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The Operational Evidence Base for Delivering Direct Nutrition Interventions in India

A Desk Review

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ABSTRACT

The persistence of undernutrition in the face of India's impressive economic growth is of enormous concern. Less than 55 percent of mothers and children receive any essential health and nutrition inputs that are critical for improving maternal and child nutrition. We conducted a desk review (1) to document the extent to which national and civil society/NGO programs in India reflect current technical recommendations for nutrition and (2) assess the operational evidence base for implementing essential interventions for nutrition in the Indian context. We reviewed the design of the two major national programs, Integrated Child Development Services (ICDS) and the National Rural Health Mission (NRHM). Subsequently, we used Google Scholar to search the published literature from 2000 to 2012 for evidence of interventions addressing the inputs to improve child nutrition. Finally, we contacted 70 program stakeholders to identify the unpublished evidence on inputs in program models implemented by civil society/nongovernment organizations.

We find that, by design, the two national programs (ICDS and NRHM) together appear to incorporate all the essential inputs and use evidence-based interventions. There is an expectation by design that the frontline workers of ICDS and NRHM coordinate and collaborate to deliver the interventions. A review of 22 program models shows that a majority focused on improving breastfeeding and timely initiation of complementary feeding. However, only a few addressed the full spectrum of complementary feeding, vitamin A deficiency, pediatric anemia, and severe acute malnutrition. None addressed how to reduce intestinal parasitic burdens or prevent malaria. There is limited published literature on the effectiveness of the recommended interventions to deliver the essential inputs. There are few efficacy studies and even fewer effectiveness studies or program evaluations on delivering essential nutrition interventions in the Indian context.

The most commonly used delivery strategies across multiple essential inputs were home visits that involved individual or group counseling by community health workers or by self-help groups. Mass media and community events such as marriages and fairs were used as avenues to generate support for the interventions. Some programs used community mobilization to promote the interventions. Several of these programs worked to improve coordination and convergence between ICDS and NRHM and to strengthen these existing systems through training, improved monitoring, and supervision.

Overall, a large gap persists in both the published and gray literature on how to promote interventions to address the essential inputs. Much more operational evidence is needed to ensure high-quality delivery of the evidence-based interventions that are already being implemented nationwide. Given the potential for the national programs to effectively deliver interventions to achieve maximum coverage and impact, and the government of India's current interest in ICDS system strengthening, this is an opportune time to test some of the innovations using the ICDS and NRHM platforms.

Keywords: undernutrition, interventions, convergence, India

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ABBREVIATIONS AND ACRONYMS

ANM	auxiliary nurse midwife
ASHA	accredited social health activist
AWC	*anganwadi* center (courtyard shelter center)
AWW	*anganwadi* worker (courtyard shelter worker)
BCC	behavior change communication
BPM	*bar parivar mitra* (friend of child's family)
CBMCHN	Community-Based Maternal and Child Health and Nutrition program
CDPO	child development project officer
DEVTA	Deworming and Enhanced Vitamin A
eLENA	electronic Library of Evidence for Nutrition Actions
ICDS	Integrated Child Development Services
IFA	iron and folic acid
MSG	mothers' support group
MWCD	Ministry of Women and Child Development
NCCS	Nutrition Counseling and Childcare Session
NFHS	National Family Health Survey
NGO	nongovernmental organization
NRHM	National Rural Health Mission
RACHNA	Reproductive and Child Health, Nutrition and HIV/AIDS
SAM	severe acute malnutrition
SHG	self-help group
TBA	traditional birth attendant
VHND	Village Health and Nutrition Day
VHW	village health worker
WHO	World Health Organization

1. INTRODUCTION

India's progress toward the Millennium Development Goal for reducing the under-five mortality rate is still not on track (WHO/UNICEF 2012). The persistence of undernutrition in the face of India's impressive economic growth is of enormous concern. A comparison of National Family Health Survey data in 1998–1999 and 2005–2006 shows that across the two surveys, among children under three years of age, the proportion of children who were stunted dropped from 51 percent to 45 percent, and there was a marginal decline in the prevalence of underweight, from 42 percent to 40 percent (IIPS/Macro International 2007).

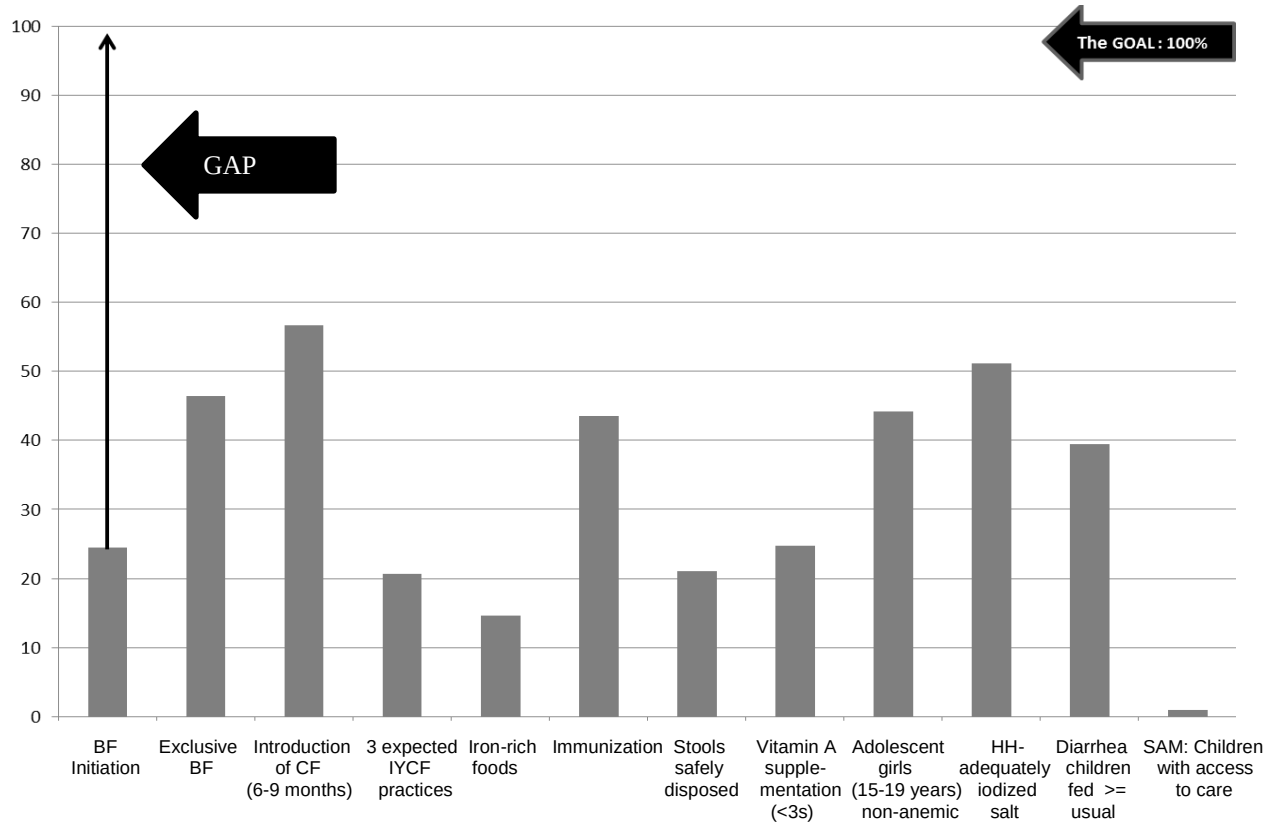
The period from pregnancy to 24 months of age is a critical window of opportunity to reduce child undernutrition (Victora et al. 2010). While acknowledging the importance of both direct[1] and indirect[2] interventions and their enabling environment's effect on maternal and child undernutrition, researchers have identified a set of direct interventions that are efficacious and recommended for scale-up to improve child growth during the first two years of life (Bhutta et al. 2008, 2013). In India, there is now broad agreement on the package of direct interventions targeted to the first thousand days of life, following the Lancet Series on Maternal and Child Undernutrition (Bhutta et al. 2008) and the Coalition for Sustainable Nutrition Security in India's convening of technical expert review groups (Coalition for Sustainable Nutrition Security in India 2010).

Although inputs to reduce child undernutrition must be implemented at scale to achieve rapid reductions in undernutrition, in India the coverage of several of the key inputs remains low (Figure 1.1). Furthermore, there are subnational variations in the coverage of these inputs (WHO/UNICEF 2012). To understand which interventions are promoted and how they are carried out in India, we conducted a desk review of two government-implemented national programs, examined published literature, and reviewed documents of program models implemented by civil society/nongovernmental organizations (NGOs).

[1] Direct interventions address immediate causes of child nutrition (for example, appropriate child feeding practices, vitamin A supplementation, hygiene, and so on).

[2] Indirect interventions address underlying causes of child nutrition (for example, agriculture, social protection, education, health systems, women's empowerment, and so on).

Figure 1.1 Status of inputs to reduce stunting (NFHS-3, 2005–2006)



Source: Menon and Aguayo (2011).

Notes: BF = breastfeeding; CF = complementary feeding; HH = households; IYCF = infant and young child feeding; NFHS = National Family Health Survey; SAM = severe acute malnutrition.

Objectives

The objectives of this desk review were to

1. document the extent to which national and civil society/NGO programs in India reflect current technical recommendations for nutrition and
2. assess the operational evidence base for implementing essential interventions for nutrition in the Indian context.

This desk review included a review of the published literature and a review of several program models. In Section 2 we define the framework for the program review, and in Section 3 we describe the methodology for the literature review and the program review. In Section 4 we describe the two large-scale national programs—the Integrated Child Development Services (ICDS) scheme and the National Rural Health Mission (NRHM)—to understand the incorporation of essential inputs from a *design* perspective. In Section 5 we present results from a review of the published literature and the program models implemented by civil society/NGOs. Section 6 summarizes the overall findings, discusses the operational evidence gaps, and makes program and policy recommendations.

2. FRAMEWORK FOR REVIEW

This review examines programmatic information using the framework of essential inputs, interventions, and delivery strategies. The definitions of and distinction between inputs, interventions, and delivery strategies are provided below (Figure. 2.1).

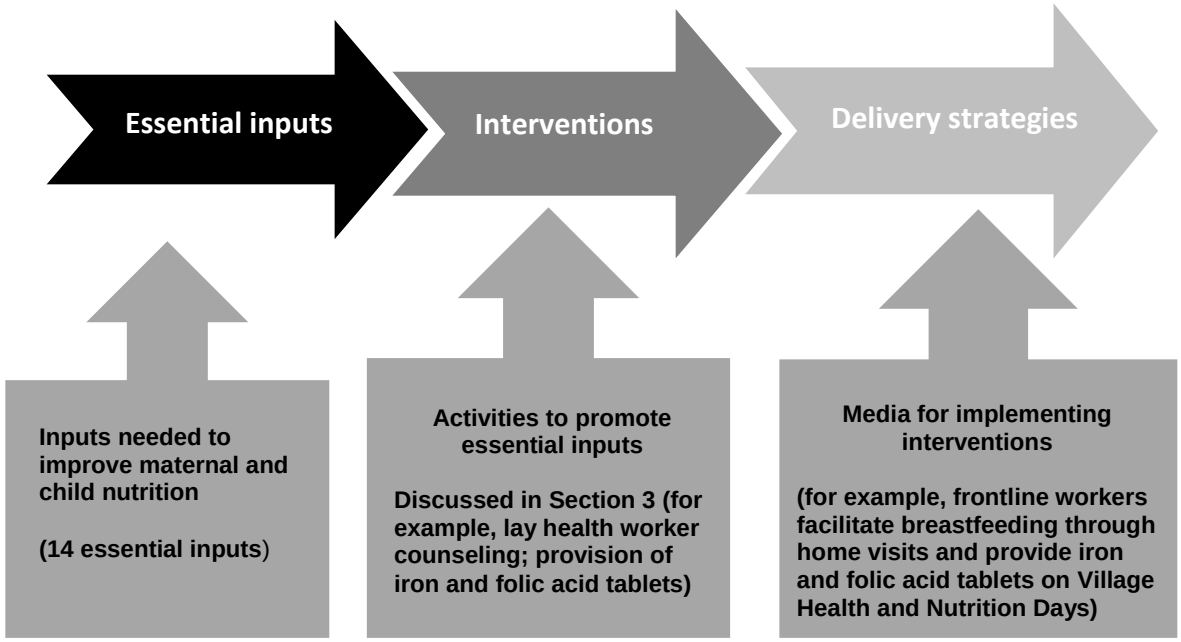
Concepts and Definitions

An essential input is a direct action required to improve maternal and child nutrition—for example, exclusive breastfeeding in the first six months of life. It is usually an action undertaken by the child's caregiver or parent.

An intervention is usually a programmatic action or activity intended to improve the status of the essential input—for example, counseling by lay health workers to promote exclusive breastfeeding.

Delivery strategies or platforms are used to describe the programmatic approach through which interventions reach intended beneficiaries—for example, frontline workers or workers in health facilities may counsel mothers to enable them to exclusively breastfeed their infants. In the first case, the delivery strategy is one that is outreach-based and takes the intervention (counseling) to households through the use of lay health workers. In the other, the delivery strategy is facility-based, and health workers at facilities offer counseling to parents who must come to the facility.

Figure 2.1 Framework of inputs and interventions



Source: Compiled by authors.

Framing the review using these distinctions helps identify the gaps in evidence related to inputs, interventions, and delivery strategies that need to be filled to improve the coverage of these essential inputs for mothers and children. Our major goal for the review is to identify (1) which essential inputs have a strong operational evidence base (these inputs can then be prioritized for rapid scale-up), (2) which essential inputs have the weakest operational evidence base (these inputs or interventions will need to be prioritized for further evidence building before scale-up), and (3) operational issues that require further examination.

3. IDENTIFYING EVIDENCE-BASED ESSENTIAL INPUTS AND INTERVENTIONS

An essential first step in this review process was to first identify the major essential inputs and interventions for addressing maternal and child undernutrition in India. To do this, we compiled a list of essential inputs based on current global and national recommendations and then used this list to identify evidence-based interventions to address these inputs (Appendix Table A.1).

Methods

First, we compiled a list of essential inputs, beginning with the Lancet Series on Maternal and Child Undernutrition (Bhutta et al. 2008) and comparing the series recommendations with the list of essential recommendations proposed in the Leadership Agenda for Action by the Coalition for Sustainable Nutrition Security in India (Coalition for Sustainable Nutrition Security in India 2010) and the Scaling Up Nutrition Framework for Action (2011). Subsequently, we searched the Cochrane Library, the World Health Organization's electronic Library of Evidence for Nutrition Actions, and the International Initiative for Impact Evaluation (3ie) website to identify recommended evidence-based interventions to address the essential inputs.

Results

A list of 14 essential inputs for improving child nutrition (Box 3.1) and eight essential inputs for improving maternal nutrition (Appendix Table A.2) were compiled. Of the 14 essential inputs compiled for improving child nutrition, 12 are directed at children (for example, child feeding practices, micronutrient supplementation, deworming, and immunization) and 2 are directed at adolescent girls and pregnant and lactating women.

We systematically examined the literature to identify evidence-based interventions that are needed to address each of the essential inputs (Appendix Tables A.3 and A.4). Broadly, these interventions fall into two categories: (1) counseling-based interventions and (2) product-based interventions. For example, counseling is the recommended intervention for a majority of essential inputs related to infant and young child feeding, immunization, and improving maternal food intake, whereas iron and folic acid (IFA) supplements and deworming tablets are recommended to address adolescent and pediatric anemia and to reduce parasitic burden, respectively.

Box 3.1 Essential inputs for child nutrition

1. Timely initiation of breastfeeding within one hour of birth
2. Exclusive breastfeeding during the first 6 months of life
3. Timely introduction of complementary foods at 6 months
4. Age-appropriate complementary feeding, adequate in terms of quality, quantity, and frequency, for children ages 6–24 months
5. Prevention of anemia
6. Safe handling of complementary foods and hygienic complementary feeding practices
7. Full immunization
8. Reducing vitamin A deficiency
9. Reducing burden of intestinal parasites
10. Prevention and treatment of diarrhea
11. Timely and quality therapeutic feeding and care for all children with severe acute malnutrition
12. Improved food and nutrition intake for adolescent girls, particularly to prevent anemia
13. Improved food and nutrient intake for adult women, including during pregnancy and lactation
14. Prevention and treatment of malaria

Sources: Lancet Series on Maternal and Child Undernutrition (Bhutta et al. 2008); Coalition for Sustainable Nutrition Security in India Leadership Agenda for Action 2010; Scaling Up Nutrition: Framework for Action 2011.

4. REVIEW OF NATIONAL PROGRAMS

The two national programs—the ICDS scheme (Box 4.1), implemented by the Ministry of Women and Child Development, and NRHM (Box 4.2), implemented by the Ministry of Health and Family Welfare—aim to improve maternal and child nutrition and health and have the potential to reach even the most vulnerable members of society. The reach of these two programs suggests that they could have a major impact on the coverage of interventions to address the essential inputs for nutrition.

Box 4.1 Integrated Child Development Services Scheme package of services for improving maternal and child nutrition and health

- Supplementary nutrition[a]
- Immunization[ab]
- Health checkups[ab]
- Referral services[ab]
- Preschool nonformal education for children ages three to six years

Source: India, MWCD (2011).
Notes: [a] Services for children under six years and for pregnant and lactating women.
[b] Services delivered through the public health infrastructure under the Ministry of Health and Family Welfare.

Box 4.2 National Rural Health Mission services for improving maternal and child nutrition and health

- Neonatal health (newborn care, facility-based sick newborn care)
- Nutrition (promotion of optimal infant and young child feeding practices, micronutrient supplementation, management of severe acute malnutrition)
- Management of common childhood illnesses
- Immunization
- Essential obstetric care
- Quality antenatal care
- Postnatal care
- Skilled attendance at birth
- Provision of emergency obstetric and neonatal care
- Referral services at both the community and institutional level (safe abortion services, prevention and management of sexually transmitted infections, Village Health and Nutrition Days)
- *Janani Shishu Suraksha Kayakaram* (expense-free delivery and sick newborn care)
- Immunization and growth-monitoring tool
- Tracking severe anemia during pregnancy and childbirth
- Internet-based mother and child tracking system

Source: India, MHFW (2012).

The Indian government initiated ICDS in 1975 to address the health and nutrition needs of children under the age of six. The program adopts a multisectoral approach to child well-being, incorporating health, nutrition, and education interventions, and emphasizes a life-cycle approach that has the potential to address some of the underlying causes of undernutrition as well as its direct causes. It operates through a network of *anganwadi* centers (AWCs) to provide services for adolescent girls, pregnant and lactating women, and children six months to six years old that are delivered by *anganwadi* workers (AWWs). There is one AWC per village or for a population of 1,000 (700 in tribal areas) (Grangnolati et al. 2006).

ICDS evaluation suggests gaps in program implementation pertaining to its unbalanced focus on the food security component of the program, poor targeting, poor coverage, and poor quality of service delivery originating from a lack of training and monitoring, all of which undermine the program's potential to address child undernutrition (Grangnolati et al. 2006). Corrective actions have been taken,

however, in the recent past to improve the functioning of ICDS. In 2004, the Supreme Court of India issued orders to universalize the program to ensure that every settlement in the country is covered by the program. Budgetary investments in the program continue to increase after nearly doubling in 2005–06. Finally, at present, ICDS is in a restructuring mode to revise the package of services to focus on under-three children, maternal care, and early childhood care education along with programmatic, management, and institutional reforms (India, Press Information Bureau 2012). Given that ICDS is the only major national program aimed at improving child health and nutrition, these changes, if implemented well, could have a major impact on undernutrition in India.

The NRHM was launched in 2005 in 18 states with poor infrastructure and low public health indicators to strengthen state health systems, with a special focus on reproductive and child health services and disease control programs. The reproductive and child health program integrates interventions that promote child health and addresses factors contributing to infant and under-five mortality. The main focus areas for child health are neonatal health, nutrition, management of childhood illnesses, and immunization, and for maternal health, the focus areas are ensuring quality antenatal care and postnatal care of the mother and the newborn in addition to other reproductive health services. These services address some of the essential inputs. The strategies adapted by the NRHM to promote these services are improving the skills of health workers, strengthening the healthcare infrastructure, and involving the community through behavior change communication (NRHM 2012).

The NRHM services operate through the existing health and ICDS infrastructure, with additional NRHM staff at district and village levels complementing and strengthening the existing activities; therefore, these services have similar potential to that of ICDS to reach a majority of the population and improve maternal and child health and nutrition outcomes. For this reason, we reviewed these two programs to understand the extent to which the programs addressed the essential nutrition inputs and the types of interventions used.

Our review of these two national programs is mainly from a design perspective. It does not address the operational constraints to achieving at-scale delivery of essential inputs for nutrition.

Methods

We reviewed national program guidelines (India, MWCD 2011); operational documents (India, MHFW 2007, 2011; India, MWCD 2010a, 2010b); training modules (National Health Systems Resource Center 2010a, 2010b); and evaluation documents (Dhingra and Dutta 2011; National Health Systems Resource Center 2011; National Institute of Public Cooperation and Child Development 2009a, 2009b). We accessed these documents directly from the government websites.

A previously conducted review (Ramakrishnan et al. 2012a) examined the inclusion of interventions for maternal nutrition in the national policies, and this section draws on that review document. Below, we summarize the findings on the essential inputs for child nutrition and maternal nutrition that are currently promoted by ICDS and the NRHM.

Results: Essential Inputs for Child Nutrition

From a design perspective, our findings indicate that the ICDS program includes interventions to address 12 of the 14 essential inputs, while the NRHM includes interventions to address 13 essential inputs. ICDS does not include interventions to reduce the burden of intestinal parasites or to prevent and treat malaria, and the NRHM does not include interventions to prevent adolescent anemia (Appendix Table A.5). Between the two programs, however, it appears that all the essential inputs for child nutrition are included in the program design.

Our review, to the extent to which ICDS and the NRHM include evidence-based interventions, highlights that by design, 9 of the 12 essential inputs addressed by ICDS are to be implemented using evidence-based interventions, and ICDS supports the NRHM in implementing the interventions for the

remaining 3 inputs. Furthermore, 12 of the 13 essential inputs addressed by the NRHM are expected to be implemented using evidence-based interventions (Appendix Table A.5).

The ICDS interventions are delivered at the AWC and through home visits by frontline workers known as AWWs. The NRHM interventions are delivered by frontline workers of the Ministry of Health and Family Welfare known as accredited social health activists (ASHAs) and auxiliary nurse midwife (ANMs). AWWs, ANMs, and ASHAs are expected to implement all the ICDS and NRHM interventions.

In delivering some of the interventions, AWWs, ASHAs, and ANMs are intended to complement each other, with clearly defined roles that help achieve specific outcomes. For other interventions, they are expected to play reinforcing roles with similar functions. These are described below.

Complementary Roles

To implement interventions such as combating pediatric anemia or providing a platform such as the Village Health and Nutrition Day (VHND) for the delivery of interventions, two or more workers with specific roles are expected to work together. Implementation of VHNDs (Box 4.3), during which an integrated set of services are expected to be delivered to the intended beneficiaries, requires close coordination between ICDS and the health workers. All three types of workers (AWWs, ASHAs, and ANMs) are required to come together to plan VHNDs, to provide services on that day, and to mobilize the beneficiaries to take advantage of the services during VHNDs.

Box 4.3 Village Health and Nutrition Days

- Village Health and Nutrition Days are organized once every month at the anganwadi center by the anganwadi workers (AWW) and accredited social health activists (ASHA).
- AWWs and ASHAs mobilize the villages, women, and children to assemble at the anganwadi center.
- Services such as pregnancy registration; antenatal care; immunization for children; vitamin A supplementation; growth monitoring; supplementary nutrition for underweight children; counseling on family planning, pregnancy care, and child nutrtion; and antituberculosis drugs are provided.
- Services are provided by AWWs, ASHAs, and auxiliary nurse midwives.

Source: India, MHFW (2007).

The program design documents also suggest the need for complementary roles in implementing interventions related to pediatric anemia, immunization, severe acute malnutrition (SAM), and diarrhea. For all these inputs, ICDS is expected to play a supportive role. ASHAs are responsible for identifying anemic children, and ANMs are responsible for the provision of pediatric IFA tablets to children six months to three years old on VHNDs. The AWWs are expected to hold the stock of IFA tablets and vitamin A supplements for ANMs. This requires that these three frontline workers coordinate their work quite closely for effective implementation. In practice, however, the relative roles of ANMs, ASHAs, and AWWs differ quite widely from state to state (and over time) in terms of responsibilities related to IFA supplementation, vitamin A supplementation, and deworming (personal communication with Sridhar Srikantiah, technical advisor to the Family Health Initiative Project, Bihar, with CARE India).

A second example is the case of immunization, where AWWs and ASHAs are expected to counsel mothers during home visits to encourage them to use immunization services provided on the VHND. ASHAs are expected to update the immunization records once every six months when they visit each family. AWWs are intended to organize immunization sessions on VHNDs, and ASHAs are expected to escort the families, if needed, for immunization. Similar coordination is required for preventing adolescent anemia (Appendix Table A.6).

Diagnosis and treatment of SAM requires an even closer coordination between ICDS and the NRHM. AWWs are expected to identify children with SAM, give them special supplementary food, and refer them to health subcenters. ASHAs are expected to accompany children with SAM to the nutrition rehabilitation centers and motivate mothers to stay for at least seven days at the centers, until their

children are stabilized. ASHAs receive incentives for these services. ASHAs are expected to follow up with the children and their families after their discharge from the nutrition rehabilitation centers.

Similarly, referral for diarrhea treatment requires coordination between the workers. AWWs are expected to identify cases of diarrhea and refer them to ANMs. ASHAs and ANMs are expected to play a primary role, supported by AWWs for interventions related to decreasing intestinal parasitic burden and prevention of malaria in malaria-endemic areas.

Reinforcing Roles

In delivering some interventions, ICDS and health workers are expected to play similar roles. For example, AWWs and ASHAs are expected to promote breastfeeding and complementary feeding practices to mothers and families during home visits and community gatherings (Appendix Table A.6). Research suggests that AWWs promote breastfeeding and complementary feeding through home visits, nutrition and health education sessions, village fairs, and mass media (National Institute of Public Cooperation and Child Development 2009a, 2009b), whereas a majority of ASHAs promote initiation of breastfeeding through newborn care visits (National Health Systems Resource Center 2011). Multiple frontline workers are expected to promote and appear to be promoting messages on similar behaviors, which can reinforce messages promoting better nutrition and health practices. When such messages are not harmonized, however, confusion can result among the recipients of the messages. Furthermore, a certain degree of role redundancy is possible when two frontline workers are charged with the same responsibilities.

In summary, from a design perspective, the two national programs together cover all the essential inputs, and a majority of these inputs are addressed through evidence-based interventions. At the same time, substantial coordination is required between the NRHM, the flagship health-sector program for rural India, and ICDS, the flagship nutrition program for India, if the critical inputs for nutrition are to be delivered effectively, a link that the policy documents recognize as well. The five-year strategic plan of the Ministry of Women and Child Development (India, MWCD 2011) envisions collaboration between the ICDS and NRHM programs for improving immunization and reducing SAM among children, and anemia among pregnant and lactating mothers, and has identified verifiable indicators for such collaboration (for example, holding VHNDs and their joint monitoring by ICDS and the NRHM). Some of the means to foster collaboration between ICDS and the NRHM are also identified (for example, joint training of AWWs and ASHAs to facilitate collaboration and role clarity).

This need to come together for a common goal (for example, convergence for concerted action) is defined in the context of nutrition as "strategic and coordinated policy decisions and program actions in multiple sectors, such as agriculture, nutrition, livelihoods, education, and women's empowerment, to achieve a common goal of reduced child undernutrition" (Ved and Menon 2012, 1). The program design documents and the strategic plan clearly indicate the requirement for high convergence. It is therefore important to assess how convergence is being operationalized and whether the extent of convergence expected might itself not create some inefficiencies in the implementation of these programs. Indeed, in the current programmatic context in India, the issue of convergence, or the lack thereof, is a known stumbling block to effective service delivery (Ved and Menon 2012).

Our review raises questions regarding the need to critically examine the extent of convergence required, both from a design perspective and an operational perspective, for optimal service delivery, especially for interventions that require distinct complementary roles to ensure effective delivery. Clearly defined roles for all workers, and explicit responsibilities and accountability for ensuring effective delivery of interventions, will remain crucial for improving the coverage of essential inputs and scaling up the impact.

Results: Essential Inputs for Maternal Nutrition

A recent review (Ramakrishnan et al. 2012a) examined the status of programmatic interventions to improve maternal nutrition in India, and therefore we did not conduct a full review of programs targeting essential inputs to improve maternal nutrition. The findings of the Ramakrishnan review show that some of the inputs are addressed by the ICDS and NRHM programs through evidence-based interventions. The AWWs provide food supplements to pregnant and lactating women, ASHAs provide IFA supplements to pregnant women, and both AWWs and ASHAs provide counseling on infant and young child feeding practices, immunization, sanitation, and hygiene (Ramakrishnan et al. 2012a). The NRHM provides incentives to women who participate in the program, which involves birth planning, referral transport for institutional deliveries, institutional deliveries, post-delivery visits, and family planning (Ramakrishnan et al. 2012a). The essential inputs pertaining to universal completion of secondary schooling for girls, improving gender equality, prevention and treatment of malaria, and reducing tobacco consumption, are not covered by these two programs.

The targeted interventions are intended to be available at one central routine service delivery point, that is, the VHNDs offer a package of nutrition, health, and sanitation services at the village level (Ramakrishnan et al. 2012a). There are, however, several supply-side challenges that affect the implementation of these interventions. For example, researchers identified sporadic availability of IFA supplements and deworming tablets as supply-side barriers to provision of services (Ramakrishnan et al. 2012a). Moreover, lack of state-level, targeted, and measurable goals on the improvement of maternal nutrition, lack of communication between nutrition and health functionaries, and poor monitoring systems resulting in poor implementation of the programs plague the system. Improper procurement systems, overworked and undercompensated staff, and nonincentivized activities, such as counseling, according to the review, are leading to a disproportional emphasis on incentive-based activities (Ramakrishnan et al. 2012a).

The review on maternal nutrition interventions highlights that ICDS and the NRHM cover some essential inputs. However, lack of communication between the nutrition and health frontline workers and other supply-side barriers, such as weak procurement systems resulting in poor-quality food products and irregular supply of IFA and deworming tablets, are among the challenges faced in implementing these programs.

In the remainder of this review, we focus on programs that aim to improve child nutrition outcomes, rather than maternal nutrition outcomes. We refer the reader to the Ramakrishnan et al. (2012a) review for further details on issues related to maternal nutrition interventions, programs, and policies.

5. REVIEW OF PUBLISHED LITERATURE AND PROGRAM MODELS IMPLEMENTED BY CIVIL SOCIETY/NONGOVERNMENTAL ORGANIZATIONS

In this section, we review the published literature on program models and programmatic experiences to examine the evidence base for delivering interventions in the Indian context and review several program models implemented by civil society/NGOs to address essential inputs. We focus on program models that were implemented or documented after 2006, since a previous World Bank-supported program-evidence review covered programs implemented up to 2006 (Micronutrient Initiative 2007).

Methods

First, using Google Scholar, we searched the published literature from India for evidence of interventions that addressed the essential inputs, restricting the research period to 2000–2012.[3] We searched research articles using specific keywords (Appendix Table A.7) and reviewed all the relevant articles. We examined the titles and abstracts (where needed) of all the retrieved citations for relevance to the specific intervention and included only efficacy and effectiveness studies.

Second, to identify the unpublished evidence on programs implemented by civil society/NGOs, we focused on programs that were previously highlighted as "best practices" in previous program-evidence reviews supported by the World Bank and the Vistaar Project in India (IntraHealth International 2008a; Micronutrient Initiative 2007) as a starting point. The four recommended best-practice program models from the World Bank-supported review of ICDS (Micronutrient Initiative 2007) and some of the best-practice models from the Vistaar review (IntraHealth International 2008a) were included in the review.

To update this evidence review, which covered the period until 2007, we reached out to program stakeholders to obtain program documents. In total, we contacted about 70 stakeholders (NGOs, research institutes, development partners, and so on) and had a 50-percent response rate. Only those programs that met predetermined criteria of program scale, offered information on direct nutrition interventions, and provided a detailed description of the program and its implementation were included in this review. Thus, a total of 22 programs were included (Table 5.1). Program models that were not included here did not have adequate documentation, provided technical assistance to NGOs to implement program models through systems strengthening, or were implemented outside India.

For each program model included, the available documentation was reviewed to identify the essential inputs covered and the interventions and strategies used to address them. An example of the process is illustrated in Appendix Table A.8. In our analysis, we summarized the delivery strategies used to implement the interventions across each of the inputs. Since some program models covered multiple inputs that were addressed together (for example, age-appropriate complementary feeding, safe handling of complementary foods), to avoid repetition we present results in broad categories covering several inputs together.

[3] A few important studies related to essential inputs have been published since September 2012 but are not included in this document.

Table 5.1 List of civil society/nongovernmental program models reviewed

No.	Program	Implementer	States in which program was implemented	Years of implementation
1.	Anchal Se Angan Tak	UNICEF, in collaboration with Integrated Child Development Services (ICDS)	Rajasthan	2001–2006
2.	Ankur project	Society for Education, Action, and Research in Community Health in collaboration with seven nongovernmental organizations	Maharashtra	2001–2005
3.	Baby Friendly Community Health Initiative	Department of Paediatrics, B.R.D. Medical College, Gorakpur, Uttar Pradesh, in collaboration with the Lalitpur district administration, government of Uttar Pradesh, and UNICEF	Uttar Pradesh	2006–2007
4.	Cell Phone Technology as Community-Based Intervention	Lata Medical Research Foundation	Maharashtra	2009
5.	Community-Based Maternal and Child Health and Nutrition	Directorate of Health and Family Welfare of Uttar Pradesh in collaboration with the Directorate of ICDS of Uttar Pradesh, with technical and financial support from UNICEF	Uttar Pradesh	2001–2004
6.	Community-Based Nutrition–cum–Day Care Centers	Society for Elimination of Rural Poverty	Andhra Pradesh	2007–present
7.	Community Driven and Managed Health, Nutrition and Well-Being Improvement Program	Urban Health Resource Center provided technical support to the State Health and Family Welfare Department, government of Uttar Pradesh, and District Health Department	Uttar Pradesh Madhya Pradesh	2005–present
8.	Community Involvement in Promoting Neonatal and Infant Nutrition in Tribal Vadodara	Deepak Foundation	Gujarat	2005–2010
9.	Community-Led Initiatives for Child Survival	Aga Khan Foundation in collaboration with the Department of Community Medicine, Mahatma Gandhi Institute of Medical Sciences	Maharashtra	2003–2008
10.	Comprehensive Child Survival Program	Launched by the government of Uttar Pradesh and implemented by Catholic Relief Services and Mamta Health Institute for Mother and Child with technical assistance from the Vistaar Project	Uttar Pradesh	2008–2012
11.	Dular	UNICEF, in collaboration with ICDS	Bihar; Jharkand	1999–2005
12.	Health Promotion for Adolescent Girls	Supported by Population Foundation of India, New Delhi, and implemented by Multi Applied System, Bhubaneswar, in association with the district administration	Orissa	2008–2011

Table 5.1 Continued

No.	Program	Implementer	States in which program was implemented	Years of implementation
13.	Home-Based Neonatal Care	Society for Education, Action, and Research in Community Health	Maharashtra	1993–1998
14.	Kano Parbo Na	UNICEF, in collaboration with ICDS	West Bengal	2001–2005
15.	Maternal, Newborn and Child Health and Nutrition Practices in Select Districts of Uttar Pradesh and Jharkhand	Government of Uttar Pradesh and government of Jharkhand (Department of Health and Family Welfare and Department of Women and Child Development) with technical assistance from the Vistaar Project	Uttar Pradesh; Jharkhand	2007–2012
16.	Mother and Child Care Program	Welthungerhilfe	West Bengal	2004–2008
17.	Nutrition Security Innovations in Chhattisgarh (Mitanin Program)	State Health Resource Center	Chhattisgarh	2001–2005
18.	Reproductive and Child Health, Nutrition and HIV/AIDS	CARE India, in collaboration with ICDS	9 states[a]	2001–2006
19.	Sure Start	PATH	Maharashtra, Uttar Pradesh	2005–2012
20.	Adolescent Girls Anemia Control Program	UNICEF, in collaboration with ICDS	13 states[b]	2000–2005
21.	National Program for Adolescent Girls	Ministry of Women and Child Development	35 states (51 districts and union territories)	2005–2006
22.	Uplifting Marriage Age, Nutrition, and Growth	Government of Uttar Pradesh, Vatsalya, and UNICEF	Uttar Pradesh	2001–2005

Source: Compiled by authors.

Notes: [a] Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh, and West Bengal.
[b] Andhra Pradesh, Bihar, Gujarat, Rajasthan, Tamil Nadu, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Uttar Pradesh, West Bengal, Chhattisgarh, and Karnataka.

Results

Our review of the published literature finds very limited evidence on the effectiveness of the recommended interventions from India, and even less published evidence on the implementation of these interventions. The program review finds, however, that a majority of the program models reviewed addressed several of the essential inputs using recommended interventions (Appendix Table A.9). A key finding was that across the essential inputs and the sources reviewed, systems strengthening using techno-managerial inputs, such as adding workers to fill human resource gaps, ramping up training and mentoring staff, developing job aids, and strengthening monitoring and supervision, were common components in many of the program models. These are described in Box 5.1 and have been recognized as important factors in previous evidence reviews as well (IntraHealth International 2008b).

Box 5.1 System-strengthening features across multiple inputs and interventions

System strengthening was a common feature of the program models implemented by civil society/nongovernmental organizations to strengthen the delivery systems across multiple essential inputs. The elements of systems strengthening that were used in most of the program models are as follows:

1. **Recruiting a new cadre of health workers.** Health workers were introduced as part of new programs. They either collaborated with existing workers or worked independently. For example, the Reproductive and Child Health, Nutrition and HIV/AIDS (RACHNA) change agents were recruited to support anganwadi workers (AWW) activities. Lay health workers called *bal parivar mitras* promoted maternal and child nutrition interventions by themselves in the Community-Based Maternal and Child Health and Nutrition program.
2. **Training and mentoring of program personnel.** All program personnel (both newly recruited and existing staff) received **training** on essential inputs prior to program implementation. For example, accredited social health activists were closely mentored by supervisors in the Sure Start project to improve their knowledge, build skills, and motivate them to work with communities to promote maternal and child health. In RACHNA the newly recruited change agents received intensive training along with AWWs, auxiliary nurse midwives, and Integrated Child Development Services (ICDS) supervisors. Monthly meeting days were turned into short capacity-building sessions in the Comprehensive Child Survival Programme.
3. **Job aids to assist service delivery.** Health workers received job aids such as quick reference guides on frequently asked **questions**, flip charts, and modified home-visit planners to help with counseling and record maintenance.
4. **Strengthening monitoring and supervision.** The existing personnel were trained and given tools to improve **monitoring** and/or additional personnel were recruited for monitoring. In RACHNA, all the supervisors working at the village, block, district, and regional levels received training and tools for monitoring. Similarly, supervisory checklists were provided in the Maternal, Newborn and Child Health and Nutrition Practices project. In the Kano Parbo Na program, new monitoring and surveillance tools were introduced at multiple levels to facilitate relevant data collection and monitoring. These included tools such as family-level mother and child protection cards, community-level community growth charts, spreadsheet-based ICDS monthly progress reports to improve data flow, community service provider–level community mapping sheets that facilitate capturing community perceptions of issues at hand, and state-level friendly mapping techniques for lay users.

Source: Compiled by authors.

Promotion of Breastfeeding

We bundled the literature on timely initiation of breastfeeding and exclusive breastfeeding in this section, as the behaviors are on the continuum of optimal breastfeeding practices. We found only two efficacy studies (Khan et al. 2012; Kumar et al. 2008) on interventions to improve the timely initiation of breastfeeding and four efficacy studies (Khan et al. 2012; Kilaru et al. 2005; Kumar et al. 2008; More et al. 2012) and one effectiveness study (Bhandari et al. 2005) on exclusive breastfeeding. A majority of the interventions studied used the recommended interventions.

Timely initiation of breastfeeding was promoted through the distribution of packages of leaflets with information for mothers and their families (Khan et al. 2012) and individual and group counseling (Kumar et al. 2008). Exclusive breastfeeding was promoted through individual and group counseling by the AWWs, ANMs, traditional birth attendants, physicians (Bhandari et al. 2005), trained health workers (Kumar et al. 2008; Mankar, Mehendale, and Garg 2008), counselors (Kilaru et al. 2005), and local educated women who acted as facilitators (More et al. 2012).

Among the program models reviewed, 15 addressed both the timely initiation of breastfeeding and exclusive breastfeeding, while 2 additional programs addressed only the timely initiation of breastfeeding and 2 addressed only exclusive breastfeeding. Of the 17 program models that addressed the timely initiation of breastfeeding, 7 programs implemented the intervention using ICDS, and two others collaborated with ICDS. Among the program models promoting exclusive breastfeeding, 9 used ICDS and NRHM programs to deliver the intervention, and 5 others collaborated with ICDS and the NRHM. Almost all the program models used recommended interventions, such as counseling or nutrition

education by peer counselors or health workers through individual or group counseling, and 4 of the programs included community mobilization as one of their intervention components as well.

The most common delivery strategy for counseling on improved breastfeeding was home visits or group sessions; mothers and their family members were counseled either during home visits or at group sessions by frontline workers. The number of visits and timing of visits varied for different programs. For example, in the Home-Based Neonatal Care Program, home visits were conducted twice during pregnancy and once the second day after delivery, whereas in the Maternal and Child Health and Nutrition program, lay health volunteers called *bal parivar mitras* counseled mothers once a week. In some program models, health workers were either present at birth to facilitate early breastfeeding and/or timed home visits so that mothers were contacted within the first one or two days after childbirth. Lactation counselors used cell phones to deliver multiple messages to mothers in one program.

Lactation counselors, mothers' groups, village health workers, village health groups, and adolescent groups were used to deliver the interventions. Five programs included community awareness–raising activities at events such as marriages and festivals (Community-Based Maternal and Child Health and Nutrition [CBMCHN] program), using rallies and wall paintings (Community-Led Initiatives for Child Survival program), at fairs (Baby Friendly Community Health Initiative; *Kano Parbo Na*), and via radio, television, and folk media (*Anchal Se Angan Tak*). Four programs used community mobilization to raise awareness and promote breastfeeding through forming village committees (*Kano Parbo Na*), participation in self-help groups (CBMCHN; Community-Based Nutrition–cum–Day Care Centers), and participation in farmers' groups and adolescent girls' groups (Community-Led Initiatives for Child Survival program).

Summary

Timely initiation and exclusive breastfeeding were addressed mainly by implementing evidence-based interventions. Lactation counselors, mothers' groups, lay health workers, and adolescent groups promoted individual and/or group counseling. In addition, community mobilization using a variety of different strategies also helped sensitize community members.

Promotion of Complementary Feeding

Here, we present studies and programs addressing timely initiation of complementary feeding, age-appropriate complementary feeding, and safe handling of complementary foods. These three inputs are on the continuum of optimal complementary feeding practices. Published literature on complementary feeding interventions in India is extremely limited. We found only five efficacy studies (Bhandari et al. 2001; Palwala et al. 2009; Sethi, Kashyap, and Seth 2003; Kilaru et al. 2005; Vazir et al. 2013) and two effectiveness studies (Bhandari et al. 2004, 2005).

Individual and group counseling through home visits was the most commonly used method for promoting complementary feeding by trained nutritionists (Bhandari et al. 2001), lay health workers (Sethi, Kashyap, and Seth 2003; Palwala et al. 2009; Bhandari et al. 2004, 2005), trained village women (Vazir et al. 2013), and counselors (Kilaru et al. 2005). Only one program provided a milk cereal supplement in addition to counseling (Bhandari et al. 2001). Information and education materials were used to facilitate counseling (Bhandari et al. 2004). Community awareness-raising activities such as village rallies by children, school debates (Bhandari et al. 2004), songs and street plays, and group discussions (Sethi, Kashyap, and Seth 2003) were used to promote complementary feeding.

Fourteen program models addressed inputs related to complementary feeding. All 14 program models promoted initiation of complementary feeding, but only 9 of them also promoted safe handling of complementary foods and age-appropriate complementary feeding. Almost all the program models used recommended interventions (for example, individual or group counseling). Only 1 program model provided food along with counseling (Community Involvement in Promoting Neonatal and Infant Nutrition in Tribal Vadodara). In addition, 3 programs included community mobilization or participation as one of their intervention components. Only 5 programs used ICDS to deliver the intervention, and 2

program models partnered with ICDS to implement the interventions. The most common strategy used for promoting complementary feeding was individual and/or group counseling or a combination of both. Health workers counseled mothers and their family members either during home visits or during group sessions. The interventions were delivered through lactation counselors, mothers' groups, village health workers, community nutrition workers, women's groups, and adolescent groups.

Five programs also included community awareness-raising activities such as promoting messages during marriages and festivals (CBMCHN program), through rallies and wall paintings (Community-Led Initiatives for Child Survival program), during fairs (Baby Friendly Community Health Initiative; *Kano Parbo Na*), and through radio, television, and folk media (*Anchal Se Angan Tak*).

Summary

Complementary feeding was addressed using recommended interventions such as individual or group counseling by health workers, mothers' groups, and lactation counselors. Not all programs addressed the full spectrum of complementary feeding. Innovative delivery strategies included using local belief systems and rituals, cell phones, and street plays to encourage timely initiation of complementary feeding. Three programs also used community mobilization to promote complementary feeding.

Preventing Pediatric Anemia

We found seven efficacy studies on the prevention of childhood anemia, and a majority used recommended interventions. The interventions promoted were delayed cord clamping (Gupta and Ramji 2002), iron supplementation along with complementary feeding (Hirve et al. 2007), medicinal iron supplementation for very low-birth-weight children at two weeks (Sankar et al. 2009), weekly IFA supplementation among children ages 6–36 months (Sharma, Parikh, and Desai 2011), iron supplementation for four months (Majumdar et al. 2003), provision of fortified milk for a year among children one to three years of age (Sazawal et al. 2010), and use of Sprinkles (Hirve et al. 2007).

Only two program models attempted to address pediatric anemia. Both distributed IFA supplements monthly during designated nutrition and health days. One program, RACHNA (Reproductive and Child Health, Nutrition and HIV/AIDS), ensured distribution of IFA tablets through ICDS and NRHM personnel (AWWs and ANMs) supported by a new cadre of health workers called change agents. Another program (Community Involvement in Promoting Neonatal and Infant Nutrition in Tribal Vadodara) was implemented through a public-private partnership that linked a voluntary agency with NRHM personnel (ASHAs), along with community sensitization via wall paintings and public hearings.

Summary

The published literature on interventions to reduce pediatric anemia in India is scant. Furthermore, few program models appear to have included interventions to improve pediatric anemia. In these models, AWWs and ASHAs distribute IFA tablets along with counseling to reduce the prevalence of anemia among children.

Promoting Full Immunization

One efficacy study (Banerjee et al. 2010) and one effectiveness study (Goel et al. 2012) discussed full immunization. The efficacy study tested the effect of improved delivery mechanisms and incentives on full immunization, which showed that increasing the reliability of services improves immunization rates modestly and that small incentives can have a large impact on improving immunization rates in resource-poor settings (Banerjee et al. 2010). The effectiveness study involved intervening on both the demand and supply sides to promote immunization. It used an evidence-based intervention for increasing demand for immunization, wherein women's groups held meetings to generate awareness of the benefits of immunization. Simultaneously, intersectoral coordination between the Departments of Health and Women

and Child Development was enhanced in the areas of planning, budgetary support, and monitoring and supervision (Goel et al. 2012).

Of the nine program models that promoted full immunization, six used recommended interventions such as counseling and mobilization to promote the services. The most common delivery strategy was counseling during home visits or counseling at the centers. The AWWs (Baby Friendly Community Health Initiative; *Kano Parbo Na*), auxiliary nurse midwives (Baby Friendly Community Health Initiative), trained lay health workers (*Anchal Se Angan Tak*; Community-Led Initiatives for Child Survival program; Community-Based Nutrition–cum–Day Care Centers; *Dular*), and women's groups (Community Driven and Managed Health, Nutrition, and Well-Being Improvement Program in Agra City) were used to promote immunization. Lay health workers supported AWWs in delivering the messages in two program models (*Anchal Se Angan Tak*; *Dular*). Of the rest, one provided transportation to help mothers access health camps for immunization (Mother and Child Care Program), and one assisted auxiliary nurse midwives (CBMCHN project).

Summary

A majority of program models addressed immunization by counseling and mobilizing communities to use immunization services. All these program models contained links with the NRHM to implement the intervention.

Reducing Vitamin A Deficiency

Four efficacy studies were conducted on vitamin A supplementation. The studies examined the effect of vitamin A supplementation in pregnancy (Radhika et al. 2003), immediately after delivery (Basu, Sengupta, and Paladhi 2003), in neonates (Rahmathullah et al. 2003), and among children 0 to 10 years old on morbidity (Chowdhury et al. 2002). The outcomes of these studies, however, were focused on mortality and morbidity and did not examine improvements in vitamin A status.[4]

Four of the program models promoted vitamin A supplementation, and a majority of them used the recommended intervention, providing vitamin A supplementation. The vitamin A supplements were provided through the NRHM in two program models (CBMCHN project and RACHNA). The AWWs counseled mothers about vitamin A supplementation in another (*Kano Parbo Na*).

Summary

A few program models aimed at reducing vitamin A deficiency, of which a majority used the evidence-based intervention of vitamin A supplementation; others focused on counseling to promote the use of vitamin A supplementation services.

Prevention and Treatment of Diarrhea

We found two efficacy studies (Gupta et al. 2003; Sur et al. 2003) and one effectiveness study (Bhandari et al. 2008) on the prevention of diarrhea and six efficacy studies on the treatment of diarrhea (Bhatnagar et al. 2004; Dutta et al. 2000; Fischer Walker et al. 2006; Mazumder et al. 2010; Patel et al. 2009; Trivedi, Chudasama, and Patel 2009). The impact of zinc (Bhatnagar et al. 2004; Dutta et al. 2000; Fischer Walker et al. 2006; Mazumder et al. 2010; Trivedi, Chudasama, and Patel 2009) and zinc and copper treatment (Patel et al. 2009) in diarrhea were examined among children. Some studies also examined the effect of zinc supplementation on decreasing the prevalence of diarrhea (Gupta et al. 2003; Mazumder et al. 2010; Sur et al. 2003). Only two studies (Bhandari et al. 2008; Mazumder et al. 2010) used the ICDS platform to deliver the intervention. All ICDS staff were trained on the intervention.

[4] New evidence from the Deworming and Enhanced Vitamin A trial suggests that vitamin A supplementation has only a modest effect on mortality (Awasthi et al. 2013a). This study has not been included because it was published outside the search period used for this discussion paper's literature review.

Of the six program models that addressed prevention or treatment of diarrhea, a majority included the recommended intervention, counseling on hand-washing practices. Two programs also provided oral rehydration salts. The most common delivery strategies were counseling during home visits or group counseling sessions by AWWs (*Kano Parbo Na*) and lay health workers (*Anchal Se Angan Tak*; *Dular*; RACHNA; CBMCHN program). Only one program model used mass media (that is, radio and television) as well (*Anchal Se Angan Tak*).

Summary

A few program models addressed prevention or treatment of diarrhea. A majority of the program models promoted hand washing through individual and group counseling, and a few provided oral rehydration salts through lay health workers.

Reducing Intestinal Parasitic Burden[5]

We found one efficacy study (Sur et al. 2005) and one effectiveness study (Awasthi et al. 2008) on reducing the burden of intestinal parasites through the use of deworming tablets in India. The studies examined the effect of deworming on growth (Awasthi et al. 2008; Sur et al. 2005) and diarrheal incidence (Sur et al. 2005). The ICDS infrastructure was used in one study (Awasthi et al. 2008) to deliver the intervention, and ICDS workers were trained on the intervention, community mobilization, record keeping, and anthropometric measurements. Among the program models reviewed, we did not find any that addressed the parasitic burden.

Summary

Information on programmatic experiences to reduce intestinal parasitic burden is scarce in the literature.

Promoting Timely and Quality Therapeutic Feeding and Care for All Children with Severe Acute Malnutrition

We found three efficacy studies (Mamidi et al. 2010; Patel et al. 2010; Singh et al. 2010) and one effectiveness study (Taneja et al. 2012) on treating SAM. Hospital-based treatment was found to improve weight (Mamidi et al. 2010), whereas home-based management using home-prepared food followed by a hospital follow-up resulted in suboptimal and slow recovery (Patel et al. 2010). Locally prepared ready-to-use therapeutic food provided through preschools contributed to greater weight gain among children (Singh et al. 2010). Weight gained during the 14-day rehabilitation period at nutrition rehabilitation centers was not sustained after discharge (Taneja et al. 2012).

Among the program models, only the Kano Parbo Na program addressed SAM. The program trained ICDS personnel such as AWWs to identify severely malnourished children, who were then fed for 12 days at the center and were given additional take-home rations for another 18 days. This intervention is clearly not aligned with global recommendations on addressing SAM at the community level.

Summary

Information is scarce on programmatic experiences to promote timely and quality therapeutic feeding to improve SAM in India.

[5] New evidence from the Deworming and Enhanced Vitamin A trial suggests that regular deworming has little effect on mortality in a lightly infected preschool population (Awasthi et al. 2013b).

Improving Food and Nutrition Intake for Adolescent Girls, Particularly to Prevent Anemia

We found six efficacy studies (Agarwal et al. 2003; Goyle and Prakash 2010; Gupta and Kochar 2010; Mehnaz et al. 2006; Sharma, Prasad, and Rao 2000; Unisa et al. 2011) and one effectiveness study (Deshmukh, Garg, and Bharambe 2008) on the prevention of anemia among adolescents. The efficacy studies showed that giving iron, IFA, or IFA with other micronutrient supplements improved hemoglobin levels. The study provided IFA supplements either alone or in combination with other nutrients to examine their effect on girls' hemoglobin levels. A majority of these studies were conducted through schools. The supplements were distributed through the AWCs (Deshmukh, Garg, and Bharambe 2008).

Five programs focused on improving adolescent anemia outcomes. A majority of the program models recommended interventions (for example, provision of IFA supplements and deworming tablets). The most common strategy for the delivery of the intervention was through schools for school-going girls, where teachers provided the supplements, and the AWCs for non-school-going girls, where the AWWs provided the supplements (Adolescent Girls Anemia Control Program to Address the Intergenerational Cycle of Undernutrition in India; Health Promotion for Adolescent Girls; Uplifting Marriage Age, Nutrition, and Growth). In addition, two programs also used behavior change communication to educate adolescent girls on improving diets, personal hygiene, and overall health (Adolescent Girls Anemia Control Program to Address the Intergenerational Cycle of Undernutrition in India; Health Promotion for Adolescent Girls). One program provided coupons for underweight adolescents to procure supplemental food from the public distribution system. Community health motivators, AWWs, and school teachers delivered the food.

Improved Food and Nutrient Intake for Adult Women, Including During Pregnancy and Lactation

We found one efficacy study that examined the effect of nutrition counseling on the dietary intake of pregnant women (Garg and Kashyap 2006) and one effectiveness study that examined the effect of a community-based local food system on the dietary intake of pregnant women (Schmid et al. 2007). Nutrition education (Garg and Kashyap 2006) and traditional agricultural systems (Schmid et al. 2007) improved maternal dietary intake.

Six program models included interventions to improve the food and nutrient intake of pregnant and lactating women. Of these program models, three promoted improvements to food and nutrient intake through evidence-based interventions. Some programs offered nutrition education and counseling along with nutritional support, and the rest provided only counseling. The most common delivery strategy was provision of cooked food along with nutrition counseling by lay health workers; one model provided food at subsidized prices (Community-Based Nutrition–cum–Day Care Centers) and another provided free food (Mother and Child Care Program). One model facilitated provision of take-home rations (RACHNA) through the AWCs.

Summary

A few program models promoted improved food and nutrient intake during pregnancy and lactation through individual or group counseling by health workers, as well as by providing hot cooked meals or take-home rations.

Prevention and Treatment of Malaria

We did not find any published literature or program models that included prevention or treatment of malaria among their interventions to improve child nutrition. A body of work on malaria reduction in India likely exists, but this particular input, and the interventions to address it, are not included in any programs to address undernutrition.

6. SUMMARY AND DISCUSSION

In this review of programs that implemented the essential inputs to improve maternal and child nutrition in India, we examined guidelines for the two national programs (ICDS and NRHM), conducted a literature review, and reviewed some civil society/NGO program models. Our findings are summarized below:

1. The review of the NRHM and ICDS finds that together these two programs address all of the 14 essential inputs to improve maternal and child nutrition. Frontline workers in the two programs seem to need to play either complementary roles or supporting/reinforcing roles to deliver these essential inputs. A critical requirement for effective service delivery, therefore, is convergence between the two programs, a need that is also echoed in many recent consultations, planning documents, and the ICDS restructuring process. Our review of the *design* of these programs raises questions regarding the need to understand the extent of convergence required for optimal service delivery. It is likely that in addressing pediatric anemia and vitamin A supplementation, role clarity and accountability might ensure effective and efficient service delivery, whereas for interventions involving behavior change communication, a greater convergence and coordination on the frontline might be beneficial.
2. The literature review and review of NGO program models highlight the very limited literature on how to implement evidence-based interventions to address the essential inputs and their level of effectiveness. Efficacy and effectiveness studies on most of the inputs are sparse. For example, there are no effectiveness studies on implementing evidence-based interventions to prevent pediatric anemia and vitamin A deficiency.
3. A majority of the program models implemented by civil society/NGOs addressed essential inputs pertaining to breastfeeding and complementary feeding. Only a few addressed vitamin A deficiency, pediatric anemia, and SAM, and none addressed how to reduce intestinal parasitic burden or prevent malaria. More concerted efforts are needed to scale up all the essential inputs for nutrition in a given geographic area, as coverage of all the inputs is imperative to rapidly reduce undernutrition. This requires that programs either take on all the essential inputs or work together with other programs to ensure complementarity, so that all the essential inputs are covered by different organizations and programs working together.
4. Some programs implemented interventions through their own delivery platforms, independent of the existing national programs. Others used the ICDS and NRHM platforms to deliver the interventions, and a few collaborated with these platforms. The most commonly used delivery strategies across multiple inputs were home visits and individual or group counseling by community health workers, ICDS and NRHM personnel, and self-help group members. In addition, community participation was viewed as a supporting strategy in many cases, and community mobilization was used as well in some cases. Systems-strengthening efforts were almost universally implemented as a part of program implementation and included activities such as training existing and newly recruited staff, development and provision of job aids, and improved monitoring and supervision.
5. A positive finding is that the majority of programs, including the national programs, used evidence-based interventions to address the essential inputs. However, new evidence-based intervention options should also be explored if they alleviate important constraints on the implementation systems or for the intended beneficiaries. For inputs such as pediatric anemia and SAM, the evidence on new interventions such as micronutrient powders and community-based approaches (rather than facility-based approaches) is important to explore. Where evidence is lacking (for example, community mobilization), investing in generating evidence should be a priority.

Overall, although there is evidence that national and civil society/NGO-based programs in India address a variety of essential inputs through evidence-based interventions, there is a tremendous gap in the published literature on operational evidence related to these processes and their effectiveness. Few efficacy studies and even fewer effectiveness studies or program evaluations on delivering essential nutrition interventions in the Indian context exist. This gap signals a serious lack of documentation on the effectiveness of programs and on the implementation of evidence-based interventions in India. Although policymakers and program implementers want more programmatic evidence, our review highlights a serious evidence gap, one that will hamper progress on delivering evidence-based interventions effectively.

Operational Research Gaps

The review identified the following two broad areas for further evidence generation: (1) how best to implement evidence-based interventions for some essential inputs where the evidence base is particularly poor, and (2) how to address specific operational issues that will improve the delivery and effectiveness of all evidence-based interventions.

1. **Neglected essential inputs**: We find a dearth of information on the delivery of evidence-based interventions for certain inputs. The gap is particularly large for interventions aimed at improving the full spectrum of complementary feeding, tackling pediatric anemia, treating severe and acute malnutrition, reducing the burden of intestinal parasites, and integrating prevention or treatment of malaria into nutrition-focused programs. A key challenge here is that not enough program models have tried to implement these interventions. For example, program guidelines indicate that IFA tablets should be given to 6- to 24-month-old children to prevent pediatric anemia. However, practically no documented programmatic evidence exists on how to provide the IFA tablets. In addition, new evidence-based interventions, such as the provision of micronutrient powders, have not been tested through the existing delivery platforms such as ICDS or the NRHM in India. A similar gap exists with SAM, where community-based management approaches are slowly being tested, to complement facility-based approaches.
2. **Improving the delivery and effectiveness of all evidence-based interventions**: The inclusion of evidence-based interventions in most programs suggests that intervention designs have been largely sound. The gaps in coverage, however, raise a question: Are the delivery strategies used to implement the interventions operating at full potential? The review identified some key operational considerations that are important for the implementation of evidence-based interventions in India, but noted little or no operational evidence.

   Convergence: The review of the national programs suggests a critical requirement for convergence between these two programs in order to ensure effective service delivery. There is little understanding, however, about how convergence can be most efficiently and effectively achieved. Some relevant research questions related to convergence are (1) What models of convergence have resulted in the best coverage outcomes and effectiveness? (2) What is the extent of convergence needed to ensure effective service delivery—is convergence required all the way from national to village levels, or is it adequate to ensure some critical elements of convergence in the training and support of implementing frontline workers? (3) What is the role of mechanisms such as the VHNDs in ensuring adequate convergence? (4) Can mechanisms such as joint training of AWWs, auxiliary nurse midwives, and ASHAs ensure high-quality convergent services on the ground? Overall, there is little operational evidence on whether and how convergence is being achieved and how it is envisioned at various levels of operation (for example, state, district, block, and

village levels). It is an opportune time to examine such issues, given current interest in ICDS restructuring to strengthen the convergence of ICDS and health activities.

Systems strengthening: Most interventions in this review were delivered only after existing systems were strengthened—through increased staffing, training and aids for facilitating staff performance, and improved monitoring and supervision. This suggests that for effective delivery of interventions, existing systems must first be strengthened. The current ICDS restructuring proposal incorporates several of these system-fortifying elements, including recruitment of additional workers to strengthen home visits and counseling, organizing joint training for ICDS and health staff to promote convergence between ICDS and health activities, and the strengthening and rolling out of new monitoring systems. There is, however, little understanding of the conditions under which such changes are feasible and would actually influence service delivery outcomes and enhance intervention effectiveness. Given the expected investments to improve the systems' functioning, it is imperative to prospectively examine whether these systemic changes, which are based on a variety of prior programmatic experiences, will in fact be successful when incorporated into the government-led implementation systems, and lead to the expected impact.

Limitations

Our review was comprehensive and examined multiple data sources to ascertain the extent to which essential inputs are included in the programs and evidence-based interventions are used to address them. One limitation is that the review of published literature includes studies from 2000 through September 2012 only and therefore does not reflect the evidence from some important studies that have been published since then. Furthermore, because the desk review is limited to available documents, it does not incorporate insights from field-based data collection.

Another limitation is that this program review was constrained by the documentation that we retrieved through our search. It is indeed possible that some program models were missed because of a lower than expected response rate to requests for documentation, in spite of our best efforts to reach out to relevant stakeholders. Additionally, the overall poor documentation of most programs limited the synthesis of delivery strategies.

Lastly, because program documentation is often available only long after implementation ends, our review does not capture insights from ongoing programs that are not yet completed and documented. Given the major gap in operational documentation, reviews such as this must be updated periodically.

Program and Policy Recommendations

Based on our overall review of national program guidelines, the published literature pertaining to India, and some major nongovernmental programs, we offer the following program and policy recommendations:

1. Given that the two national programs together cover all the essential inputs, a priority for both government and nongovernment actors should be to identify mechanisms to strengthen and support these national programs. This is particularly important, given the resources, reach, and somewhat untapped potential these programs offer to improve maternal and child nutrition and health.
2. An imbalance in the focus of programs appears to result in some essential inputs receiving significantly more attention than others. This has implications both for intervention coverage and for generating evidence on implementing all essential direct interventions together. Efforts are needed to address this imbalance by ensuring that all essential inputs are delivered in all communities, as high coverage of all inputs is needed for rapid reductions in undernutrition.

3. Choices about inputs, interventions, and delivery strategies must be based on a solid evidence base and should be informed by the latest evidence. Our findings on the use of scientific evidence are positive, in general, but for significant public health problems such as pediatric anemia and SAM, the intervention choices made in India's programs lag behind the scientific evidence.
4. Implementers and development partners in India *must* invest in routinely building operational evidence to identify and strengthen optimal delivery mechanisms. The need for this has been articulated in many spaces—documents, meetings, stakeholder interviews—but the time for action on building better evidence is now. Evidence about what works, and in what contexts, brings critically needed data-driven insights to decisionmaking processes.
5. In addition to consistently documenting the types of implementation strategies used in programs to ensure that information is available more rapidly and systematically, it is also important to embed impact and process evaluations into program innovations.

To conclude, the evidence base regarding how best to operationalize interventions for nutrition in India is weak. Overall, it will be essential to institutionalize documentation and learning processes relating to nutrition programs to ensure that ongoing efforts to address undernutrition tap into the best available evidence and knowledge in order to ensure the best possible future for India's children.

APPENDIX: SUPPLEMENTARY TABLES

Table A.1 Essential inputs to improve infant and child nutrition

Essential inputs for improving infant and child nutrition	Coalition for Sustainable Nutrition Security in India (2010)	Working Group for Children Under Six (of Right to Food Campaign and Jan Swasthya Abhiyan) (2012)[1]	Bhutta et al. 2008 (Lancet Series on Maternal and Child Undernutrition)	Scaling Up Nutrition: Framework for Action (2011)	Lancet Series on Maternal and Child Nutrition (2013)[1]
Timely initiation of breastfeeding within one hour of birth	Counseling of pregnant women before and after delivery by trained frontline workers (*Anganwadi* Worker, Auxiliary Nurse Midwife, Accredited Social Health Activist)	Breastfeeding counseling and support services to be provided by ASHA through home visits and nurses in health facilities	Promotion of breastfeeding through individual and group counseling	Promotion of breastfeeding	Promotion of early breastfeeding through a combination of individual and group counseling
Exclusive breastfeeding during the first 6 months of life	Counseling of pregnant women before and after delivery by trained frontline workers (*Anganwadi* Worker, Auxiliary Nurse Midwife, Accredited Social Health Activist)	Maternity entitlements at minimum wages for six months IYCF counseling and support services Crèches at worksites to support breastfeeding	Promotion of breastfeeding through individual and group counseling		Promotion of exclusive breastfeeding through a combination of individual and group counseling
Timely introduction of complementary foods at 6 months	Promotion of timely introduction of complementary foods and continued breastfeeding through Village Health and Nutrition Days and other community sensitization activities	Counseling and support services; Provide supplementary nutrition in the form of take home rations (THR)	Behavior change communication for improved complementary feeding and provision of food supplements in food-insecure populations[a]	Promotion of complementary feeding after the age of 6 months	Promotion of complementary feeding and provision of additional supplements in food-insecure populations

Table A.1 Continued

Essential inputs for improving infant and child nutrition	Coalition for Sustainable Nutrition Security in India (2010)	Working Group for Children Under Six (of Right to Food Campaign and Jan Swasthya Abhiyan) (2012)	Bhutta et al. 2008 (Lancet Series on Maternal and Child Undernutrition)	Scaling Up Nutrition: Framework for Action (2011)	Lancet Series on Maternal and Child Nutrition (2013)
Age-appropriate complementary feeding, adequate in terms of quality, quantity, and frequency, for children 6–24 months	Promotion of age-appropriate complementary foods through Village Health and Nutrition Days and community sensitization activities	Provide calorie dense nutritious supplements that are locally produced and culturally appropriate in the form of take home rations (THRs) or cooked meals by *Anganwadi workers;* 3 meals for children in crèches	Behavior change communication for improved complementary feeding and food supplements in food-insecure populations[a]	Promotion of complementary feeding for infants after the age of 6 months	Promotion of complementary feeding and provision of additional supplements in food-insecure populations
Iron and folic acid supplementation to prevent anemia	Provision of prophylactic iron and folic acid supplements to prevent anemia	Follow IFA supplementation program of Government of India		Iron fortification and supplementation programs[b]	Multiple micronutrient powders
Safe handling of complementary foods and hygienic complementary feeding practices	Promotion of sanitation, safe handling of food and water, and hand washing; promotion of community use of clean drinking water and improved sanitation facilities through Village Health and Nutrition Days and community mechanisms	Nutrition and health counseling; access to safe drinking water	Hand washing and hygiene intervention	Improved hygiene practices, including hand washing	Complementary feeding education
Full immunization	Ensure delivery of the full course of immunization through the routine immunization system, Village Health and Nutrition Days, and building awareness at the community level	Follow immunization program of Government of India	Not mentioned	Not mentioned	Not mentioned

Table A.1 Continued

Essential inputs for improving infant and child nutrition	Coalition for Sustainable Nutrition Security in India (2010)	Working Group for Children Under Six (of Right to Food Campaign and Jan Swasthya Abhiyan) (2012)	Bhutta et al. 2008 (Lancet Series on Maternal and Child Undernutrition)	Scaling Up Nutrition: Framework for Action (2011)	Lancet Series on Maternal and Child Nutrition (2013)
Biannual vitamin A supplementation	Biannual vitamin A supplementation for all children 6–59 months	Follow Government of India program	Vitamin A supplementation for infants and children Vitamin A supplementation for neonates[b]	Provision of periodic vitamin A supplements	Vitamin A supplementation between 6 and 59 months *for children at risk*
Deworming	Biannual deworming for all children 6–59 months through Village Health and Nutrition Days and building awareness at the community level	Follow Government of India program	Deworming	Deworming drugs for children	Deworming drugs increase weight and hemoglobin among children with confirmed infection only
Frequent, appropriate, and active feeding for children during and after illness	Feeding age-appropriate and nutrient-dense foods actively and frequently along with on-demand breastfeeding	Nutrition and health counseling; treatment and referral of illnesses (by second AWW or ASHA).	Not mentioned	Not mentioned	Lactose-free diets reduce incidence of diarrhea in acute diarrhea
Oral rehydration during diarrhea	Appropriate rehydration therapy, including a full course of zinc supplements	Nutrition and health counseling; treatment and referral of illnesses (by second AWW or ASHA).	Not mentioned	Not mentioned	Not mentioned
Zinc supplementation during diarrhea	Appropriate rehydration therapy, including a full course of zinc supplements	Not mentioned	Use of zinc supplements to manage diarrhea Zinc supplementation[c]	Therapeutic zinc supplements for diarrhea	Preventive zinc supplementation between 12 and 59 months of age for children at risk

Table A.1 Continued

Essential inputs for improving infant and child nutrition	Coalition for Sustainable Nutrition Security in India (2010)	Working Group for Children Under Six (of Right to Food Campaign and Jan Swasthya Abhiyan) (2012)	Bhutta et al. 2008 (Lancet Series on Maternal and Child Undernutrition)	Scaling Up Nutrition: Framework for Action (2011)	Lancet Series on Maternal and Child Nutrition (2013)
Timely and quality therapeutic feeding and care for all children with severe acute malnutrition	A combination of facility- and community-based optimal therapeutic feeding and care, with adequate referral between the two, and ensured access to ready-to-use therapeutic food	Treatment at Nutrition Rehabilitation Centers for complicated cases; Community Management of Acute Malnutriton for rest with locally produced foods	Treatment of severe acute malnutrition	Treatment with ready-to-use therapeutic foods Prevention or treatment of moderate undernutrition	Management of severe acute malnutrition through facility- and community-based management Management of moderate acute malnutrition
Food fortification	Not mentioned	Not mentioned	Vitamin A and universal salt iodization Iron fortification[b]	Provision of micronutrients through **s**alt iodization and iron fortification of staple foods	Fortification with iron and vitamin A
Improved food and nutrition intake for adolescent girls, particularly to prevent anemia	Provision of diet counseling, weekly iron and folic acid supplementation, deworming prophylaxis once every six months, and life-skills development to avoid early marriage and early pregnancy	Not mentioned	Not mentioned	Not mentioned	Periconceptual folic acid supplementation or fortification

Table A.1 Continued

Essential inputs for improving infant and child nutrition	Coalition for Sustainable Nutrition Security in India (2010)	Working Group for Children Under Six (of Right to Food Campaign and Jan Swasthya Abhiyan) (2012)	Bhutta et al. 2008 (Lancet Series on Maternal and Child Undernutrition)	Scaling Up Nutrition: Framework for Action (2011)	Lancet Series on Maternal and Child Nutrition (2013)
Improved food and nutrient intake for adult women, including during pregnancy and lactation	Daily intake of iron and folic acid supplements along with sufficient quality and quantity of food and regular consumption of salt with adequate levels of iodine	Not mentioned	Iron folate supplementation; supplements of multiple micronutrients; iodine provision through iodization of salt; and calcium supplementation Maternal supplements of balanced energy and protein[b]	Iron and folic acid supplements to prevent and treat anemia; iodized oil capsules where iodized salt is unavailable	Maternal micronutrient supplements to *all*, calcium supplements to *mothers at risk of low intake*, and balanced energy-protein supplements as needed along with universal salt iodization[d]
Insecticide-treated bed nets	Not mentioned	Not mentioned	Insecticide-treated bed nets[b]	Not mentioned	Insecticide-treated bed nets improve packed cell volume percent and reduce malaria-attributable risk among children
Delayed cord clamping	Not mentioned	Not mentioned	Delayed cord clamping[b]	Not mentioned	Delayed cord clamping increases newborn hemoglobin

Source: Compiled by authors.

Notes: [1] The review was completed prior to release of the new Lancet Series on Maternal and Child Nutrition (2013).The compiled list of essential inputs was revisited and compared with the new Lancet Series recommendations and with the Working Group for Under Six of the Right to Food Campaign and Jan Swasthya Abhiyan (2012).

[a] Timely initiation of complementary feeding is not specifically mentioned, but it could be surmised that the recommendation is inclusive of timely initiation.

[b] There is evidence only for implementation in specific situational contexts.

[c] Zinc supplementation recommended for prevention in addition for during management of diarrhea.

[d] Salt iodization was recommended as one of the interventions for infants and children in Bhutta et al. (2008) in the Lancet Series on Maternal and Child Undernutrition.

Table A.2 Essential inputs to improve women's nutrition

Essential inputs for women	Coalition for Sustainable Nutrition Security in India (2010)	Bhutta et al. (2008)	Scaling Up Nutrition: Framework for Action (2011)	Lancet Series on Maternal and Child Nutrition (2013)
Improvement in the quantity and quality of food and nutrient intake for girls and women	Promotion of household food and nutrition security and bridging the macro- and micronutrient gap for girls and women through self-help groups for improved community participation and through strengthening of the public distribution system to provide nutritious food	Not mentioned	Not mentioned	Periconceptual folic acid supplementation or fortification[a]
Prevention and management of micronutrient deficiencies	Expansion of iron and folic acid supplementation program under the National Rural Health Mission; nutrition education for communities, with the focus on anemia and local production and consumption of low-cost iron-rich food	Iron folate supplementation; supplements of multiple micronutrients; provision of iodine through iodization of salt; calcium supplementation Maternal supplements of balanced energy and protein[b]	Iron and folic acid supplements for pregnant women to prevent and treat anemia	Maternal micronutrient supplements to *all*, calcium supplements to *mothers at risk of low intake*, and balanced energy-protein supplements as needed along with universal salt iodization
Improved sanitation and hygiene practices and access to safe drinking water	Expanded infrastructure and use of appropriate low-cost technologies; sanitary latrines and rainwater harvesting; promotion of sanitation and hygiene education and behavior change	Not mentioned	Improved hygiene practices, including hand washing	Not mentioned
Increased access to basic health services	Expansion of key health services such as immunization, deworming, complete antenatal care and safe delivery by skilled attendants, introduction of Village Health and Nutrition Days for anemia and weight monitoring	Maternal deworming in pregnancy[b]	Not mentioned	Not mentioned

Table A.2 Continued

Essential inputs for women	Coalition for Sustainable Nutrition Security in India (2010)	Bhutta et al. (2008)	Scaling Up Nutrition: Framework for Action (2011)	Lancet Series on Maternal and Child Nutrition (2013)
Universalized completion of secondary schooling for girls	Female education, especially completion of secondary education for the girl child; expansion of early childhood programs; improved school hygiene and sanitation facilities	Not mentioned	Not mentioned	Schooling might transmit information on health, teach basic skills, increase exposure to environments, impart self-confidence, and provide opportunity for social networks[b]
Improved gender equity	Equitable opportunities for education, health service, and nutritious foods, and economic opportunities for girls and women	Not mentioned	Not mentioned	Targeted agricultural interventions that include women's empowerment activities such as improvement in knowledge and skills through behavior change communication or promotion of their increased control over income from the sale of targeted commodities; social safety net programs such as conditional cash transfers foster certain aspects of women's empowerment
Prevention and treatment of malaria	Not mentioned	Intermittent preventive treatment for malaria[b]	Not mentioned	Reviewed but not included in the package
Interventions to reduce tobacco consumption or indoor air pollution	Not mentioned	Interventions to reduce tobacco consumption or indoor air pollution	Not mentioned	Not mentioned

Source: Compiled by authors.

Notes: [a] Bhutta et al. (2013).

[b] There is evidence only for implementation in specific situational contexts.

Table A.3 Evidence-based interventions to address the essential inputs to improve nutritional status of children under age two[a]

Essential inputs	Evidence-based interventions to address the essential inputs	Source
Timely initiation of breastfeeding within one hour of birth	Individual and group counseling by peer counselors, or education by doctors, nurses, or lactation consultants	Bhutta et al. 2008
	Provision of time-sensitive counseling by professionals or peer counselors	Dyson, McCormick, and Renfrew 2005
	Lay health workers promoting education and support (moderate evidence[b])	Lewin et al. 2010
Exclusive breastfeeding during the first 6 months of life	Individual and group counseling by peer counselors, or education by doctors, nurses, or lactation consultants	Bhutta et al. 2008
	Lay health workers promoting child feeding and providing support (moderate evidence[b])	Lewin et al. 2010
	Provision of time-sensitive prenatal and postnatal counseling to promote exclusive breastfeeding within four to six weeks of childbirth	Imdad, Yakoob, and Bhutta 2011a
Timely introduction of complementary foods at 6 months	Nutrition education through trained community health workers in food-secure population	Bhutta et al. 2008
	Nutrition education combined with food supplementation	Imdad, Yakoob, and Bhutta 2011b
	Nutrition education combined with conditional cash transfer	Dewey and Adu-Afarwuah 2008
Age-appropriate complementary feeding, adequate in terms of quality, quantity, and frequency, for children 6–24 months	Nutrition education through trained community health workers in food-secure population	Bhutta et al. 2008
	Nutrition education combined with food supplementation	Imdad et al. 2011b
	Nutrition education combined with conditional cash transfer	Dewey and Adu-Afarwuah 2008
Prevention of anemia	Delayed cord clamping at birth	Bhutta et al. 2008
	Home fortification with multiple micronutrient powders for children 6–23 months (strong evidence for improving iron status and moderate evidence[b] for reducing anemia)	Bhutta et al. 2008
	Intermittent iron supplementation once, twice, or three times a week for children from birth to 12 years	De-Regil et al. 2011
Safe handling of complementary foods and hygienic complementary feeding practices	Hand-washing counseling, hygiene education, water quality treatment, sanitation, and hygiene	Bhutta et al. 2008

Table A.3 Continued

Essential inputs	Evidence-based interventions to address the essential inputs	Source
Full immunization	Increasing demand for immunization through conditional cash transfer programs (moderate evidence[b]; requires minimum supply-side strengthening and assessment of feasibility in poor settings)	Lagarde, Haines, and Palmer 2009
	Increasing demand for immunization through discussions at village meetings promoting vaccination uptake (moderate evidence[b]) and facility-based counseling of mothers (low evidence[c])	Oyo-Ita and Nwachukwu 2011
	Lay health workers promoting the uptake of immunization services by reminding people through postcards, phone calls, home visits, or a combination (moderate evidence[b])	Lewin et al. 2010
Reducing vitamin A deficiency	Neonatal vitamin A supplementation, fortification of sugar	Bhutta et al. 2008
	Vitamin A supplementation to children under 5	Bhutta et al. 2008; Imdad et al. 2010
Reducing burden of intestinal parasites	Provision of deworming tablets to children (moderate evidence[b]; needs careful investigation prior to scaling up into communities)	Taylor-Robinson, Jones, and Garner 2011
Prevention and treatment of diarrhea	Oral zinc supplementation during diarrhea for children ages 6 months and above	Lazzerini and Ronfani 2011
	Oral rehydration therapy	Jones et al. 2003
	Point-of-use water treatment (at the household level) such as: • Improved water storage • Chlorination • Solar disinfection • Filtration • Combined flocculation and disinfection	Waddington et al. 2009
	Hygiene intervention: counseling on hand washing	Bhutta et al. 2008
Timely and quality therapeutic feeding and care for all children with severe acute malnutrition (SAM)	• Community management of SAM with ready-to-use therapeutic foods for weight gain in emergency settings • Home-based management of SAM with prepared balanced food can achieve high coverage and low case fatality (Observational studies: Need cautious interpretation of comparison between facility-based trials and the community-based observational studies) More research is needed to determine the effectiveness of community-based rehabilitation in routine health services in nonemergency settings	Bhutta et al. 2008

Table A.3 Continued

Essential inputs	Evidence-based interventions to address the essential inputs	Source
Improved food and nutrition intake for adolescent girls, particularly to prevent anemia	Intermittent iron supplementation alone or in combination with other micronutrients	Fernandez-Gaxiola and De-Regil 2011
	Provision of deworming tablets to children improves anemia in populations with high rates of intestinal helminthiasis	Bhutta et al. 2008
Improved food and nutrient intake for adult women, including during pregnancy and lactation	Balanced protein and energy supplementation is effective in reducing low-birth-weight and small- for-gestational-age births, especially in undernourished women	Imdad and Bhutta 2012a
	Nutritional education and counseling along with nutritional support	Girard and Olude 2012
Prevention and treatment of malaria	Prevention: insecticide-treated bed nets	Bhutta et al. 2008
	Indoor residual spraying reduces malaria incidence in unstable malaria settings	Pluess et al. 2010
	Very limited evidence exists to compare insecticide-treated nets with indoor residual spraying and assess their combination effects	

Source: Compiled by authors.

Notes: [a] The review of the evidence-based interventions to address the essential inputs was conducted between January 2012 and October 2012 using Bhutta et al. (2008), the Cochrane Library, WHO's electronic Library of Evidence for Nutrition Actions (eLENA), and the International Initiative for Impact Evaluation (3ie).

[b] Moderate evidence: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate, according to the Cochrane Review definition;

[c] Low evidence: further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate, according to the Cochrane Review definition.

Table A.4 Evidence-based interventions to address the essential inputs to improve nutritional status of women[a]

Essential inputs	Evidence-based interventions to address the essential inputs	Source
Improvement in the quantity and quality of food and nutrient intake for girls and women	Nutrition education and counseling along with nutritional support	Girard and Olude 2012
	Improving household food production through home gardening, with or without animal production strategies; improved dietary diversity; greater consumption of pulses, vitamin A–rich fruits and vegetables, and other fruits and vegetables	Girard et al. 2012
	Balanced protein and energy supplementation reduces low-birth-weight and small-for-gestational age births, especially in undernourished women	Imdad and Bhutta 2012a
Prevention and management of micronutrient deficiencies	Preventive iron supplementation during pregnancy reduces incidence of anemia among mothers and decreases low birth weight in neonates	Imdad and Bhutta 2012b
	Peri- and preconception supplementation of folic acid (evidence is of low quality except for preconception folic acid supplementation, for which evidence is high)	Ramakrishnan et al. 2012b
	Iron folate supplementation	Bhutta et al. 2008
	Maternal calcium supplementation to prevent pre-eclampsia	Bhutta et al. 2008
	Calcium supplements to mothers at risk of low intake	Bhutta et al. 2013
	Multiple micronutrient supplementation reduces incidence of low-birth-weight and small-for-gestational age births [Caution: multiple micronutrient supplementation increased neonatal mortality where intervention was started after first trimester. Use caution prior to policy changes in settings with poor prenatal care.]	Ramakrishnan et al. 2012c
Improved sanitation and hygiene practices and access to safe drinking water	Point-of-use water treatment (at household level) such as: • Improved water storage • Chlorination • Solar disinfection • Filtration • Combined flocculation and disinfection	Waddington et al. 2009
	Hygiene intervention: counseling on hand washing	Bhutta et al. 2008
Increased access to basic health service	Adding on services or creating linkages to an existing service might improve its use but may not improve service delivery or health status	Dudley and Garner 2011
Universalized completion of secondary schooling for girls	Schooling might transmit information on health, teach basic skills, increase exposure to environments, impart self-confidence, and provide opportunity for social networks	Ruel et al. 2013
Improved gender equity	Targeted agricultural interventions that include women's empowerment activities such as improvement in knowledge and skills through behavior change communication or promotion of their increased control over income from the sale of targeted commodities; social safety net programs such as conditional cash transfers foster certain aspects of women's empowerment	Ruel et al. 2013

Table A.4 Continued

Essential inputs	Evidence-based interventions to address the essential inputs	Source
Prevention and treatment of malaria	Prevention: insecticide-treated bed nets	Bhutta et al. 2008
	Indoor residual spraying reduces malaria incidence in unstable malaria settings	Pluess et al. 2010
	Very limited evidence exists to compare between insecticide-treated nets and indoor residual spraying and assess their combination effects	
	Routine antimalarial drugs reduce antenatal parasitemia and fever in pregnant women living in malaria-endemic areas	Garner and Gülmezoglu 2006
	Drug safety data on combination drug treatment of malaria during pregnancy are limited	Orton and Omari 2008
Interventions to reduce tobacco consumption or indoor air pollution	Legislative smoking ban does lead to a reduction in exposure to passive smoking	Callinan, Doherty, and Kelleher 2010
	Mass media interventions through television, radio, newspapers, billboards, posters, leaflets, or booklets, with the intention to discourage smoking among smokers and maintain abstinence in nonsmokers, are likely to reduce smoking *when used as part of a complex set of interventions only; their value as independent interventions is difficult to establish*	Bala et al. 2013

Source: Compiled by authors.

Note: [a] The review of the evidence-based interventions to address the essential inputs was conducted between January 2012 and August 2013 using Bhutta et al. (2008), the Cochrane Library, WHO's electronic Library of Evidence for Nutrition Actions (eLENA), and the International Initiative for Impact Evaluation (3ie).

Table A.5 Essential inputs for nutrition included in the design of the Integrated Child Development Services and National Rural Health Mission

Essential input	ICDS	NRHM
Timely initiation of breastfeeding	√	√
Exclusive breastfeeding during the first 6 months of life	√	√
Timely introduction of complementary foods at 6 months	√	√
Age-appropriate complementary feeding, adequate in terms of quality, quantity, and frequency, for children 6–24 months	√	√
Prevention of anemia	√	√
Safe handling of complementary foods and hygienic complementary feeding practices	√	√
Full immunization	√	√
Reducing vitamin A deficiency	√	√
Reducing burden of intestinal parasites	–	
Prevention and treatment of diarrhea	√	√
Timely and quality therapeutic feeding and care for all children with severe acute malnutrition	√	√
Improved food and nutrition intake for adolescent girls, particularly to prevent anemia	√	-
Improved food and nutrient intake for adult women, including during pregnancy and lactation	√	√
Prevention and treatment of malaria	–	√

Source: Compiled by authors.

Table A.6 Mapping essential inputs and evidence-based interventions in the Integrated Child Development Services and National Rural Health Mission components

Essential inputs to ensure adequate nutrition among children under 2 years of age	Evidence-based interventions to address the essential inputs	Interventions in ICDS program	Delivery of ICDS interventions[a]	Interventions in NRHM program	Delivery of NRHM interventions[b]
Timely initiation of breastfeeding	Lay health workers promoting education and providing support	AWWs counseling mothers	AWWs make regular home visits and counsel the mothers and their families during critical contact periods of infancy to promote child growth and development.	ASHAs counseling mothers on breastfeeding	ASHAs counsel and help solve breastfeeding problems during home visits.
Exclusive breastfeeding for the first 6 months	Lay health workers promoting education and providing support	AWWs counseling mothers	AWWs make regular home visits and counsel the mothers and their families during the infant's critical contact periods.	ASHAs counseling mothers on breastfeeding	ASHAs visit on the 3rd, 7th, 14th, 21st, and 28th day, and after that, once every 2 weeks starting from the 42nd day, until the child is 2 years old.
	–	–	–	Community mobilization	ASHAs discuss exclusive breastfeeding on VHNDs.
Timely introduction of complementary foods at 6 months	Nutrition education combined with food supplementation	AWWs counseling mothers, with food supplement provided at AWCs	AWWs make regular home visits and counsel mothers and their families during critical contact periods of infancy. AWWs provide take-home rations for children ages 6–36 months.	ASHAs counseling mothers on complementary feeding	During home visits, ASHAs counsel and provide support to mothers on complementary feeding. ASHAs mobilize for and facilitate access to the supplementary nutrition program.
	–	–	–	Community mobilization	ASHAs discuss complementary feeding on VHNDs.

Table A.6 Continued

Essential inputs to ensure adequate nutrition among children under 2 years of age	Evidence-based interventions to address the essential inputs	Interventions in ICDS program	Delivery of ICDS interventions[a]	Interventions in NRHM program	Delivery of NRHM interventions[b]
Age-appropriate complementary feeding, adequate in terms of quality, quantity, and frequency, for children ages 6–24 months	Nutrition education combined with food supplementation	AWWs counseling mothers, with food supplement provided at AWCs	AWWs make regular home visits and counsel mothers and their families during critical contact periods of infancy. AWWs provide take-home rations for children 6–36 months old.	ASHAs discussing complementary feeding	ASHAs discuss complementary feeding during home visits in terms of quality, quantity, and frequency. (Module 7 gives details of this.) ASHAs mobilize for and facilitate access to the supplementary nutrition program.
	–	–	–	Community mobilization	ASHAs discuss complementary feeding on VHNDs.
Prevention of anemia	Intermittent oral iron supplementation one, two, or three times a week	–	–	ANM provision of pediatric IFA tablets to children ages 6 months to 3 years	ANMs provide pediatric IFA tablets on VHNDs. ASHAs examine children for signs of anemia.
	–	–	AWWs assist ANMs in administering IFA and vitamin A supplementation. Distribute IFA tablets	–	–
Safe handling of complementary foods and hygienic complementary feeding practices	Counseling on hand washing and hygiene, water quality treatment, and sanitation	AWWs provide information on safe handling of complementary foods.	AWWs counsel mothers on safe handling of complementary foods during home visits.	ASHA counseling about safe handling of food	ASHAs counsel mothers on safe handling of food during home visits.

Table A.6 Continued

Essential inputs to ensure adequate nutrition among children under 2 years of age	Evidence-based interventions to address the essential inputs	Interventions in ICDS program	Delivery of ICDS interventions[a]	Interventions in NRHM program	Delivery of NRHM interventions[b]
Full immunization	Lay health workers promoting the uptake of immunization services by reminding people through postcards, phone calls, home visits, or a combination	AWW counseling mothers on the importance of immunization	AWWs counsel mothers on the availability of immunization during home visits.	ASHA counseling families to update immunization records	ASHAs discuss immunization during home visits. They remind the mother when the immunization is due and alert her to the date when the VHND is scheduled. ASHAs visit all families at least once every 6 months to update this list. After every immunization session (VHND), both the village register and the child's health card are updated.
	–	AWWs organize immunization services.	AWWs organize immunization sessions or VHNDs. AWWs maintain immunization records to ensure full coverage.	Immunization is conducted on VHNDs	Arrangements are made for needed immunization. If required, the ASHA escorts the baby and mother for immunization. ANMs immunize children on VHNDs.
Reducing vitamin A deficiency	Vitamin A supplementation to children under 5	–	–	ANMs provide vitamin A supplementation	ANMs provide vitamin A doses on VHNDs.
	–	AWWs assist ANMs in vitamin A supplementation.	AWWs maintain stock of vitamin A for ANM.	–	–
Reducing burden of intestinal parasite	Provision of deworming tablets to children to improve nutritional outcomes			Deworming tablets are provided to children below age 3 at AWCs	It is not clear who provides these tablets and when.

Table A.6 Continued

Essential inputs to ensure adequate nutrition among children under 2 years of age	Evidence-based interventions to address the essential inputs	Interventions in ICDS program	Delivery of ICDS interventions[a]	Interventions in NRHM program	Delivery of NRHM interventions[b]
Prevention and treatment of diarrhea	Oral rehydration therapy			ANM provide oral rehydration salts.	ANMs provide oral rehydration salts during VHNDs.
	Hygiene intervention: counseling on hand washing			ASHAs provide counseling.	ASHAs counsel to prevent recurrent diarrhea and enable home-based care.
	–	Diarrhea case referral	AWWs report severe diarrhea cases to ANMs.	–	–
Timely and quality therapeutic feeding and care for all children with severe acute malnutrition	Community management of SAM with ready-to-use therapeutic foods (in emergency settings)	Special supplementary food given to severely malnourished children	AWWs identify severely malnourished children through growth monitoring. If severely malnourished, the children are given special supplementary food (800 calories and 20–25 g protein). Severely malnourished children are referred to health subcenters and primary health centers as required.	Nutrition rehabilitation centers are used to manage SAM cases that qualify for facility-based treatment.	Children with SAM are admitted per the defined admission criteria and given medical and nutritional therapeutic care. Once discharged from the nutrition rehabilitation centers, children remain in the nutrition rehabilitation program until they exhibit the defined discharge criteria. Special focus is on timely, adequate, and appropriate feeding for children, and on improving the skills of mothers and caregivers in complete age-appropriate care and feeding practices. ASHAs receive incentives for accompanying the child to the nutrition rehabilitation centers and motivating the mother to stay for at least 7 days, until the child is stabilized.
	Home-based management of SAM with prepared balanced food	AWWs counsel mothers.	If children are mildly malnourished, AWWs counsel mothers on feeding and other healthcare requirements.	ASHAs provide counseling and referral as needed.	Children who are moderately underweight should be taken to a 24/7 primary health center or higher facility for a medical consultation. Children who are severely malnourished need prompt hospitalization in a center, which is often the district hospital.

Table A.6 Continued

Essential inputs to ensure adequate nutrition among children under 2 years of age	Evidence-based interventions to address the essential inputs	Interventions in ICDS program	Delivery of ICDS interventions[a]	Interventions in NRHM program	Delivery of NRHM interventions[b]
Improved food and nutrition intake for adolescent girls, particularly to prevent anemia	Intermittent iron supplementation alone or in combination with other micronutrients	Two adult IFA tablets provided once per week (under Sabla program)	The tablets are provided to out-of-school girls when they come to the AWCs. It is best if they consume the tablets right at the center. IFA supplementation is provided by ANMs/AWWs/health system. Supply of IFA tablets to each AWC will be ensured by CDPOs/supervisors in coordination with the primary health centers. The IFA tablets may be made available to AWCs through CDPOs and to supervisors during the sectoral meetings. If the Health Department is unable to provide the required quantity of IFA tablets, then the Department of Women and Child Development of the state government / UT concerned may purchase the required quantity of IFA adult tablets. Alternatively, the state government / UT may further decentralize this to the district level.		
	Provision of deworming tablets to children	Adolescent girls are given deworming tablets	If the deworming tablets are given to the AWWs, then it is their responsibility to ensure that the adolescent girl consumes the tablets.		

Table A.6 Continued

Essential inputs to ensure adequate nutrition among children under 2 years of age	Evidence-based interventions to address the essential inputs	Interventions in ICDS program	Delivery of ICDS interventions[a]	Interventions in NRHM program	Delivery of NRHM interventions[b]
Improved food and nutrient intake for adult women, including during pregnancy and lactation	Balanced protein and energy supplementation	Take-home rations to pregnant women and lactating mothers	AWWs distribute the take-home rations from the AWC.		
	Nutrition education and counseling along with nutritional support	AWW provide counseling during pregnancy and lactation.	AWWs make regular home visits and counsel the mothers and their families during critical contact periods of pregnancy and lactation.		
	–	–	–	ASHAs provide counseling to pregnant mothers.	During home visits, ASHAs provide counseling to mothers on nutrition, preparation for birth, danger signs during pregnancy, and so on.
Prevention and treatment of malaria	Prevention: insecticide-treated bed nets	–	–	ASHA facilitate acquisition of insecticide-treated bed nets in malaria-endemic areas	ASHAs should facilitate the procurement of insecticide-treated bed nets for pregnant women during their first antenatal check-up. ASHA should ensure that the baby also sleeps under the treated net.

Source: Compiled by authors.

Notes: ANM = auxiliary nurse midwife; ASHA = accredited social health activist; AWC = *anganwadi* center; AWW = *anganwadi* worker; CDPO = child development project officer; ICDS = Integrated Child Development Services; IFA = iron and folic acid; NRHM = National Rural Health Mission; Sabla = Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (RGSEAG) - Sabla (meaning an empowered woman in the local language); SAM = severe acute malnutrition; UT = union territory; VHND = Village Health and Nutrition Day

[a] The list of ICDS program delivery strategies is based on the program design document and hence reflects the expected functions of AWWs and may not reflect actual implementation.

[b] The list of NRHM delivery strategies is based on the program design document and hence reflects the expected functions of auxiliary nurse midwives (ANMs) and ASHAs and may not reflect actual practices.

Table A.7 Keywords used to search literature for the essential inputs

Essential input	Keywords	Number of articles found	Number of relevant articles
Timely initiation of breastfeeding	“breastfeeding initiation*” + “intervention*” + India	318	2
	“breastfeeding initiation*” + “counselling*” + “intervention* “ + India	98	0
	“breastfeeding initiation*” + “counselling*” + “intervention*” + “community*” + India	95	0
	“breastfeeding initiation*” + “counselling*” + “intervention*” + “community*” + “health worker*” + India	27	1
Exclusive breastfeeding during the first 6 months of life	“exclusive breastfeeding*” + “intervention*” + “community*” + “counselling*” + India	593	3
	“exclusive breastfeeding*” + “intervention*” + “community*” + “counselling*” + “health workers*” + India	361	3
	“exclusive breastfeeding*” + “trial*” + “community*” + “counselling*” + India	493	3
	“exclusive breastfeeding*” + trial*" + “community*” + “nutrition education*” + India	223	3
	“exclusive breastfeeding*” + “trial*” + “community*” + “counselling*” + “health workers*” + India	284	3
Complementary food (timely introduction + age appropriate + safe handling)	“complementary feeding*” + “initiation*” + "interventions*" + India	455	4
	“complementary feeding*” + “initiation*” + "interventions*" + "trials*" + India	82	3
	“complementary feeding*” + “initiation*” + "interventions*" + “nutrition education*” + India	145	3
	“complementary feeding*” + “nutrition education*” + India	490	6
Full immunization	“Full immunization*” + “intervention*” + India	237	2
	“Full immunization*” + “community*” + “intervention*” + India	222	1
	“Full immunization*” + “intervention*” + “community*” + India	221	1
	"Full immunization*” + “community*” + “intervention*” + “promotion*” + India	109	0
Reducing burden of intestinal parasites	“deworming*” + “intervention*” + “infants*” + India	634	2
	“de-worming*” + “intervention*” + “infants*” + India	217	1
	“de-worming*” + “trials*” + “infants*” + India	115	1
Reducing vitamin A deficiency	“Vitamin A supplementation*” + “intervention*” + “neonatal*” + India	896	5
	“Vitamin A supplementation*” + “intervention” + “neonatal” + “community” + India	814	3
	“Vitamin A supplementation*” + “intervention” + “neonatal” + “community” + “trial*” + India	631	4
	“Vitamin A supplementation*” + “trial*” + “community*” + “neonatal*” + India	734	3

Table A.7 Continued

Essential input	Keywords	Number of articles found	Number of relevant articles
Timely and quality therapeutic feeding and care for all children with severe acute malnutrition	“severe acute malnutrition*” + “community management*" + “intervention*” + India	15	0
	“severe acute malnutrition*” + “community management*” + “intervention*” + “RUTF*” + India	9	0
	“severe acute malnutrition*” + “intervention*” + “RUTF*” + India	77	1
	“severe acute malnutrition*” + “intervention*” + India	275	2
	“severe acute malnutrition*” + "facility-based management*” + “intervention*” + “RUTF*” + India	6	0
	“severe malnutrition*” + “RUTF*” + “intervention*” + India	86	2
Prevention and treatment of diarrhea	“diarrhoea*” + “intervention*” + “infants*” + “*zinc supplementation*” + India	559	9
	“diarrhoea*” + “intervention*” + “infants*” + “*oral rehydration*” + India	953	5
	“diarrhoea*” + “intervention*” + “infants*” + “*water treatment*” + India	305	0
	“diarrhoea*” + “trial*” + “infants*” + “*water treatment*” + India	205	0
	“diarrhoea*” + “intervention*” + “infants*” + “*hand washing*” + “counsel*” + India	31	0
	“diarrhoea*” + “trial*” + “infants*” + “*hand washing*” + “counsel*” + India	18	0
	“diarrhoea*” + “intervention*” + “infants*” + "*soap*” + “counsel*” + India	58	0
	“diarrhoea*” + “intervention*” + “infants*” + “*hygiene*” + “counsel*” + India	161	1
Anemia prevention and treatment	“anemia*” + “infants*” + “intervention*” + “*cord clamp*” + India	15	0
	“anemia*” + “infants*” + “trial*” + “*cord clamp*” + India	17	0
	“anemia*” + “infants*” + “intervention*” + “home fortification*” + India	155	1
	“anemia*” + “infants*” + “intervention*” + “home fortification*” + “counsel*” + India	11	0
	“anemia” + “infants” + “intervention*” + “home fortification*” + “nutrition education*” + India	159	0
	“childhood anemia*” + “interventions*” + India	133	4
	“childhood anemia*” + “iron supplementation*” + India	103	3
	“anemia*” + “iron supplementation*” + “infants*” + India	7	3
Improving nutrition intake in adolescent girls	“adolescent girls*” + “anemia*” + “intervention*” + India	931	6
	“adolescent girls*” + “anemia*” + “intervention*” + “iron supplementation*” + India	337	10
	“adolescent girls*” + “anemia*” + “iron supplementation*” + India	462	9
	“adolescent girls*” + “anemia*” + “intervention*” + “micronutrient supplementation*” + India	175	3
	“adolescent girls*” + “anemia*” + “intervention*” + “de-worming*” + India	47	4
	“adolescent girls*” + “anemia*” + “intervention*” + “deworming*” + India	177	0

Source: Compiled by authors.

Table A.8 Sample: Identifying evidence-based interventions and delivery strategies used to address essential inputs in civil society/nongovernmental program models

No.	Program model	Evidence-based interventions used	Other interventions used	Delivery of interventions
1	Kano Parbo Na **Target Group** **Primary Target:** Mothers and parents **Secondary Target:** Childcare workers, mothers-in-law, fathers-in-law, community, *mahila mandals* (women's groups), and SHGs	Nutritional Counseling and Childcare Sessions (NCCS) organized at AWCs to counsel mothers on adopting best infant feeding practices (exclusive breastfeeding)		• All the children under 3 years old were weighed and their nutritional status was identified. • The NCCS conducted at AWCs covered a period of 12 days, during which caregivers received hands-on training on infant feeding followed by practice sessions at home for 18 more days. The cycle continued for 6–9 months. • Mothers of positive deviant children shared their experiences with infant feeding. • During the NCCS, demonstrations of better cooking methods, personal hygiene, and cleanliness were conducted. • Community and growth charts were maintained by AWWs.
			Community mobilization for the positive deviance approach	Village committees were formed. Proactive dialogues between social groups and institutions, using cultural methods such as village picnics, fairs, and so on, were facilitated.
2	Reproductive and Child Health, Nutrition and HIV/AIDS (RACHNA) **Coverage**: 9 states 78 districts Period of intervention: 2001–06 **Target**: Pregnant and lactating women, children < 2 years old	BCC through interpersonal communication at appropriately timed home visits		AWWs, ANMs, or volunteers made home visits during critical periods and provided appropriate information and advice; change agents worked with support of the AWW and community organizations to promote child health and nutrition practices. Change agents, AWWs, or ANMs visited frequently during the first week and once a month after that to promote exclusive breastfeeding using job aids.

Table A.8 Continued

No.	Program model	Evidence-based interventions used	Other interventions used	Delivery of interventions
3	Community-Based Maternal and Child Health and Nutrition (CBMCHN) **Coverage**: 4 districts of Uttar Pradesh **Target**: Children < 2 years old, pregnant and lactating women and newlywed women; children < 6 years old with clinical signs of severe malnutrition were given special attention	Individual counseling of pregnant women, lactating mothers of children under age 2, and newlywed women by *bal parivar mitras* (BPMs)		BPMs were the primary contact points to the at-risk families. The BPMs worked in coordination with ICDS functionaries and also linked with the "outreach" sessions of ANMs. In ICDS blocks, the weekly contact point with mothers was the "take-home ration" day at the AWC. BPMs participated in health *melas* (celebration days) and Mother and Child Days organized by ICDS, and linked with ANMs on routine immunization. BPMs counseled mothers about exclusive breastfeeding. BPMs visited families once a week for counseling and returned 15 days later to follow up on the implementation of the messages. If BPMs found it difficult to convince people, they were advised to contact AWWs or ANMs. Standardized messages were promoted by BPMs in counseling families. BPMs used a pictorial card to promote appropriate behavioral practices and monitor families. This monitoring card was developed using the life-cycle approach, depicting messages with colored instructions. The BPMs easily recorded information and used it in monitoring and counseling. The card had six sections: (1) messages for newlyweds, (2) key messages for pregnant women, (3) newborn care, (4) care for children ages 6–24 months, and (5) household water sanitation and iodized salt.
			Community sensitization	Messages were promoted through wall writings. The BPMs also participated in special group activities at the village level, including women's health groups, SHGs, and village health committees. The BPMs used these as opportunities to converse with the community and promote behavior change through counseling. Social functions such as marriages, festivals, and fairs were used by BPMs as opportunities to interact with the community.

Table A.8 Continued

No.	Program model	Evidence-based interventions used	Other interventions used	Delivery of interventions
4	Home-Based Neonatal Care: the Gadchiroli Field Trial **Coverage:** Gadchiroli district, 53 villages **Primary target group:** Newborns and mothers of newborns; pregnant women **Secondary target group**: Families and communities; community health workers (to be trained); TBAs (cooperation and training).	Health education of the pregnant women, mothers, families, and community at large		The cooperation of TBAs was important. VHWs gave information and demonstrations about nutrition and weight gain during pregnancy, antenatal care, preparation for delivery and the baby, breastfeeding, keeping the baby warm, cleanliness, danger signals in the baby, and seeking early care from the VHW at group meetings held once every 4 months for 2 hours for pregnant women and grandmothers. A follow-up house visit was conducted by the VHW after 2 weeks of group sessions. Home visits were conducted to reach individual mothers, twice during pregnancy and once on the second day after delivery. VHWs attended deliveries along with TBAs, and taught or supported initiation of early and exclusive breastfeeding. During the home visit, the VHW educated the mother and the family about health using a flip chart. During the eighth and ninth months of pregnancy, she gave the mother-to-be 10 messages and a printed pamphlet about mother and baby care. On the first day after delivery she repeated these messages, weighed the baby, and demonstrated how to keep the baby clean and warm and how to breastfeed. She also described nine danger signals requiring early care. If, on day one, the VHW identified the baby as high risk, she conveyed additional messages and followed up with a doctor and care. Traditional birth attendants reinforced the messages and practices. Songs, role-plays, games, slide shows, posters, demonstration, case studies, and experience sharing were used during group sessions.

Table A.8 Continued

No.	Program model	Evidence-based interventions used	Other interventions used	Delivery of interventions
5	Community-Led Initiatives for Child Survival (CLICS)	Adolescent peer educators (*kishori panchayats*) provided breastfeeding counseling to women		How the peer educators contacted women and promoted breastfeeding is not clear.
			Community sensitization	Community-based events and programs were conducted in villages, promoting maternal and child health, involving local leaders, healthcare providers, and members of the media. *Melawas* were organized for mothers-in-law and males who were educated on problems of maternal and child health.
			Community mobilization	The members' self-help groups, *kisan vikas manch* and *kishori panchayat*, organized and participated in improving village sanitation and health by organizing a parenting workshop, collecting village health funds, and setting up a village clinic (Community Health Center), disinfection of drinking water, rallies for dissemination of health messages, making the villages open-defecation-free, adoption of malnourished children, sharing responsibility for antenatal care of pregnant mothers, getting hand pumps repaired through the *gram panchayat*, offering health insurance, painting health messages on walls, and so on.
6	Nutrition Security Innovations in Chhattisgarh	BCC to inform the families of dietary practices and related knowledge as well as to try to influence the attitudes and practices in the community to achieve better nutrition		Mitanins communicated to families the importance of breastfeeding. Mitanins, *prashikshaks*, and Poshan Fellows conducted hamlet-level and community-level mobilization and monitoring activities. More details were not provided.
7	Mother and Childcare Program **Target**: Pregnant mothers, their guardians, mothers-in-law, and newborn babies and unmarried adolescent girls		Counseling for mothers and mothers-in-law at awareness camps	Fifty-one awareness camps were organized for various health topics. During the camps organized at the community level, mothers and mothers-in-law were educated on best infant feeding practices. Audiovisual aids were used to disseminate information to the target group. A nutritionist and ICDS staff participated.

Table A.8 Continued

No.	Program model	Evidence-based interventions used	Other interventions used	Delivery of interventions
8	Baby Friendly Community Health Initiative **Target group:** Children < 2 years old	BCC on timely breastfeeding at the household level		An AWW, ANM, TBA, or active mother from the village formed a mothers' support group (MSG). One MSG was responsible for 10–15 households. At least one member of the group was available 24 hours a day to provide counseling and practical help for mothers. An MSG member visited the lactating mother on the 3rd, 6th, 15th, 30th, 90th, and 180th days and when needed to provide support for breastfeeding, growth monitoring, and so on. MSGs arranged group counseling sessions once a week. During these meetings they provided education on infant and young child feeding, offering help and support to mothers with feeding difficulties. When they failed to help mothers, they referred them to block- and district-level centers.
			Community participation	MSGs sensitized community groups like Balbandhus, SHGs, CHAI, and other community-based organizations about child feeding. Two large carnivals were organized with stalls depicting field-based actions.
9	Community-Driven and Managed Health, Nutrition, and Well-Being Improvement Program in Agra City (Uttar Pradesh) Slums of Agra: 93	Home and group counseling by women's groups (It is assumed that timely initiation of breastfeeding and exclusive breastfeeding were promoted based on the program description. Exclusive breastfeeding was not specifically mentioned.)		*Mahila arogya samitis* (women's groups) were formed, with 10–15 active women per 1,000 people. These were formed to generate awareness and demand for nutrition and health services and serve as a community resource link to service providers. *Mahila arogya samitis* conducted home and group counseling along with community awareness activities to improve behaviors of pregnant women. Follow-up continued until the child turned 5 years old.
			Promotion of optimal child feeding by organizing community-level activities	One or two members of the MSG were nominated to form a federation of women's groups. A federation is a central body of representatives composed of 14–15 women's groups. These federations aimed to promote health and nutrition behaviors through home visits and mothers' meetings. They also organized healthy mother and baby competitions and counseling days to encourage families to adopt optimal infant and young child feeding and maternal care practices.

Table A.8 Continued

No.	Program model	Evidence-based interventions used	Other interventions used	Delivery of interventions
10	Community-Based Nutrition–cum–Day Care Centers **Target group:** Pregnant and lactating mothers, and children < 5 years old	Health education and counseling for the community		During nutrition and health days, the nutrition and day-care centers ensured that their members attended sessions when ASHAs, ANMs, and members of SHGs taught nutrition and health.
11	Sure Start	BCC to mothers and family members by ASHAs		Health workers conducted structured home visits to change behaviors of women and family members. BCC was based on each woman's specific needs. Key messages were delivered on maternal nutrition and health during a minimum of three antenatal home visits and two postnatal visits.
12	Cell Phone Technology as Community-Based Intervention to Improve Exclusive Breast Feeding and Reduce Infant Morbidity		Lactation counselor using mobile phones to communicate breastfeeding information	The lactation counselor made around 70–80 calls to the mothers per day and sent 500–600 text messages (short message service or SMS) about breastfeeding.
13	Community Involvement in Promoting Neonatal and Infant Nutrition in Tribal Vadodara		Community mobilization	Horoscopes were used as a cultural tool to elicit community participation in improving the nutritional status of children under age 2 in tribal areas. The use of horoscopes helped increase the recording of birth weight, promote timely identification and referral of low-birth-weight babies, and reduce the proportion of underweight children. AWWs, ANMs, and ASHAs attended the nutrition campaigns that promoted convergence.

Table A.8 Continued

No.	Program model	Evidence-based interventions used	Other interventions used	Delivery of interventions
14	Dular	Local resource personnel and AWWs counsel mothers		Local resource groups composed of neighborhood-based volunteers (10–15 per village) called local resource personnel assisted the AWWs in counseling mothers on exclusive breastfeeding during home visits. Local resource personnel spent more time with mothers and families to teach them new practices.
				District and block coordination committees were created and trained. These committees consisted of government, ICDS, NRHM, and NGO representatives at the district and block levels. The *panchayati raj* institution members provided help at the cluster and village level. A two-day initial training and advocacy session was conducted in each village, during which the objectives of the strategy were discussed with villagers and information was gathered regarding local beliefs and practices.
15	Anchal Se Angan Tak (ASAT)	Promotion of messages by AWWs and *gram sampark samooh* (GSS) members		GSS members communicated messages to families and assisted AWWs and ANMs in the regular activities of the AWC.
				A new cadre of health workers was formed. One GSS was organized per AWC, including an *anganwadi* helper, the *mahila panch* of the ward, the members of an SHG, the members of the water users association, the members of the youth group, the members of the women's cooperative, the local teacher, an NGO functionary, adolescent girls, and an active woman in the area. Each GSS member was assigned 15–20 households, with whom they maintained close contact.
				All the team members were trained. Monitoring was set up at multiple levels. Families monitored their child's progress using the *Mamta* card. AWWs and ICDS functionaries were trained on the Triple A (Assessment, Analysis, Action) approach. At the village level, monitoring was performed by sector-level committees of AWWs and the president of the GSS during a quarterly review meeting. At the district level, a core committee of district-level officials, NGOs, and others organized review meetings.
			Community sensitization	Mass media such as the national radio station and television were used to communicate messages. Puppet shows and street plays were used to generate awareness in the community about care for mothers and children. Songs and poems were written in local dialects to mobilize the community.

Table A.8 Continued

No.	Program model	Evidence-based interventions used	Other interventions used	Delivery of interventions
16	Maternal, Newborn, and Child Health and Nutrition Practices in Select Districts of Uttar Pradesh and Jharkhand	AWWs and ASHAs counsel mothers		AWWs and ASHAs gave advice and counseled mothers and pregnant women during home visits and VHNDs. An in-service training program was built into the regular monthly meetings by using the meetings as opportunities to assess progress, solve problems, and conduct short capacity-building sessions. AWWs received two days of training. Job aids such as a flip book and a counseling guide with key messages and frequently asked questions were developed for AWWs and ASHAs. Efforts were made to raise awareness of the VHND guidelines, improve joint planning, and use a VHND checklist for monitoring and data collection. The project facilitated convergence between the Department of Health and Family Welfare and the Department of Women and Child Development through the promotion of the use of data and joint reviews of VHNDs. Supervisory checklists were developed for monitoring.
17	Comprehensive Child Survival Programme (CCSP)	ASHAs counsel women		During home visits, ASHAs interacted with currently pregnant women, recently delivered women, and household decisionmakers to deliver key health messages and offer support and guidance on adopting positive healthcare practices. During monthly meetings, topics such as interpersonal communication, steps and process of counseling, critical maternal health and newborn care messages, planning home visits, and organizing community meetings were discussed with ASHAs. These meetings were led by a team of two block facilitators. There was a pool of six to eight block facilitators comprising of health and education officers, ANMs, lay health volunteers, and male supervisory staff in each block. A team of district facilitators who were part of district health education and NRHM district program management unit supported block facilitators. Job aids with key messages, frequently asked questions, pictorial flip books, and checklists were developed for ASHAs. ANMs were encouraged to make joint home visits with ASHAs. ANMs were trained on supportive supervision.

Source: Compiled by authors.

Notes: ANM = auxiliary nurse midwife; ASHA = accredited social health activist; AWC = *anganwadi* center; AWW = *anganwadi* worker; BCC = behavior change communication; BPM = *bal parivar mitra;* CHAI = Catholic Health Association of India; GSS = *gram sampark samooh;* ICDS = Integrated Child Development Services; MSG = mothers' support group; NCCS = Nutritional Counseling and Child Care Sessions; NGO = nongovernmental organization; NRHM = National Rural Health Mission; SHG = self-help group; TBA = traditional birth attendant; VHND = Village Health and Nutrition Day; VHW = village health worker.

Table A.9 Essential inputs and evidence-based interventions in civil society/nongovernmental organization program models

	Essential inputs													
Programs	**BFI**	**EBF**	**CFI at 6 months**	**Age-appropriate CF**	**Prevent anemia**	**Safe handling of CF**	**Full immunization**	**Vitamin A**	**Reduce burden of intestinal parasites**	**Prevent and treat diarrhea**	**Timely and therapeutic feeding**	**Prevent anemia in adolescent girls**	**Improved food intake in adult, pregnant, and lactating women**	**Prevent and treat malaria**
Kano Parbo Na (Positive Deviance Model)	–	*	+	+	–	*	+	+	–	+	+	–	–	–
Reproductive and Child Health, Nutrition and HIV/AIDS (RACHNA)	*+	*	*	*	*	–	*+	*+	–	*	–	–	*	–
Community-Based Maternal and Child Health and Nutrition (CBMCHN)	*+	*+	*+	–	–	*	+	+	–	+	–	–	+	–
Home-Based Neonatal Care (HBNC)	*	*	*		–	–	–	–	–	–	–	–	–	
Community-Led Initiatives for Child Survival (CLICS)	*	*+	+	–	–	*	*+	–	–	–	–	–	–	–
Health Promotion for Adolescent Girls (HePA)	–	–	–	–	–	–	–	–	–	–	–	*+	–	–
Nutrition Security Innovations in Chhattisgarh (Mitanin Program)	*	*	*	–	–	–	–	–	–	–	–	–	+	–
Adolescent Girls Anemia Control Program	–	–	–	–	–	–	–	–	–	–	–	*+	–	–
Mother and Child Care Program	*	*	*	–	–	*	+	–	–	–	–	–	*	–

Table A.9 Continued

	Essential inputs														
Programs	**BFI**	**EBF**	**CFI at 6 months**	**Age-appropriate CF**	**Prevent anemia**	**Safe handling of CF**	**Full immunization**	**Vitamin A**	**Reduce burden of intestinal parasites**	**Prevent and treat diarrhea**	**Timely and therapeutic feeding**	**Prevent anemia in adolescent girls**	**Improved food intake in adult, pregnant, and lactating women**	**Prevent and treat malaria**
Baby Friendly Community Health Initiative	*+	*+	*+	*+	–	*	*	–	–	–	–	–	–	–
Community Driven and Managed Health, Nutrition and Well-Being Improvement Program	*	*	*	*	–	–	*	–	–	–	–	–		–
Uplifting Marriage Age, Nutrition, and Growth (UMANG)	–	–	–	–	–	–	–	–	–	–	–	*	–	–
Community-Based Nutrition–cum–Day Care Centers (NDCCs)	*	*	*	*	–	*	*	–	–	+	–	–	*	–
Sure Start	*+	*+	–	–	–	–	–	–	–	–	–	–	–	–
Community Involvement in Promoting Neonatal and Infant Nutrition in Tribal Vadodara	+	+	*+		*	*	*	*						
Cell Phone Technology as Community-Based Intervention to Improve Exclusive Breast Feeding and Reduce Infant Morbidity	+	+	+	–	–	–	–	–	–	–	–	–	–	–
National Program for Adolescent Girls (NPAG)	–	–	–	–	–	–	-–	–	–	–	–	+	–	–

Table A.9 Continued

	Essential inputs													
Programs	**BFI**	**EBF**	**CFI at 6 months**	**Age-appropriate CF**	**Prevent anemia**	**Safe handling of CF**	**Full immunization**	**Vitamin A**	**Reduce burden of intestinal parasites**	**Prevent and treat diarrhea**	**Timely and therapeutic feeding**	**Prevent anemia in adolescent girls**	**Improved food intake in adult, pregnant, and lactating women**	**Prevent and treat malaria**
Dular	*	*	*	–	–	*	*	–	–	*	–	–	*	–
Achal Se Angan Tak	*	*	*	*	–	*	*	–	–	*	–	+	–	–
ANKUR project	*	–	–	–	–	–	–	–	–	–	–	–	–	–
Comprehensive Child Survival Programme (CCSP)	*	*	–	–	–	–	–	–	–	–	–	–	–	–
Maternal, Newborn and Child Health and Nutrition Practices in Select Districts of Uttar Pradesh and Jharkhand	*	*	*	*	–	–	–	–	–	–	–	–	–	–

Source: Compiled by authors.

Notes: ***** = Program addressed essential inputs and used recommended interventions; **+ = p**rogram addressed essential inputs but used interventions not listed under recommended interventions; ***+ =** combination of both evidence-based and other interventions; **-** = Program did not address the essential input. BFI = breastfeeding initiation; CF = complementary feeding; CFI = complementary feeding initiation; EBF = exclusive breastfeeding.

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