Final1

by Rashmi D

Submission date: 22-May-2018 01:01PM (UTC+0530)
Submission ID: 967077702
File name: Rashmi_Report.docx (62.16K)
Word count: 5217
Character count: 30616

Addressing early malnutrition in rural Rajasthan: A Literature Review

I. Background

India is one of the fastest growing economies in the world, yet more than one third of the world's wasted children live in India (1). With 31.4, global hunger index score in 2017, India ranks 100th globally and lies at higher end of the serious category (2).

Malnutrition, a silent emergency is one of the India's greatest human development challenges. Over past 20 years, India has witnessed a strong economic growth but on the other side malnutrition in under-five year children continue to be among the highest in the world (3).

According to WHO, Malnutrition refers to deficiencies, excesses or imbalances in person's intake of energy and/or nutrients and includes undernutrition and overweight. Undernutrition is further categorized into stunting, wasting, underweight and micronutrient deficiencies or insufficiencies. Stunting is low height for age, wasting is low weight for height, underweight is low weight for age and micronutrient deficiencies is lack of important vitamins and minerals.

India has an Infant Mortality Rate of 41 per 1000 live births, with Uttar Pradesh on the top with 63.5, followed by Chhattisgarh (54), Madhya Pradesh (51.2), Bihar (48) and Assam (47.6) (8). Child death occurs mostly from increased severity of diseases which results due to under-nutrition (4). High risk of having impaired cognitive development is witnessed in the undernourished children between conception and age of two and thus adversely affecting the country's productivity and development.

The Indian national government, as well as many state governments has developed schemes to help alleviate malnutrition directly, but they are not yet demonstrating that they will deliver the desired outcomes. Micronutrient deficiency alone may cost India US$ 12 billion annually and

seriously affect national GDP, whereas scaling up of core micronutrient intervention would only cost less than US$ 574 million per year (4).

Approximately 60 million children are underweight and accounts for five times more malnourished children than in China and twice that in Sub-Saharan Africa and indicates that the levels of malnutrition in India are alarmingly high. Over half of India's malnutrition cases are in six states i.e. Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Rajasthan, and Uttar Pradesh, while specific areas of Andhra Pradesh and Maharashtra contributes for an additional 8 to 10% of the burden (3).

During the duration from 2005-2015, an overall reduction is witnessed in the proportion of underweight children in India, mainly the improvement in percentage of stunting. While on one-part reduction is noticed in the percentage of stunted children under five, i.e. from 48% in 2005-06 to 38.4% in 2015-16, there has been a rise in the percentage of children who are wasted from 19.8% to 21% during this period (5, 6). In India, higher prevalence of under-nutrition was noticed in rural area (38%) in comparison to urban areas (29%) (6).

Rapid survey of children, 2013 report indicated that "among all casts, schedule tribe comprises of high proportion of children who are stunted, wasted as well as underweight (42 percent, 19 percent and 37 percent respectively) children and the lowest among those belonging to Other castes (34 percent, 14 percent and 24 percent respectively)" (7). In India, 19 % of children have less than 2.5kg of national average weight at birth. At 23%, Madhya Pradesh, Rajasthan and Uttar Pradesh witnessing the highest number of underweight childbirths.

About Rajasthan

Rajasthan is the largest state in India comprising over 33 districts with the total population of 6.85 crores and accounts for 5.67 % of Indian population. 75.1% of population of Rajasthan resides in rural area out of which 16.3% of population is of children in the age group of 0-6. The highest children's population in the country is in the state of Uttar Pradesh (19.27%) followed by Bihar (10.55 %), Maharashtra (8.15 %), West Bengal (6.81 %) and Madhya Pradesh (6.46%) contribute 52% of Children's population in the country (9).

Over the past two decades, Rajasthan has shown significant growth both socially and economically. Comparing NFHS 3 and NFHS-4 reports, data suggests a slight decline in percentage of underweight children under 5 years of age from 39.9% (NFHS-3) to 36.7% (NFHS-4), and percentage of stunted children from 43.7 (NFHS-3) to 39.1 (NFHS-4) but it is higher in comparison to national average i.e. 35.7% and 38.4% respectively. According to NFHS report 2015-16, Rajasthan has 23% of wasted children and 8.6% of severely wasted children under 5 years, which is again higher in comparison to national average i.e.21% and 7.5%. Respectively. Infant mortality rate and under five mortality rate of Rajasthan is 41 and 51, which is comparatively similar to national average i.e. 41 and 50 (5, 6). Thus, malnutrition among children contributes significantly towards this increased infant mortality.

II. Aims & Objectives of the Review

Aim: The aim of the study is to review literature on:

1. Burden of early malnutrition in rural Rajasthan
2. Programs on addressing malnutrition in Rajasthan

The specific objectives of this Literature review article were

(i) To identify the relevant literature and synthesize findings and undertake a narrative review on burden of early malnutrition under four main themes.

(ii) To discuss the existing programs in terms of their strengths and weaknesses for addressing malnutrition in Rajasthan.

(iii) To provide recommendations for using Village Health Nutrition Day (VHND) as target program to address early malnutrition among children.

III. Methodology

Malnutrition is defined as the deficiencies, excesses or imbalances of energy and/or nutrients and categorized into groups i.e. 'undernutrition' stunting (low height for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals) and other is overweight, obesity and diet-related non-communicable diseases (such as heart disease, stroke, diabetes and cancer). (10) Stunting results due to chronic malnutrition, underweight results due to acute malnutrition and combination of both results into wasting.

Search Engines: Google Search engine, PubMed, Medline, and Google scholar was used as search engine for collection of information.

Key Words: Different key words like "Early Malnutrition", "Child Malnutrition", "Sustainable Development Goals", "Rajasthan", "India", "Maternal Nutrition" and their combinations were used to locate the relevant literature information. Furthermore, the list of references was also reviewed to access for more relevant literature on early malnutrition.

Inclusion Criteria

- Articles published showcasing malnutrition in India and Rajasthan
- Studies done in Indian context will be included
- Government and State Reports
- Unicef and world bank reports in context with Rajasthan and India.
- The most relevant and current published papers between 2005-2018 were included.

Exclusion Criteria

- Newsletters excluded
- Malnutrition studies with no specific focus on India are not included in literature review.

Quality of Assessment

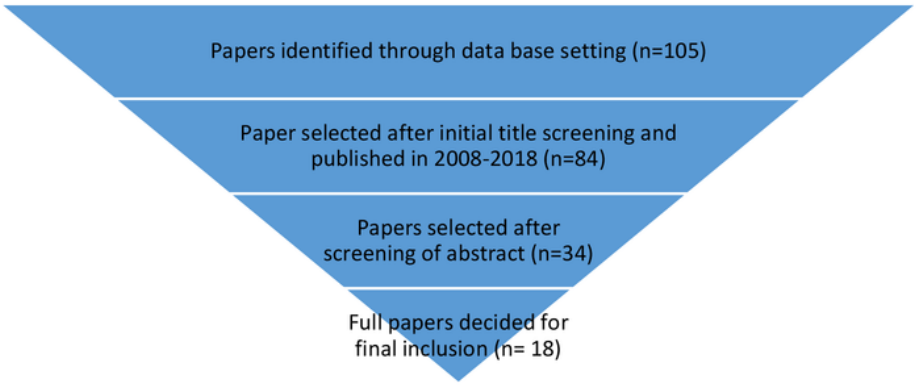
During the process of review, emphasis was laid on the following factors for ensuring quality:

- Reputation of publication and organizations
- Inclusion of other relevant publications
- Relevance of material with respect to aims of review

Data Synthesis Methods

The present review used descriptive analysis method thus to explore the available literature and the secondary data. All articles and secondary data found compatible with inclusion criteria were categorized under four separate headings based on the aims of the review.

Fig. 1 Prism flow diagram of literature review



IV. Key Finding

1. Major causes of early malnutrition among children

Various factors contribute to the development of the malnutrition among children as outlined in the logical framework proposed by Black et al (10). Infections and inadequate dietary intake are the factors frequently linked to malnutrition. In Rajasthan, two percent of children under age five had the symptoms of ARI, 10 % percent had fever and seven percent of children had episode of diarrhea (6). Inadequate dietary intake might be due to improper feeding practices, household food insecurity or both. WHO recommends exclusive breastfeeding for up to six months of age and appropriate complementary feeding practices (timely introduction, adequate quantity of nutrients, safely prepared and adequately fed) as appropriate infant and young child feeding practices for adequate nutrition (11). In rural Rajasthan, 28.9% of children in 6-8 months' age group were receiving solid or semi solid food and breast milk, and 3.3 % of total children in 6-23 months' age group were receiving adequate diet thus showcasing alarming nutrition level of early childhood (6). 57.5% children under age of 6 months were exclusively breast feed and lack of exclusive breastfeeding as compared to partial and no breastfeeding causes significantly high relative risk

for all-cause mortality and pneumonia in infants i.e. (6,10). Even with optimum breastfeeding, children are usually at risk of stunting if they do not receive an adequate quality and quantity of complementary food after 6 months of age (10). Apart from inappropriate and delayed start of breastfeeding and / or delayed start of complementary feeding, household food insecurity is another major underlying factor that lies in the direct causeway of child undernutrition (10). In rural Rajasthan, increased poverty, low dietary diversity, belonging to a tribe, and failing to save money to cover food expenses are the factors associated with food insecurity for both women and children. Using more coping strategies and having a husband who made decisions about how money earned was used were associated with food insecurity among women, while not received food from an Integrated Child Development Service center was associated with food insecurity in children. (25)

Transformation of lifestyle is one of the contributing factor to a high risk of malnutrition and hence often threaten appropriate growth in the earliest life stages. In especially young children, malnutrition has been closely linked with increased mortality and impaired physical, cognitive and metabolic development (12) It is mentioned in various literature, that after the age of 2 years, undernutrition will have caused irreversible damage for future development towards adulthood (13).

Both protein-energy malnutrition and micronutrient deficiencies not only directly affect many aspects of children's development but also retards their physical and cognitive growth and increases susceptibility to infection and disease like malaria, diarrhea, measles and pneumonia, which further augments mortality. Menon P et al identified that "poor complementary feeding practices, are strongly associated with poor nutritional outcomes, especially with the outcomes such as low z-score for height-for-age and a higher prevalence of stunting and other

complementary feeding practices that are associated with better nutrition outcomes are minimum meal frequency and timely introduction of complementary foods". (14)

Hence to have a high impact on current challenges in terms of outcomes, we propose to focus on the problem of early malnutrition, from birth to 2 years of age, within the rural context of Rajasthan.

2. Role of women in early malnutrition among children:

Women's nutrition plays a crucial role in optimizing pregnancy outcome and influencing maternal, neonatal and child health outcomes (16). It is being observed that the proportion of undernourished women is greater in rural setting (29.9%) as compared to urban setting (18.6%) in state of Rajasthan. The burden of malnutrition, high prevalence of chronic energy deficiency and anemia among mothers in India leads to more number of severely undernourished children population. (26). Forty-seven percent of women in Rajasthan have anemia, including 35 percent with mild anemia, 11 percent with moderate anemia, and 1 percent with severe anemia. It is identified that anemia is found greater for scheduled tribe women (63%) and women who are breastfeeding (52%) (6). Johri Mera et al stated that "children of mothers with high health literacy had approximately half the likelihood of severe stunting or severe underweight than those with low health literacy. The beneficial effect of maternal high health literacy was greater in the rural site for severe stunting as on the other side for severe underweight and severe wasting, the effects of high health literacy did not differ between rural and urban settings". Proportion of literate women is much lower in rural Rajasthan (49.8%) than in urban Rajasthan (75.8). (6,15)

Poor socio-economic status of women not only affect fetal growth and pregnancy outcome but

also adversely impacts behavioral practices pertaining to appropriate self and child care, which contribute to low body mass index (BMI) in women and stunting in children. Today, there is increasing evidence and recognition among the scientific community that it will be difficult to achieve rapid and significant progress in reducing childhood stunting without scaling up evidence-based direct nutrition interventions as well as simultaneously addressing the underlying socio-economic causes that adversely influence nutrition of women (17,18,19). Women's nutrition, a low priority in the public health agenda of most developing countries, including South Asia, needs special attention for accelerating reduction of stunting rates in children (18,20). The Nutrition Foundation of India estimates that "nearly 30% of babies born in India are affected by IUGR [30–31], which is associated with inadequate food intake and low weight gain during pregnancy". (18)

Hence to address some of the underlying drivers and complexity in the causality of early infant malnutrition, we propose better and targeted support for maternal nutrition, feeding practices and education, with an emphasis on identification and response toward those most vulnerable groups.

3. Currently Implemented Program targeting malnutrition

Various nutritional supplement programs are being run by the Government of India in response to increased numbers of malnutrition in every age group, especially among children. The major nutrition programs delivering direct food/ nutrient supplements are a) Integrated Child Development Services Scheme (ICDS), b) Mid-day meal Programs (MDM), c) Wheat Based Nutrition Programs (WNP), d) Balwadi Nutrition Programs (BNP); e) National Nutritional Anemia Prophylaxis Program f) Special Nutrition Programs (SNP); g) Applied Nutrition Programs (ANP); (NNAPP); h) National Program for Prevention of Blindness due to Vitamin A Deficiency; and i) National Goiter Control Program (NGCP).

Out of these nine programs, six (ICDS, MDM, SNP, WNP, ANP, BNP) have broader nutrition focus of providing nutritional supplementation. The Mid Day Meal program (MDM) primarily targets children in primary school, especially those belonging to the lower scheduled classes. The Special Nutritional Program (SNP) targets pre-school children, pregnant and lactating mothers primarily in urban slums and tribal areas with supplementary nutrition and health care. The main aim of the Applied Nutritional Program (ANP) is to increase awareness among people about their nutritional needs and supplementary nutrition to children 3-6 years and pregnant and lactating mothers. The Wheat Based Nutrition Program (WNP) focuses on the children of preschool age and pregnant and lactating mothers in areas having high infant mortality rates. Under the Balwadi Nutritional Program, pre-school children between the ages of 3-5 years are provided with about one third of calorie and half of protein requirements.

The Integrated Child Development Services (ICDS) programme was set up in 1975 and designed to provide children under six with ready-made meals at community health centers known as "Anganwadi" which is generally available at the rate of 1 center per 1000 population. The ICDS program, mainly targets children 0-6 years, pregnant and lactating mothers, and women aged 15-44 years, with benefits such as supplementary nutrition; immunization; health check-ups; referral services; treatment of minor illnesses; pre-school education to children aged 3-6 years (21)

Although this program covers all the states of India including Rajasthan and provides food supplementation assistance to more than 90 million beneficiaries, the rate of malnutrition in India remains constant, or may even be increasing. Since 2005, India has introduced the National Rural Health Mission, in an attempt to strengthen health services and systems to rural populations. The opportunity this program provides for strengthening an integrated approach to maternal and child health and nutrition is worthy of exploration (22).

As per reports from the World Bank; an array of urgent changes is warranted to bridge the gap between the policy intentions and current outcomes of ICDS. Key weaknesses related to this nationwide program are (23):

1. Inadequate attention given to improve child-care behaviors, and educating parents.

2. Inadequate focus of children 0-3 years of age.

3. Poor co-ordination between Health and ICDS functionaries compounded by poor quality of training provided to Anganwadi workers and other health supervisors.

4. Irregular supply of supplementary food and a weak referral system.

5. Inadequate co-ordination of home visits by AWWs and poor community participation leads to improper tracking of those malnourished children unable to report at centers.

Although the Scheme is associated with decreased malnutrition and better child development, but the size and diversity of the country, the policy context, funding mode and lack of community awareness and engagement have hindered scaling up access while the approach to service delivery, low institutional capacity and poor infrastructure have impeded scaling up of implementation quality (23). Narendra Singh and Pankaj concluded in their findings that the overall incidence of morbidity was significantly higher in rural ICDS covered area (7.97episode per child per year) than in urban ICDS area (5.43 episodes per child per year). (27)

Report of ministry of women and child development showcased that "among the mothers of children aged 0-35 months, 97.7 percent were aware of at least one out of six services provided from AWCs. Maximum awareness was about supplementary food (93.3 percent), followed by immunization (82.3 percent), preschool education (53.9 percent), and health check-up (24.7

percent) in rural Rajasthan. Only 4.4% percent mothers were aware of referral services and 7.1 % of mothers were aware about nutrition and health education in rural Rajasthan". (7) Thus indicating that more emphasis is needed to increase awareness of services as well utilization.

From this appraisal of the available evidence, (articles, NHS, WHO, UNICEF and other observational studies) and through identifying key concerns and potential gaps in current implemented policies, we propose high impact recommendations for overall improvement in the approach to child malnutrition through addressing early child malnutrition, (affecting children from birth through to 2 years of age), in rural Rajasthan, predominantly through strengthening the current rural outreach program through focused support of health workers and targeted education and support for mothers, particularly in vulnerable groups (i.e. lower castes).

4. Child feeding practices in Rajasthan:

As per the survey report of National family health survey (NFHS-4), in Rajasthan, around 58.2 percent of children less than six months of age are exclusively breastfed and 30.1% of children age 6-8 months receiving solid or semi solid food with breast milk. Only 3.4% breastfeeding children of 6-23 months of age receiving an adequate diet and 3.7% of non-breast feeding children in age group of 6-23 months receives adequate diet which is very low.

Very few children are put to the breast immediately after birth. Data suggested near about 36.2% of children between age group of 0-23 months were immediately breastfed/ breastfed within one hour of birth in rural Rajasthan which is comparatively lower than the urban proportion (45.8%). (6)

It is mentioned in this report that children of illiterate mothers preponderate within the scheduled castes and tribes, and are less likely to received breast milk within the first day of life compared to

mothers who have at least completed high school and belong to a higher caste. Also children born at home or in a health facility run by the government are much less likely to be breastfed within one day of birth than children born in a private health facility. (7)

Report of rapid survey of children indicates that "in India, depending on the culture, pre-lacteal feeds i.e. giving some food before the initiation of breastfeeding is being practiced in various states. It can be either ghee, honey, sugar, sugar juice, or cow/goat milk etc". "Nearly one-fourth (28.6 percent) children aged 0-23 months were given pre-lacteal feeds. Although the practice of giving pre-lacteal feeds was more or less common across all the categories of gender, residence, social group, mother's education or wealth index" stated in RSOC report. (7)

In Rajasthan, a social taboo of squeezing out of mother's first milk (colostrum) is quite common. The custom of squeezing the first milk from the breast before breastfeeding a child is widely practiced in every group but it is somewhat more common in rural areas, in the Western and Southern Regions, and among mothers of scheduled-caste and scheduled-tribe children.

Recommendations to improve child nutrition in Rural Rajasthan:

The literature as surmised above points to the opportunities available to impact current shortfalls in the approach to child malnutrition. We propose work streams in three potential high impact strategic areas; attempting to provide solutions to address current weaknesses in national practices, challenges and guidelines through a targeted and integrated approach. To deliver high impact intervention, we target the birth to two years' age group of children to prevent and control early malnutrition in rural Rajasthan, with an emphasis on supporting maternal feeding practices and strengthening the approach of the National Rural Health Mission to Monthly Village Nutrition Days. "In Rajasthan, only 13.6 % ever married women were aware of VHND or mother's day

held at AWC and 26% attended the VHND" as stated in RSOC report. (7)

We propose an initiative that addresses these 3 main priority areas for impact through an integrated approach within the context of the Village Health Nutrition Day (VHND).

1. Targeting children aged 0 - 3 years

Review of current weaknesses in practice points to a need to emphasize a targeted approach towards the most vulnerable, lowest castes, youngest age group, female sex, rural Northern India.

2. Maternal Education: Targeting women's feeding practices and those most in need.

Elements of the national guidelines on infant and young child feeding will be emphasized within current strategies to educate and support mothers in the transition from pregnancy to early motherhood. Targeting those most vulnerable will allow practices to become more progressive towards those most in need.

When looking at a quantile regression of data from the Indian National Family Health Survey from 2005-6, investigators found that maternal health and education had specifically significant impacts on the lower end of the distribution of child body-mass-index, height for age and hemoglobin concentration outcomes (23). Policies and interventions should be aligned with these socio-economic drivers of child malnutrition.

3. Strengthening the approach to improving rural child malnutrition through the existing monthly Village Health Nutrition Day (VHND) and support of pre-existing networks of health workers; through the National Rural Health Mission (20).

At present, VHND is being organized once in every month. The World Bank and Indian Academy of Pediatrics' review of the current situation highlights the current inadequacies for training of

health- workers.

Delivery of improvements to early child nutrition through the Village Health Nutrition Day (VHND)

Addressing child feeding practices in India at village level, with VHND as a powerful means for delivering health education and behavior modification among present and future mothers related to child feeding practices (24).

Village Health and Nutrition Day (VHND) also known as Health Day is organized every month on a specific day (mainly Thursday) in every village at Anganwadi centers, which is an important component under National rural health mission.

The main objectives of this program are providing health care services to women, adolescents and children. Women, adolescent girls and children will be mobilized with the help of ASHAs, AWWs and ANMs to assemble at nearest Anganwadi center. As recommended in the guidelines provided by Ministry of Health and Family Welfare; on this day, health related issues like nutrition, personal hygiene, and care during pregnancy, importance of antenatal and post-natal care, institutional deliveries, immunization, etc. should be discussed. If organized regularly and effectively a VHND can bring about much needed behavioral changes in the community, and can induce health-seeking behaviors in the community leading to better health outcomes.

Currently the following tasks are usually performed through the VHND days:

1) Registration of pregnant women for ANC (antenatal care)
2) Tracking of dropped out women, eligible for ANC.
3) Child immunizations and Vitamin A supplementation.
4) Periodic weighing of children to tackle malnutrition.
5) Distribution of oral contraceptives and condoms for eligible couples.

6) Food supplements distribution for underweight children etc.

Although our proposed program focuses on food supplementation distribution for malnourished children, we acknowledge that lots of changes are still needed in terms of educating communities and behavior modifications.

Interventions

Based on the previous analysis of prevalence, magnitude and mechanism of malnutrition in India, gaps and opportunities in VHND program of NRHM Rajasthan, we recommend following interventions.

The overall goal of the program is to reduce incidence and prevalence of malnutrition among children up to 2 years of age through following approaches. (Please see attached Figure 1 for logic model of program)

1. Strengthening the institutional capacity of VHND in targeting early malnutrition by:
   a. Capacity building of AWWs in the screening and management of malnutrition.
   b. Exclusive Target towards the age group of 0-2 years.
   c. Appropriate utilization of the food supplements provided through the VHND.
2. Strengthen the monitoring and evaluation of VHND program and better functional management information system (MIS).
3. Improving 'compliance' among the families. This will help in food supplements leakage from focus group to other members in family.

Our logic model (Figure 1) contains three different categories through 'Input' section incorporating technical, logistical, and human recourses. Points considered under technical section

are improvement in training curriculums, guidelines and advocacy documents. Under logistical inputs funds, locally produced RUTF, weighing scales, MIS and M&E tools is considered, in human resource inputs training / supervision times and frequency with MIS support.

The key activities will be performed under this project are: Strengthening the institutional capacity of VHND in targeting early malnutrition by exclusively targeting the age group of 0-2 years, this will be done by adding evidences explaining the importance and specific needs for this age group, in the training curriculum of health workers. This will increase their focus towards this age group. Apart from this formal guideline from state quarter will be sent to district program coordinators explaining their roles in organizing and implementing the program targeting this age group.

As mentioned earlier inadequate, less frequent training of AWWs and other health workers as per what guidelines says, along with lack / nonfunctional equipment causes poor identification and tracking of malnourished children. Keeping this in mind we recommend capacity building of AWWs along with their periodic training (proper use of MUAC, as per FANTA CMAM guidelines) as to how to screen and manage acute malnutrition.

As mentioned earlier about the role of RUTF in management of acute malnutrition globally i.e 80% in Malawi, we would like to promote its local production and distribution. A randomized control trial conducted in Vellore, India explained successful role of locally produced RUTF in community-based management of acute malnutrition (24) District-based contracting with bakeries will be done to locally produce RUTF used for the management of acute malnutrition using the method reported by Singh et al(24). A logistic supply chain will be established to provide regular supply of the MUAC tapes, weighing scales (through international development partners support) and RUTF from districts to AWCs on the basis of a quarterly stock review

Common guidelines for community-based management of acute malnutrition and referral mechanisms for severe malnutrition will be send to state health department and to if field monitoring officers.

Utilizing the food supplements provided through the VHND scheme will be facilitated by revising the criteria for receiving Take Home Ration. At least one meal will be consumed under the supervision of the AWW at the Anganwadi centers. Manufacturing of separate food supplements according to specific needs along with local taste will increase the acceptance rate among children with separate, targeted packaging for Take Home Ration (THR) for children less than 2 years and for mothers.

Strengthen the monitoring and evaluation of the VHND program will be done by

1) Modification of Management Information System through separate reporting of the data on malnutrition figures among 0-2 years and 2-6 years separately.
2) Capacity building of supervisors in supportive supervision and active monitoring of program activities will be built through refresher trainings of the supervisors.
3) Periodic (quarterly) evaluations of program will be conducted by external agencies.

Food provided as Take home ration is often used by the whole family rather than the intended child, which is a big problem in rural areas. We will address this issue through various approaches mentioned below:

1) Family counseling by AWW on utilization of supplementary food and complementary feeding practices with parents.
2) Sending regular reminders about the appropriate utilization of supplementary foods by the AWW to the mother and father, as well as reinforcements.

Monitoring and evaluation:

The program will be implemented in a phase-wise manner over 4 years across the entire state based upon the logical framework approach. As such, it will be implemented in 8 districts in the first phase during the first year and scaled up to other districts in the same manner.

For the first two phases of the program, the districts without interventions will serve as controls for the districts with interventions (i.e. districts of phase 3 will serve as controls for districts of phase 1 and those of phase 4 will serve as controls for districts of phase 2). Table 2 summarizes the indicators identified for the program.

Improving 'compliance'

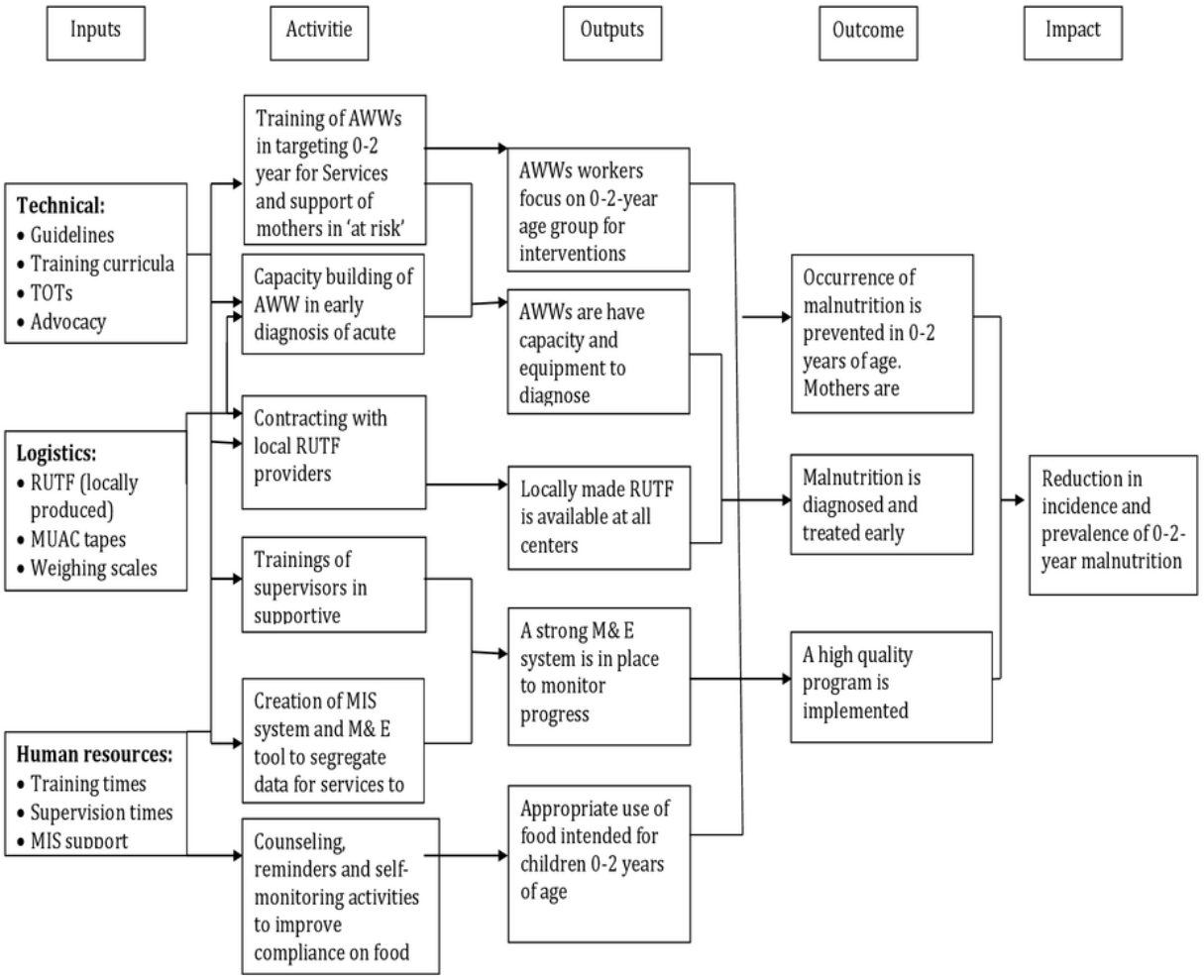
A study undertaken by the Infant Feeding Study Group, involving a cluster randomized controlled trial undertaken in Haryana, revealed that improvements could be achieved in complementary feeding practices, when incorporated with existing government programs and supported by increased training for the health nutrition workers. However, this study by Bhandari et al, did also demonstrate that this improvement in feeding practice failed to translate to any growth or weight benefits. The authors reflect on the fact that counseling techniques by nutrition health workers have had much greater benefits on weight gain in Chinese and other populations, however this has failed to manifest in South Asian populations. Namely, the effects of such interventions may vary according to the baseline characteristics of the group served and other factors such as the food types available to them. This study was undertaken in a rural Northern Indian setting and possibly alludes to a much greater complexity in the weight and growth nuances concerning this population, such as limitations imposed through maternal malnutrition on overall child weight and growth potential. We suggest in our program that targeted support of women of the more vulnerable

socioeconomic categories may go some way to address some of the yet hitherto understood complexity of underlying drivers, yet acknowledge this gap is yet to be fully researched.

CONCLUSION

Early malnutrition is the underlying cause of child morbidity and major public health and social problem for India. At present, early malnutrition is one of the major challenges faced by country. Further understanding and appropriation of efforts is needed to tackle early child malnutrition in those states where the prevalence and urgency to address current shortfalls. Advances are called in for strategies, policies and interventions that acknowledge and appropriate increasing comprehension of the complexity of issues driving rural early child malnutrition. The here outlined intervention highlights an example of an evidence-based approach with potential high impact for those groups and regions currently known to be most vulnerable to child malnutrition and the subsequent associated morbidity, mortality and loss of human potential and productivity. Scaling up of improvements and further implementation research is urgently needed to address remaining gaps; particularly in light of the impending 2015 Millennium Development Goal achievement and SDGs shortfalls India faces. Research to lend insight into why nutritional interventions have failed to yield expected benefits in these settings would be most helpful, particularly in terms of understanding the limitations to the growth effect.

Addressing early malnutrition in rural Rajasthan: Logical Frame work


Inputs
Activitie
Outputs
Outcome
Impact
Technical:
• Guidelines
• Training curricula
• TOTs
• Advocacy
Logistics:
• RUTF (locally produced)
• MUAC tapes
• Weighing scales
Human resources:
• Training times
• Supervision times
• MIS support
Training of AWWs in targeting 0-2 year for Services and support of mothers in 'at risk'
Capacity building of AWW in early diagnosis of acute
Contracting with local RUTF providers
Trainings of supervisors in supportive
Creation of MIS system and M& E tool to segregate data for services to
Counseling, reminders and self-monitoring activities to improve compliance on food
AWWs workers focus on 0-2-year age group for interventions
AWWs are have capacity and equipment to diagnose
Locally made RUTF is available at all centers
A strong M& E system is in place to monitor progress
Appropriate use of food intended for children 0-2 years of age
Occurrence of malnutrition is prevented in 0-2 years of age. Mothers are
Malnutrition is diagnosed and treated early
A high quality program is implemented
Reduction in incidence and prevalence of 0-2-year malnutrition

Final1

ORIGINALITY REPORT

18%	14%	10%	6%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	docplayer.net Internet Source	3%
2	www.science.gov Internet Source	2%
3	N. Rao, V. Kaul. "India's integrated child development services scheme: challenges for scaling up", Child: Care, Health and Development, 2018 Publication	1%
4	savethechildren.org.nz Internet Source	1%
5	Submitted to Aga Khan University Student Paper	1%
6	www.prsindia.org Internet Source	1%
7	www.nrhmassam.in Internet Source	1%
8	www.msf-crash.org Internet Source	1%

9	moneylane.news Internet Source	1%
10	Tulika Goswami Mahanta, Manjit Baruah, Bhupendra Narayan Mahanta, Pranab Gogoi, Jenita Baruah, Sachin Gupte. "Process evaluation of Village Health and Nutrition Day observation (VHND) in a block of Dibrugarh District of Assam", Clinical Epidemiology and Global Health, 2015 Publication	1%
11	Submitted to Bloomsbury Colleges Student Paper	1%
12	Courtney C Choy, Mayur M Desai, Jennifer J Park, Elizabeth A Frame, Avery A Thompson, Take Naseri, Muagututia S Reupena, Rachel L Duckham, Nicole C Deziel, Nicola L Hawley. "Child, maternal and household-level correlates of nutritional status: a cross-sectional study among young Samoan children", Public Health Nutrition, 2017 Publication	<1%
13	"IUNS. 21st International Congress of Nutrition. Buenos Aires, Argentina, October 15-20, 2017: Abstracts", Annals of Nutrition and Metabolism, 2017 Publication	<1%

14	documents.worldbank.org Internet Source	<1%
15	Submitted to University of Melbourne Student Paper	<1%
16	www.childlineindia.org.in Internet Source	<1%
17	www.who.int Internet Source	<1%
18	www.worldbank.org Internet Source	<1%
19	Submitted to EDMC Student Paper	<1%
20	Vinod Kumar Paul, Harshpal Singh Sachdev, Dileep Mavalankar, Prema Ramachandran et al. "Reproductive health, and child health and nutrition in India: meeting the challenge", The Lancet, 2011 Publication	<1%
21	Submitted to Lal Bahadur Shastri National Academy of Administration of Management Student Paper	<1%
22	Submitted to Rajiv Gandhi National University of Law Student Paper	<1%
	Submitted to CSU, Long Beach	

23	Student Paper	<1%
24	spotidoc.com Internet Source	<1%
25	Nutrition and Food Science Present Knowledge and Utilization, 1980. Publication	<1%
26	pratichi.org Internet Source	<1%
27	www.slideshare.net Internet Source	<1%
28	Aimee Summers, Oleg O Bilukha. "Suboptimal infant and young child feeding practices among internally displaced persons during conflict in eastern Ukraine", Public Health Nutrition, 2017 Publication	<1%
29	wcd.nic.in Internet Source	<1%
30	uk.sagepub.com Internet Source	<1%
31	rchiips.org Internet Source	<1%
32	Christine Powell. "Overview of Early Child-Care and Education Programmes and Jamaican Case Studies", Food and Nutrition Bulletin,	<1%

2016
Publication

33	Submitted to University Der Es Salaam Student Paper	<1%
34	scholar.sun.ac.za Internet Source	<1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		