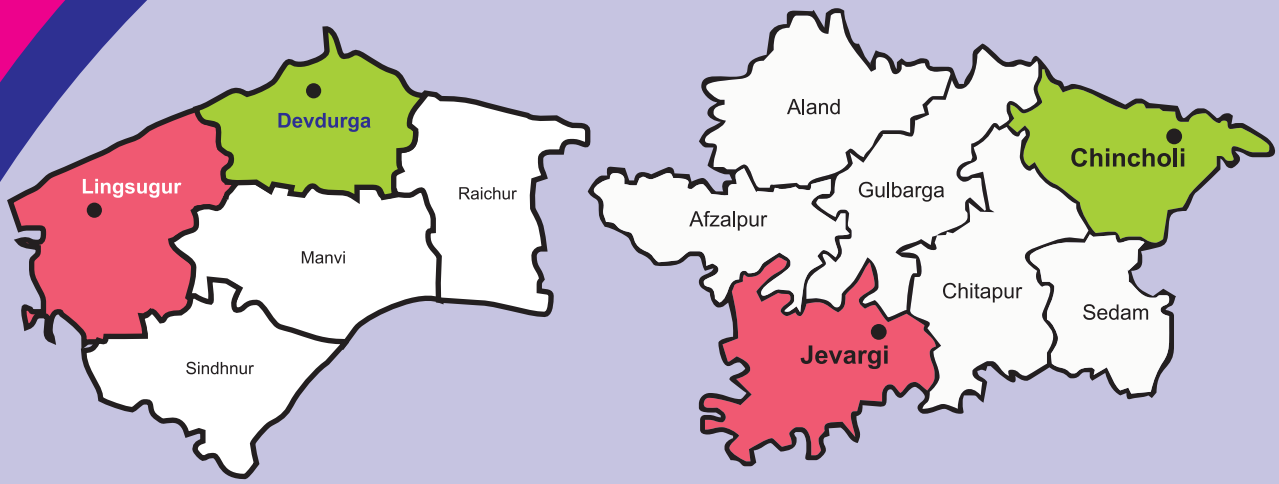
IMPACT EVALUATION OF KARNATAKA MULTI-SECTORAL NUTRITION PILOT PROJECT



ICMR-NATIONAL INSTITUTE OF NUTRITION
Indian Council of Medical Research
Hyderabad – 500 007, Telangana

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DRAFT REPORT

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Executive Summary

Undernutrition continues to be a major public health problem in the developing countries, including India, the most vulnerable groups being women and young children. Proper nutrition is necessary for adequate growth and development of children. Undernutrition has a multi-factorial aetiology, which include both nutrition and non-nutrition components.

National Nutrition Monitoring Bureau (NNMB), which has conducted repeat surveys in rural India since 1975-79 to 2011-12 period has also shown a reduction in nutrition in preschool children over the last four decades. Stunting reduced from 82% during 1975-79 to 45.7% in 2011-12 period. The relative reduction in stunting was 44.2% at a rate of 1.1% per year. The relative reduction of severe stunting was 65.6%, while there was a slight increase in moderate stunting from 24.1% to 25.8% between 1975-79 and 2011-12 respectively. Wasting also reduced during the same period from 27% to 15.5% at 0.34% per year. The relative reduction in severe wasting was 54.9%, while reduction in moderate wasting was 37.2%. Underweight also reduced from 75.5% to 41.1% at a rate of 1% per year. Relative reduction in severe underweight (69.4%) was much higher than moderate underweight (15.3%). As per the National Family Health Survey (NFHS) 3 report, the prevalence of underweight, stunting and wasting among under 5 children in rural areas of Karnataka. As, reported by NNMB micronutrient survey 2003, the overall prevalence of anaemia among pre-school children, adolescent girls, pregnant women and lactating mothers was 66.9% ,81.2%, 75% and 78% respectively and the corresponding figures for the state of Karnataka were 66%, 67%, 80% and 75% respectively.

Keeping in view the magnitude of under nutrition as well as micronutrient malnutrition, the government of Karnataka has initiated the Comprehensive Nutrition Mission to address the underlying prevalence of under nutrition and to clip the gaps in the existing/on-going nutrition programmes. The mission has been implementing Karnataka Multi-sectoral Nutrition Pilot (KMNP) project with the objective to reduce malnutrition by increasing utilization of services related to nutrition services for children <3 years, adolescent girls, pregnant women and lactating mothers in the selected two blocks in on pilot basis. The KMNP was implemented in Chincholi (Gulbarga district) and Devadurga (Raichur district) Blocks of Karnataka since 2015. KMNP envisaged a life cycle nutrition supplementation intervention that seeks to provide support at critical phase of growth for pregnant women, young children and adolescent girls. Effectively, there are three important components of KMNP of which Components 1 and 2 are

the focus of the evaluation; the third and final component focuses on administration, capacity building and internal activities for KMNP. The intervention continued till the end of September 26, 2018 and National Institute of Nutrition under the ambit of MoU with KCNM has carried out the impact evaluation of the KMNP project by assessing the inputs against outcome indicators with neighbouring non-intervention blocks as control. This impact evaluation was carried out by collecting quantitative and qualitative data using mixed methods approach with the objective to assess the impact of the KMNP interventions on the nutritional status of under three-year children and adolescent girls. The sampling design was a community-based case control study by adopting cluster sampling procedure. Similar blocks in the respective districts in human development index were taken as intervention and control blocks. Chincholi and Jewargi blocks of Gulbarga and Devdurga and Lingasugar blocks of Raichur. Chincholi and Devdurga blocks are Intervention groups. Study subjects were mothers of under 3 children who were current beneficiaries and adolescent girls who were current beneficiaries. For the purpose of survey, in each arm, a total of 30 villages representing the entire intervention blocks were selected by adopting systematic random sampling procedure. In each of the selected village, a total of 20 households having at least one index child of under 3 years of age who was a current beneficiary was covered by adopting cluster sampling method. In the control blocks, a set of criteria used by IIM was used for selection of children and adolescent girls. The investigations like socio-economic and demographic particulars, Antenatal Care (ANC) particulars, immunization history, morbidity, anthropometry (height, weight and Mid upper Arm Circumference (MUAC)), haemoglobin, nutrition history, child care practices, hygiene, dietary intakes (FFQ) were taken for mothers of under 3 children and adolescent girls. For qualitative data, Information on knowledge and practices (K&P) of Adolescent girls, mothers on infant and child nutrition as well as socio-cultural aspects of food consumption were collected till theoretical saturation was reached.

Majority of the mothers in their last pregnancy had undergone ANC check-ups (>98%) in both the groups. However, the place of ANC was Primary Health Centre (PHC) (65.5%) in the Intervention blocks compared to the control blocks (51.6%). A higher proportion in the control blocks were visiting private facility (45.6%) compared to the Intervention blocks (32.2%). The number of ANC visits was more or less similar in the Intervention and control blocks and majority of them were attending at least 4 ANC visits. In general counselling on health and nutrition was higher in the intervention blocks compared to the control blocks during the ANC visits. A higher proportion of mothers in the intervention blocks (98.2%) were consuming extra food during pregnancy, compared to the control blocks (95.4%). Similarly, a

higher proportion of mothers in the intervention blocks (95.2%) were receiving Take Home Ration (THR) food during pregnancy, compared to the control blocks (88.7%). A higher proportion of mothers in the control blocks (8.9%) did not receive Tetanus Toxoid (TT) injection, compared to the intervention blocks (2.7%). The number of tablets received and consumed was not different between the groups. Morbidities in children were in general lower in the Intervention blocks compared to the control blocks in the last 15 days. A higher proportion in the Intervention blocks received THR food in the intervention blocks compared to the control blocks. Similarly, more children received 2 doses of Vitamin A and deworming in the Intervention groups compared to the control blocks. A higher proportion of mothers said they would visit a private doctor in case of illness to the child in both the intervention blocks and the control blocks. About 70% of the mothers said they would give Oral Rehydration Salt (ORS) during diarrhoea and was not different between the groups. In case of Acute Respiratory tract infection (ARI), a higher proportion said they gave co-trimoxazole in the Intervention group compared to the control blocks. About 1 in 4 mothers said that their mother in law would take care of the child, when she goes to work. A higher proportion of the mothers in the intervention group (96%) compared to the control group (58.1%) washed hands with soap before feeding the child. There was a higher proportion of mothers and adolescent girls in the Intervention block compared to the control blocks, who were aware of basic nutrition and health related issues. A higher proportion in the Intervention blocks were beneficiaries in the Mid-day Meal programme at schools compared to the control blocks. A higher proportion of the adolescent girls in the intervention group compared to the control group received Iron folic acid (IFA) tablets in the past one year. Mothers and adolescent girls reported that counselling, group meetings, house visits, growth monitoring and food supplementation were being regularly provided by Village Nutrition Volunteers (VNVs). Mothers of under 3 children reported that they found both counselling and nutrition supplementation useful. They could see a perceptible influence in their child nutritional status like weight and also a feeling of well-being. Adolescent girls also reported that nutrition education and nutrition supplementation was useful and felt an overall well-being in addition to increase in weight. Mothers of under 3 children as well as adolescent girls reported good acceptability of shakti vita. Mothers of under 3 children and adolescent girls felt that counselling alone was also beneficial as it is impacted their behaviour change in terms of hygiene, sanitation and dietary intakes. Both mothers of under 3 children as well as adolescent girls requested for the continuation of VNVs and shakti vita as they found both to helpful. Mothers of under 3 children as well as adolescent girls felt that VNVs were complementary to the services provided by AWW (Anganwadi workers). Mean

Height for age Z scores, an indicator for chronic malnutrition was better in children in the intervention block, while Mean Weight for height Z scores, an indicator of acute malnutrition was lower in the control blocks. Stunting was about 6% lower in the intervention blocks (46%) compared to the control blocks (52.1%) and was statistically significant (P <0.05). The overall thinness (an indicator of chronic energy deficiency) was similar in the intervention blocks (30.2%) and control blocks (28.2%) and was not significant (P=0.45). The overall prevalence of stunting in adolescent girls was 34.3% and was similar in the intervention blocks (35.6%) and the control blocks (33.0%) and was not significant (P=0.34). The overall prevalence of anaemia was 84.8% and was significantly lower (P=0.001) in the intervention blocks (81%) compared to the control blocks (89.5%).

In conclusion, there was a significant difference in the intervention blocks compared to the control blocks in the nutritional status as indicated by lower stunting of children and lower anemia in adolescent girls in the Intervention group compared to the control group. There was a significant difference in the intervention blocks compared to the control blocks on awareness of nutrition, health and sanitation related issues and utilization of various government programs, which were better off in the Intervention blocks compared to the control block. The overall wellbeing in children and adolescent girls in the Intervention group as assessed by qualitative methods

CONTENTS

1. INTRODUCTION

Under nutrition is one of the important public health problems and is alarming the biggest human development challenges in India. A surfeit of nutrition and health intervention programmers was launched by the government of India to address all aspects of nutrition, take a lifecycle approach. The most important nutrition programmes are National Nutrition Anemia Control Programme (NNAC)[1], National Prophylaxis Programme for prevention of nutritional blindness due to vitamin A deficiency[2] and National Iodine Deficiency Control Programme[3], which are aimed at combating micronutrient deficiencies. In addition, many supplementary feeding programmes, have been taken up to ensure food and nutrition security of population. Despite implementation of these programmes for more than four decades, impact evaluations at different points of time showed limited effects. Despite a plethora of programmes and substantial improvement in health since the country's independence in 1947, under nutrition remains a resistant problem with 40 percent children under the age of five being underweight, 30 percent of new-borns being low birth weight and 70 percent of women and 79 percent of children being anemic[4].

The health and nutritional status of population has a significant impact on the overall development of the nation. As stated by the World Bank, 'nutrition is the centre of development for any nation'. Better health and nutritional indicators of children below 5 year of age and women in the reproductive age group are true reflection of the development of a nation. Either the UN Millennium Development Goals (MDGs) or the latest Sustainable Development Goals (SDGs), cannot be achieved unless health and nutrition status of women and children is improved[5].

Nutritional status of a population is dependent on nutrition sensitive and nutrition specific factors[6], and it has been shown from repeated surveys of National Nutrition Monitoring Bureau (NNMB) in rural India, that dietary consumption has been not optimal in all age groups particularly in the vulnerable segments such as under 5 children and pregnant women[7]. As per the NFHS 3 report, the prevalence of underweight, stunting and wasting among under 5 children in rural areas of Karnataka was 33.3%, 42.4% and 18.9% respectively[8].

In India, high prevalence of undernutrition and multiple micro-nutrient malnutrition are the major nutritional problems of public health significance among different age and physiological groups in both rural, urban or tribal areas. Children of under 5 years of age, adolescent girls, pregnant women and lactating mothers, especially those residing in the chronically drought prone rural and tribal areas and urban slums are nutritionally most vulnerable.

Micronutrient deficiencies (MNDs), particularly vitamin A deficiency (VAD), iron deficiency anaemia (IDA), iodine deficiency disorders (IDD) and zinc deficiencies are major nutritional problems that adversely affect the people's health, cognitive function, performance and productivity and income, thereby becoming a major impediment to economic development[9]. Undernutrition as well as micronutrient deficiencies continue to plague public health in India despite the green revolution and implementation of several national nutrition intervention programmes for over four decades.

As, reported by NNMB micronutrient survey 2003, the overall prevalence of anaemia among pre-school children, adolescent girls, pregnant women and lactating mothers was 66.9% ,81.2%, 75% and 78% respectively and the corresponding figures for the state of Karnataka were 66%, 67%, 80% and 75% respectively[10].

National Nutrition Monitoring Bureau, which has conducted repeat surveys in rural India since 1975-79 to 2011-12 period has also shown a reduction in nutrition in preschool children over the last four decades. Stunting reduced from 82% during 1975-79 to 45.7% in 2011-12 period[11,12]. The relative reduction in stunting was 44.2% at a rate of 1.1% per year (calculated over a period of 34 years). The relative reduction of severe stunting was 65.6%, while there was a slight increase in moderate stunting from 24.1% to 25.8% between 1975-79 and 2011-12 respectively. Wasting also reduced during the same period from 27% to 15.5% at 0.34% per year. The relative reduction in severe wasting was 54.9%, while reduction in moderate wasting was 37.2%. Underweight also reduced from 75.5% to 41.1% at a rate of 1% per year. Relative reduction in severe underweight (69.4%) was much higher than moderate underweight (15.3%).

The National Nutrition Monitoring Bureau (NNMB) surveys carried out in rural and tribal areas of 10 NNMB states including Karnataka during three points of time also revealed that the population in general, and children below 5 years and school age were subsisting on poor diets in terms of both quantity and quality. Similarly, the diets were grossly deficit for majority of nutrients in general and vitamin A, iron, riboflavin, calcium and folic acid in particular.

Keeping in view the magnitude of under nutrition as well as micronutrient malnutrition, the government of Karnataka has initiated the Comprehensive Nutrition Mission to address the underlying prevalence of under nutrition and to clip the gaps in the existing/on-going nutrition programmes. The mission has been implementing Karnataka Multi-sectoral Nutrition Pilot (KMNP) project with the objective to reduce malnutrition by increasing utilization of services related to nutrition services for children <3 years, adolescent girls, pregnant women and

lactating mothers in the selected two blocks in on pilot basis. The KMNP was implemented in Chincholi (Gulbarga district) and Devadurga (Raichur district) Blocks of Karnataka since 2015.

Intervention details

KMNP envisaged a life cycle nutrition supplementation intervention that seeks to provide support at critical phase of growth for pregnant women, young children and adolescent girls. Effectively, there are three important components of KMNP of which Components 1 and 2 are the focus of the evaluation; the third and final component focuses on administration, capacity building and other activities for KMNP. The focus of these components are:

Component 1: Increase consumption of nutritious foods and improve household nutrition-related knowledge and behaviours.

This component delivers direct support to under-three children, adolescent girls and pregnant/ lactating women from poor and vulnerable households in the form of locally-sourced nutrition supplements coupled with support to encourage household behaviours with a large impact on nutrition, notably breastfeeding, complementary feeding and hygiene practices through Village Nutrition Volunteers (VNV). The high-energy nutrition supplement was locally produced using local farm produce such as millet (*ragi*), chickpeas (*gram*), cane sugar (*jaggery*) and groundnuts. Village Nutrition Volunteers (VNV) engaged under the project implemented the program at the village level with the support of grassroots groups, including women's self-help groups and village health and sanitation committees as well as the government health workers such as Anganwadi workers (AWW) and Accredited Social Health Activists (ASHA). These groups supported the VNVs to identify and provide support to women and children facing food insecurity and malnutrition. Capacity building support was also provided to women's self-help groups. The implementation of this component was the responsibility of Karnataka Health Promotion Trust (KHPT). KHPT set-up production units and produced high-energy nutritional supplements in accordance with state food safety regulations. KHPT distributed the food supplements through the Village Nutrition Workers to the targeted beneficiaries. It was also responsible for identifying, engaging and providing capacity building and ongoing supervision support to nutrition volunteers and SHGs under the project.

A separate Non-governmental organization (NGO) was contracted to develop Social and Behavioural Communications Change (SBCC) materials that was used in the field by KHPT. KHPT remains responsible for the provision of a nutritional supplement, training and supervising volunteer nutrition educators to deliver the intervention, and also responsible for routine monitoring and evaluation, as agreed with the KSRLPS and the World Bank. The

interventions included flipchart counselling, radio communications, Wall posters, group counselling etc.

Component 2: Improve access to multi-sectoral interventions with an impact on nutrition.

This component aimed to leverage interventions and services in several sectors that have an impact on the nutritional status of poor families in the target areas. At the policy and administrative levels, coordination was strengthened between key programs. On the ground, contracted NGOs, community-based organizations, and village nutrition workers facilitated access by poor families to programs in various sectors. In addition, demand generation activities empowered vulnerable households and communities to demand services and benefits to which they are entitled. This included programs and services with an impact on nutrition, such as Integrated Child Development Services (ICDS) and health services (including treatment of severe acute malnutrition, immunization, diarrhea treatment, de-worming, micro-nutrient supplementation, antenatal care, etc.).

Component 3: Project Management and Monitoring & Evaluation:

This component focused on internal capacity development to help the scheme conducts its own audit, monitoring, planning and evaluation activities. Thus, this component finances the creation of management capacity for implementation of the project, including the management costs of the implementing NGOs and the development of an effective information, education and communication (IEC) strategy which was monitored for assessing behaviour change. Rigorous monitoring and evaluation were supported, including baseline and follow-up household surveys to measure nutritional status, household knowledge and behaviours, and access to services. This provided the necessary evidence on program effectiveness to inform decisions on potential scale-up. Routine reporting and monitoring will also be ensured under this component. This component also promoted knowledge dissemination with a variety of stakeholders through briefing notes and knowledge sharing workshops.

A key activity prior to program roll-out was the identification of beneficiaries to be targeted by KMNP. The original proposal consisted of rolling-out the intervention to 40% of the poorest households. A simple strategy of rolling-out to all Below Poverty Line (BPL) households in each taluka was not possible because the target population were children, adolescent girls and pregnant and lactating women who were malnourished and there is no obvious way to do a nutrition ranking within the BPL population. While there is significant concentration of the malnourished among the poor (i.e. BPL households), this is far from perfect. For example, women in households without a BPL card may become pregnant and malnourished due to greater nutritional needs during pregnancy. Thus, such women are at-risk

of poor health outcomes even as they belong in non-poor families. While a BPL based admission strategy is easy as an operational strategy in terms of roll-out it is not clear that it serves the goals for KMNP.

Recognizing similar concerns, KHPT used data from the 2011 Socio-Economic and Caste Census (SECC), commissioned by the Ministry of Rural Development, Government of India, to identify individuals who were at risk. The SECC survey collected data at the individual and household level on the following: occupation, education, disability, religion, Scheduled Caste/Tribe (SC/ST) status, name of caste/tribe, employment, income and source of income, asset ownership, housing, consumer durables and non-durables and ownership of land presents a list of criteria that KHPT used to identify a set of individuals who were eligible for inclusion as beneficiaries for the scheme.

TABLE 1: CRITERIA FOR SELECTING SUBJECTS IN THE CONTROL AREAS

S.no	Auto-Include Criteria	Deprivation indicators used to rank households
1	Households without shelter	Only one room with kutcha walls and kutcha roof
2	Households where main occupation is manual scavenging	No adult member between age 16 to 59 years
3	Primitive Tribal groups	Female headed households with no adult male member between age 16 to 59
4	Legally released bonded laborers	Disabled member and no able-bodied adult member
5		SC/ST households
6		No literate adult above 25 years
7		Landless households deriving major part of their income from manual casual labor
8		Monthly income of highest earning household member, less than 1000 per month

The algorithm to identify beneficiaries begins with the SECC data for the two talukas and automatically selects all households that meet any of the auto-include criteria listed in column were used to give each household an ordinal rank based on a principal component analysis. Households were subsequently classified into tertiles and households in the lowest tertile with

average income below Rs. 10,000 per month were given highest priority for inclusion into the beneficiary list. The final list was arrived at by placing indicative caps for each beneficiary group that is calculated as the estimated number of children below the age of 36 months, adolescent girls in the 11 – 18 years of age, pregnant and lactating women to be expected in 40% of BPL households. This formed the eligible list.

TABLE 2 COUNT OF BENEFICIARIES IDENTIFIED BY KHPT IN PILOT AREAS

	Settlement			Adolescent	Women		
Taluka	Type	N	Children	Girls	Pregnant	Lactating	Total
Chincholi	Tandas	85	525	476	61	87	1149
	Villages	135	3738	6351	623	1562	12274
	Sub-Total	220	4263	6827	684	1649	13423
Devadurga	Doddis	58	26	130	13	17	186
	Tandas	62	214	197	16	66	493
	Villages	170	3974	4808	528	1618	10928
	Sub-Total	290	4214	5135	557	1701	11607
TOTAL		510	8477	11962	1241	3350	25030

The eligible list was further updated through field visits and explicit selection of beneficiaries by the VNV (along with their Supervisors) to verify the list arrived at via the SECC analysis. The list was updated to reflect absences (people listed in the SECC exercises who had migrated, or were not identifiable based on SECC data, or had assets not listed in the SECC data) and inclusions (identifiably poor households such as those who are homeless i.e. meeting auto-inclusion criteria in the table. A summary of the final beneficiary list is presented in the above table and this reflects that almost half of each target population is from each of the taluka. A final point to note is that the numbers selected for inclusion is significantly larger than the number of beneficiaries originally estimated. This exercise was completed at some time during November 2015 and is the basis for all subsequent roll-out. The intervention continued till the end of September 26, 2018 and National Institute of Nutrition under the ambit of MoU with KCNM has carried out the impact evaluation of the KMNP project by assessing the inputs against outcome indicators with neighbouring non-intervention blocks as control.

2.OBJECTIVES

This impact evaluation was carried out by collecting quantitative and qualitative data using mixed methods approach with the following specific objectives:

I. **Quantitative data**

Primary Objective

1. To assess the impact of the KMNP interventions on the nutritional status of under three-year children and adolescent girls

Secondary objectives

1. To assess the impact of the KMNP interventions on pregnancy weight gain and birth weight
2. To assess the impact of KNMP interventions on behaviour change in target groups
3. To assess the coverage of ICDS, Immunization and other health related programs in intervention and control areas

II. **Qualitative data**

1. To assess the perceived impact of the IEC activities disseminated under this project through Behaviour change communication (BCC) aimed at improving the knowledge and behaviours of HHs regarding improved nutritional and child care practices, such as initiation of breast feeding, feeding colostrum, exclusive breasting for 1st 6 months and initiation of complementary feeding by completion of 6 months and also nutritional care of adolescent girls, pregnant women and lactating mothers, and dietary improvement in the household.
2. To assess the acceptability and demand for energy dense supplementary foods and perceived impact of such foods on the nutritional status of the beneficiaries and also its consumption pattern.

3. Methodology

Before the start of the study, Institutional Ethical clearance was taken. In the field, written consent was taken from mothers of under 3 children, adolescent girls for administration of the questionnaire. Further consent was taken for collection of blood through finger prick from adolescent girls.

3.1 Sampling Design:

A community-based case control study by adopting cluster sampling procedure. Similar blocks in the respective districts in human development index were taken as intervention and control blocks.

3.2.1 Estimation of Sample size:

Expecting a reduction of 10% in stunting from 45% (NFHS 3 Karnataka report) to 35%, with 95% CI, 80% Power, design effect of 1.5 and non-response rate of 10%, the required sample size is 600 children per group i.e. 600 in control blocks and 600 in intervention blocks.

A total of 600 children along with their mothers each in intervention and control areas (30 villages X 20 children = 600) were covered. Similarly, expecting a similar reduction of thinness from 45% to 35% in adolescent girls, 600 adolescent girls were taken from each of the intervention and control areas.

3.2.2 Type of study: Case Control Study

3.2.3 Study setting: Chincholi and Jewargi blocks of Gulbarga and Devdurga and Lingasugar blocks of Raichur. Chincholi and Devdurga blocks are Intervention groups

3.2.4 Study subjects: Mothers of under 3 children, under 3 children, adolescent girls

3.2.5 Inclusion criteria:

- HHs with under 3 children who were current beneficiaries and their mothers, HHs with adolescent girls who were also current beneficiaries.
- For the control group, selection was based on socio demographics indicators previously used by Indian Institute of Management (IIM), Bangalore for the baseline survey.

3.2.6 Exclusion criteria:

- HHs with mothers and adolescent girls suffering from chronic diseases such as TB, HIV were excluded

3.3 Selection of Villages and HHs:

For the purpose of survey, in each group, a total of 30 villages representing the entire intervention blocks were selected by adopting systematic random sampling procedure. In each of the selected village, a total of 20 households having at least one index child of under 3 years of age who was a current beneficiary was covered by adopting cluster sampling method. For this purpose, the main village and its hamlets, if any, were divided into 5 geographical areas, based on natural groups of household/streets/ mohallas/areas etc. Households belonging to Scheduled Caste and Scheduled Tribe communities formed one group. From each of these groups, the beneficiaries were randomly selected. In each of the selected HH, the beneficiary children <3 year and their mothers were covered for the survey. Similarly, the required numbers of beneficiary adolescent girls, from each village were covered similarly. If the required number of under 3 children and adolescent girls were not available from the select HHs, they were covered from the HHs of the nearby village using similar procedures of selection described above.

Intervention and Control area selection: Only those children and adolescent girls in the intervention blocks were taken for the survey, who had VNV card and was a beneficiary. In the control blocks, a set of criteria used by Indian Institute of Management (IIM), Bangalore was used for selection of children and adolescent girls. The criteria are given in Table 3

Table 3 Auto include criteria for the control group

S.no	Auto-Include Criteria	Deprivation indicators used to rank households
1	Households without shelter	Only one room with kutcha walls and kutcha roof
2	Households where main occupation is manual scavenging	No adult member between age 16 to 59 years
3	Primitive Tribal groups	Female headed households with no adult male member between age 16 to 59
4	Legally released bonded laborers	Disabled member and no able bodied adult member
5		SC/ST households
6		No literate adult above 25 years
7		Landless households deriving major part of their income from manual casual labor
8		Monthly income of highest earning household member, less than 1000 per month

3.4 Investigations

The investigations like socio-economic and demographic particulars, ANC particulars, immunization history, morbidity, anthropometry (height, weight and Mid Upper Arm Circumference (MUAC)), haemoglobin, nutrition history, child care practices, hygiene, dietary intakes (FFQ) were taken for mothers of under 3 children and adolescent girls.

I. Quantitative methods

3.4.1 Household demographic and socioeconomic particulars

Information on demographic and socio-economic particulars were collected in all the households selected, using a pre-coded and pre-tested questionnaire.

3.4.2 Pregnancy history and ANC particulars

Pregnancy and Antenatal care (ANC) particulars were taken regarding live births, abortions, birth weight, place of delivery, ANC visits, ICDS participation etc.

3.4.3 Immunization and morbidity history

Immunization uptake and Information on history of morbidity among <3years children such as fever, respiratory infection, diarrhoea, and measles, if any, during the previous 15 days of visit were collected.

3.4.4 Anthropometry and Hb estimation

Height to nearest 0.1 cm, weight to nearest 100 grams and MUAC (only in children) to the nearest 0.1 cm were carried out in children, mothers of under 3 children and adolescent girls from the selected HHs and was measured using standard equipment and procedures[13]. The nutritional status of children was assessed according to SD classification using WHO growth standards 2006[14]. Similarly, the nutritional status of selected adolescent girls (thinness and stunting based on WHO standards for BMI and height for age and gender) and lactating mothers (BMI) were assessed.

A subsample of adolescent girls who consented for blood samples were included for Hemoglobin (Hb) estimation. 20µl blood were drawn using Hb pipette on whatman no. 1 filter paper, dried and sent to NIN for Hb estimation. Haemoglobin estimation was done using Cynmethhemoglobin method. The criteria recommended by the World Health Organization (WHO) 2001 were used to diagnose anaemia.

Standard Deviation Classification

Nutritional status of <3-year children were assessed according to weight-for-age, height-for-age and weight-for-height, by Standard Deviation classification recommended by WHO, as given below:

Table 4: Cut off values for assessing nutritional status of under 3 children

Cut-off level	**Nutritional grade**		
	Weight for Age	**Height for Age**	**Weight for Height**
≥ Median –2SD	Normal	Normal	Normal
<Median–2SD to ≥Median-3SD	Moderate underweight	Moderate stunting	Moderate wasting
<Median – 3 SD	Severe underweight	Severe stunting	Severe wasting

For adolescents

The school age children and adolescents were categorized into various grades of nutritional status using BMI Z-scores (WHO Reference value[15]) as given below:

Table 5: Adolescent girls nutritional status based on WHO classification

BMI Z scores	Nutritional grade
< Median –3 SD	Severe Thinness
–3 SD to –2 SD	Moderate Thinness
–2 SD to +1 SD	Normal
+1 SD to +2 SD	Overweight
≥ Median +2 SD	Obesity

3.4.5 Diet Survey

Dietary pattern was assessed using a Food Frequency Questionnaire (FFQ) method to know the pattern of consumption of various food groups.

3.4.6 History of Morbidity

Information on history of morbidity among <3years children such as fever, respiratory infection, diarrhoea, if any, during the previous 15 days of visit were collected.

3.4.7 Nutrition history

Information on breast feeding practices such as initiation of breast feeding, exclusive breast feeding and current feeding practices on complementary feeding were taken. Information on participation of ICDS programmes were also collected.

3.4.8 Child care practices and hygiene

Information on child care practices on treatment of diarrhoea, hand washing practices, storage of water were collected.

3.4.9 Counselling by VNV and Shakti Vita food supplementation (Intervention group)

Information regarding VNV visits, activities and counselling were recorded in the Intervention blocks. Similarly, information on Shakti Vita food supply, consumption and acceptability were taken.

3.5 Recruitment, Training and Standardization

All the investigators were recruited locally, trained and standardized in various aspects of survey methodology for 2 weeks at Gulbarga, Karnataka by a core team of scientists from NIN.

3.6 Quality Control

The Scientists from NIN periodically carried out random visits to the field and monitor the data collection to ensure quality.

3.7 Data Analysis

The data was scrutinized and entered into the computers as soon as the data was received at NIN from each district. Analysis was carried out using SPSS Windows version 19.0 and R programming software (version 3.4). Appropriate statistical tools were used for data analysis. For main outcome measure stunting and thinness, chi square test was be done to see significant differences between the groups. P value less than 0.05 was considered significant.

3.8. Qualitative methods

3.4.5 Knowledge & Practice of mothers, Adolescent girls

In-depth Interviews

Information on knowledge and practices (K&P) of Adolescent girls, mothers on infant and child nutrition as well as socio-cultural aspects of food consumption were collected in HHs having at least one child of below 3 years of age till theoretical saturation was reached.

In depth interviews (IDIs) with Village Nutrition Volunteers (VNVs), AWW, ASHA, SHGs and VNV supervisors (in a sample of the selected villages) were done

The following issues were discussed

i. What was the pre-intervention situation?
ii. What was the perceived improvement after intervention?
iii. How sustainable is the achieved improvement?
iv. Process of implementation
v. Nutrition and health issues

3.4.7 Focus Group Discussions

Focus Group Discussions (FGDs) were carried out for the following Target group:

i. Mothers of under 3 years

   On nutrition knowledge, any change perceived after the initiation of current intervention, what help/support they are receiving from the village Nutrition volunteers, what extent availing ANCs, any change observed before and after intervention.

ii. Adolescent girls: With themes, similar as above

Table 6 Summary of qualitative data collection

Sno	Qualitative method	Numbers
FGDs		
1	Focused group discussions in mothers of under 3 children	4
2	Focused group discussions in adolescent girls	3
In-depth Interviews		
1	VNV interviews	12
2	VNV supervisor interviews	3
3	AWW interviews	13
4	Asha interviews	7
5	SHG interviews	2

Table 7 Details of focussed group discussions in the study area

	Sl no	area	Participant no	Participants Age
FGD for Lactating mother	**1**	Bandegudda	1	24
			2	23
			3	27
			4	28
			5	20
			6	22
	2	Chindanoor	1	28
			2	22
			3	25
			4	22
			5	23
	3	Sulepeth	1	28
			2	27
			3	24
			4	20
			5	24
			6	30
			7	26
	4	Yalakapalli	1	21
			2	27
			3	28
			4	26
			5	20
			6	21
FGD for Adolescent girls	1	Bandegudda	1	13
			2	12
			3	13
			4	16
			5	15
			6	14
			7	15
			8	12
	2	Marpalli	1	16
			2	14
			3	16
			4	16
			5	14
			6	15
	3	Chindanoor	1	13
			2	15
			3	15
			4	15

			5	15
			6	12
			7	14
			8	16
			9	16

Table 8 Details of In depth interviews in the study area

	Sl no	village
VNV	1	Chindanoor
	2	Kudavandanapura
	3	Nidagunda(Jetlur)
	4	Yalakapalli
	5	Pangarga
	6	Tumkunta
	7	Eragapalli
	8	Chandankera
	9	Neemahosahalli
	10	Marapalli
	11	Shivarampura
	12	Bhogalingadahalli
supervisor	1	Sulepeth
	2	Chandankera
	3	Pangarga
ASHA	1	Kanmeswar
	2	bhosga
	3	Kollur
	4	Satheked
	5	Rajwal
	6	Marapalli
	7	Chandankera
Anganwadi Worker	1	Rajwal
	2	Satheked
	3	Kanmeswar
	4	bhosga
	5	Bhosga
	6	Malla
	7	Sonna
	8	Kollur
	9	Kudavandanapura
	10	Sulepeth
	11	Marapalli
	12	Eragapalli
	13	Pangarga
SHG member	1	Harsugundagi
	2	Eragapalli

4.0 RESULTS

4.1 Socio demographics

Table S1 shows socio demographics and characteristics of mothers of under 3 children. About 1 in 2 mothers and fathers of under 3 children were literate in both the blocks. Mothers and fathers of the control blocks had higher literacy compared to the intervention blocks. About 1 in 2 households belonged to Scheduled Caste (SC) and Scheduled Tribes (SC) and was similar in the intervention and control blocks. Majority of the HHs belonged to Hindu religion and was no difference between the groups. There was also no difference in the type of family, number of children, adults, duration of stay, type of house, Ownership, cooking fuel used, source of drinking water. Majority of the HHs had no toilet facility. 80% of the HHs in the Intervention group had no toilet facility compared to 75% in the Intervention blocks. Similarly, more HHs in the intervention blocks had BPL card and were participating in PDS compared to the Control blocks. There were no differences in majority of the HH assets. However, HHs in the control blocks had more two wheelers, while HHs in the intervention blocks had more livestock. Mean age of the mothers was about 25 years. While mean age was 18.5 years, mean age of pregnancy was 20 years. There were no major differences in the intervention and control blocks regarding the characteristics of mothers.

4.2 Pregnancy history and ANC particulars

Majority of the mothers in their last pregnancy had undergone ANC check-ups (>98%) in both the groups (Table S2). However, the place of ANC was PHC (65.5%) in the Intervention blocks compared to the control blocks (51.6%). A higher proportion in the control blocks were visiting private facility (45.6%) compared to the Intervention blocks (32.2%). The number of ANC visits was more or less similar in the Intervention and control blocks and majority of them were attending at least 4 ANC visits. In general counselling on health and nutrition was higher in the intervention blocks compared to the control blocks during the ANC visits. A higher proportion of mothers in the intervention blocks (98.2%) were consuming extra food during pregnancy, compared to the control blocks (95.4%). Similarly, a higher proportion of mothers in the intervention blocks (95.2%) were receiving Take Home Ration (THR) food during pregnancy, compared to the control blocks (88.7%). A higher proportion of mothers in the control blocks (8.9%) did not receive TT, compared to the intervention blocks (2.7%). The number of tablets received and consumed was not different between the groups.

There was no difference in the birth order between the groups and also spacing between the last two births. Low birth weight prevalence based on records was 8.7% in the intervention

blocks compared to 11.9% in the control blocks. Majority of the deliveries happened in government hospital in both the blocks. Home deliveries were higher in the control blocks (9.6%) compared to the Intervention blocks (5.8%).

4.3 Immunization, morbidity, feeding practices and Utilization of Anganwadi services

The coverage of immunization was higher in both the blocks and was more or less similar in the intervention and control blocks (Table S3). Morbidities in children were in general lower in the Intervention blocks compared to the control blocks in the last 15 days (Table S4). While exclusive breast feeding was higher in the intervention blocks, delayed complementary feeding was also higher in the Intervention blocks. Initiation of breast feeding was higher in the control blocks and also a higher proportion in the control blocks gave prelacteal feeds compared to the intervention blocks. A higher proportion in the Intervention blocks received THR food in the intervention blocks compared to the control blocks. Similarly, more children received 2 doses of Vitamin A and deworming in the Intervention groups compared to the control blocks.

4.4 Health Seeking behaviour and WASH practices among mothers

A higher proportion of mothers said they would visit a private doctor in case of illness to the child in both the intervention blocks and the control blocks (Table S5). About 70% of the mothers said they would give Oral Rehydration Salt (ORS) during diarrhoea and was not different between the groups. In case of ARI, a higher proportion said they gave co-trimoxazole in the Intervention group compared to the control blocks. About 1 in 4 mothers said that their mother in law would take care of the child, when she goes to work.

A higher proportion of the mothers in the intervention group (96%) compared to the control group (58.1%) washed hands with soap before feeding the child. Similarly, in the intervention group, a higher proportion washed hands with soap before taking a meal, bathing child, boiling water daily and storing water in steel container compared to the control group.

4.5 Knowledge about Nutrition, Health and Hygeine among mothers and adolescent girls

There was a higher proportion of mothers and adolescent girls in the Intervention block compared to the control blocks, who were aware of basic nutrition and health related issues (Table S6 and S7). Similarly a higher proportion of mothers and adolescent girls in the Intervention blocks used ORS during diarrhea compared to the control blocks. Most of the information was conveyed by the VNVs during the counselling session. While a third were aware of the information before, majority had knowledge on only few of the issues before the VNV counselling (Table not shown here).

4.6 Adolescent health and hygiene

A higher proportion in the Intervention blocks were beneficiaries in the Mid-day Meal programme at schools compared to the control blocks (Table S8). A higher proportion of the adolescent girls in the intervention group (82.8%) compared to the control group (71.0%) washed hands with soap after defecation. A higher proportion of the adolescent girls in the intervention group (59.7%) compared to the control group (39.4%) received IFA tablets in the past one year. Similarly, those who received weekly was more in the intervention group compared to the control group.

4.7 Undernutrition in children in both the districts (Gulburga and Raichur)

A total of 1410 mothers of children were surveyed in both the intervention (N=709) and control (N=701) blocks in Gulburga and Raichur districts. The mean (SD) age of children was 15.7 (9.3) months. Children in the intervention were about 1 month older compared to the control blocks ($P < 0.05$). About 48% of children were boys, with no significant differences between the groups. Mean (SD) weight of the children in the intervention blocks was 8.1 (1.8) kg compared to 7.9 (1.8) kg in the control blocks ($P = 0.05$). Mean height of children in the intervention blocks was about 1.5 cm taller than the control blocks ($P < 0.05$). Mid Upper Arm Circumference (MUAC) was also significantly higher in the intervention blocks compared to control blocks ($P < 0.001$). Mean Height for age Z scores, an indicator for chronic malnutrition was better in children in the intervention block, while Mean Weight for height Z scores, an indicator of acute malnutrition was lower in the control blocks.

Table 9 Anthropometric measures in under 3 children in Intervention and Control blocks in both the districts

	Intervention blocks	**Control blocks**	**P value**
N	709	701	
Age in months (mean (sd))	16.24 (9.33)	15.18 (9.30)	0.034
Gender = Male (%)	357 (50.4)	324 (46.2)	0.134
Weight (kg) (mean (sd))	8.07 (1.84)	7.88 (1.85)	0.050
Height (cm) (mean (sd))	72.41 (9.31)	70.93 (9.30)	0.003

Nutritional status of children was analysed using WHO growth standards for the following indicators, stunting, wasting and underweight. The overall prevalence of stunting was 49%. Stunting was about 6% lower in the intervention blocks (46%) compared to the control blocks (52.1%) and was statistically significant (P <0.05). There were however no significant differences in the grades of stunting (P = 0.08). The overall prevalence of underweight was 41.7%. There were no significant differences in the prevalence of underweight in the intervention blocks (42.9%) compared to the control blocks (40.6%). Similarly, there was no significant differences in the grades of underweight (P=0.61). The overall prevalence of wasting was 18.7% and was similar in the intervention blocks (20.1%) compared to the control blocks (17.3%) and was not statistically significant (P=0.33). Children with MUAC less than 12.5 cm, an indicator of moderate acute malnutrition was significantly lower in the intervention blocks (25.7%) compared to the control blocks (32.0%). Both severe wasting and moderate acute malnutrition was not significantly different between the groups.

Table 10 Nutritional status of children based on WHO growth standards in both the districts

	Intervention blocks	**Control blocks**	**P value**
N	709	701	
Stunting = Yes (%)	312 (46.0)	344 (52.1)	0.029
Grades of stunting (%)			0.082
Severe	166 (24.5)	182 (27.6)	
Moderate	146 (21.5)	162 (24.5)	
Normal and above	366 (54.0)	316 (47.9)	
Underweight = Yes (%)	298 (42.9)	280 (40.6)	0.416
Grades of underweight (%)			0.613
Severe	125 (18.0)	112 (16.2)	
Moderate	173 (24.9)	168 (24.3)	
Normal and above	397 (57.1)	410 (59.4)	
Wasting = Yes (%)	137 (20.1)	116 (17.3)	0.221
Grades of wasting (%)			0.335
Severe	41 (6.0)	30 (4.5)	
Moderate	96 (14.1)	86 (12.9)	
Normal and above	545 (79.9)	553 (82.7)	
MUAC less than 11.5 cm = Yes (%)	30 (4.8)	22 (3.7)	0.425

MUAC less than 12.5 cm = Yes (%)	160 (25.7)	189 (32.0)	0.018
MAM = Yes (%)	242 (38.8)	249 (42.5)	0.210

4.8 **Nutritional status of mothers of children under 3 years in both the districts (Gulburga and Raichur)**

The mean (SD) age of the mothers of children under 3 years was 25.1 (3.4) years. There was no significant differences between the mothers age in the intervention and the control blocks (P=0.20). The mean (SD) weight of mothers was about 46.4 (7.9) kg and was not significant between the groups. Mean (SD) height of the mother was 151.7 (5.3) cm and was also not significant between the groups. Mean (SD) Body Mass Index (BMI) was significantly higher in the mothers in the control block compared to the intervention block (P<0.05), however Chronic Energy Deficiency (CED) defined as BMI less than 18.5 was not significantly different between the groups.

Table 11 Nutritional status of mothers of under 3 children in Intervention and Control blocks in both the districts

	Intervention blocks	**Control blocks**	**P value**
N	709	701	
Age of mother in years (mean (sd))	25.30 (3.57)	25.07 (3.29)	0.209
Weight of mother (kg) (mean (sd))	46.09 (8.00)	46.72 (7.90)	0.142
Height of mother (cm) (mean (sd))	151.80 (5.38)	151.60 (5.33)	0.475
Body Mass Index of mother (mean (sd))	19.98 (3.14)	20.33 (3.20)	0.042
Chronic energy deficiency in mothers = Yes (%)	244 (34.9)	215 (31.4)	0.189
BMI Normal = Yes (%)	412 (58.9)	409 (59.7)	0.789

4.9 **Nutritional status of adolescent girls in both the districts (Gulburga and Raichur)**

Mean age of adolescent girls was 13.5 years. Adolescent girls in the Intervention blocks were about 6 months older compared to control blocks (P<0.01). Mean (SD) weight of adolescent girls was 35.1 (7.6) kg. Mean weight of adolescent girls in the Intervention blocks was about 1kg higher compared to control blocks and was significant (P <0.05). Similarly, adolescent girls in the intervention blocks were about 1.4 cm taller than those in the control blocks. However, there was no significant differences in the BMI in the intervention and the control blocks (P=0.06). Mean HAZ and BMIZ were also not significantly different between the groups. The overall thinness (an indicator of chronic energy deficiency) was similar in the intervention blocks (30.2%) and control blocks (28.2%) and was not significant (P=0.45). There were also no significant differences in the grades of thinness between the groups (P=0.64). The overall prevalence of stunting in adolescent girls was 34.3% and was similar in the intervention blocks (35.6%) and the control blocks (33.0%) and was not significant (P=0.34).

Table 12 Nutritional status of adolescent girls in both the districts

	Intervention blocks	**Control blocks**	**P value**
N	658	655	
Age in months (mean (sd))	166.09 (21.41)	159.22 (21.66)	<0.001
Weight in kg (mean (sd))	35.69 (7.33)	34.53 (7.82)	0.006
Height in cm (mean (sd))	146.00 (7.52)	144.64 (8.61)	0.002
Body Mass Index (mean (sd))	16.59 (2.49)	16.33 (2.50)	0.055
Thinness = Yes (%)	198 (30.2)	184 (28.2)	0.450
Grades of thinness (%)			0.645
Normal	457 (69.8)	469 (71.8)	
Moderate	142 (21.7)	128 (19.6)	
Severe	56 (8.5)	56 (8.6)	
Stunting = Yes (%)	234 (35.6)	216 (33.0)	0.343
Grades of stunting (%)			0.399
Normal	423 (64.4)	439 (67.0)	
Moderate	178 (27.1)	172 (26.3)	

Severe	56 (8.5)	44 (6.7)	

4.10 **Anemia in adolescent girls in both the districts (Gulburga and Raichur)**

Mean (SD) haemoglobin was 10.4 (1.7) g/dl and was significantly higher in adolescent girls of Intervention blocks compared to the control blocks (P<0.001). The overall prevalence of anaemia was 84.8% and was significantly lower (P=0.001) in the intervention blocks (81%) compared to the control blocks (89.5%). Similarly, the grades of anemia was significant between the groups (P<0.001).

Table 13 Anemia in adolescent girls in both the districts

	Intervention blocks	**Control blocks**	**P value**
	651	534	
Hemoglobin in gm/dl (mean (sd))	10.66 (1.81)	10.04 (1.67)	<0.001
Anemia = Yes (%)	388 (81.0)	349 (89.5)	0.001
Grades of anemia (%)			<0.001
Normal	91 (19.0)	41 (10.5)	
Mild	102 (21.3)	65 (16.7)	
Moderate	255 (53.2)	239 (61.3)	
Severe	31 (6.5)	45 (11.5)	

5.1 Undernutrition in children in Gulburga district

A total of 607 mothers of children were surveyed in both the intervention (N=307) and control (N=300) blocks in Gulburga district. The mean (SD) age of children was 14.6 (9.1) months. Children in the intervention were about 1 month older compared to the control blocks but was not significant (P=0.14). About 48% of children were boys, with no significant differences between the groups. Mean (SD) weight of the children in the intervention blocks was 8.0 (1.9) kg compared to 7.6 (1.8) kg in the control blocks (P < 0.05). Mean height of children in the intervention blocks was about 2.0 cm taller than the control blocks (P <0.05). Mid Upper Arm Circumference (MUAC) was also significantly higher in the intervention blocks compared to control blocks (P <0.001). Mean Height for age Z scores, an indicator for chronic malnutrition

was significantly better in children in the intervention block, while Mean Weight for height Z scores, an indicator of acute malnutrition was similar in both the blocks.

Table 14 Anthropometric measures in under 3 children in Intervention and Control blocks in Gulburga district

	Intervention blocks	**Control blocks**	**P value**
N	307	300	
Age in months (mean (sd))	15.15 (8.94)	14.05 (9.27)	0.140
Gender = Male (%)	145 (47.2)	147 (49.0)	0.723
Weight (kg) (mean (sd))	8.04 (1.90)	7.66 (1.80)	0.012
Height (cm) (mean (sd))	72.05 (9.16)	69.94 (9.18)	0.005
MUAC (cm) (mean (sd))	13.49 (1.12)	12.96 (0.99)	<0.001

The overall prevalence of stunting was 45%. Stunting was more than 8% lower in the intervention blocks (41%) compared to the control blocks (49.8%) and was statistically significant (P <0.05). There were however no significant differences in the grades of stunting (P = 0.05). The overall prevalence of underweight was 38.4%. There were no significant differences in the prevalence of underweight in the intervention blocks (39.7%) compared to the control blocks (37.1%). Similarly, there was no significant differences in the grades of underweight (P=0.77).

The overall prevalence of wasting was 19.0% and was similar in the intervention blocks (19.9%) compared to the control blocks (18.2%) and was not statistically significant (P=0.68). Children with MUAC less than 12.5 cm, an indicator of moderate acute malnutrition was significantly lower in the intervention blocks (14.3%) compared to the control blocks (27.8%). Severe wasting was not significantly different between the groups, however moderate acute malnutrition was significantly lower in children in the intervention blocks (29.7%) compared to the control blocks (41.5%)

Table 15 Nutritional status of children based on WHO growth standards in Gulburga district

	Intervention blocks	**Control blocks**	**P value**
N	307	300	
Stunting = Yes (%)	120 (41.0)	142 (49.8)	0.040
Grades of stunting (%)			0.051
Severe	53 (18.1)	73 (25.6)	
Moderate	67 (22.9)	69 (24.2)	
Normal and above	173 (59.0)	143 (50.2)	
Underweight = Yes (%)	119 (39.7)	109 (37.1)	0.572
Grades of underweight (%)			0.773
Severe	46 (15.3)	40 (13.6)	
Moderate	73 (24.3)	69 (23.5)	
Normal and above	181 (60.3)	185 (62.9)	
Wasting = Yes (%)	59 (19.9)	52 (18.2)	0.680
Grades of wasting (%)			0.865
Severe	12 (4.0)	10 (3.5)	
Moderate	47 (15.8)	42 (14.7)	
Normal and above	238 (80.1)	234 (81.8)	
MUAC less than 11.5 cm = Yes (%)	6 (2.2)	5 (2.1)	1.000
MUAC less than 12.5 cm = Yes (%)	39 (14.3)	65 (27.8)	<0.001
MAM = Yes (%)	81 (29.7)	97 (41.5)	0.007

5.2 **Nutritional status of mothers of children under 3 years in Gulburga district**

The mean (SD) age of the mothers of children under 3 years was 25.0 (3.6) years. There were no significant differences between the mothers age in the intervention and the control blocks (P=0.32). The mean (SD) weight of mothers was about 45.6 (7.3) kg and was not significant between the groups. Mean (SD) height of the mother was 151.7 (5.4) cm and was also not significant between the groups (P=0.25). Mean (SD) Body Mass Index (BMI) was higher in the mothers in the intervention block compared to the control block, but was not significant (P=0.66). Similarly, Chronic Energy Deficiency (CED) defined as BMI less than 18.5 was also not significantly different between the groups.

Table 16 Nutritional status of mothers of under 3 children in Intervention and Control blocks in Gulburga district

	Intervention blocks	**Control blocks**	**P value**
N	307	300	
Age of mother in years (mean (sd))	24.90 (3.79)	24.95 (3.44)	0.853
Weight of mother (kg) (mean (sd))	45.85 (7.22)	45.26 (7.36)	0.321
Height of mother (cm) (mean (sd))	151.90 (5.57)	151.39 (5.23)	0.250
Body Mass Index of mother (mean (sd))	19.85 (2.80)	19.75 (2.99)	0.662
Chronic energy deficiency in mothers = Yes (%)	100 (32.6)	106 (36.1)	0.416
Normal BMI =Yes (%)	194 (63.2)	172 (58.5)	0.274

5.3 **Nutritional status of adolescent girls in Gulburga district**

Mean age of adolescent girls was 14.1 years. Adolescent girls in the Intervention blocks were about 3 months older compared to control blocks but was not significant (P=0.23). Mean (SD) weight of adolescent girls was 37.1 (7.7) kg. Mean weight of adolescent girls in the Intervention blocks was about 1 kg higher compared to control blocks but was not significant (P =0.13). Similarly, adolescent girls in the intervention blocks were about 1.4 cm taller than those in the control blocks (P<0.05). However, there was no significant differences in the BMI in the intervention and the control blocks (P=0.41). Mean HAZ and BMIZ were also not significantly different between the groups. The overall thinness (an indicator of chronic energy deficiency) was similar in the intervention blocks (27.4%) and control blocks (24.3%) and was not significant (P=0.45). There were also no significant differences in the grades of thinness between the groups (P=0.27). The overall prevalence of stunting in adolescent girls was 34.6% and was similar in the intervention blocks (34.2%) and the control blocks (35.1%) and was not significant (P=0.88).

Table 17 Nutritional status of adolescent girls in Gulburga district

	Intervention blocks	**Control blocks**	**P value**
N	308	305	
Age in months (mean (sd))	171.00 (21.96)	168.79 (23.61)	0.230
Weight in kg (mean (sd))	37.58 (7.24)	36.64 (8.10)	0.129
Height in cm (mean (sd))	147.67 (6.67)	146.26 (8.56)	0.023
Body Mass Index (mean (sd))	17.13 (2.62)	16.96 (2.63)	0.410
Thinness = Yes (%)	84 (27.4)	74 (24.3)	0.447
Grades of thinness (%)			0.268
Normal	223 (72.6)	230 (75.7)	
Moderate	65 (21.2)	50 (16.4)	
Severe	19 (6.2)	24 (7.9)	
Stunting = Yes (%)	105 (34.2)	107 (35.1)	0.886
Grades of stunting (%)			0.968
Normal	202 (65.8)	198 (64.9)	
Moderate	86 (28.0)	87 (28.5)	
Severe	19 (6.2)	20 (6.6)	

5.4 **Anemia in adolescent girls in Gulburga district**

Mean (SD) haemoglobin was 10.8 (1.9) g/dl and was significantly higher in adolescent girls of Intervention blocks compared to the control blocks (P<0.001). The overall prevalence of anaemia was 77.4% and was significantly lower (P=0.001) in the intervention blocks (71.8%) compared to the control blocks (86.2%). Similarly, the grades of anemia was significant between the groups (P=0.002).

Table 18 Anemia in adolescent girls in Gulburga district

	Intervention blocks	**Control blocks**	**P value**
	252	202	
Hemoglobin in gm/dl (mean (sd))	11.07 (2.04)	10.39 (1.49)	<0.001
Anemia = Yes (%)	181 (71.8)	138 (86.2)	0.001
Grades of anemia (%)			0.002
Normal	71 (28.2)	22 (13.8)	
Mild	48 (19.0)	30 (18.8)	
Moderate	119 (47.2)	102 (63.7)	
Severe	14 (5.6)	6 (3.8)	

6.1 Undernutrition in children in Raichur district

A total of 803 mothers of children were surveyed in both the intervention (N=402) and control (N=401) blocks in Raichur district. The mean (SD) age of children was 16.5 (9.4) months. Children in the intervention were about 1 month older compared to the control blocks but was not significant (P=0.11). About 48% of children were boys, with no significant differences between the groups. Mean (SD) weight of the children in the intervention blocks was 8.1 (1.8) kg compared to 8.1 (1.9) kg in the control blocks (P=0.69). Mean height of children in the intervention blocks was about 1.0 cm taller than the control blocks (P=0.13). Mid Upper Arm Circumference (MUAC) was similar in the intervention blocks and the control blocks (P =0.89). Mean Height for age Z scores, an indicator for chronic malnutrition and Mean Weight for height Z scores, an indicator of acute malnutrition was similar in both the blocks.

Table 19 Anthropometric measures in under 3 children in Intervention and Control blocks in Raichur district

	Intervention blocks	**Control blocks**	**P value**
N	402	401	
Age in months (mean (sd))	17.07 (9.54)	16.02 (9.25)	0.114
Gender = Male (%)	212 (52.7)	177 (44.1)	0.018
Weight (kg) (mean (sd))	8.10 (1.79)	8.05 (1.87)	0.694
Height (cm) (mean (sd))	72.69 (9.42)	71.68 (9.33)	0.131
MUAC (cm) (mean (sd))	12.81 (1.00)	12.80 (0.98)	0.887

The overall prevalence of stunting was 51.8%. Stunting was 4% lower in the intervention blocks (49.9%) compared to the control blocks (53.9%) but was not statistically significant (P =0.30). There were also no significant differences in the grades of stunting (P = 0.337). The overall prevalence of underweight was 44.2%. There were no significant differences in the prevalence of underweight in the intervention blocks (45.3%) compared to the control blocks (43.2%). Similarly, there was no significant differences in the grades of underweight (P=0.77).

The overall prevalence of wasting was 18.5% and was higher in the intervention blocks (20.3%) compared to the control blocks (16.7%) but was not statistically significant (P=0.24). Children with MUAC less than 12.5 cm, an indicator of moderate acute malnutrition was similar in the intervention blocks (34.5%) and the control blocks (34.7%). Severe wasting was not significantly different between the groups, and so was moderate acute malnutrition which was similar the intervention blocks (45.9%) compared to the control blocks (43.2%).

Table 20 Nutritional status of children based on WHO growth standards in Raichur district

	Intervention blocks	**Control blocks**	**P value**
N	402	401	
Stunting = Yes (%)	192 (49.9)	202 (53.9)	0.303
Grades of stunting (%)			0.337
Severe	113 (29.4)	109 (29.1)	
Moderate	79 (20.5)	93 (24.8)	
Normal and above	193 (50.1)	173 (46.1)	
Underweight = Yes (%)	179 (45.3)	171 (43.2)	0.594
Grades of underweight (%)			0.774
Severe	79 (20.0)	72 (18.2)	
Moderate	100 (25.3)	99 (25.0)	
Normal and above	216 (54.7)	225 (56.8)	
Wasting = Yes (%)	78 (20.3)	64 (16.7)	0.240
Grades of wasting (%)			0.342
Severe	29 (7.5)	20 (5.2)	
Moderate	49 (12.7)	44 (11.5)	
Normal and above	307 (79.7)	319 (83.3)	
MUAC less than 11.5 cm = Yes (%)	24 (6.8)	17 (4.8)	0.307
MUAC less than 12.5 cm = Yes (%)	121 (34.5)	124 (34.7)	1.000
MAM = Yes (%)	161 (45.9)	152 (43.2)	0.522

6.2 **Nutritional status of mothers of children under 3 years in Gulburga district**

The mean (SD) age of the mothers of children under 3 years was 25.4(3.3) years. There were no significant differences between the mothers age in the intervention and the control blocks (P=0.05). The mean (SD) weight of mothers was about 47.1 (8.4) kg and was significantly lower in the intervention group compared to the control group (P=0.01). Mean (SD) height of the mother was 151.7 (5.3) cm and was also not significant between the groups (P=0.95). Mean (SD) Body Mass Index (BMI) was higher in the mothers in the control block compared to the intervention block and was significant (P<0.01). Similarly, Chronic Energy Deficiency (CED) defined as BMI less than 18.5 was lower in the control block (27.9%) compared to the Intervention block (P<0.05).

Table 21 Nutritional status of mothers of under 3 children in Intervention and Control blocks in Raichur district

	Intervention blocks	**Control blocks**	**P value**
N	402	401	
Age of mother in years (mean (sd))	25.61 (3.37)	25.16 (3.16)	0.052
Weight of mother (kg) (mean (sd))	46.28 (8.56)	47.82 (8.12)	0.010
Height of mother (cm) (mean (sd))	151.72 (5.23)	151.75 (5.41)	0.950
Body Mass Index of mother (mean (sd))	20.08 (3.39)	20.76 (3.28)	0.004
Chronic energy deficiency in mothers = Yes (%)	144 (36.6)	109 (27.9)	0.011
Normal BMI =Yes (%)	218 (55.5)	237 (60.6)	0.166

6.3 **Nutritional status of adolescent girls in Raichur district**

Mean age of adolescent girls was 13.0 years. Adolescent girls in the Intervention blocks were about 11 months older compared to control blocks and was significant (P<0.001). Mean (SD) weight of adolescent girls was 33.4 (7.1) kg. Mean weight of adolescent girls in the Intervention blocks was about 1.5 kg higher compared to control blocks and was significant (P<0.05). Similarly, adolescent girls in the intervention blocks were about 1.3 cm taller than those in the control blocks (P<0.05). There were also significant differences in the BMI in the intervention block which was higher than the control blocks (P<0.05). Mean HAZ was significantly lower in the intervention blocks compared to the control blocks but not BMIZ scores (P=0.55). The overall thinness (an indicator of chronic energy deficiency) was similar in the intervention blocks (32.8%) and control blocks (31.5%) and was not significant (P=0.79). There were also no significant differences in the grades of thinness between the groups (P=0.81). The overall prevalence of stunting in adolescent girls was 34.0% and was similar in the intervention blocks (36.9%) and the control blocks (31.1%) which was not significant (P=0.13).

Table 22 Nutritional status of adolescent girls in Raichur district

	Intervention blocks	**Control blocks**	**P value**
N	350	350	
Age in months (mean (sd))	161.76 (19.98)	150.89 (15.62)	<0.001
Weight in kg (mean (sd))	34.02 (7.01)	32.70 (7.09)	0.013
Height in cm (mean (sd))	144.54 (7.93)	143.23 (8.41)	0.035
Body Mass Index (mean (sd))	16.12 (2.28)	15.78 (2.25)	0.048
Thinness = Yes (%)	114 (32.8)	110 (31.5)	0.788
Grades of thinness (%)			0.811
Normal	234 (67.2)	239 (68.5)	
Moderate	77 (22.1)	78 (22.3)	
Severe	37 (10.6)	32 (9.2)	
Stunting = Yes (%)	129 (36.9)	109 (31.1)	0.130
Grades of stunting (%)			0.141
Normal	221 (63.1)	241 (68.9)	
Moderate	92 (26.3)	85 (24.3)	
Severe	37 (10.6)	24 (6.9)	

6.4 **Anemia in adolescent girls in Raichur district**

Mean (SD) haemoglobin was 10.4 (1.8) g/dl and was significantly higher in adolescent girls of Intervention blocks compared to the control blocks (P<0.001). The overall prevalence of anaemia was 84.8% and was significantly lower (P=0.001) in the intervention blocks (81.0%) compared to the control blocks (89.5%). Similarly, the grades of anemia was significant between the groups (P<0.001).

Table 23 Anemia in adolescent girls in Raichur district

	Intervention blocks	**Control blocks**	**P value**
	282	449	
Hemoglobin in gm/dl (mean (sd))	10.66 (1.81)	10.04 (1.67)	<0.001
Anemia = Yes (%)	388 (81.0)	349 (89.5)	0.001
Grades of anemia (%)			<0.001
Normal	91 (19.0)	41 (10.5)	
Mild	102 (21.3)	65 (16.7)	
Moderate	255 (53.2)	239 (61.3)	
Severe	31 (6.5)	45 (11.5)	

7.0 **Qualitative findings**

FGDS

- Mothers and adolescent girls reported that counselling, group meetings, house visits, growth monitoring and food supplementation were being regularly provided by VNVs

  VNV tells us to eat more and should drink milk and vegetables should be included more in our day to day food (15-year-old adolescent girl, Chindanur Village).

  Monthly, the VNV provide us the shaktivita packets and our height and weights are measured (24-year-old mother of an under 3 child, Bandegudda Village)

  VNV conducts regular meeting and told us to maintain cleanliness, to use sanitary napkins, consume shaktivita and to wear chappals (16-year-old adolescent girl, Marpalli Village).

  VNV has told me about nutritious food. A nutritious food is the one which has fruits, vegetables, green leafy vegetables, pulses, eggs and milk to be taken to maintain good health (27-year-old mother of under 3 child, Yalakpalli Village)

- Mothers of under 3 children reported that they found both counselling and nutrition supplementation useful. They could see a perceptible influence in their child nutritional status like weight and also a feeling of well-being.

  According to my opinion, there is a physical and mental development among the children (23-year-old mother of an under 3 child, Chindanur Village)

  Yes, there is weight gain in children. They eat well. We too feel there is a change in health. My child strength has increased (28-year-old mother of under 3 child, Yalakpalli Village)

- Adolescent girls also reported that nutrition education and nutrition supplementation was useful and felt an overall well-being in addition to increase in weight.

  After consuming shaktivita, I feel there are changes in my height and weight (15-year-old adolescent girl, Bandegudda Village).

  My memory power has improved and there was a positive change in my results at school (12-year-old adolescent girl, Bandegudda Village).

- Mothers of under 3 children as well as adolescent girls reported good acceptability of shakti vita.

  Shaktivita is good and like and consumed by all children. We didn't find any side effects (Mothers of under 3 children, Chindanur Village)

Initially, we didn't give shaktivita to our children, it was not good. But now we mix with water and milk and our children eat. Yes there is also a development change in my child (Mothers of under 3 children, Sulepethi Village).

Shaktivita tastes good, and I feel like studying after consumption (13-year-old adolescent girl, Chindanur Village)

Shaktivita is better than the food provided in Anganwadi and it is good for the children (Mothers of under 3 children, Yalakpalli Village)

For children, shaktivita is good. From seven months, shaktivita is given. It is better than cerelac. We prepare shaktivita with good hygienic practices and VNV tells us how to prepare during her meetings. (26-year-old mother of under 3 child, Yalakpalli Village)

We don't share shaktivita at home due to the counselling given by VNV (14-year-old adolescent girl, Marpalli Village)

- Mothers of under 3 children and adolescent girls felt that counselling alone was also beneficial as it is impacted their behaviour change in terms of hygiene, sanitation and dietary intakes

  Yes, I have started including more of green leafy vegetables like palak and even brinjal now. Before, I used to take them occasionally. This change was there after the counselling of VNV (mother of 3-year-old child, Chindanur Village).

  I used to take less vegetables before the counselling, now include more vegetables in my diet (15-year-old adolescent girl, Chindanur Village)

- Both mothers of under 3 children as well as adolescent girls requested for the continuation of VNVs and shakti vita as they found both to helpful.

  We need shaktivita packets as well as information given by VNVs (16-year-old adolescent girl, Bandegudda Village)

  We need both shaktivita and VNVs. Some of things I didn't knew before. It was after the VNV counselling, I followed (21 year old mother of under 3 child,Yalakpalli Village)

- Mothers of under 3 children as well as adolescent girls felt that VNVs were complementary to the services provided by AWW (Anganwadi workers)

  Anganwadi worker does not measure our height and weight. We visit Anganwadi center to receive the food and VNV measure our height and weight (15 year old adolescent girl, Chindanur Village)

Once in a month, VNV and Anganwadi teacher conducts group meetings (20-year-old mother of under 3 child, Yalakapalli Village)

ASHA, VNV and Anganwadi worker have told us that pregnant women should do her work, should eat more vegetables and fruits. Should not miss monthly ANC check up and should check her weight regularly (27 year old mother of under 3 child, Yalakpalli Village).

In-depth interviews

- In depth interview were conducted with Village Nutrition Volunteers (VNVs), VNV supervisors, AWW, ASHA, SHGs, gram panchayat and village heads
- Village Nutrition Volunteers (VNVs) reported that counselling alone prior to shakti vita supplementation had an impact on health seeking behaviour, dietary intakes, hygiene and sanitation. They also found an improvement in nutritional status of under 3 children, adolescent girls and weight gain during pregnancy
- VNVs reported that shakti vita was being accepted well by the beneficiaries. There were no major complaints by the beneficiaries
- VNVs reported that both counselling and supplementation were needed and any alone was not sufficient and both were needed for improvement in nutritional status
- VNVs also reported that their work was complementary to Anganwadi workers (AWW) and both VNVS as well as AWW reported that they had no conflict of work
- VNVS had a good knowledge on nutrition, health and hygiene and aware of other programs in their area
- Similarly, VNV supervisors reported the same that counselling alone prior to shakti vita supplementation had an impact on nutritional status

8.0 KEY FINDINGS

- Socio demographics were similar in the intervention and control groups and therefore comparable
- Counselling on Health and Nutrition education during ANC visits was in general better in the intervention compared to the control groups
- A higher proportion of mothers in the Intervention blocks were consuming additional meal during pregnancy
- A higher proportion of mothers in the Intervention blocks were receiving THR food and were taking TT immunization during pregnancy
- Home deliveries were less common in the Intervention blocks compared to the control blocks
- The coverage of immunization was higher in both the blocks and was more or less similar in the intervention and control blocks.
- Morbidities in children were in general lower in the Intervention blocks compared to the control blocks in the last 15 days.
- While exclusive breast feeding was higher in the intervention blocks, delayed complementary feeding was also higher in the Intervention blocks.
- Initiation of breast feeding was higher in the control blocks and also a higher proportion in the control blocks gave prelacteal feeds compared to the intervention blocks.
- A higher proportion in the Intervention blocks received THR food in the intervention blocks compared to the control blocks. Similarly, more children received 2 doses of Vitamin A and deworming in the Intervention groups compared to the control blocks.
- WASH practices in mothers and adolescent girls were better in the Intervention blocks compared to the control blocks
- There was a higher proportion of mothers and adolescent girls in the Intervention block compared to the control blocks, who were aware of basic nutrition and health related issues
- A higher proportion of the adolescent girls in the intervention group compared to the control group received IFA tablets in the past one year.
- Mothers and adolescent girls reported that counselling, group meetings, house visits, growth monitoring and food supplementation were being regularly provided by VNVs
- Mothers of under 3 children reported that they found both counselling and nutrition supplementation useful. They could see a perceptible influence in their child nutritional status like weight and also a feeling of well-being.

- Adolescent girls also reported that nutrition education and nutrition supplementation was useful and felt an overall well-being in addition to increase in weight
- Mothers of under 3 children as well as adolescent girls reported good acceptability of shakti vita
- Mothers of under 3 children and adolescent girls felt that counselling alone was also beneficial as it is impacted their behaviour change in terms of hygiene, sanitation and dietary intakes
- Both mothers of under 3 children as well as adolescent girls requested for the continuation of VNVs and shakti vita as they found both to helpful.
- Mothers of under 3 children as well as adolescent girls felt that VNVs were complementary to the services provided by AWW (Anganwadi workers)
- Mean Height for age Z scores, an indicator for chronic malnutrition was better in children in the intervention block, while Mean Weight for height Z scores, an indicator of acute malnutrition was lower in the control blocks.
- Stunting was about 6% lower in the intervention blocks (46%) compared to the control blocks (52.1%) and was statistically significant ($P < 0.05$).
- The overall thinness (an indicator of chronic energy deficiency) was similar in the intervention blocks (30.2%) and control blocks (28.2%) and was not significant ($P=0.45$).
- The overall prevalence of stunting in adolescent girls was 34.3% and was similar in the intervention blocks (35.6%) and the control blocks (33.0%) and was not significant ($P=0.34$).
- The overall prevalence of anaemia was 84.8% and was significantly lower ($P=0.001$) in the intervention blocks (81%) compared to the control blocks (89.5%).

9.0 DISCUSSION

With the setting up of National Nutrition Mission (NNM) now renamed as POSHAN abhiyaan[16] (PMs overarching goal for holistic nourishment), there is clear vision of the government to reduce malnutrition in the vulnerable segments of population in India. NNM targets to reduce stunting, under-nutrition, anemia (among young children, women and adolescent girls) and reduce low birth weight by 2%, 2%, 3% and 2% per annum respectively. Although the target to reduce stunting is at least 2% per annum, the mission aims to achieve reduction in stunting from 38.4% (NFHS-4)[17] to 25% by 2022. While the targets are realistic, there is an urgent need to fill gaps in the existing programs to achieve the targets. Though there are many schemes targeting the nutritional status of children (0-6 years age), adolescent girls and pregnant women and lactating mothers, there is lack of synergy and linking the schemes with each other to achieve common goal.

Over the last one decade, the rate of change in chronic malnutrition as indicated by stunting in under 5 children has fallen from 48% in 2005-06 (NFHS 3)[18] to 38.4% in 2015-16 (NFHS 4) at a rate of 0.96% per year with a 20% relative reduction in stunting. The percent of reduction in severe stunting (31.2%: 23.7% to 16.3%) was higher than moderate stunting (9%: 24.3% to 22.1%). in the third and fourth survey respectively. Acute malnutrition as indicated by wasting has increased from 19.8% in 2005-06 (NFHS 3) to 21% in 2015-16 (NFHS 4) and increased at a rate of 0.12% per year with and relative increase of 6.1%. Underweight, which represents a composite index of stunting and wasting has fallen from 42.5% in 2005-06 (NFHS 3) to 35.7% in 2015-16 (NFHS 4) at a rate of 0.68% per year with a 16% relative reduction in underweight. Low birth weight is an important determinant of future growth of the baby.

In this study, stunting at baseline before the intervention in the intervention areas was 45.5% in under 5 children, while it was 47.6% in the control areas (IIM unpublished report 2016)[19]. In our study, i.e. at the end line after the intervention, stunting was 46% in under 3 children, while stunting in control areas was 52.1%. With respect to underweight, at baseline, 35.7% and 38.3% of under 5 children were underweight in intervention and control areas respectively. At the end line, 42.9% and 40.6% of under 3 children were underweight in intervention and control areas respectively. Wasting was 20.1% and 20.5% in the intervention and control areas respectively at baseline and during the end line, wasting was 20.1% and 17.3% in the intervention and control areas respectively. Stunting was about 6% lower in the intervention blocks (46%) compared to the control blocks (52.1%) and was statistically significant ($P < 0.05$).

Thus, while there was a positive effect on stunting, which was significant, there was a slight decrease in wasting, however it was not statistically significant. The prevalence of under nutrition are comparable to the existing data in this area. Stunting, wasting and underweight respectively in Gulburga[20] was 52.2%, 34.0% and 56.7% respectively in 2015-16 period (NFHS 4). In Raichur, stunting, wasting and underweight respectively in Raichur was 37.2%, 34.9% and 41.2% respectively in 2015-16 period[21].

The prevalence of low birth weight has reduced from 21.5% in 2005-06 (NFHS 3) to 18.2% in 2015-16 (NFHS 4) at a rate of 0.33% per year. The relative reduction in low birth weight was about 15% during the above period. In this study, low birth weight reduced from 17.1% at baseline to 8.7% in the end line in the intervention area, while low birth weight reduced from 18.0% at baseline to 11.9% in the end line in the intervention blocks.

Body mass index (BMI) is also an important indicator of nutritional status of adolescent girls. BMI reduced in control areas as well as intervention areas, and was more or less similar in the intervention areas (17.6 vs 16.6) and the control areas (17.2 vs 16.3). Anemia, which is known to adversely affect various health outcomes, has reduced among children aged 6 to 59 months in the above period from 69.5% in 2005-06 (NFHS 3) to 58.5% in 2015-16(NFHS 4) at a rate of 1.1% per year. The relative reduction in anemia was 16% during the above period. The relative reduction in severe and moderate anemia was 45% and 27% respectively, while mild anemia increased slightly from 26.3% to 27.8%. In women aged 15 to 49 years, anemia reduced from 55.3% in 2005-06 (NFHS 3) to 53.1% in 2015-16 (NFHS 4) at a rate of 0.2% per year with relative reduction in anemia of 4% during the above period.

In this study, anemia in adolescent girls was higher in the end line compared to baseline probably due to different methods of estimation of haemoglobin. At baseline, mean haemoglobin was 11.4 g/dl in the intervention areas, while it was 11.8 g/dl in the control areas. At the end line, mean haemoglobin was 10.0 g/dl and 10.6 g/dl respectively in the intervention and control areas. The overall prevalence of anaemia was 84.8% and was significantly lower (P=0.001) in the intervention blocks (81%) compared to the control blocks (89.5%).

Integration of existing schemes is essential as the National Nutrition Strategy[22] by Niti Ayog advocates life cycle approach for elimination of malnutrition and as early as possible, across the life cycle, to avert irreversible cumulative growth and development deficits that compromise maternal and child health and survival. AWCs also can provide a platform at village habitation level for integration of services during pregnancy, lactation, infancy, young children till adolescence through a continuum of service such as ICDS, sabla, nutrition

education etc. While convergence and integration are important, it is necessary to maintain quality of care across the programs. This includes quality of counselling and education, growth monitoring, food supplementation, maternal and health care among many others. Quality of care can be maintained through standard operating procedures, regular monitoring (real time or quarterly) and evaluation of the services as need basis. Active involvement of community participation can lead to demand for quality services and will be a driving force for continuous quality care.

In this study, VNVs have established a crucial link between AWW and ASHA and were able to bring about significant changes in nutrition and health education among the target groups as well as improve the utilization of existing services. In this study, mothers and adolescent girls reported that counselling, group meetings, house visits, growth monitoring and food supplementation were being regularly provided by VNVs. Mothers of under 3 children reported that they found both counselling and nutrition supplementation useful. They could see a perceptible influence in their child nutritional status like weight and also a feeling of well-being. Home deliveries were less common in the Intervention blocks compared to the control blocks.

With respect to nutrition practices in this study, A higher proportion of mothers in the Intervention blocks were consuming additional meal during pregnancy. A higher proportion of mothers in the Intervention blocks were receiving THR food and were taking TT immunization during pregnancy. Similarly, more children received 2 doses of Vitamin A and deworming in the Intervention groups compared to the control blocks and a higher proportion of the adolescent girls in the intervention group compared to the control group received IFA tablets in the past one year. With respect to Water and Sanitation Hygiene (WASH) practices, mothers and adolescent girls were doing better in the Intervention blocks compared to the control blocks. With respect to nutrition education, there was a higher proportion of mothers and adolescent girls in the Intervention block compared to the control blocks, who were aware of basic nutrition and health related issues.

10.0 CONCULUSIONS

There was a significant difference in the intervention blocks compared to the control blocks in the nutritional status as indicated by lower stunting of children and lower anemia in adolescent girls in the Intervention group compared to the control group. There was a significant difference in the intervention blocks compared to the control blocks on awareness of nutrition, health and sanitation related issues and utilization of various government programs, which were better off in the Intervention blocks compared to the control block. The overall wellbeing in children and adolescent girls in the Intervention group as assessed by qualitative methods

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Table S1 Socio demographics and characteristics of mother

	Intervention blocks	Control blocks	P value
N	707	700	
Literacy status of mother = Literate (%)	381 (53.9)	417 (59.6)	0.036
Literacy status of father = Literate (%)	393 (55.6)	445 (63.6)	0.003
Caste (%)			0.245
SC and ST	335 (47.4)	359 (51.4)	
OBC	344 (48.7)	309 (44.2)	
Others	28 (4.0)	31 (4.4)	
Religion (%)			0.263
Muslim	79 (11.2)	77 (11.0)	
Hindu	622 (88.0)	620 (88.7)	
Christian	2 (0.3)	2 (0.3)	
Others	4 (0.6)	0 (0.0)	
Type of family (%)			0.202
Nuclear	377 (53.4)	381 (54.6)	
Extended Nuclear	71 (10.1)	87 (12.5)	
Joint family	258 (36.5)	230 (33.0)	
Number of children (<5y) (mean (sd))	1.67 (0.82)	1.64 (0.80)	0.500
Number of adults (mean (sd))	4.36 (2.59)	4.50 (2.88)	0.316
Duration of stay in years (mean (sd))	6.74 (3.87)	6.84 (4.60)	0.654
Type of house (%)			0.108
Kutcha	402 (56.9)	399 (57.0)	
Semi pucca	167 (23.6)	139 (19.9)	
Pucca	138 (19.5)	162 (23.1)	
House ownership (%)			NS
Own	686 (97.0)	649 (93.0)	
Rented	19 (2.7)	48 (6.9)	
Migrant camp or Unauthorized	2 (0.3)	1 (0.1)	
Living in other's house	0 (0.0)	0 (0.0)	
Others	0 (0.0)	0 (0.0)	
Number of rooms (mean (sd))	2.24 (2.01)	2.00 (1.40)	0.008
Is the kitchen separate = Yes (%)	421 (59.5)	399 (57.0)	0.360
Cooking fuel (%)			NS
Gas	292 (41.3)	243 (34.7)	
Wood or coal or cow dung	411 (58.1)	454 (64.9)	
Kerosene	4 (0.6)	3 (0.4)	
Others	0 (0.0)	0 (0.0)	
Source of drinking water (%)			0.256
Draw well	65 (9.2)	49 (7.0)	
Tube well	68 (9.6)	80 (11.4)	
Tap water	546 (77.2)	535 (76.5)	
Filter or packed water	27 (3.8)	35 (5.0)	
Others	1 (0.1)	0 (0.0)	
Toilet facility (%)			0.044
Own flush toilet	121 (17.1)	156 (22.3)	
Own pit toilet	20 (2.8)	22 (3.1)	
No toilet facility	566 (80.1)	522 (74.6)	

Electricity (%)			0.009
Metered connection	663 (93.8)	671 (96.0)	
Drawn from street lines	33 (4.7)	13 (1.9)	
No	11 (1.6)	15 (2.1)	
BPL card = Yes (%)	658 (93.1)	617 (88.1)	0.002
Participation in PDS = Yes (%)	647 (91.5)	610 (87.3)	0.012
Household assets			
Clock or Watch = Yes (%)	611 (86.4)	592 (84.6)	0.363
Radio or Transistor = Yes (%)	269 (38.0)	262 (37.4)	0.853
Television = Yes (%)	505 (71.4)	498 (71.1)	0.953
Bicycle = Yes (%)	172 (24.3)	180 (25.7)	0.590
Motor cycle or scooter = Yes (%)	252 (35.6)	293 (41.9)	0.018
Refrigerator = Yes (%)	24 (3.4)	13 (1.9)	0.102
Telephone or mobile phone = Yes (%)	620 (87.7)	607 (86.7)	0.638
Livestock = Yes (%)	290 (41.0)	176 (25.2)	<0.001
Agricultural land = Yes (%)	590 (83.5)	532 (76.0)	0.001
Land in acres (mean (sd))	3.87 (4.53)	4.69 (9.06)	0.033
Characteristics of Mother			
Age in completed years (mean (sd))	25.45 (5.22)	25.07 (3.45)	0.117
Age at Marriage (y) (mean (sd))	18.58 (2.51)	18.37 (2.77)	0.134
Age at first pregnancy (y) (mean (sd))	19.86 (2.97)	19.79 (3.15)	0.660
Number of Live birth (mean (sd))	2.17 (1.07)	2.14 (1.07)	0.569
Physiological status of Mother (%)			0.039
Lactating mother	695 (98.3)	675 (96.4)	
Pregnant women	11 (1.6)	21 (3.0)	
NPNL	1 (0.1)	0 (0.0)	

Table S2 Pregnancy history and ANC particulars

	Intervention blocks	Control blocks	P value
N	707	700	
Did you attend ANC visit = Yes (%)	699 (98.9)	685 (98.0)	0.271
Place of ANC (%)			<0.001
Home	5 (0.7)	5 (0.7)	
Sub center	1 (0.1)	2 (0.3)	
PHC or Govt hospital	463 (65.5)	361 (51.6)	
Pvt hospital	232 (32.8)	319 (45.6)	
Others	2 (0.3)	0 (0.0)	
Not applicable	4 (0.6)	12 (1.7)	
ANC conducted by (%)			NS
ANM	21 (3.0)	12 (1.7)	
LHV	0 (0.0)	0 (0.0)	
MO PHC	451 (63.8)	352 (50.4)	
Pvt doctor	228 (32.2)	321 (46.0)	
Others	2 (0.3)	1 (0.1)	
NA	5 (0.7)	12 (1.7)	
Total number of ANC visits (mean (sd))	6.09 (1.26)	5.85 (1.27)	0.001
ANC registration in weeks (mean (sd))	11.50 (4.51)	10.87 (3.99)	0.006
Number of ANC visits = less than four (%)	31 (4.4)	40 (5.8)	0.291
Late registration = More than 12 weeks (%)	137 (19.6)	77 (11.2)	<0.001
Health and Nutrition Education during ANC			
To attend regular ANC check-ups (%)			0.006
Yes	701 (99.2)	676 (96.7)	
No	3 (0.4)	12 (1.7)	
NA	3 (0.4)	11 (1.6)	
To consume GLVs (%)			0.006
Yes	701 (99.2)	676 (96.7)	
No	3 (0.4)	11 (1.6)	
NA	3 (0.4)	12 (1.7)	
To consumed milk and eggs (%)			<0.001
Yes	701 (99.2)	667 (95.4)	
No	3 (0.4)	21 (3.0)	
NA	3 (0.4)	11 (1.6)	
To consume more fruits and vegetables (%)			<0.001
Yes	702 (99.3)	671 (96.0)	
No	2 (0.3)	17 (2.4)	
NA	3 (0.4)	11 (1.6)	
Take IFA tablets for 100 days (%)			0.004
Yes	638 (90.2)	643 (92.0)	
No	66 (9.3)	43 (6.2)	
NA	3 (0.4)	13 (1.9)	
To consume additional meal (%)			0.003
Yes	697 (98.6)	668 (95.6)	
No	7 (1.0)	19 (2.7)	
NA	3 (0.4)	12 (1.7)	

Did you consume extra food during pregnancy = Yes (%)	694 (98.2)	666 (95.4)	0.006
Did you receive ICDS food supplements = Yes (%)	673 (95.2)	620 (88.7)	<0.001
If yes, how frequently (%)			<0.001
Every month	657 (92.9)	589 (84.3)	
Every two months	14 (2.0)	25 (3.6)	
Every three months	3 (0.4)	7 (1.0)	
More than three months	1 (0.1)	5 (0.7)	
NA	32 (4.5)	73 (10.4)	
Sharing of food (%)			0.001
Yes	567 (80.3)	568 (81.1)	
No	88 (12.5)	54 (7.7)	
NA	51 (7.2)	78 (11.1)	
Did you consume regularly (%)			0.026
Yes	654 (92.6)	619 (88.4)	
No	4 (0.6)	6 (0.9)	
NA	48 (6.8)	75 (10.7)	
Acceptability of ICDS food (%)			<0.001
Good	276 (39.8)	98 (14.0)	
Ok	415 (59.9)	595 (85.2)	
Bad	2 (0.3)	5 (0.7)	
Number of doses of TT (%)			<0.001
One dose	85 (12.0)	53 (7.6)	
Two or more doses	602 (85.3)	585 (83.6)	
No dose taken	19 (2.7)	62 (8.9)	
Received IFA tablets during pregnancy = Yes (%)	635 (89.9)	641 (91.6)	0.336
Number of tablets received (mean (sd))	41.43 (23.32)	41.04 (21.71)	0.758
Number of tablets consumed (mean (sd))	38.18 (24.00)	36.46 (21.60)	0.177
Age of child in months (mean (sd))	16.16 (9.37)	15.11 (9.34)	0.036
Sex of child= Female (%)	338 (47.8)	356 (51.0)	0.252
Birth order of the child (mean (sd))	2.14 (1.05)	2.16 (1.12)	0.738
Spacing between last two births in months (mean (sd))	29.55 (16.38)	31.17 (15.16)	0.120
Source of information on birth weight (%)			0.114
Medical record	325 (46.0)	306 (44.0)	
Recall	374 (52.9)	388 (55.7)	
DNK	8 (1.1)	2 (0.3)	
Did you check your weight during pregnancy = Yes (%)	682 (96.5)	694 (99.3)	0.001
If yes, how frequently (%)			0.002
Every month	501 (70.9)	439 (62.7)	
Every two months	178 (25.2)	219 (31.3)	
every three months	18 (2.5)	34 (4.9)	
Occasionally	1 (0.1)	4 (0.6)	
NA	9 (1.3)	4 (0.6)	
Weight in kg during first visit (mean (sd))	44.85 (7.17)	44.81 (6.72)	0.971
Weight in kg during last visit (mean (sd))	48.65 (9.60)	50.84 (8.73)	0.166
Weight difference in kg (mean (sd))	6.32 (7.60)	6.26 (3.83)	0.956

GA at first visit (mean (sd))	27.92 (31.06)	23.87 (24.12)	0.368
GA at last visit (mean (sd))	40.48 (22.90)	37.54 (19.74)	0.310
Child birth details			
Low birth weight (Record) (%)	36 (8.7)	28 (11.9)	0.251
Place of delivery (%)			0.042
Home	41 (5.8)	67 (9.6)	
Sub centre	5 (0.7)	3 (0.4)	
Govt hospital	546 (77.6)	501 (71.6)	
Pvt hospital	111 (15.8)	128 (18.3)	
Others	1 (0.1)	1 (0.1)	
Type of delivery (%)			0.740
Normal	612 (86.8)	615 (87.9)	
Caesarean	91 (12.9)	84 (12.0)	
Assisted forceps	2 (0.3)	1 (0.1)	

Table S3 Immunization history

	Intervention blocks	Control blocks	P value
N	707	700	
BCG (%)			NS
Received	693 (99.7)	677 (97.6)	
Not received	1 (0.1)	8 (1.2)	
DNK	0 (0.0)	0 (0.0)	
NA	1 (0.1)	9 (1.3)	
OPV1 (%)			0.030
Received	667 (96.9)	658 (94.9)	
Not received	14 (2.0)	14 (2.0)	
DNK	3 (0.4)	3 (0.4)	
NA	4 (0.6)	18 (2.6)	
OPV2 (%)			0.051
Received	600 (87.2)	619 (89.3)	
Not received	63 (9.2)	39 (5.6)	
DNK	3 (0.4)	3 (0.4)	
NA	22 (3.2)	32 (4.6)	
OPV3 (%)			<0.001
Received	558 (81.1)	551 (79.6)	
Not received	52 (7.6)	74 (10.7)	
DNK	32 (4.7)	3 (0.4)	
NA	46 (6.7)	64 (9.2)	
Penta1 (%)			0.971
Received	644 (93.6)	647 (93.5)	
Not received	21 (3.1)	21 (3.0)	
DNK	4 (0.6)	3 (0.4)	
NA	19 (2.8)	21 (3.0)	
Penta2 (%)			0.809
Received	599 (87.1)	599 (86.6)	
Not received	58 (8.4)	56 (8.1)	
DNK	4 (0.6)	3 (0.4)	
NA	27 (3.9)	34 (4.9)	
Penta3 (%)			<0.001
Received	550 (80.1)	536 (77.6)	
Not received	60 (8.7)	88 (12.7)	
DNK	24 (3.5)	3 (0.4)	
NA	53 (7.7)	64 (9.3)	
Measles (%)			0.023
Received	327 (47.5)	310 (44.9)	
Not received	202 (29.4)	253 (36.6)	
DNK	3 (0.4)	2 (0.3)	
NA	156 (22.7)	126 (18.2)	
DPT booster (%)			0.176
Received	244 (35.5)	212 (30.7)	
Not received	230 (33.4)	261 (37.8)	
DNK	4 (0.6)	2 (0.3)	
NA	210 (30.5)	216 (31.3)	

Source of information = Recall (%)	314 (45.0)	309 (44.7)	0.944

Table S4 Child morbidity, feeding practices and utilization of Anganwadi services

	Intervention blocks	Control blocks	P value
N	707	700	
Morbidity in last 15 days			
Diarrhea = Yes (%)	56 (7.9)	73 (10.4)	0.124
Fever = Yes (%)	83 (11.7)	106 (15.1)	0.073
Cough or Cold = Yes (%)	45 (6.4)	71 (10.1)	0.013
Any other morbidity = Yes (%)	3 (0.4)	6 (0.9)	0.494
Child feeding practices			
Ever given breast milk = Yes (%)	672 (95.0)	697 (99.6)	<0.001
Currently breast feeding = No (%)	104 (14.7)	92 (13.3)	0.473
Upto what age breast milk was given in months (mean (sd))	15.89 (7.41)	15.25 (5.50)	0.409
Initiation of complementary feeding in months (mean (sd))	8.23 (2.23)	7.87 (1.64)	0.003
Number of meals (mean (sd))	2.56 (0.88)	2.70 (0.85)	0.011
Number of snacks (mean (sd))	1.24 (0.77)	1.29 (0.48)	0.225
Exclusive breast-feeding duration in months (mean (sd))	5.09 (1.23)	4.93 (1.18)	0.020
Complementary feeding (%)			0.002
less than 6	12 (2.2)	15 (2.8)	
6 to 9	387 (71.7)	421 (79.9)	
More than 9	141 (26.1)	91 (17.3)	
Initiation of breast feeding = More than or equal to 1 hour (%)	443 (63.3)	403 (57.9)	0.045
Colostrum given =Yes (%)	634 (89.7)	637 (91.0)	0.456
Pre-lacteal feeds given = Yes (%)	424 (60.0)	450 (64.3)	0.066
Anganwadi services utilization			
THR food received (%)	580 (82.0)	522 (74.6)	0.002
If yes, how frequently (%)			<0.001
Every month	562 (79.5)	504 (72.0)	
Every two months	31 (4.4)	19 (2.7)	
Every three months	1 (0.1)	4 (0.6)	
More than three months	2 (0.3)	5 (0.7)	
NA	111 (15.7)	168 (24.0)	
Number of times child was weighed in the last three months (%)			<0.001
Once	244 (34.5)	173 (24.7)	
Twice	243 (34.4)	179 (25.6)	
Thrice	101 (14.3)	168 (24.0)	
Not weighed	43 (6.1)	64 (9.1)	
Don’t know	1 (0.1)	1 (0.1)	
NA	75 (10.6)	115 (16.4)	
Does the child like THR food (%)			<0.001
Yes	572 (80.9)	496 (70.9)	
No	21 (3.0)	30 (4.3)	
NA	114 (16.1)	174 (24.9)	
Acceptability of THR food (%)			<0.001

Good	315 (44.6)	180 (25.7)	
Ok	269 (38.0)	339 (48.4)	
Bad	5 (0.7)	3 (0.4)	
NA	118 (16.7)	178 (25.4)	
Sharing of food (%)			<0.001
Yes	522 (73.9)	498 (71.1)	
No	69 (9.8)	24 (3.4)	
NA	115 (16.3)	178 (25.4)	
Number of Vitamin A doses in last one year = 2 (%)	73 (21.0)	54 (16.7)	0.185
Number of deworming does in last one year = 2 (%)	35 (10.1)	27 (8.5)	0.576

Table S5 Health seeking behaviour and WASH practices

	Intervention blocks	Control blocks	P value
N	707	700	
In case of illness to your child, whom do you contact (%)			NS
None	52 (7.4)	26 (3.7)	
AWW	4 (0.6)	2 (0.3)	
ANM/LHV	3 (0.4)	1 (0.1)	
Govt doctor	276 (39.0)	301 (43.2)	
Pvt doctor	370 (52.3)	361 (51.9)	
Others	0 (0.0)	0 (0.0)	
NA	2 (0.3)	5 (0.7)	
Number of episodes of diarrhea (mean (sd))	1.19 (0.61)	1.21 (0.65)	0.703
ORS given during diarrhea =Yes (%)	497 (70.3)	494 (70.7)	0.120
In case of ARI, co-trimoxazole given =Yes (%)			<0.001
Yes	146 (20.7)	117 (16.7)	
No	375 (53.0)	398 (56.9)	
Don't know	95 (13.4)	46 (6.6)	
NA	91 (12.9)	138 (19.7)	
Caring of child, when mother goes to work (%)			0.001
Mother in law	211 (29.8)	176 (25.3)	
Father in law	3 (0.4)	0 (0.0)	
Elder siblings	103 (14.6)	76 (10.9)	
Other	3 (0.4)	0 (0.0)	
Carry the child to work spot	46 (6.5)	38 (5.5)	
Left at AWC/Creche	122 (17.3)	118 (16.9)	
NA	219 (31.0)	289 (41.5)	
WASH practices			
Do you wash your hands with soap before feeding the child (%)			<0.001
Yes	679 (96.0)	406 (58.1)	
No	21 (3.0)	180 (25.8)	
Don't know	7 (1.0)	112 (16.0)	
How do you wash your hands before taking a meal (%)			<0.05
With soap	672 (95.0)	412 (58.9)	
With soil or ash	6 (0.8)	10 (1.4)	
Only with water	29 (4.1)	277 (39.6)	
Hand washing of child before taking food (%)			<0.05
With soap	641 (90.7)	350 (50.1)	
With soil or ash	5 (0.7)	14 (2.0)	
Only with water	61 (8.6)	335 (47.9)	
Don't know	0 (0.0)	0 (0.0)	
Bathing the child (%)			<0.05
Once daily	597 (84.4)	533 (76.3)	

Twice daily	109 (15.4)	140 (20.0)	
Thrice daily	1 (0.1)	25 (3.6)	
Alternate day	0 (0.0)	0 (0.0)	
Too young for bath	0 (0.0)	0 (0.0)	
Boil water before storing drinking water at home (%)			NS
Yes daily	239 (33.8)	193 (27.6)	
Yes occasionally	89 (12.6)	151 (21.6)	
No	379 (53.6)	355 (50.8)	
Storing drinking water at home (%)			0.001
Steel	489 (69.2)	415 (59.3)	
Clay	40 (5.7)	70 (10.0)	
Copper	98 (13.9)	107 (15.3)	
Plastic	79 (11.2)	103 (14.7)	
Others	0 (0.0)	2 (0.3)	
NA	1 (0.1)	3 (0.4)	

Table S6 Knowledge about Nutrition, Health and Hygiene among mothers

	Intervention blocks	Control blocks	P value
N	707	700	
Nutrition supplements during pregnancy is important = Yes (%)	699 (98.9)	632 (90.3)	<0.001
Should eat more during pregnancy = Yes (%)	702 (99.3)	634 (90.6)	<0.001
Should eat protein rich foods = Yes (%)	692 (97.9)	631 (90.1)	<0.001
Should take IFA tablets during pregnancy = Yes (%)	675 (95.5)	631 (90.1)	<0.001
Aware of IFA supplements to be given to the child = No (%)	41 (5.8)	68 (9.7)	0.008
Start breast feeding within first hour after birth = Yes (%)	637 (90.1)	607 (86.7)	0.057
Exclusively breast feed for first six months = Yes (%)	633 (89.5)	550 (78.6)	<0.001
Poor nutrition for child results in poor growth and health = Yes (%)	671 (95.0)	503 (71.9)	<0.001
Nutrition supplements are important for child health = Yes (%)	679 (96.2)	506 (72.3)	<0.001
Hand washing after defecation with soap = Yes (%)	697 (98.6)	517 (73.9)	<0.001
Hand washing before eating with soap = Yes (%)	695 (98.3)	503 (71.9)	<0.001
Heard of ORS = Yes (%)	597 (84.4)	518 (74.0)	<0.001
Ever used ORS = Yes (%)	584 (82.6)	508 (72.6)	<0.001
ORS is the best treatment for diarrhea = Yes (%)	590 (83.6)	519 (74.1)	<0.001
Aware of free ORS = Yes (%)	561 (79.5)	520 (74.3)	0.025
BCG vaccine should be given in first month of child life = Yes (%)	699 (98.9)	667 (95.3)	<0.001
Vitamin A supplements are important = Yes (%)	631 (89.6)	620 (88.6)	0.581

Table S7 Knowledge about Nutrition, Health and Hygiene among Adolescent girls

	Intervention blocks	Control blocks	P value
N	660	652	
Nutrition supplements during pregnancy is important = Yes (%)	496 (75.2)	167 (25.6)	<0.001
Should eat more during pregnancy = Yes (%)	602 (91.2)	489 (75.0)	<0.001
Should eat protein rich foods = Yes (%)	452 (68.5)	142 (21.8)	<0.001
Should take IFA tablets during pregnancy = Yes (%)	362 (54.8)	96 (14.7)	<0.001
Start breast feeding within first hour after birth = Yes (%)	247 (37.4)	68 (10.4)	<0.001
Exclusively breast feed for first six months = Yes (%)	220 (33.3)	77 (11.8)	<0.001
Poor nutrition for child results in poor growth and health = Yes (%)	591 (89.5)	457 (70.1)	<0.001
Nutrition supplements are important for child health = Yes (%)	619 (93.8)	478 (73.3)	<0.001
Hand washing after defecation with soap = Yes (%)	649 (98.3)	633 (97.1)	0.185
Hand washing before eating with soap = Yes (%)	648 (98.2)	630 (96.6)	0.110
Heard of ORS = Yes (%)	373 (56.5)	128 (19.6)	<0.001
Ever used ORS = Yes (%)	272 (41.2)	97 (14.9)	<0.001
ORS is the best treatment for diarrhea = Yes (%)	301 (45.6)	90 (13.8)	<0.001
Aware of free ORS = Yes (%)	277 (42.0)	91 (14.0)	<0.001
BCG vaccine should be given in first month of child life = Yes (%)	346 (52.4)	131 (20.1)	<0.001
Vitamin A supplements are important = Yes (%)	409 (62.0)	99 (15.2)	<0.001

Table S8 Adolescent health and Hygiene

	Intervention blocks	Control blocks	P value
N	660	652	
Beneficiary of MDM = Yes (%)	513 (77.8)	455 (69.8)	0.001
WASH practices			
Washing hands after defecation (%)			NS
With soap	545 (82.8)	463 (71.0)	
With soil or ash	5 (0.8)	1 (0.2)	
Only with water	106 (16.1)	187 (28.7)	
Don't wash	0 (0.0)	0 (0.0)	
NA	2 (0.3)	1 (0.2)	
Wash hands before taking food (%)			NS
With soap	319 (48.5)	415 (63.7)	
With soil or ash	4 (0.6)	0 (0.0)	
Only with water	334 (50.8)	234 (35.9)	
Don't wash	0 (0.0)	0 (0.0)	
NA	1 (0.2)	3 (0.5)	
Do you boil water before storing drinking water (%)			<0.001
Yes daily	11 (1.7)	5 (0.8)	
Yes occasionally	40 (6.1)	6 (0.9)	
No	605 (91.9)	640 (98.2)	
NA	2 (0.3)	1 (0.2)	
Storing drinking water at home (%)			NS
Steel	496 (75.2)	499 (76.5)	
Clay	39 (5.9)	27 (4.1)	
Copper	83 (12.6)	51 (7.8)	
Plastic	38 (5.8)	64 (9.8)	
Others	0 (0.0)	0 (0.0)	
NA	4 (0.6)	11 (1.7)	
IFA supplementation			
Received IFA tablets in the past one year = Yes (%)	393 (59.7)	251 (39.4)	<0.001
Frequency of IFA received = Weekly (%)	313 (47.5)	177 (27.1)	<0.001
Did you participate in any other govt program = Yes (%)	530 (80.5)	536 (82.2)	0.483

ANNEXURE 1


00:03


06:03


03:28

ANNEXURE 2

GENERAL INFORMATION (MOTHER AND UNDER 3 CHILDREN)

SUBJECT ID ☐☐☐☐		**GROUP** ☐ [1=KMSP 2=NO-KMSP]
G.1	Date of interview	/ / [DD/MM/YY]
G.2 G.3	Name of the respondent	**Mobile no**:
G.4 G.5	Name of the village code	**Code** ☐☐☐
G.6	Name of the block	☐ [1=Chincoli, 2=Jewargi, 3= Devadurga, 4=Lingasugur]
G.7	Name of the district	☐ [1=Gulbarga, 2=Raichur]
G.8	Physiological status of mother	☐ [1= Lactating mother,2= Pregnant women, 3= NPNL, 4= Lac. /Preg.]
G.9	Date of birth	/ / [DD/MM/YY] DNK (99/99/99)
G.10	Age in completed years	☐☐
G.11	Which category do you belong to?	☐ [1 = General , 2 = SC , 3 =ST , 4 = OBC , 5 = Others ----------]
G.12	What religion do you belong to?	☐ [1= Muslim , 2 =Hindu , 3 = Christian , 4 =Others----------]
G.13 G.14 .	Occupation of the mother and father	**Mother** ☐ **Father** ☐ 1=laborer 2=farmer 3=Artisans 4=Service 5=business 6=house wife 7=others (specify)_____9=Not alive
G.15 G.16	Highest educational level attained by mother and father	**Subject** ☐ **Husband** ☐ 1=Illiterate 2=Literate, no formal education 3=Up to primary school (class IV) 4= 5th to 9th class 5=Secondary school (ITI course, class X/XII, Intermediate/vocational) 6=Graduate (BA, B.Sc, B.Com, Diploma)-completed 7=Post Graduate and above 8=DNK 9=NA
G.17	Type of family	☐ [1= Nuclear, 2 =Extended Nuclear, 3 = Joint]
G.18 G.19 G.20	Number of family members	☐☐ Children (**Below 5**) ☐☐ Children (**5-18 years**) ☐☐ Adults
G.21 G.22	Since how many years have you been staying here	☐☐ Years ☐☐ Months

HOUSE HOLD INFORMATION

HH.1	Type of house (from observation)	☐ [1 = Kutcha, 2 = Semi pucca, 3= Pucca]
HH.2	House ownership	☐ [1= Own, 2= Rented, 3= Migrant camp/Unauthorized, 4= Living in other house]
HH.3	How many rooms (excluding kitchen) are there in the house?	☐☐
HH.4	Is the kitchen separate?	☐ [1=Yes; 2=No]
HH.5	What fuel is used for cooking?	☐ [1=Gas; 2=Wood/coal/cow dung, 3= Kerosene, 4=Others]
HH.6	What is the main source of drinking water for members of your household?	☐ 1=Draw well 2=Tube well 3=Tap water 4=Filter/packed water 5=Others
HH.7	What kind of toilet facility does the household have?	☐ [1=Own flush toilet, 2=Own pit toilet 3=No toilet facility]
HH.8	If you have toilet facility, do you use it	☐ [1=Yes, 2=No, 9=NA]
HH.9	Does the house have electricity?	☐ [1=Metered connection; 2=Drawn from street lines; 3= No]
HH.10	Does your family have BPL card?	☐ [1=Yes, 2=No]
HH.11	Participation in PDS	☐ [1=Yes, 2=No]
HH.12	Participation in Targeted PDS	☐ [1=Yes, 2=No, 8=DNK]

Do you have the following

HH.13	(a) Clock/Watch	☐ [1=Yes; 2=No]
HH.14	(b) Radio/Transistor/Tape recorder	☐ [1=Yes; 2=No]
HH.15	(c) Television	☐ [1=Yes; 2=No]
HH.16	(d) Bicycle	☐ [1=Yes; 2=No]
HH.17	(e) Motorcycle/scooter/moped	☐ [1=Yes; 2=No]
HH.18 HH.19	(f1) Own Car	☐ [1=Yes; 2=No] (f2) Own auto ☐ [1=Yes; 2=No]
HH.20	(g) Refrigerator	☐ [1=Yes; 2=No]
HH21 HH22	(h) Telephone/Mobile phone	☐ [1=Yes; 2=No] (h2) Live stock ☐ [1=Yes; 2=No]
HH23 HH24	(j) Agricultural land	☐ [1=Yes; 2=No] if yes, land in Acres ☐☐.☐

PREGNANCY AND CHILD DEATH DETAILS

PC.1	Age at marriage (in completed years)	☐☐
PC.2	Age at first pregnancy (in completed years)	☐☐
PC.3	Total number of pregnancies excluding the current pregnancy	☐☐
PC.4	Total number of live Births	☐☐
PC.5	Total number of Abortions, if any	☐☐
PC.6	still births	☐☐
PC.7	Total number of under 5 deaths	☐☐
PC.8 PC.9 PC.10 PC.11 . PC.12 PC.13 PC.14 PC.15 PC.16 PC.17 PC.18 PC.19	If 1 or more under 5 deaths, age of the child, year and month of death and gender	Child 1 ☐☐ Age in months ☐☐ MM ☐☐ YY ☐ Gender [1=boy, 2=girl] Child 2 ☐☐ Age in months ☐☐ MM ☐☐ YY ☐ Gender [1=boy, 2=girl] Child 3 ☐☐ Age in months ☐☐ MM ☐☐ YY ☐ Gender [1=boy, 2=girl]

ANTENATAL INFORMATION OF LAST CHILD BIRTH (INDEX CHILD LESS THAN 3 YEARS)

A.1 A.2	Did you go to your mother's house for the last delivery?	☐ [1=Yes, 2=No] if yes for how many months ☐☐
A.3	Where did you deliver the child?	☐ [1=current place, 2=maternal place, 3= Another place]
A.4	Did you attend for ANC during the birth of your last child	☐ [1=Yes, 2=No]
A.5 A.6 A.7	Who advised you about ANC	☐, ☐, ☐ [1 = ASHA, 2 = AWW, 3 = VNV, 4 = ANM, 5 = Other,9=NA]
A.8	If yes, place of ANC (general)?	☐ [1 = Home, 2 = Sub-centre 3= PHC/Govt. hospital, 4=Private hospital ,5 = Others]
A.9	Who has conducted the ANC (general)?	☐ [1 = ANM, 2 = LHV, 3 = MO-PH, 4 = Pvt. Doctor, 5 = Other,9=NA]
A.10	Total number of ANC visits	☐☐ [98=DNK, 99=NA]
A.11	When did you first register for ANC?	☐☐ Weeks of Gestational age [DNK=98, NA=99]
A.12 A.13 A.14 A.15 A.16 A.17	Components of ANC conducted in general (multiple answers)	☐ Physical examination ☐ Weight recording ☐ Urine examination ☐ Hb estimation ☐ Ultrasound ☐ Health & Nutrition Education [1 = ASHA, 2= ANM,3= M0-PHC, 4= Pvt. Doctor, 5 = Others, 6= Don't know, 7= Not done, 8=DNK, 9=NA]
A.18 A.19 A.20 A.21 A.22 A.23	If received nutrition education	☐ To attend regular ANC checkups ☐ To consume GLVs ☐ To consume milk and eggs ☐ To consume more veg/fruit ☐ To take IFA for 100 days ☐ To consume additional meal [1 = Yes, 2=No, 9=NA]
A.24	Did you consume extra food during pregnancy	☐ [1=Yes, 2=No]
A.25 A.26 A.27	Who advised you to eat extra food	☐, ☐, ☐ [1 = ASHA, 2 = AWW, 3 = VNV, 4 = family, 5 = Other]
A.28	Did you receive ICDS food supplementation during pregnancy	☐ [1=Yes, regularly, Yes, irregularly, 2=No]
A.29	If yes, how frequently	☐ [1= every month, 2=every two months, 3=every three months, 4=more than three months, 9=NA]
A.30	If yes, what foods did you receive	Sharing ☐ [1= Yes, 2= No, 9= NA]
A.31	Did you consume the food regularly	☐ [1=Yes, 2=No,9=NA]; Acceptability ☐ [1= Good, 2= Ok, 3= Bad]
A.32	No of doses of TT immunization	☐ [1= One dose, 2=Two or More doses, 3= No dose taken]
A.33	Did you receive IFA tablets during pregnancy?	☐ [1=Yes, 2=No]
A.34	If yes, from whom you have received?	☐ [1=AWW, 2=ANM,3 = LHV,4= MO-PHC, 5= Pvt. doctor, 6=others, 9=NA]
A.35	Number of tablets received	☐☐☐ [888= DNK,999=NA]
A.36	Number of tablets consumed	☐☐☐ [888= DNK,999=NA]

DETAILS OF LAST CHILD BIRTH (INDEX CHILD LESS THAN 3 YEARS)

CB.1	Name of the child	
CB.2 CB.3	Age and gender of the child	☐☐ months ☐ [1= Male, 2=Female]
CB.4 CB.5	Birth order of your last child	☐☐ Are they twins? ☐ [1=Yes, 2=No]
CB.6	Spacing between the last two live births	☐☐ Months [99=NA]
CB.7	DATE OF BIRTH (from medical record)	/ / [DD/MM/YY], DNK=99/99/99
CB.8	LMP(from medical record)	/ / [DD/MM/YY], DNK=99/99/99
CB.9 CB.10	Gestational age at delivery	☐☐ Weeks ☐ [1= Medical record, 2= Recall, DNK=999]
CB.11	Did you check your weight during pregnancy	☐ [1=Yes; 2=No]
CB.12	If yes, how frequently did you check weight	☐ [1= every month, 2= every 2 months, 3= every 3 months, 4= occasionally, 9=NA]
CB.13 CB.14 CB.15 CB.16 CB.17	If yes, weight gain during pregnancy (based on records Thai card for controls and Nutrition card for beneficiaries) [NA=99.9/99]	GWt1 ☐☐.☐ Kg ; GWt2 ☐☐.☐ Kg [99.8=DNK] Weight gain (GWt2-GWt1): ☐☐.☐ Kg GA first Wt ☐☐ Weeks GA last Wt ☐☐ Weeks
CB.18	Who checked you weight majority of the times	☐ [1 = ASHA, 2 = AWW, 3 = VNV, 4 = ANM, 5 = Other]
CB.19	Was baby weight recorded at birth	☐ [1=Yes; 2=No]
CB.20	If yes, when was birth weight recorded (days)	☐☐ [99=Not recorded]
CB.21 CB.22	Child Weight at birth [9999=NA]	☐.☐ KG ☐ [1= Medical record, 2= Recall]
CB.23	Place of delivery	☐ [1 = Home, 2 = Sub-centre 3=Govt. hospital, 4=Private hospital, 5 = Others]
CB.24	Type of delivery	☐ [1 = Normal, 2 = Caesarian, 3= Assisted forceps]
	ANTHROPOMETRY (MOTHER)	(As on day of survey)
CB.25	Weight	☐☐.☐ Kg
CB.26	Height	☐☐☐.☐ cm
CB.27	Hemoglobin	☐☐.☐ gm/dl [99.9=NA]

CURRENT STATUS OF THE CHILD (LAST CHILD)

IMMUNIZATION HISTORY [1= Received, 2= Not Received, 8=DNK, 9=NA]		
CS.1	BCG	☐
CS.2 CS.3 CS.4	OPV	OPV1 ☐, OPV2 ☐, OPV3 ☐
CS.5 CS.6 CS.7	Pentavalent	Penta1 ☐, Penta2 ☐, Penta3 ☐
CS.8 CS.9 CS.10	DPT	DPT1 ☐, DPT2 ☐, DPT3 ☐
CS.11 CS.12 CS.13	Hepatitis B	Hep B1 ☐, Hep B2 ☐, Hep B3 ☐
CS.14 CS.15	Measles	☐ DPT booster dose (16-24 mo) ☐
CS.16	Information obtained from	☐ [1=Record, 2=Recall]
MORBIDITY HISTORY		
CS.17	Did the child have diarrhea in the last 15 days?	☐ [1=Yes; 2=No]
CS.18	Did the child have fever in the last 15 days?	☐ [1=Yes; 2=No]
CS.19	Did the child have cough in the last 15 days?	☐ [1=Yes; 2=No]
CS.20	Did the child have any other morbidity in the last 15 days?	☐ [1=Yes; 2=No]
CS.21	If yes, specify	
CS.22	Does your child suffer from any chronic illness	☐ [1=Yes; 2=No]
CS.23	If yes, specify	
ANTHROPOMETRY (CHILD)		
CS.24	Weight	☐☐.☐ Kg
CS.25	Height	☐☐☐.☐ cm
CS.26	MUAC **(Above 6 Months Children)**	☐☐.☐ cm [99.9 = NA]
CS.27	Pedal edema (Pitting)	☐ [1=Yes; 2=No]
C.S28	Hemoglobin	☐☐.☐ gm/dl

NUTRITON HISTORY (LAST CHILD)

NH.1	Did you ever give breast milk to your baby?	☐ [1=Yes, 2=No]
NH.2	Are you currently giving breast milk to your child?	☐ [1=Yes, 2=No, 9=NA]
NH.3	If no, till what age did you give breast milk to your child?	☐☐ months [99=NA]
NH.4	At what age did you initiate complementary feeding?	☐☐ Months [99=NA]
NH.5	Number of meals including breakfast per day (current)	☐ [9=NA]
NH.6	Number of snacks per day (current)	☐ [9=NA]
NH.7	Up to what age did you give exclusive breast feeding not even water?	☐☐ Months
NH.8 NH.9	How long after birth, did you initiate breast feeding to your child (in hrs)	☐☐☐ Hrs ☐☐ Min[99999=NA]
NH.10	Did you give Colostrum after birth?	☐ [1=Yes, 2=No, 9=NA]
NH.11	Did you give pre-lacteal feeds such as honey, sugar water, and animal milk after birth?	☐ [1=Yes, 2=No, 9=NA]
NH.12	Did the child receive THR food from AWW? (6-35 month)	☐ [1=Yes, 2=No, 9=NA]
NH.13	If yes, how frequently	☐ [1= every month, 2=every two months, 3=every three months, 4=more than three months, 9=NA]
NH.14	If yes, foods received	
NH.15	How many times, did the AWW weigh the child in the last 3 months?	☐ [1=Once, 2=Twice, 3 =Thrice, 4= Not weighed, 5=Don't know, 9= NA]
NH.16	Does the child consume THR food regularly?	☐ [1=Yes, 2=No, 9=NA]
NH.17	Acceptability of THR food	☐ [1=Good, 2= Ok, 3= Bad, 9=NA]
NH.18	Is the THR food shared by family members?	☐ [1=Yes, 2=No, 9=NA]
NH.19	Vitamin A dose in last one year for the child	☐ [No of doses, DNK=8, 9=NA]
NH.20	No of doses of deworming in the last one year	☐ [DNK=8, 9=NA]
NH.21 NH.22	No of tablets/syrup of IFA received in last one year	☐☐ [DNK=98] ☐ [1=SYP,2=T,9=NA]
NH.23 NH.24	No of tablets/syrup of IFA consumed in last one year	☐☐ [DNK=98] ☐ [1=SYP,2=T,9=NA]
NH.25	Do you give multi vitamin syrup to the child in last one year?	☐ [1=Regular, 2=No, 3= Occasionally, 9=NA]
NH.26	Do you give infant formula to the child in the last one year(Ex: Cerelac/Lactogen/pediasure)?	☐ [1=Regular, 2=No, 3= Occasionally, 9=NA]

CHILD CARE PRACTICES AND HYGEINE (Last One Year)

CC.1	Whom do you consult in case your child falls sick?	☐ [1=None, 2=AWW, 3 =ANM/LHV, 4= Govt. doctor, 5 =Pvt. doctor, 6= others, 9=NA]
CC.2	Number of episodes of diarrhea in the last 6 months	☐☐ [98= don't know, 99= NA]
CC.3	In case of diarrhea, did you give ORS?	☐ [1=Yes, 2=No, 3 =Don't know, 9= NA]
CC.4	In case of ARI, did the ANM give co-trimoxazole to the child?	☐ [1=Yes, 2=No, 3 =Don't know, 9= NA]
CC.5	Generally, who looks after the child when you go out for work?	☐ [1=Mother in law, 2=Father in law, 3 =Elder siblings, 4= Other, 5=Carry the child to work spot, 6 = Left at AWC/Crèche9= NA]
CC.6	Do you wash your hands with soap before feeding the child?	☐ [1=Yes, 2=No, 3 =Don't know, 9= NA]
CC.7	How do you wash your hands after defecation?	☐ [1=With soap, 2=With soil/Ash, 3 =Only with water, 9= NA]
CC.8	Do you wash your hand before taking a meal	☐ [1=With soap, 2=With soil/ash, 3 =Only with water, 4= Don't wash, 9= NA]
CC.9	Hand washing practices of the child before taking food?	☐ [1=With soap, 2=With soil/ash, 3 =Only with water, 4= Don't wash, 9= NA]
CC.10	How regularly do you bath the child?	☐ [1=Once daily 2=Twice daily, 3 =Thrice daily 4= Alternate day, 5= Too young for bath 9= NA]
CC.11	Do you boil water before storing drinking water at home	☐ [1=Yes, daily, 2=Yes, occasionally 3 =No, 9= NA]
CC.12	How do you store drinking water at home	☐ [1=Steel, 2=Clay, 3 =Copper, 4= Plastic, 5=Others, 9= NA]

COUNSELLING BY VNV (ONLY FOR THE INTERVENTION GROUP BENEFICIARIES)

VN.1	Were you given a Nutrition card given by VNV	☐ [1= Yes, 2=No, 9=NA]
	If yes, ask the following questions	
VN.2 VN.3 VN.4	Since when, were you given this card (in months based on date of registration)	P ☐☐ L ☐☐ C ☐☐ [99=NA]
VN.5 VN.6	Do you have this card with you currently	M ☐ C ☐ [1= Yes, 2=No, 9=NA]
VN.7 VN.8 VN.9	Number of visits by the VNV in last 3 months(place of visit: 1=home, 2= VNV place, 3=other, 9=NA)	M ☐ C ☐ [1= Yes, 2=No, 9=NA] place ☐
VN.10 VN.11 VN.12 VN.13 VN.14 VN.16 VN.17 VN.18 VN.19 VN.20 VN.22 VN.23 VN.24	Type & frequency of services provided during the visit by VNV [1 = Every month, 2=Every 2 months, 3=Every 3 months, 4= Occasionally, 5=Never, 8=DNK,9=NA]	Nutrition/health education: P ☐ L ☐ C ☐ Weight recording: P ☐ L ☐ C ☐ Shakti Vita: P ☐ L ☐ C ☐ Group Counseling: P ☐ L ☐ C ☐ Immunization: P ☐ L ☐ C ☐
VN.25 VN.26 VN.27	If received Shakti vita do you and your child consume regularly	P ☐ L ☐ C ☐ [1= Yes, 2=No,9=NA]
VN.28 VN.29 VN.30 VN.31 VN.32 VN.33	If received shakti vita in the last 3 months by you and your child	No of packets: M ☐☐ C ☐☐ [99=NA] Acceptability: M ☐ C ☐ [1=Good, 2=Ok, 3= Bad,9=NA] Sharing: M ☐ C ☐ [1=yes,2=No,9=NA]
	Did the VNV explain you about the following	
VN.34	Did she educate on Inter-generational cycle of malnutrition (show poster for recall)	☐ [1= Yes, 2=No, 8=DNK, 9=NA]
VN.35	Did she educate to improve dietary practices with low cost available foods at home	☐ [1= Yes, 2=No, 8=DNK, 9=NA]
VN.36 VN.37	Did she educate on anemia and iodine deficiency	Anemia ☐ Iodine ☐ [[1= Yes, 2=No, 8=DNK, 9=NA]
VN.38	Did she educate you on gender discrimination	☐ [1= Yes, 2=No,8=DNK, 9=NA]
VN.39	Did she educate on improving weight before and during delivery	☐ [1= Yes, 2=No, 8=DNK, 9=NA]
VN.40 VN.41	Did she educate on importance of feeding colostrum, exclusive breast feeding (EBF for 6M)	colostrum ☐ EBF ☐ [1=Yes,2=No,8=DNK,9=NA]
VN.42	Did she educate on initiation of complementary feeding *(only for pregnant and lactating women)*	☐ [1= Yes, 2=No, 8=DNK,9=NA]
VN.43	Did she educate on importance of proper birth weight and avoid LBW babies *(for current)*	☐ [1= Yes, 2=No, 8=DNK, 9=NA],
VN.44	If yes, what is the ideal birth weight (grams)	☐.☐ kg [9.8=DNK, 9.9=NA]
VN.45	Did she educate on hygiene and sanitation	☐ [1= Yes, 2=No, 9=NA]
VN46	**Did you know all this information before counseling by VNV**	☐ [1= Mostly, 2=Few, 3 =None, 9=NA]

FFQ (ONLY FOR THE INTERVENTION GROUP BENEFICIARIES)

FF.1 FF.2	*How frequently were you eating the foods before and after the project started*	*BEFORE*	*AFTER*
FF.3	Do you think your overall food consumption improved after the VNV counselling	☐ [1= Yes, 2=No, 3= Can't say, 9=NA]	
FF.4	Do you think your overall health has improved after VNV counselling	☐ [1= Yes, 2=No, 3= Can't say, 9=NA]	
FF.5	Did you feel stronger and energetic after eating shakti vita	☐ [1= Yes, 2=No, 3= Can't say, 9=NA]	
FF.6	Do you think your child health improved after VNC counselling	☐ [1= Yes, 2=No, 3= Can't say, 9=NA]	
FF.7	Do you think your child was active and energetic after eating shakti vita	☐ [1= Yes, 2=No, 3= Can't say, 9=NA]	
	*Foods consumed[***1 = One time, 2= Two times, 3 = Three times, 4 =Four times, 5 =Five times, 6 = Six times, 7= Seven times or More, 8= Don't know, 9= NA, 0= Never]** **[D= Daily, W= Weekly, M=Monthly, Y=Yearly, 0=Never, 8=Don't know, 9=NA]**	Eg. Rice: 3/D	Eg. Rice: 3/D
FF.8 FF.9	Rice	☐☐/☐	☐☐/☐
FF.10 FF.11	Wheat	☐☐/☐	☐☐/☐
FF.12 FF.13	Jowar	☐☐/☐	☐☐/☐
FF.14 FF.15	Ragi	☐☐/☐	☐☐/☐
FF.16 FF.17	Pulses	☐☐/☐	☐☐/☐
FF.18 FF.19	Jaggery	☐☐/☐	☐☐/☐
FF.20 FF.21	Milk	☐☐/☐	☐☐/☐
FF.22 FF.23	Vegetables	☐☐/☐	☐☐/☐
FF.24 FF.25	Fruits	☐☐/☐	☐☐/☐
FF.26 FF.27	Eggs	☐☐/☐	☐☐/☐
FF.28 FF.29	Non-veg (Meat/chicken/fish etc)	☐☐/☐	☐☐/☐
FF.30 FF.31	Others (specify_____)	☐☐/☐	☐☐/☐
FF.32 FF.33	Meals (including breakfast) consumed per day	☐	☐
FF.34 FF.35	Snacks consumed per day	☐	☐

FFQ ONLY FOR THE CONTROL GROUP AND NON-BENEFICIARIES

	*Foods consumed[***1 = One time, 2= Two times, 3 = Three times, 4 =Four times, 5 =Five times, 6 = Six times, 7= Seven times or More, 8= Don't know, 9= NA, 0= Never] [D= Daily, W= Weekly, M=Monthly, Y=Yearly, 0=Never, 8=Don't know, 9=NA]**	Eg. Rice: 3/D
FC.1	Rice	☐☐/☐☐
FC.2	Wheat	☐☐/☐☐
FC.3	Jowar	☐☐/☐☐
FC.4	Ragi	☐☐/☐☐
FC.5	Pulses	☐☐/☐☐
FC.6	Jaggery	☐☐/☐☐
FC.7	Milk	☐☐/☐☐
FC.8	Vegetables	☐☐/☐☐
FC.9	Fruits	☐☐/☐☐
FC.10	Eggs	☐☐/☐☐
FC.11	Non-veg (Meat/chicken/fish etc)	☐☐/☐☐
FC.12	Others (specify_____)	☐☐/☐☐
FC.13	Meals (including breakfast) consumed per day	☐
FC.14	Snacks consumed per day	☐

ANTHROPOMETRY FOR CHILDREN OTHER THAN INDEX CHILD BELOW 5 IN THE HOUSEHOLD

	Children below 5 years	Child 1	Child 2
OT.1 OT.2	Name		
OT.3 OT.4	Gender	☐ [1= Male, 2=Female]	☐ [1= Male, 2=Female]
OT.5 OT.6	Age	☐☐ months	☐☐ months
OT.7 OT.8	Did the child participate or currently participating in KMNP program (check for card)	☐ [1=Yes, 2=No, 3 =Don't know, 9= NA]	☐ [1=Yes, 2=No, 3 =Don't know, 9= NA]
OT.9 OT.10	Did the child have diarrhea in the last 15 days?	☐ [1=Yes; 2=No]	☐ [1=Yes; 2=No]
OT.11 OT.12	Did the child have fever in the last 15 days?	☐ [1=Yes; 2=No]	☐ [1=Yes; 2=No]
OT.13 OT.14	Weight	☐☐.☐ Kg	☐☐.☐ Kg
OT.15 OT.16	Height	☐☐☐.☐ cm	☐☐☐.☐ cm
OT.17 OT.18	MUAC	☐☐.☐ cm	☐☐.☐ cm
OT.19 OT.20	Pedal edema (Pitting)	☐ [1=Yes; 2=No]	☐ [1=Yes; 2=No]

KNOWLEDGE ABOUT NUTRITION HEALTH AND HYGIENE

	Now I am going to ask you about general nutrition and health information. Do you know about the following	
KN.1	Nutritional Supplements During Pregnancy is Important	☐ [1=Yes; 2=No]
KN.2	Should Eat More During Pregnancy	☐ [1=Yes; 2=No]
KN.3	Should Eat More Protein rich foods such as pulses during Pregnancy	☐ [1=Yes; 2=No]
KN.4	Should take IFA tablets During Pregnancy	☐ [1=Yes; 2=No]
KN.5	Aware of IFA supplements to be given to child	☐ [1=Yes; 2=No]
KN.6	Start Breast Feeding within first hour after birth	☐ [1=Yes; 2=No]
KN.7	Exclusive Breast feed for first 6 months	☐ [1=Yes; 2=No]
KN.8	Poor nutrition for child results in poor growth, less weight and poor health	☐ [1=Yes; 2=No]
KN.9	Nutritional supplements for child Important	☐ [1=Yes; 2=No]
KN.10	Hand Washing After Defecation with soap	☐ [1=Yes; 2=No]
KN.11	Hand Washing Before Eating with soap	☐ [1=Yes; 2=No]
KN.12	Heard of ORS	☐ [1=Yes; 2=No]
KN.13	Ever used ORS	☐ [1=Yes; 2=No]
KN.14	ORS is the best treatment for child diarrhea	☐ [1=Yes; 2=No]
KN.15	Aware of free ORS	☐ [1=Yes; 2=No]
KN.16	BCG Vaccine Should be given in first month of child's life	☐ [1=Yes; 2=No]
KN.17	Vitamin A supplements are important	☐ [1=Yes; 2=No]

VNV NUTRITION CARD ID

Pregnancy_____

Lactation_____

Child _____

Any other details

_____

Name of the investigator _____

Signature of the investigator_____

Name of the supervisor _____

Signature of the supervisor _____

ANNEXURE 3

Focus group Discussions

Mothers of under 3 yr children, and adolescent girls–

Theme Guide

1. Importance of nutrition to you and kid and family
2. Sources of information for nutrition
    a. Before intervention and after intervention
    b. Now who do you think is the best advisor for knowing about nutrition
3. Any change perceived after the initiation of current intervention, and improvement in nutritional status.
4. Has it changed the quality of their lives in any way – How?
    a. Any new information, any new tips, any new hope?
5. Help/support they are receiving from the village Nutrition volunteers
6. Ante natal care (ANC) – any change they brought
7. Any perceived change before and after intervention

Name of VNV VNV code

Village Date

Investigator name

1. Who are the government health and nutrition workers who work for mother and child nutrition in your village?

List the worker (Hint ANM, AWW, ASHA, etc)

2. How long have you been working as VNV in this project (in years and months) if less than the project duration who was working earlier

3. What are your duties as a VNV

4. Before you joined what do you think was a major nutritional issue in mothers and children in your area (hint: lbw, anemia, malnutrition in children)

5. What did you do to help them overcome some of these problems? (hints: group meeting, house visits, growth monitoring, food supplementation)

6. What are the key messages you have given in counseling for adolescent girls

6.a Nutrition messages

6.b Personal hygiene

6.c Cleanliness of surroundings

6.d Menstrual hygiene

6.e Supplementation of IFA weekly once

6.f Age of marriage and conception

7. What are the key messages you have given in counseling for mother and child

7.a Nutrition messages during pregnancy, lactation and children

7.b Personal hygiene

7.c Cleanliness of surroundings

7.d Importance of weight monitoring in pregnancy

7.e Importance of child growth monitoring

7.f Importance of IFA supplementation during pregnancy and children

8. With your counseling only (before you started giving Shakti Vita), what are the significant changes you observed among adolescents and mothers

9. How is your relationship between AWW and ASHA WORKERS (hint: any conflict of work you faced with job?)

10. After supplementation with Shakti Vita, what are the major changes you saw that was over and above the health affects you saw with counseling alone (hint: in terms of growth of children, iq, alertness, memory, nutritional status, self-perception and habits, because of food supplement is there any increased attendance)

11. Can you manage with only counselling or do you think counselling along with supplementation will be beneficial?

12. Questions on Shakti vita

12.a Do you think the beneficiaries are liking Shakti vita

12.b Do you think only beneficiaries consume or is it getting shared in the family?

12.c Did any beneficiaries complain about the food, if yes, what are the complaints?

12.b Do you have any issues related to supply

13. What do you think is the most important contribution of this program

14. Do you think there is any change that is required in the program

Name of VNV VNV code

Village Date

Investigator name

1. Are there any government health workers who do similar duties as you?

List the workers (Hint AWW supervisor)

2. How long have you been working as Supervisor in this project (in years and months)

3. What are your duties as a Supervisor

4. Before you joined what do you think was a major nutritional issues in mothers and children in your area

5. What did you do to help them overcome some of these problems? (hints: group meeting, house visits, growth monitoring, food supplementation)

6. What are the activities of VNV that regular government health workers cannot do

7. How do you think VNV have helped overcome these issues

With VNV counseling only (before you started giving Shakti Vita), what are the significant changes you observed among adolescents and mothers

Did you or do you and your VNVS encounter any problems with ICDS set up such AWW and their supevisors (hint: any conflict of work you faced with job?)

After supplementation with Shakti Vita, what are the major changes you saw that was over and above the health affects you saw with counseling alone (hint: in terms of growth of children, iq, alertness, memory, nutritional status, self-perception and habits, because of food supplement is there any increased attendance)

Can you manage with only counselling or do you think counselling along with supplementation will be beneficial?

Questions on Shakti vita

Do you think the beneficiaries are liking Shakti vita

Do you think only beneficiaries consume or is it getting shared in the family?

Did any beneficiaries complain about the food, if yes, what are the complaints?

Do you have any issues related to supply

What is the most important contribution of this program

Do you think there is any change this required in the program?

Name of Anganwadi worker AWC code

Village Date

Investigator name

1. Since how long you have been working here as Anganwadi worker (AWW)

2. What are your duties as AWW

3. Do you get to carry out IEC programmes on infant nutrition and maternal nutrition given the work burden you have?

4. If yes, What IEC messages (counselling) do you provide?

4.a Nutrition messages

4.b Personal hygiene

4.c Cleanliness of surroundings

4.d Menstrual hygiene

4.e Supplementation of IFA weekly once

4.f Age of marriage and conception

5. What are the key messages you have given in counselling for mother and child

5.a Nutrition messages during pregnancy, lactation and children

5.b Personal hygiene

5c Cleanliness of surroundings

5.d Importance of weight monitoring in pregnancy

5.e Importance of child growth monitoring

5.f Importance of IFA supplementation during pregnancy and children

6 How easy or difficult has it been to convince the women/mothers about the importance of good nutrition for children, adolescents, pregnant and nursing mothers, and other adult members of the family?

7 Do you get to carry out the IEC programmes on infant nutrition and maternal nutrition given the work burden you have?

8 Are you able to contact and interact with each and every mother in your area having a child beneficiary?

9 Existing programmes and their coverage for maternal and child nutrition

10 can you tell what the existing programmes (apart from KMNP) are, what their uses and pitfalls in implementation (to be asked only in intervention villages)?

11 What do you think of the new program being provided by KMNP through VNVs (to be asked only in intervention villages)?

12 Do you see there is a need for an additional nutrition volunteer who take up this job and supplement your efforts (to be asked only in intervention villages)?

13 What activities the VNV does (to be asked only in intervention villages)

14 How did the education impact the mothers, adolescents in your village during the intervention period (Only in intervention villages)?

15 Do you see any change in the nutritional status of the children, pregnant women and adolescent girls in your village after they were provided food supplementation under this programme above and over nutrition education (Only in intervention villages) (probe for changes)?

16 Any other changes in the nutritional status of mothers and children in the intervention area (Only in intervention villages)

Name of ASHA AWC code

Village Date

Investigator name

1. Since how long you have been working here as ASHA

2. What are your duties as ASHA

3. Do you get to carry out IEC programmes on infant nutrition and maternal nutrition given the work burden you have?

4. If yes, What IEC messages (counselling) do you provide?

4.a Nutrition messages

4.b Personal hygiene

4.c Cleanliness of surroundings

4.d Menstrual hygiene

4.e Supplementation of IFA weekly once

4.f Age of marriage and conception

5. What are the key messages you have given in counselling for mother and child

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Name of SHG member SHG group name

Village Date

Investigator name

1. Since how long you have been working here in this SHG group

2. What are the activities under SHG group

3. Do you get to carry out IEC programmes on infant nutrition and maternal nutrition given the work burden you have?

4. If yes, What IEC messages (counselling) do you provide?

4.a Nutrition messages

4.b Personal hygiene

4.c Cleanliness of surroundings

4.d Menstrual hygiene

4.e Supplementation of IFA weekly once

4.f Age of marriage and conception

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