methods included focus group discussions (with female and male beneficiaries and non-beneficiaries), key informant interviews (with community elders, teachers, laborers, minority groups and traders), household case studies (a 'qualitative panel' of beneficiaries and non-beneficiaries), and participatory methods (social mapping, timelines and community wealth ranking).

This report relates to the impact of the program on HSNP households after 24 months from the point of targeting. It compares the situation of HSNP and control households at the time of their selection into the program (baseline), with their situation 24 months later (year 2 follow-up). Over this 24-month period most of the HSNP households covered by the evaluation had received 11 or 12 bi-monthly transfers (initially KES 2,150, increased to KES 3,500 by the end of the evaluation period). The first impact report, published in May 2012, assessed the impact of the program on HSNP households after 12 months, at which point most had received four or five transfer payments. This report is accompanied by the final Operational Monitoring Report, which assesses the effectiveness of the implementation of the various components of the program, and a follow-up year 2 qualitative evaluation report, which provides the extended results of the qualitative research conducted during the second follow-up evaluation round.

Key results

The HSNP stops or slows the slide into poverty.

The HSNP is having a significant impact on increasing consumption expenditure and reducing extreme poverty in northern Kenya. HSNP households are 10 percentage points less likely to fall into the bottom national poverty decile than

control households. In addition, both the poverty gap (how far on average a household is below a given poverty line – in this case the bottom national decile) and the severity of poverty (a measure giving more weight to poorer households) improve in comparison to control households by seven percentage points each. HSNP households have seen their consumption expenditure increase by KES 247 per adult equivalent per month on average.

This impact was achieved despite a severe drought (even by the extreme standards of northern Kenya) that affected program districts in 2011. Programme impact on consumption and poverty was characterised by significant decreases in consumption among control households, rather than increases for HSNP households. In other words, the HSNP is fulfilling its title and acting as a vital safety net, mitigating the negative impact of drought and other adverse shocks for HSNP households.

The poverty impact is driven by poorer and smaller households, who are experiencing the largest reductions in poverty as a result of the program. This is as expected given the greater size of the transfer relative to their consumption expenditure. This implies that in order to maximise its poverty impact going forward, the HSNP must make efforts to target the poorest households and consider measures for indexing the value of the transfer to household size so as to ensure that larger poor households are not left behind.

HSNP households spend more on food

The program is having a significant impact on food security, another of its key objectives, reflected in a significant positive impact on food consumption. Eighty-seven per cent of HSNP households report eating more and/or larger meals. HSNP households spend approximately KES213 more on food per month per adult equivalent than control households. As with general consumption, the impact on food consumption is driven by a significant fall among control households rather than improvements for HSNP beneficiaries, highlighting the successful safety net function of the program. Once again the impacts are most pronounced for smaller and poorer households.

Dietary diversity, food aid and child nutrition

In addition to expenditure on food, the evaluation assesses program impact on food security by considering: whether households are consuming more varied diets; whether households are being deprioritised for food aid and other food support programs; and whether child nutrition is improving. In contrast to the findings after one year of program operations, after two years we do not find an impact on dietary diversity for HSNP households overall. However, poorer HSNP household are increasing the diversity of their diets.

There were concerns that HSNP households would be deprioritised for food aid and other support such as school and supplementary feeding programs, but this has not happened. HSNP beneficiaries are not less likely to receive food aid, probably because food aid distributions are driven by their own programming decisions.

In terms of the mode of support, HSNP households expressed a clear preference for cash support over food aid, since it provides the flexibility to meet a wider range of needs. However, it was also clearly expressed that, at current levels, the value of the transfer is not large enough to fully replace food aid. The evaluation found no significant impact on child nutrition. This is not surprising given the variety of factors external to the HSNP and beyond simple access to food that affect child nutrition, which a cash transfer by itself is unlikely to influence.

Evidence suggests the HSNP is helping households to retain livestock

The evaluation finds some evidence of positive impact on retention of livestock, with HSNP households six percentage points more likely to own some form of livestock after two years of program operations than control households; this result is even more pronounced for goats/sheep, at seven percentage points. However, this result is not robust when you control for community- and household-level factors, nor for any specific categories of households under the heterogeneity analysis. At the same time, there is much qualitative testimony to the positive impact of the program

enabling households to retain livestock. Therefore, there is some strong evidence that the HSNP is enabling households to retain livestock but it is not fully conclusive.

In terms of the retention and accumulation of non-livestock productive assets, the HSNP is not having a significant impact on ownership of a range of key productive assets. However, the qualitative research did reveal some beneficiaries buying consumer goods, such as housing materials, clothing, or basic household items.

Secondary impact areas

- The HSNP is enabling households to spend more on health care
- The HSNP is not increasing attendance or expenditure on education, but beneficiary children are improving their performance in school
- The HSNP is not causing inflation or stabilising prices over time
- The HSNP is not creating dependency or disrupting pastoralist livelihoods
- The HSNP may be positively benefiting the local economy saving, borrowing and credit
- The HSNP can help households cope with shocks

Conclusions and implications for social protection policy

Implications for HSNP design and other potential interventions

The quantitative analysis conducted by the evaluation provides a robust estimate of aggregate program impact. The qualitative data demonstrate a diversity of individual experience behind that aggregate impact, indicating that different types of household respond in different ways to the transfer. This reality of the way different households respond differently to the transfer could be dampening the overall average impact of the program.

The analysis shows that the impact of the program is more pronounced on smaller and poorer households and on households that received a greater cumulative per capita value of transfer. This indicates that targeting the transfer at the poorest households, and ensuring the payments system functions effectively so that all households receive their full entitlement, are the best ways to maximise program impact and value for money. In addition, these findings raise questions about the effective minimum value of the transfer and whether it could be effectivelyi ndexed to household size.

The above findings also show that, in the context of northern Kenya at least, an unconditional cash transfer such as the HSNP does not have an impact across hundreds of different domains.There is therefore a need to be realistic about where such an intervention can make a real difference. In some areas, complementary interventions may be needed in order to enable the cash transfer to make a tangible impact. In others, conditionalities may be appropriate. In yet others, different interventions altogether may be required that focus more on the supply side.

Implications for social protection policy

Cash transfers in Kenya are being consolidated into a single National Safety Net Programme(NSNP). This incorporates the HSNP, the Cash Transfer for Orphans and Vulnerable Children (CTOVC),the Older Persons Cash Transfer (OPCT), the Persons with Severe Disability Cash Transfer(PwSD-CT) and the Urban Food Subsidy Cash Transfer (UFS-CT). Lessons from this evaluation will be useful for the NSNP as whole, and not just the HSNP.

This evaluation provides further evidence that cash transfers have positive impacts without creating dependency. The evaluation also demonstrates that the impact is stronger for smaller and poorer households across a variety of domains. This may imply that the NSNP considers an option for per capita rather than per household transfers. Also, the HSNP seems to have a stronger impact on food security and other domains during shock periods. This underlines the usefulness of cash transfers as a shock response system and provides justification for introducing a shock responsiveness function across the NSNP. A useful next step for the NSNP would be to explore complementarities with other programs, and in particular supply-side activities.

7. USAID Examples

Promoting Data-Driven Action to End Malnutrition: Improving Measurement of Maternal Diet

The global community has embraced the importance of the 1,000-day window; however, we have generally neglected to deliver good nutrition for mothers. Suboptimal fetal growth due to poor maternal nutrition causes more than 800,000 infant deaths each year, and there has been little progress in reducing low birth weight. A key action to reduce preventable infant deaths is to improve nutrition services for women of reproductive age before and during pregnancy to ensure women's diets include a diverse range of foods to support the growth of infants.

During the 2017 Nutrition for Growth Summit in Milan, the United States Agency for International Development (USAID) committed to a partnership with the Bill & Melinda Gates Foundation to strengthen nutrition metrics that empower practitioners and donors to better track and evaluate our nutrition investments, including support to the Demographic and Health Surveys (DHS) Program.

Measuring the progress of nutrition programming is often challenging due to inconsistent monitoring and lack of data that reveals the direct and indirect causes of malnutrition for specific populations in low- and middle-income countries. Maternal nutrition, in particular, is not always a focus of data collection and analysis efforts, yet a woman's diet during pregnancy can have a significant impact on the first 1,000 days of a child's life.

Together with the Bill & Melinda Gates Foundation, USAID has strengthened the quality and availability of data on maternal nutrition by creating a new nutrition unit within the DHS Program and updating the DHS core questionnaire to include questions on maternal diets. New indicators incorporated into the DHS include maternal nutrition measures for minimum dietary diversity for women, coverage of nutrition counseling during antenatal care and pregnancy, and sources for women to obtain iron-containing supplements taken during pregnancy.

Next year, DHS surveys will be able to collect data on maternal diets, which will enable policymakers, implementers, and other decision makers to design policies and programs that better support maternal nutrition during the first 1,000 days.

USAID's commitment to strengthening data has prompted the global community to re-examine data collection tools to further improve data quality. For example, in Nigeria, the DHS Program enhanced their data collection methods and tested innovations to improve the quality of data. The use of a new checklist allowed data collectors to gather more accurate weight and height measurements, conduct standard assessments, and provide a more comprehensive picture of malnutrition in the country. To further reduce data collection errors while in the field, the most recent DHS survey in Nigeria also shifted from paper questionnaires to an electronic version to make it easier to identify mistakes and track children who may need re-measurement. These adjustments will improve the quality of data collected for nutrition indicators in Nigeria as well as other countries in the future while supporting better country nutrition programs and policies.

Looking ahead, continued collaboration with the DHS Program, partner countries, and the private sector can improve data collection tools to help policymakers better understand and respond to the nutritional needs of vulnerable populations in low- and middle-income countries. With this global commitment, USAID has improved the monitoring of nutrition programming to understand the dietary practices of pregnant women and drive further reductions in maternal and child mortality in the years to come.

https://nutritionforgrowth.org/promoting-data-driven-action-to-end-malnutrition-improving-the-measurement-of-maternal-diets/

USAID: Advancing Country Ownership to Support Nutrition in the First 1,000 Days

The first 1,000 days of a child's life, from pregnancy through a child's second birthday, is a critical period for ensuring optimal nutrition so children can grow and develop properly. Worldwide, almost half of deaths of children under five are due to undernutrition, 21 percent of children under five are stunted, and nearly 7 percent of children under five are

wasted. As the COVID-19 pandemic disrupts all systems that deliver good nutrition, these numbers are projected to increase if we do not redouble our efforts.

During the 2013 Nutrition for Growth Summit in London, the United States government, through the United States Agency for International Development (USAID), committed to supporting country-owned, country-led interventions to reduce the prevalence of malnutrition, including deficiencies in essential vitamins and minerals, particularly in low- and middle-income countries.

In Milan in 2017, USAID also committed to a partnership with the United Kingdom's Foreign, Commonwealth & Development Office (FCDO)1 and the Eleanor Crook Foundation (ECF). This commitment sought to identify and scale cost-effective, evidence-based, and sustainable solutions to reduce malnutrition, strengthen local capacity to improve nutrition, and foster collaboration to promote effective investments that deliver the most impact, particularly for children under five.

Through the aforementioned commitments to eliminate poverty and hunger, USAID supported the implementation of evidence-based interventions in 31 countries in 2019. Such interventions include country-owned and -led multi-sectoral nutrition policies, micronutrient supplementation programs for children and women, and social and behavior change or counseling on maternal and/or child nutrition. In 2019, USAID reached more than 27.2 million children under five with high-quality nutrition interventions, and our investments helped health facilities strengthen nutrition as an essential component of comprehensive, high-quality care.

In addition, USAID has leveraged Feed the Future, the U.S. government's global hunger and food security initiative, to work hand-in-hand with partner countries to develop their agriculture sectors and break the vicious cycle of poverty and hunger for women and children. As a result of this partnership, stunting has declined 32 percent on average over the last decade in the countries where Feed the Future works.

Since the start of the COVID-19 crisis, USAID has been working to find creative solutions to ensure infants and young children continue to get adequate nutrition around the world while following and promoting recommended practices to limit the spread of the virus.

In Nepal, USAID's Suaahara activity adapted quickly to the COVID-19 pandemic and provided phone counseling on breastfeeding to over 300,000 mothers with children under two, and has provided socially distanced breastfeeding counseling as well.

Through the USAID Advancing Nutrition project, USAID also supported the development of a counseling package with recommendations for infant and young child feeding (IYCF) when COVID-19 is suspected or confirmed. Many countries have adapted the IYCF counseling cards to their specific country context and translated the information into local languages.

In response to the COVID-19 pandemic, Feed the Future programs are also pivoting to help safeguard women and children's access to safe, nutritious foods, while also continuing to build resilient food systems over the long term. For instance, in Rwanda, the Feed the Future Orora Wihaze program is strengthening the supply of essential animal-source foods for women and children through multisectoral collaboration and market systems strengthening. The project averted the collapse of the egg value chain during the pandemic by facilitating poultry producers' access to a new domestic market as egg suppliers to child nutrition programs.

Through our commitments to reducing all forms of malnutrition, USAID has strengthened country ownership to implement evidence-based nutrition programs and provide a lasting impact on the lives of young children.

https://nutritionforgrowth.org/advancing-country-ownership-to-support-nutrition-in-the-first-1000-days/

USAID Country Experiences with Multi-Sectoral Nutrition Programming

With Feed the Future and the Multi-Sectoral Nutrition Strategy in place, USAID continues tackling the challenge of integrating nutrition within agriculture and other sectors, with a high priority on coordination and collaboration. Specific elements of three country programs illustrate the range of approaches to multi-sectoral nutrition programming:

Bangladesh

In Bangladesh, USAID increased dietary diversity through the creation of Farmer Nutrition Schools. These provided information to village members on improved farming practices to grow and eat more nutrient-rich crops, as well as advised pregnant and lactating women on better child care and the importance of handwashing with soap. For women participating in the Farmer Nutrition Schools, the consumption of foods representing a diverse diet rose by 50 percent between 2012 and 2015, from an average of four to six different food groups consumed. In addition, USAID trained more than 65,000 individuals in modern fish farming methods and improved nutrition practices. The majority of participating households increased fish production and consumption.

Nepal

USAID works through its Suaahara multi-sectoral nutrition project in Nepal (2011-2021) to reduce undernutrition among women and children in the 1,000-day period, which also involves fathers, mothers-in-law and adolescent girls. Operating in more than half of the districts in Nepal, the large-scale project had reached nearly 2.4 million people by 2016. Its main components include maternal, infant and young child nutrition; water, sanitation and hygiene; maternal and child health; family planning; and homestead food production with market linkages. The project also addresses gender and other social inequities and strengthens nutrition capacity and coordination of local oficials, communities and outreach workers. This project works closely with similar Food for Peace multi-sectoral nutrition activities and Feed the Future agriculture activities in Nepal. It has also facilitated the rollout of the Nepal government's national multi-sectoral nutrition strategy.

Ethiopia USAID's Empowering New Generations to Improve Nutrition and Economic Growth (ENGINE) Project in Ethiopia (2011-2016) forged partnerships with federal, regional and local governments in several sectors. The project worked to achieve nutrition objectives in four regions, reaching 5.7 million children under 5 years old during the project's lifetime. Among the USAID-assisted nutrition initiatives in the 2010s, the Ethiopia example may be unique in the strength of its close working relationships with Ethiopian government counterparts. USAID helped revitalize the country's multi-sectoral nutrition coordination body, which oversaw the development of the government's National Nutrition Program (2016-2020). This has been viewed as an international model for such plans. The project's activities and creative partnerships have contributed to significant reductions in stunting among children 3-36 months (with declines of 12, 14 and 20 percent in three regions), and improved young child feeding (the proportion of children meeting minimum dietary diversity standards more than doubled) and maternal nutrition (126 percent increase in the number of pregnant women who took iron-folic acid supplements).70

VII. IMPACT OF COVID-19

Headey D, et al. Impacts of COVID-19 on childhood malnutrition and nutrition-related mortality. The Lancet 2020; Vol 396: 519-521

The unprecedented global social and economic crisis triggered by the COVID-19 pandemic poses grave risks to the nutritional status and survival of young children in low-income and middle-income countries (LMICs). Of particular concern is an expected increase in child malnutrition, including wasting, due to steep declines in household incomes, changes in the availability and affordability of nutritious foods, and interruptions to health, nutrition, and social protection services.1

One in ten deaths among children younger than 5 years in LMICs is attributable to severe wasting because wasted children are at increased risk of mortality from infectious diseases.2 Before the COVID-19 pandemic, an estimated 47 million children younger than 5 years were moderately or severely wasted, most living in sub-Saharan Africa and south Asia.

The economic, food, and health systems disruptions resulting from the COVID-19 pandemic are expected to continue to exacerbate all forms of malnutrition. Estimates from the International Food Policy Research Institute suggest that because of the pandemic an additional 140 million people will be thrown into living in extreme poverty on less than US$1·90 per day in 2020.4 According to the World Food Programme, the number of people in LMICs facing acute food insecurity will nearly double to 265 million by the end of 2020. Sharp declines are expected in access to child health and nutrition services, similar to those seen during the 2014–16 outbreak of Ebola virus disease in sub-Saharan Africa. Early in the COVID-19 pandemic, UNICEF estimated a 30% overall reduction in essential nutrition services coverage, reaching 75–100% in lockdown contexts, including in fragile countries where there are humanitarian crises.

The accompanying call to action on child malnutrition and COVID-19 from leaders of four UN agencies8 in The Lancet is an important first step for the international community. Alongside these efforts, the Standing Together for Nutrition consortium, a multidisciplinary consortium of nutrition, economics, food, and health systems researchers, is working to estimate the scale and reach of nutrition challenges related to COVID-19. These efforts link three approaches to model the combined economic and health systems impacts from COVID-19 on malnutrition and mortality: macro- economic projections of impacts on per capita gross national income (GNI); microeconomic estimates of how predicted GNI shocks impact child wasting using data on 1·26 million children from 177 Demographic Health Surveys (DHS) conducted in 52 LMICs between 1990–2018; and the Lives Saved Tool (LiST), which links country-specific health services disruptions and predicted increases in wasting to child mortality.

What do our initial analyses and estimates suggest? First, the projections suggest that even fairly short lockdown measures, combined with severe mobility disruptions and comparatively moderate food systems disruptions, result in most LMICs having an estimated average 7·9% (SD 2·4%) decrease in GNI per capita relative to pre-COVID-19 projections.

Second, the microeconomic model projections indicate that decreases in GNI per capita are associated with large increases in child wasting. Our own analyses, based on these estimates applied to 118 LMICs, suggest there could be a 14·3% increase in the prevalence of moderate or severe wasting among children younger than 5 years due to COVID-19-related predicted country-specific losses in GNI per capita. We estimate this would translate to an additional estimated 6·7 million children with wasting in 2020 compared with projections for 2020 without COVID-19; an estimated 57·6% of these children are in south Asia and an estimated 21·8% in sub-Saharan Africa.

Third, when the projected increase in wasting in each country is combined with a projected year average of 25% reduction in coverage of nutrition and health services, we estimate there would be 128,605 (ranging from 111,193 to 178,510 for best and worst case scenarios) additional deaths in children younger than 5 years during 2020, with an estimated 52% of these deaths in sub-Saharan Africa. The range reflects coverage scenarios, as previously described by Roberton and colleagues,10 using a low of 15% and high of 50% disruption in vitamin A supplementation, treatment of severe wasting, promotion of improved young child feeding, and provision of micronutrient supplements to pregnant women.

The COVID-19 pandemic is expected to increase the risk of all forms of malnutrition. The wasting- focused estimates we present here are likely to be conservative, given that the duration of this crisis is unknown, and its full impacts on food, health, and social protection systems are yet to be realised. The disruption of other health services during lockdowns will

further compromise maternal and child health and mortality,10 and with the deepening of economic and food systems crises, other forms of malnutrition, including child stunting, micronutrient malnutrition, and maternal nutrition, are expected to increase. Without adequate action, the profound impact of the COVID-19 pandemic on early life nutrition could have intergenerational consequences for child growth and development and life-long impacts on education, chronic disease risks, and overall human capital formation.12 Forthcoming analyses by this consortium will examine a range of diet and nutrition outcomes in women and young children and provide consensus advice on multi-sectoral actions and resources needed to recover and support optimal nutrition now and into the future.

FAO COVID-19 Response and Recovery Programme

http://www.fao.org/partnerships/resource-partners/covid-19/en/

Even before the COVID-19 pandemic, hunger continued to increase. In 2019, almost 690 million people – or nearly one in ten people in the world – went hungry. According to The State of Food Security and Nutrition in the World 2020, the pandemic may push an additional 130 million people in the world into chronic hunger by the end of 2020.
Measures to control virus outbreaks are disrupting global food supply chains. Border restrictions and lockdowns are slowing harvests, destroying livelihoods and hindering food transport. Food loss and waste is increasing, as farmers must resort to dumping perishables, and many people in urban centres are struggling to access fresh food.

Simultaneously, according to the World Bank's estimates, the pandemic's economic impact could push about 100 million people into extreme poverty. Soaring unemployment rates, income losses and rising food costs are jeopardising food access in developed and developing countries alike. Each percentage point drop in global GDP is expected to result in an additional 700 000 stunted children. Smallholder farmers and their families, food workers in all sectors, and those living in commodity-and tourism-dependent economies are particularly vulnerable.

Equally urgent is the compounding threat of the pandemic on existing crises - such as conflict, natural disasters, climate change, pests and plagues - that are already stressing our food systems and triggering food insecurity around the globe.

UN Policy Brief: Impact of COVID-19 on Food Security and Nutrition, June 2020

The COVID-19 pandemic is a health and human crisis threatening the food security and nutrition of millions of people around the world. Hundreds of millions of people were already suffering from hunger and malnutrition before the virus hit and, unless immediate action is taken, we could see a global food emergency. In the longer term, the combined effects of COVID-19 itself, as well as corresponding mitigation measures and the emerging global recession could, without large-scale coordinated action, disrupt the functioning of food systems. Such disruption can result in consequences for health and nutrition of a severity and scale unseen for more than half a century.

The pandemic hits us at a time of immense global challenges. We need to tackle all the food security and nutrition dimensions of this crisis. Addressing the COVID crisis requires us to work together across sectors and borders both to mitigate the immediate impacts and to reshape food systems so they support healthy diets for all and do more to make food production and consumption aligned to sustainable development.1
Measures to control or mitigate COVID- 19 outbreaks are already affecting global food supply chains. Border restrictions and lockdowns are, for example, slowing harvests in some parts of the world, leaving millions of seasonal workers without livelihoods, while also constraining transport of food to markets. Meat processing plants and food markets are being forced to close in many locations due to serious COVID-19 outbreaks among workers. Farmers have been burying perishable produce or dumping milk as a result of supply chain disruption and falling consumer demand. As a result, many people in urban centers now struggle to access fresh fruits and vegetables, dairy, meat and fish.

• Global markets in staple grains remain robust for now; following good harvests in 2019, stocks of most staple foods are adequate. Yet the vast majority of the world's population takes its food from local markets, and food security and nutrition remain highly susceptible to disruption.2 High levels of unemployment, loss of income, and rising food costs are also making access to food difficult for many. Prices of basic foods have begun to rise in some countries at a time when people have less money in their pockets.

• Prior to the onset of this pandemic, more than 820 million people were already identified as chronically food insecure. The latest data shows that the food security of 135 million people was categorised as crisis level or worse.3 That number

could nearly double before the end of the year due to the impacts of COVID-19.4 Similarly, the number of children under the age of five years who are stunted now stands at 144 million. That is more than one in five children worldwide. The number of children who are classified as wasting is currently 47 million.5 These numbers could grow rapidly. As of late May, 368 million school children were missing out on daily school meals on which they depend6. The pandemic could push about 49 million people into extreme poverty in 2020.7 Each percentage point drop in global GDP is expected to result in an additional 0.7 million stunted children.8 These income effects combined with other supply shocks could lead to a rapid increase in the number of people acutely food or nutrition insecure in the coming three to four months.

• Actors in all parts of the food system are impacted by this pandemic. Deep global economic shocks caused by COVID-19 will impact the cash flow and financial liquidity of producers, small and medium agri-businesses to financial institutions, due to inhibited production capacity, limited market access, loss of remittances, lack of employment, and unexpected medical costs. As countries continue to roll out sizable relief and stimulus packages, the needs of food system actors deserve focused attention. Targeted measures to alleviate liquidity constraints on vulnerable firms and households can help facilitate continued production and people's access to adequate food and nutrition. But care should be taken to adapt to local circumstances; many bottlenecks to food supply cannot be addressed by social protection alone. Government procurement and public distribution can be important expedients to preserve food system functioning and avoid food price inflation. Social protection should include smallholder farmers and their families whose numbers include more than two billion of the world's poorest and most vulnerable people, and food workers in all sectors. Supporting developing countries with increased availability and rapid deployment of international funds to address liquidity shortages and free up fiscal space is therefore crucial. The Secretary- General has called for a debt standstill and, ultimately, debt restructuring for developing countries. Commodity- and tourism- depend- ent economies will be in particular need of comprehensive debt restructuring to enable the fiscal space necessary to support people's nutritional needs alongside efforts to stimulate growth and accelerate recovery.

• Moreover, the pandemic came at a time when food security and our food systems were already under strain. Conflict, natural disaster, climate change, and the arrival of pests and plagues on a transcontinental scale preceded COVID-19 and were already undermining food security in many contexts. For example, in East Africa, people are facing a "triple menace" of mutually exacerbating disasters, as ongoing heavy rain hampers attempts to deal with swarms of locusts in the midst of the COVID-19 outbreak.9 Meanwhile, the worst locust crisis in decades threatens crops heading into the harvest period.10

As hunger increased, SNAP benefits surged, new data shows.

By Kyle Swenson and Reuben Fischer-Baum

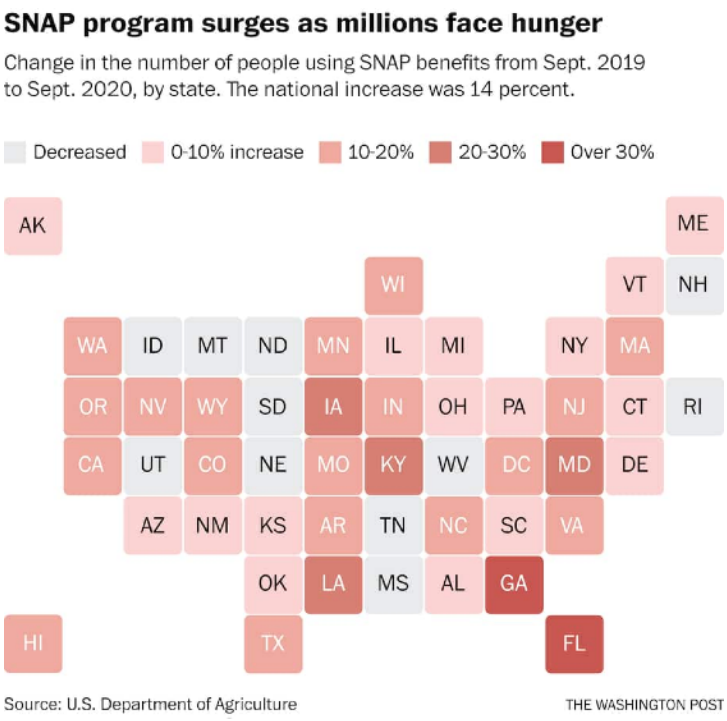
Washington Post, Jan. 28, 2021 at 9:03 p.m. EST

The number of hungry Americans relying on food benefits from the federal government jumped 14 percent in September 2020 compared with the same month in the previous year.

The latest data released Wednesday by the U.S. Department of Agriculture shows as the coronavirus pandemic rages and hunger grips the country, nearly 43 million Americans have received help from the government's Supplemental Nutrition Assistance Program (SNAP). September 2019 saw 37 million individuals enrolled in the program.

In a statement, Luis Guardia, the president of the Food Research & Action Center, noted the latest numbers "show that things would be far worse" without SNAP and other federal programs.

But Guardia also emphasized that "the administration and



Congress must make greater strides to ensure millions of struggling households get the nutrition they need and hasten economic recovery."

That need — visually underscored by haunting images of endless lines at local food pantries — is expected to increase as the pandemic crosses the one-year mark. This month, 23 million adults reported they sometimes or often struggled to provide food for their families, according to the U.S. Census Bureau. Last week, President Biden signed an executive order allowing the Department of Agriculture to increase SNAP benefits for the states.

A month-by-month look at SNAP distribution tracks with the pandemic's arrival on U.S. shores and the economic fallout of stay-at-home measures. In February 2020, 36 million Americans were receiving SNAP. Two months later, the program had stretched to 40 million.

By June, the program broke the 43 million mark, and each subsequent month has remained close to that figure.
The new data also highlights the way hunger has spread unevenly across the country between September 2019 and September 2020. Two states — Florida and Georgia — saw a more than 30 percent increase in SNAP participation.
The average monthly benefit per household also increased from $237.72 in September 2019 to $348.38 a year later.

Biden's food-stamp boost comes as 30 million U.S. households go hungry

BY AIMEE PICCHI, CBS News: JANUARY 22, 2021 / 4:48 PM

President Joe Biden's order on Friday asking the U.S. Department of Agriculture to increase food stamp benefits and provide more nutrition assistance to children comes as the nation faces a growing hunger crisis. Census data show that 30 million households reported periods of not have enough to eat last month, a sharp jump from before the coronavirus pandemic.

Mr. Biden is taking aim at at hunger across the U.S. by moving to provide more funding for the Supplemental Nutrition Assistance Program, more commonly known as food stamps. His order asks the USDA to allow states to increase their SNAP benefits by 15%. He also wants to enhance Pandemic-EBT, an electronic debit card program for students who otherwise would have qualified for free or reduced-price meals at their local schools.

The executive order also targets the underlying basis for determining a family's food stamp benefits, the so-called thrifty meal plan. Basically a food budget developed in 1975, the thrifty meal plan purports to outline the amount of money that's needed for adults, children and families to pay for enough food to thrive….Women between the ages of 19 to 50 are budgeted a maximum of $38.50 a week for food under the thrifty meal plan, according to the nonprofit news site The Counter, which covers food issues.

In response to Mr. Biden's orders, the USDA on Friday said it would boost Pandemic-EBT benefits by roughly 15% and also start revising the thrifty meal plan. The increase in Pandemic-EBT benefits could provide a family with three children an additional $100 in support per month, the White House said….The Pandemic-EBT program is scheduled to end in September, but millions of children may continue to struggle with food insecurity.

About 1 in 7 parents in December said their children didn't have enough to eat and they lacked the resources to buy more food, according to Lauren Bauer, Fellow at the Hamilton Project at the Brookings Institution….More than 1 in 5 Black and Latinx adults and "many more children" are suffering from food insecurity in the pandemic, the USDA said in a statement. "These numbers continue to worsen each month," the agency added.

….

The broader economic benefit of food stamps is that most recipients immediately use them at local grocery stores and other shops, helping to support merchants and their employees, economists note. A $1 billion increase in SNAP spending results in a boost to gross domestic product of $1.5 billion and helps support more than 13,000 jobs, according to a USDA study.

No End in Sight: Hunger surges in America amid a spiraling pandemic

Unprecedented demand for food aid is on the rise…

Nina Lakhani in New York ad Maanvi Singh in Oakland; 09:00 UTC Wed, 25 Nov 2020, The Guardian

…. A staggering 5.6m households struggled to put enough food on the table in the past week. Families of color are suffering disproportionately with 27% of black and 23% of Latino respondents with children reported not having enough to eat sometimes or often over the past week – compared with 12% of white people.

Overall food insecurity has doubled since last year due to record unemployment and underemployment rates. For families with children, hunger is three times higher than in 2019, according to analysis by Diane Whitmore Schanzenbach, director of the non-partisan Institute for Policy Research at Northwestern University.

In Cleveland, 5,000 families showed up last Thursday for the pre-Thanksgiving drive-in distribution compared with 3,300 a week earlier and an average of 1,600 over the summer. Some 54% of the food distributed was for children and seniors. "We're now seeing families who had an emergency fund but it's gone and they're at the end of their rope. We're going to be doing this for a really long time, and that's frankly terrifying given the impact hunger has on physical health, learning and development for children and parents' stress," said Kristin Warzocha, president of the Greater Cleveland Food Bank.

Earlier this month, there were long lines in Dallas as the North Texas Food Bank provided groceries to just over 25,000 people – its busiest day on record. The food bank distributed 7,000 whole turkeys that day, anda total of about 600,000 pounds of food. "Hunger isn't hidden any more," said Trisha Cunningham, CEO of the food bank. "If it isn't you, then this is your neighbor, this is your child's classmate, this is your hairdresser."

In central Alabama, demand at the Grace Klein food pantry is up 20% since last month. "It could be the rumours of civil unrest or the rise in Covid cases driving demand, but people are living off this food," said director Jenny Waltman. The pantry is currently serving about 12,000 people each week, compared with 2,500 a week before the pandemic. The 200 volunteers and staff are exhausted, said Waltman.

The Food Bank of New York was forced to start doling out the Thanksgiving frozen turkeys well before the holiday. Demand had dipped slightly in August as public health restrictions were loosened and folks returned to work, but another lockdown is looming, and the lines are growing. "We've been hustling to ramp supplies back up before the holidays … [and] sending more trucks into neighborhoods, so people don't have wait in cold, crowded lines," said Matt Honeycutt, the food bank's chief development officer.

In Chicago, the Lakeview pantry has provided groceries for 237% more people so far this year compared to 2019, with demand "ramping up again" after leveling off slightly over the summer, according to CEO Kellie O'Connell. "The pandemic has brought to light how normal wasn't working for so many people, especially black and brown communities.

Hunger is not new in America. Even before the pandemic, 35 million people relied on food banks every year, according to Feeding America. But the pandemic has been catastrophic – despite initial lauded federal interventions such as the stimulus cheques and enhanced unemployment benefit. As many as 50 million people could experience hunger this year, including a quarter of all children. In New Mexico, one in three children are experiencing hunger this year, according to Sonya Warwick of Road Runner Food Bank, headquartered in Albuquerque.

VIII. TB-SPECIFIC & IMPLEMENTATION CONSIDERATION

A. Practicable under TB program conditions
B. Types of nutrients and costs
C. Impact on TB
D. Impact on health other than TB
E. Impact of Covid-19 on nutrition
F. Key obstacles and how to address them
G. Potential partners / stakeholders for implementation
H. Potential interventions / pilot projects strategies and designs

A. Practicable under TB program conditions

Apart from food as an incentive for adherence, any nutrition intervention to be effective is going to require creativity. It will have to differ from the status quo and from past (unsuccessful) nutrition interventions in order to have a measurable impact. There is no well-beaten path, no proven highly effective examples of nutrition interventions within TB programs to copy; on the contrary, mainly examples of interventions that do not work. Therefore, to be successful, interventions will have to be novel, stretching TB programs in new ways, potentially including collaborations that have not previously developed. I exclude simple, nonselective provision of nutritional supplements—giving cans of Ensure™ or jars of Plumpy-Nut™ to TB patients at each clinic visit—as currently practiced in many programs because they do not consistently or demonstrably improve TB-specific outcomes. This assessment is grounded on the premise that USAID is seeking interventions to reduce TB-specific morbidity and mortality, not only improve nutritional status.

Second, whether an intervention is practicable under TB program conditions depends on the type and extent of resources added to the program. Very few of these interventions would be practicable without additional resources because, in general, TB programs in LMIC are under-funded and personnel are overworked and underpaid already. In addition, they do not have the necessary expertise, for example, in Nutrition Assessment, Counseling and Support (NACS), USAID's systems approach to providing the nutrition *standard of care*. Additional personnel with different types of training and experience and support would be required.

From these considerations, one could design and implement a vast variety of different interventions. Therefore, to address the specific issue of practicability under TB program conditions in LMIC, I will focus on my "best ideas" in terms of proposals for potential interventions, pilot projects, strategy and design as specified in Part 3 of this report. These include (1) a novel implementation of food/nutrition as a means of assuring adherence to treatment, (2) food/nutrition for the prevention of TB in household contacts of TB patients, and (3) food/nutrition in the treatment and care of patients with active TB disease.

From the perspective of a TB program, ***given the right resources,*** many of these interventions could be adapted to TB program circumstances where they would reach the populations served by TB programs. In very broad terms including TB patients, their families and contacts; people with quiescent / subclinical TB infection (aka LTBI) as well as their contacts (potential source cases); people being screened or evaluated for either active TB disease or subclinical TB infection; and people at risk on epidemiological or clinical grounds. This is a relatively broader swath of the population in LMIC.

To the extent that the TB program provides services to women of reproductive age, pregnant women, infants and young children, the program could implement many of the proven interventions either integrating into TB services (given the right infrastructure and personnel and budget) or alternatively through collaboration with community-based nutrition centers, agents or resources. For example, many of the interventions require talking with the individuals repeatedly, measuring their height and weight, examining them for signs of nutritional deficiency, educating them and counseling them about nutrition, recording this information. Some would involve distributing micronutrients in the form of tablets, capsules, powders, liquids, or ready to use foods.

These are precisely the type of activities in which TB medical officers, nurses and outreach workers engage on a daily basis except focused only on TB prevention and treatment. TB nurses, case workers, and others normally meet with patients regularly, observe or examine them, teach patients and contacts about TB, and administer their medications. Adding Nutritional Assessment, Counseling and Support (NACS, USAID's systems approach to providing nutrition *standard of care*) would at least double the amount of time personnel would need to spend with each patient, meaning it would require rougly doubling the number of personnel. They can include nutrition in their assessment, counseling and teaching and, for patients, including micronutrients with DOT. Most do already to some extent because patients naturally have questions about what they should/shouldn't eat. They monitor patients' weight at every visit. They can monitor children's height and weight in the same way. They can identify and refer (assist in treatment of) severe or moderate acute malnutrition. DOTS workers or TB case workers could administer any or all of the micronutrient supplements, ensuring they were taken. They can provide macro-nutritional supplements (they often do already) — a kilo of rice, a kilo of lentils, a liter of healthy cooking oil per week for the patient and his or her household. They could technically do all these things in the sense that it would fit naturally into many of the existing work flows, but it would require increased human resources, infrastructure, material support and management/monitoring. It would require doubling or tripling the number of TB nurses and community workers, for example, and training them, so that each one could spend time on nutrition-specific activities.

Extending such nutrition services to the prevention of TB among household and family contacts of TB patients would require much more emphasis than is typical in LMIC on active contact tracing (including home visiting), testing for quiescent and subclinical TB infection, and preventive treatment. Preventive treatment is become much more practicable as a consequence of one- and three-month regimens for HIV-infected and HIV-negative individuals with LTBI. This is one of the ways in which a nutrition-focused intervention could stretch the TB program in new ways, growing and strengthening the contact investigation / TB screening / TB prevention limb. This would also reduce TB morbidity.

B. Types of nutrients and costs

Specific nutrients and costs, including the costs of programs to deliver them were detailed in the Lancet 2008 and 2013 series as well as three World Bank reports. That's why they were reproduced at considerable length above. There are two distinct approaches to estimating costs, the actual expenditures method and the component costs method. In the component costs method, one thinks through each step and each input required to implement, monitor and evaluate the program, adding up all the corresponding costs to estimate total and average unit costs. In the actual expenditures method, programs review all their actual receipts, budgets and expenses to estimate the total and average unit costs. Each has strengths and weaknesses. For purposes of reporting costs, where both methods were used, I included only costs from the actual expenditures method as potentially being closer to practical reality. Please refer to the tables embedded in those sections for specific numbers.

In terms of specific nutrients, I focus on foods and nutritional components of foods, not on specific brands or products.

These nutrients can be consumed in normal foods rich in each nutrient or enriched with specific nutrients, as manufactured supplements (pills, capsules, gel-caps, powders, "sprinkles," drops, liquids), as ready-to-use foods and ready-to-use therapeutic foods. RUF, RUTF.

- Protein: Legumes and pulses; nuts and seeds; fish, chicken, eggs and dairy products
- Energy: Grains, root vegetables, vegetables and fruits
- Essential Lipids: cooking oils rich in either n-3 or n-6 PUFA (depending on USAID's strategy), fish, nuts and seeds
- Vitamin A in foods or in supplements
- Vitamin C in foods or in supplements
- Vitamin D in foods or in supplements
- Vitamin E in foods or in supplements
- Calcium in foods or in supplements
- Iodine through fortification of, e.g., salt
- Iron in foods or in supplements
- Zinc in foods or in supplements
- Multiple micronutrient supplements

C. Impact on TB

There are two distinct types of impact: the impact on TB incidence and the impact on TB treatment and outcomes. Neither can be guaranteed because of the relatively extensive history of ineffective programs in the past. Learning from their mistakes, however, building on advances in science, implementing high-quality projects that test novel approaches with the right resources and partnerships, I would expect the impact on TB incidence to be measurable and significant in a sample of 4000-5000 participants assuming a 50% reduction in incidence compared with no intervention, 9000-10,000 participants assuming a 33% reduction in incidence, and 18,000-20,000 given a 25% reduction in incidence. For comparison, the effect of LTBI preventive treatment is estimated to decrease incidence by 60% to 90% depending primarily on adherence.

In terms of impact on TB treatment and outcomes, the effect of chemotherapy is so high (>85% globally, not including relapses), that it's hard to improve upon it, but a creative and diligent food-incentive-for-adherence program could conceivably reduce non-adherence from 8-10% to <5%, for example, if it were to be implemented in deeply impoverished areas/population groups, food insecure areas or population groups and time periods of extraordinary food insecurity.

Nutrition interventions to improve treatment outcomes have not substantially improved cure rates or accelerated time-to-sputum conversion, but nutrition interventions described in Part 3 could potentially reduce the duration of treatment, measurably reduce residual lung damage and respiratory disability, and potentially reduce relapse rates.

D. Impact on health other than TB

Among infectious diseases, the impacts of nutritional support on diarrheal diseases and on malaria have been substantial, the impact on lower respiratory infections other than tuberculosis has also been considerable.

E. Impact of Covid-19 on nutrition

The impact of Covid-19 on the number of people living in poverty or near poverty as well as the depth of poverty has been devastating. An estimated 140 million people will be pushed into extreme poverty. The number of people living with food insecurity doubled to 265 million by the end of 2020, before the massive epidemic in India. GNI per capita in LMIC will decrease ~8% as a result of even short lockdowns. This decrease in GNI will increase child wasting (<5 y.o.) by 14% or 6.7 million more children wasted in 2020 than projections for 2020 in the absence of Covid-19. More than half (57% are in S/SE Asia, while 22% are in sub-Saharan Africa. Child mortality (<5 y.o.) is expected to increase by 128,000 deaths with 52% in sub-Saharan Africa. The impact is detailed in Section VII, p. 78-82.

F. Key obstacles and how to address them

1. For nutritional interventions with TB patients, the biggest obstacle is the consistently disappointing outcomes among randomized controlled nutritional intervention trials. In other words, a substantial body of available evidence does not support the expectation that nutritional interventions with TB patients would have a substantial impact on their TB treatment outcomes. In part this is because TB treatment for drug-susceptible disease is highly effective. It's hard to improve upon.

> Response: Find common structural and procedural elements as to why they haven't worked and develop novel strategies and tactics accordingly. Try science-based interventions and strategies that have not yet been tried—different nutrients/combinations, different delivery platforms, measure different outcomes (lung damage, relapse). Interventions will require sufficient resources and must strive for assiduous implementation. Focus on patients in which chemotherapy is relatively less effective, i.e., MDR or any RR-TB because in the impact of nutritional interventions may be relatively larger or more apparent. Focus on populations in which nutritional interventions predictably have greater impact—those living in extreme poverty, pregnant women, infants and young children.

2. For nutritional interventions in those with LTBI or those exposed to TB for the purpose of prevention, the biggest obstacle is there is no substantial precedent and no direct evidence because it has not been adequately tried.

Response: Design, implement, and evaluate interventions in high risk groups, e.g., household contacts and family contacts, in immunocompromised individuals. Focus on populations in which nutritional interventions predictably have greater impact—those living in extreme poverty, pregnant women, infants and young children.

3. An important premise here is that it is not practicable to provide nutritional support services to some clients or patients and not others who may also be in need. This is the reef on which "food incentive" programs have shipwrecked consistently. It simply goes against humanitarian nature to offer food to selected hungry TB patients and not to others. Implementation does not stay within protocol boundaries.

Response: Focus on populations in which food and nutrition supplements are predictably more effective—communities with a high prevalence of extreme poverty or food insecurity, pregnant women and their infants and young children. Food incentives are less effective in changing the behavior of people who have enough to eat. While it may not be practicable to withhold food from selected clients for reasons of equity, the proportion in whom food / nutritional support has no impact could be seen as "losses due to friction" or inefficiencies in the system that are accounted for in the planning. These inefficiencies will be minimized by targeting the right populations.

4. A realistic but unsavory obstacle is diversion of foods and nutritional supplements to individuals outside the target populations—from leadership levels down to field workers and support staff. Patients or their households, especially those who are not desperate for food might, for example, sell their portions or trade them for alcohol, cigarettes or drugs rather than taking them home to their families.

Response: I believe USAID has extensive experience in assuring its resources meet their targets and so would probably have effective measures to address corruption and diversion.

G. Potential partners / stakeholders for implementation

International/multinational

USAID Nutrition Bureau
US Department of Agriculture
World Food Programme (WFP)
Food & Agriculture Organization (FAO)
UNICEF
Scaling Up Nutrition movement (SUN)
1000 Days
World Health Organization
US CDC
Charitable Foundations (e.g., BMGF, CARE)

Local/national:

Ministries of Agriculture, Transportation, Labor, Commerce, Finance, and Health
Local NGOs and charities
Academic institutions

H. Potential interventions / pilot projects strategies and designs

Potential interventions, pilot projects, strategies and designs are the subject of Part 3 of this report. Please refer to that part for details.