SAVING LIVES
CHANGING LIVES

Endline Assessment of the Fortification of Nutrimix in Selected Panchayats of Wayanad, Kerala

Assessment of a Pilot Project of the Government of Kerala and the World Food Programme

Review Report

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Executive Summary

Assessment context

Considering the prevalence of micronutrient deficiencies and the identified culture-specific gaps in the intake of most of the micronutrients amongst the children in the state of Kerala, the United Nations World Food Programme (WFP) in collaboration with the Government of Kerala (GoK) implemented a pilot project on fortification of Take Home Rations (THR) distributed (THR) in the brand name 'Amrutham nutrimix' through Integrated Child Development Services (ICDS) scheme[1] to children aged 6-36 months in Wayanad district. The duration of the pilot project was from January 2017 to December 2018. The nutrimix was fortified with 11 nutrients - Iron, Calcium, Vitamin A, Zinc, Thiamine, Riboflavin, Niacin, Vitamin B6, Vitamin C, Folic acid, and Vitamin B12. Micronutrient fortification intervention was initially implemented in three selected panchayats - Panamaram, Vellamunda, and Thirunelli of Mananthavadi community block in Wayanad. Later, Thondernad panchayat from the same district was also included in the pilot project.

During the pilot project, WFP supported the GoK to provide fortified THR to young children through the ICDS. WFP support included setting up a demonstration unit in an existing nutrimix production site in Mananthavady; conducting a gap analysis-cum-scoping study; development of quality control protocols to ensure delivery of safe and nutritious nutrimix to the beneficiaries; development of Information, Education and Communication (IEC) materials and conducting folk media campaigns around feeding practices of children (aged 6-36 months); creation of a pool of master trainers and technical assistance and support towards scaling-up fortification.

The primary goal of the fortification project was to demonstrate the feasibility of establishing an operational model for the fortification of nutrimix provided under the ICDS and hand-over of the model to the state government for sustained impact on the nutritional status of children (aged 6 to 36 months) and scale-up to other parts in the State.

While the project had an in-built system of monitoring the implementation of fortification activities, an independent assessment was designed to examine the performance of the project. The government of Kerala recommended Government Medical College Kozhikode (GMCK) to evaluate the intervention

[1]ICDS is a government programme in India which provides food, preschool education, primary healthcare, immunization, health check-up and referral services to children under 6 years of age and their mothers. ICDS services are provided through Anganwadi centres. Anganwadi workers are the mainstay of the anganwadi services delivery system.

Methodology

The specific objectives of this assessment were

1. To assess the nutritional status of children in the age group of 18 months to 24 months attending Anganwadis in Manathavady Thaluq of Wayanad district in Kerala.
2. To assess the serum levels of selected micronutrients among the above children
3. To understand various socio-cultural practices like cooking and feeding patterns in the households in the study area where the Nutrimix take-home rations are supplied through anganwadis
4. To assess the impact of the GoK-WFP Nutrimix fortification project through nutritional status assessment of the above children after the intervention period.

The key parameters examined in this assessment are the nutritional status of children under study; morbidity patterns among the target age group; knowledge on appropriate complementary feeding and nutrition among the Anganwadi Workers (AWWs) and parents/caregivers of children (six months tothree years); acceptability of fortified nutrimix distributed under ICDS to the targeted children and their caregivers; intra-household consumption pattern of fortified nutrimix; cooking and eating practices concerning the fortified nutrimix; other aspects of operational feasibility of fortified nutrimix (including quality control protocols) distributed under ICDS. The assessment also aimed to provide recommendations (if any) on improvising the design and activities of the project and to provide recommendations and suggestions on further replication/scale-up of the model.

For this assessment, a quasi-experimental pre-post study design using a mixed-method approach was employed. Panamaram, Vellamunda, and Thirunelli panchayats were included in the intervention area and, Thavinjal and Edavaka panchayats in the same block were chosen as the control areas. A baseline assessment of the micronutrient levels among the target group of children in the study areas was conducted initially. Thereafter, the fortified THR was supplied to all the beneficiary children in the three intervention panchayats, while the beneficiary children in the two control panchayats continued to receive the regular non-fortified THR. The children from the intervention area who had received the fortified THR for a minimum of one year, as well as the children of the same age group from the control area who were receiving the non-fortified THR, were assessed for the selected nutrients and other nutritional parameters during the endline phase. This allowed a comparison between four groups - the intervention and control groups at baseline and the same groups at endline.

In addition to the micronutrient levels, the assessment also assessed several other parameters of the beneficiary children including morbidity profile, immunization status, pregnancy-related complications, breastfeeding, diet, knowledge of caregivers, anganwadi centres, anganwadi workers, THR, etc.

Quantitative data was collected from the AWWs of the study areas. Qualitative data was collected from the Kudumbshree[2] workers employed in the production centre of the project area, where the production of the nutrimix, which is supplied under ICDS takes place. During the baseline round, a few of the community health workers were also interviewed

[2]In every district of Kerala with the patronage and guidance of Kudumbshree, nutrimix is prepared by small units, consisting of Neighbourhood Groups (NHG) members. This initiative, exclusively involving women, has been pioneer in the field of rural development, financial inclusion and most importantly in the battle against malnutrition. Nutrimix gets supplied to Anganwadis by the units, from where the children get for free. On the other hand, the units get paid by the ICDS supervisor through Panchayat.

Baseline data collection activity was conducted from August to October 2016. Data collection for the endline phase started on 26th July 2018 but had to be halted on 08th August 2018 due to the occurrence of heavy floods in the study area. Before the onset of floods, endline data collection was mostly complete in the control panchayats of Edavaka and Thavinjal. On the advice and recommendation of GoK, post-flood endline data collection was recommenced from 3rd December 2018. The panchayats of Panamaram, Vellamunda, and Thirunelli were covered in the post-floods round. During the flood and its aftermath, the distribution and consumption of nutrimix were affected and were less than desired.

Key Findings

The assessment findings are based on both spatial and temporal comparisons. The findings were compared between the two groups in the study (intervention and control) during the two phases (baseline and endline), as well as the changes that occurred in these groups between the two phases.

The Micronutrient and CRP levels of children: Both intervention and study areas have shown a decline in the deficiencies of Folate, Vitamin A, and Vitamin B12, with the intervention area showing a better performance in these parameters.

The most significant decline in deficiency level has happened with Vitamin A. The proportion of children with vitamin A deficiency has shown a statistically significant decline in the intervention area, compared to the control area in the pre-post comparison. In the intervention area, the proportion of children with low Vitamin A levels and vitamin A deficiency reduced by 35.7 percentage points (from 94.3 percent during baseline to 58.6 percent at the endline), whereas the corresponding reduction in the control area was by 24.1 percentage points (from 90.0 percent to 65.9 percent).

The proportion of children with possible and actual folate deficiency have decreased in both areas, with the intervention area performing better than the control. In the intervention area, the percentage of children with possible or actual folate deficiency decreased by 16.1 percentage points (from 19.8 percent to 3.7 percent), whereas in the control area, the decrease was by 13.7 percentage points (from 17.3 percent to 3.6 percent).

The proportion of children with Vitamin B12 deficiency too has decreased in both areas, with the intervention area performing slightly better than the control. In the intervention area, the percentage of children with Vitamin B12 deficiency decreased by 10.8 percentage points (from 16 percent to 5.2 percent), whereas in the control area, the decrease was by 9.4 percentage points (from 13.6 percent to 4.2 percent).

The proportion of children with higher CRP levels have decreased in the intervention area by 4.2 percentage points (from 9.8 percent to 5.6 percent), whereas in the control area, the proportion has mildly increased by 0.7 percentage points (from 7.2 percent to 7.9 percent)

The Prevalence of Anaemia and Ferritin deficiency: The two indicators used to assess iron deficiency in the children were hemoglobin for anaemia and serum Ferritin for iron stores.

The proportion of children with anaemia decreased in both areas. In the intervention area, the percentage of children with anaemia decreased by 6.7 percentage points (from 64.4 percent to 57.7 percent), whereas in the control area, the reduction was by 5.3 percentage points (from 49.0 percent to 43.7 percent). Although there was a higher reduction in anaemia in the intervention area, the deficiency level continued to be higher than the control area during the endline. It should be considered that the baseline level of anaemia was also higher in the intervention area.

The proportion of children with ferritin deficiency has increased in the intervention and control areas. In the intervention area, the percentage of children with ferritin deficiency increased by 9.9 percentage points (from 59.7 percent to 69.6 percent), whereas in the control area, the increase was by 1.8 percentage points (from 65.7 percent to 67.5 percent).

Morbidity profile of children: The intervention area has seen a sharper reduction of illness among children by 17.8 percent as compared to a reduction of 13.3 percent in the control area.

Impact of Floods: As there was a break in the data collection during the endline due to floods, the impact of the flood was assessed through a questionnaire when the data collection resumed after the floods. The data collection from the control area was completed before floods, and the major part of data collection from the intervention area was conducted post-floods. In the intervention area 16.8 percent reported being affected by the flood, 11.3 percent had to move out of their houses, and water entered the house of 6 percent. 33 percent reported not having access to *Nutrimix* during the flood period. 8.6 percent had interrupted breastfeeding during the flood period. 25.1 percent of children in the intervention area had the illness in the post-flood period.

Awareness among caregivers for breastfeeding and complementary feeding practices: Awareness about the need for of initiation of breastfeeding within an hour of birth increased by 5.3 percentage points (75.5 percent to 80.8 percent) in the intervention area, whereas it remained almost the same in the control area (80.8 percent to 81.5 percent). The awareness regarding the duration of receiving exclusive breast milk till six months improved in the intervention area (81.9 percent to 92.2 percent), whereas it declined in the control area (86.4 percent to 82.7 percent). Awareness on the appropriate age of the child to start solid or semi-solid food has improved among the caregivers of the intervention area (86.0 percent to 92.4 percent) and decreased in the control area (87.5 percent to 86.6 percent).

Awareness among caregivers for safe preparation of complimentary food, responsive feeding, feeding during illness and recovery from illness phase:

- Results of the endline round show that a high percentage of caregivers have heard about the safe preparation of complementary feed in the intervention (85.7 percent) and control areas (88.0 percent). Safe preparation included keeping hands clean, separating raw from cooked food, cleaning food thoroughly, and usage of safe water and materials.
- As compared to the control area, a higher percentage of caregivers from the intervention area were aware of the responsive feeding approach (73.5 percent vs. 66.7 percent). As compared to the control area, a higher proportion of caregivers from the intervention area were aware of the various components of responsive feeding approach such as feeding the child slowly and patiently; encouraging the child to eat, but not forcing; feeding time are periods of love and care; if the child refuses certain foods, to give different food combinations, tastes and textures; minimum distractions during meals; a young child should be encouraged to take feed by praising them and their food, etc.
- Similarly, as compared to the control area, a higher percentage of caregivers from the intervention area were aware of the role of nutrimix during illness (35.9 percent versus 20.5 percent) and about the feeding practices during illness (32.3 percent vs. 21.7 percent). However, only a lower percentage of caregivers from the intervention area were aware of the feeding practices during recovery from the illness compared to the control area (57.0 percent vs. 63.5 percent).

Awareness among caregivers for the fortification of THR: The results show that 91 percent of respondents from the intervention area were aware that the THR provided in the anganwadi centres is fortified, and 89.6 percent of them mentioned that fortification of THR is beneficial or good.

Breastfeeding practices: During baseline, mothers who had ever breastfed the index child in the intervention and control area was nearly universal. However, it declined to 92.0 percent in the intervention area and 90.4 percent in the control area at the time of the endline survey. As compared to baseline, the proportion of mothers who initiated breastfeeding within an hour of their child-birth slightly increased in the intervention area, whereas in the control area there is no change in the proportion of mothers who initiated breastfeeding with an hour.

De-worming and IFA status among children: The proportion of children (18-24 months) who have undergone deworming has declined by 16 percentage points and 12.9 percentage points in the intervention and control areas respectively. The proportion of children who have received IFA has increased in the intervention area (from 1.4 percent to 10.6 percent) and in the control area (from 1.0 percent to 7.2 percent). The received IFA is also not being consumed regularly. Data collected from AWWs show that the availability of deworming and IFA in the anganwadi centres have declined from baseline to endline. There is a possibility that deworming to be conducted during August rounds could not take place due to heavy rains.

Receiving nutrimix from AWCs: During baseline and endline rounds in the intervention and control areas, almost all the caregivers reported receiving nutrimix from the anganwadi centres.

Consumption of nutrimix: The mean quantity of nutrimix consumed per child per day has increased in the intervention area (from 57.9 grams to 91.7 grams) and in the control area (from 59.9 grams to 100 grams). But this is still below the recommended consumption of 135 grams per child per day. The percentage of children who consume nutrimix daily has increased in the intervention area (from 41.7 percent to 62.8 percent), whereas there is not much change in the control area (from 40.9 percent to 39.1 percent).

Liking of nutrimix: As compared to control, the intervention area has witnessed a sharper increase in the liking for nutrimix among children. The proportion of caregivers who reported that the child likes nutrimix has increased in the intervention area by 29.8 percentage points (from 56.9 percent to 87.1 percent) and in the control area by 24.0 percentage points (from 52.7 percent to 77.3 percent). The addition of the sugar/jaggery in the supplement (which improves the taste) by the caregiver has slightly declined in the intervention area (from 61.0 percent to 59.3 percent), whereas the same has increased in the control area (from 63.8 percent to 68.6 percent).

Intrahousehold distribution of nutrimix: The reported consumption of Nutrimix exclusively by the beneficiary child which was 25.5 percent during the baseline has gone up to 63.7 percent during the endline. Both intervention and control areas have witnessed an increase in the sharing of nutrimix with siblings, mothers, and other members of the household.

Hygiene practices: A significantly higher proportion of caregivers reported washing hands with soap before handling or cooking nutrimix in both areas at the time of the endline survey. Their proportion in the intervention area has increased by 31.6 percentage points (from 51.2 percent to 82.8 percent), and in the control area by 24.7 percentage points (from 46.8 percent to 71.5 percent).

Eating Practices in the household: During baseline, in almost 38.0 percent of the households, children used to "eat first" in the family, with no difference in the proportion between intervention and control areas. At the time of the endline, the proportion of children eating first in the family has increased in the intervention area by 30.6 percentage points and in the control area by 7.8 percentage points.

Quality of nutrimix according to AWWs: The proportion of AWWs who opinionated the quality of nutrimix as 'very good' increased in the intervention area by 27.5 percentage points (from 55.8 percent to 83.3 percent), whereas in the control area, this has slightly declined by 2.4 percentage points (from 58.2 percent to 55.8 percent).

Fortification of nutrimix according to AWWs from the intervention area:

- All the AWWs of the intervention area were aware that the Nutrimix provided by them is fortified.
- Almost all of them (98.0percent) mentioned that the fortified Nutrimix is better than the non-fortified one.
- All of them believed that the fortification of Nutrimix is nutritionally beneficial/good.
- 94.1percent of them opinioned that the fortified Nutrimix tastes better than non-fortified THR.
- 90.2percent of them mentioned that Nutrimix demand has increased following fortification.
- 93.1percent reported that Nutrimix consumption has increased following fortification.

Infrastructure in AWCs: Between the two phases of the assessment, the availability of clean safe drinking water and toilet facility on the premises of AWC has increased in both areas, but there is still scope for improvement. Storage facilities for food have also improved.

Knowledge of Nutrimix preparation among Kudumbshree workers: Kudumbshree workers were aware of the ingredients used to prepare the nutrimix and could correctly list down the ingredients used. They were aware of the correct procedure for the preparation of nutrimix and specifically mentioned the addition of the premix (fortifying agent).

Perception of Kudumbshree workers: In contrast to the baseline survey where the workers recommended removal of soya from the nutrimix to improve the taste, during the endline, the workers did not suggest removal of any ingredient (including soybean). One of the respondents opined that the taste of soya was no longer a problem. Regarding the packing of the nutrimix, workers considered the current packing to be very good. Kudumbshree workers had a positive attitude towards the fortification of food and agreed that fortification provides a better nutritive value to foodstuff and is acceptable among the people too.

Challenges faced by Kudumbshree workers: One of the challenges was the non-availability of a cooler for roasted ingredients. In the absence of a cooler, the cooling process consumes more time. Initially, the workers found it difficult to use the dosing machine (the dosing machine was used only for trials and not for actual production during the project implementation) but now the issue has been resolved after the introduction of the standardized premix packets. The issue of manual blending (which was in practice before the introduction of the fortification project) has also been resolved after the introduction of the blending machine as part of the process of fortification of THR. According to the *Kudumbshree* workers, the process is now functioning smoothly and blending, and mixing is taking place properly.

Suggestions by Kudumbshree workers: The workers felt that the future training of all district unit members needs to be done more thoroughly. Since the workers in many units are temporary staff, there were concerns about the sustainability of the process.

Conclusion

1. ***Fortification of nutrimix results in an improvement in folate, Vitamin A, and Vitamin B12 levels of the beneficiaries:*** The assessment revealed that the children from the intervention area had a better reduction of Folate, Vitamin A, and Vitamin B12 deficiencies at the endline compared to the baseline. Reduction in the deficiency levels for the above three vitamins was observed in the control area too, but not to the same extent as in the intervention area. The most remarkable drop was in Vitamin A deficiency, with the intervention area demonstrating a statistically significant difference from the control area.
2. ***Anaemia in the intervention area has reduced, but not to the levels expected:*** The baseline level of anaemia was higher in the intervention area than the baseline. Although there was a higher reduction in anaemia in the intervention area, the deficiency level was higher than the control area during the endline, despite the fortification. The inherent socio-economic differences between the two study areas which widened during the endline could be a possible contributor to the disparity. Another possibility is the impact of the flood. But further studies with different methodologies are required to determine this.
3. ***Knowledge levels of caregivers and Anganwadi workers of project area regarding the various aspects of feeding practices of young children has improved***: Awareness regarding the time of initiation of breastfeeding, duration of receiving exclusive breast milk, and age of the child as an appropriate age to start solid or semi-solid food has improved among the caregivers of the project area as compared to the control area. The awareness levels for safe preparation of complementary food, responsive feeding, feeding during illness, and recovery from illness phase are comparatively higher among the caregivers of the intervention area during the endline.

4. ***Fortification of nutrimix distributed under ICDS is an operationally feasible model***: Assessment findings show that there is a wider acceptance of fortified nutrimix among the stakeholders, as a high percentage of the caregivers and anganwadi workers mentioned that fortification of THR is beneficial or good and the taste of fortified nutrimix is better than the non-fortified nutrimix. Barring the flood period, there was no gap in the supply of fortified nutrimix to the anganwadi centres, and the production of fortified nutrimix in the Kudumbshree centres was regular. Kudumbshree workers also exhibited capacities to fortify nutrimix without many challenges.

Recommendations

Based on the findings and conclusions of this assessment, the recommendations are listed below.

Recommendation 1: As fortification of nutrimix is an operationally feasible model, and as it leads to improvement in the micronutrient levels, it is recommended to the Government of Kerala to sustain the scale-up of the project in the state of Kerala

Recommendation 2: The reduction in anaemia in the intervention area was not as much as expected. Hence further studies are required to explore the reasons.

Recommendation 3: The Scheduled Tribe children have higher levels of deficiencies compared to the general population. It is recommended that the Government of Kerala strengthen the nutritional interventions for this vulnerable group.

Recommendation 4: Nutrimix consumption by the beneficiaries is short of the recommended levels and frequency. Hence innovative methods to ensure the beneficiary children are consuming the THR regularly need to be attempted by the Government of Kerala during the scale-up phase and by WFP in similar projects in other geographies.

Recommendation 5: As compared to the control area, awareness regarding breastfeeding and complementary feeding practices has improved among the caregivers from the fortification project area, but there is scope for improving the awareness about the various aspects of feeding practices. Thus, it is recommended to strengthen IEC activities among the caregivers towards improving the feeding practices of children.

1. Introduction

1.1. Background

1. In recent decades, there has been gradual but remarkable progress on the socio-economic front in India, resulting in high economic growth, a significant rise in per capita income, and poverty reduction. Nevertheless, the country lags on many crucial development indicators, nutritional status being one of them. India is home to one in every three malnourished children in the world. There is undernutrition among large segments of the population, specifically among vulnerable groups like infants, young children, adolescents, women, and the elderly.
2. In terms of the nutritional status of children, the state of Kerala is not very different from other parts of the country. As per the global standards, anaemia is a public health problem with varying degrees of severity in Kerala. The most recent round of National Family Health Survey (NFHS) (2015-16) data shows that approximately one out of every three children (35.6 percent) in the age group of 6-59 months are anaemic in Kerala. One-quarter of children under five years are stunted, 15.7 percent have wasting and 16.7 percent of children are underweight.
3. According to a survey carried out by the National Nutrition Monitoring Bureau (NNMB) in 2012 across 10 states, there is a huge gap between intake of both micro and macronutrients compared to RDA across age and physiological groups but particularly high amongst children in the age group one to three years in Kerala. Further for most nutrients, the median intake in Kerala for this age group is less than the pooled median intake of other states covered by NNMB.

Table 1.1. Average Daily Intake of Nutrients among Children 1-3 years

States	Protein (gm)	Total fat(gm)	Energy(kcal)	Calcium(mg)	Iron (mg)	Vit A (mcg)	Thiamine(mg)	Riboflavin(mg)	Niacin (mg)	Vit C (mg)	Dietary folate(mcg)
Kerala	14.6	10.4	524	165	2.5	61	0.3	0.3	3.1	8	22.0
Pooled States	19.7	11.8	733	166	4.7	61	0.5	0.3	4.8	9	48.1
RDA	16.7	27.0	106	600	9	400	0.5	0.6	6	40	80

4. Appropriate complementary feeding is critical for the achievement of healthy growth and development in children. The first 1000 days of life from conception to two years of age provide a critical window of opportunity for ensuring children's growth and development through optimal feeding. The access to the first 1000 days is through the Government of India's Integrated Child Development Services (ICDS) scheme which was launched in 1975 with the primary goal to break the inter-generational cycle of malnutrition, reduce morbidity and mortality caused by nutritional deficiencies through the network of Anganwadi Centers. The ICDS has expanded over the years and is now one of the world's largest and most unique outreach programmes responding to the challenge of meeting the holistic needs of a child. One of the major components of ICDS is providing supplementary nutrition to children.

An inherent principle of complementary feeding proposed by the World Health Organization is the need for consumption of fortified meals by young children. Fortification moves at the national-level promotes adoption of fortification in the food-based safety-schemes. Fortification of the supplementary nutrition provided through ICDS is also mandated as part of the 2009 Supplementary nutrition guidelines issued by the Ministry of Women and Child Development (https://wcd.nic.in/sites/default/files/univ_icds5.pdf). 7-8 states such as Maharashtra, Andhra Pradesh, Uttar Pradesh are already distributing fortified take home rations through the ICDS.

5. Considering the prevalence of micronutrient deficiencies and the identified culture-specific gaps in the intake of most of the micronutrients amongst the children in the state of Kerala, the World Food Programme (WFP) in collaboration with the Government of Kerala (GoK) planned a pilot project on fortification of Take-Home-Rations (THR) distributed in the brand name 'Amrutham nutrimix' through Integrated Child Development Scheme (ICDS) to children aged 6-36 months in Wayanad district. The duration of the project was from January 2017 to December 2018. The nutrimix was fortified with 11 nutrients - Iron, calcium, vitamin A, zinc, thiamine, riboflavin, niacin, vitamin B6, vitamin C, folic acid, and vitamin B12. Table 1.2 shows the micronutrient composition of the premix used for the fortification of nutrimix. Overages were built in the micronutrients to manage the loss in the micronutrient due to heating of the nutrimix (before the consumption) or loss occurring during storage, processing, and transfer. Iron was encapsulated, which prevented the interaction between iron and calcium.

Table 1.2. Micronutrient Composition of the Premix for fortification

Micronutrient	Salt	Level of micronutrients per daily serve size of the THR (Amrutham)
Calcium	Calcium Carbonate	300mg
Iron	Ferrous Sulphate Dried	4.5mg
Zinc	Zinc Oxide	2.5mg
Vitamin A	Vitamin A Palmitate 250 CWS	200mcg
Thiamine	Thiamine Hydrochloride	0.25mg
Riboflavin	Riboflavin	0.3mg
Niaicn	Nicotinic Acid	4mg
Vitamin B6	Pyridoxine Hydrochloride	0.45mg
Vitamin C	Ascorbic Acid	20mg
Folic acid	Folic Acid	40mcg
Vitamin B12	Cyanocobalamin 0.1 %	0.4mcg

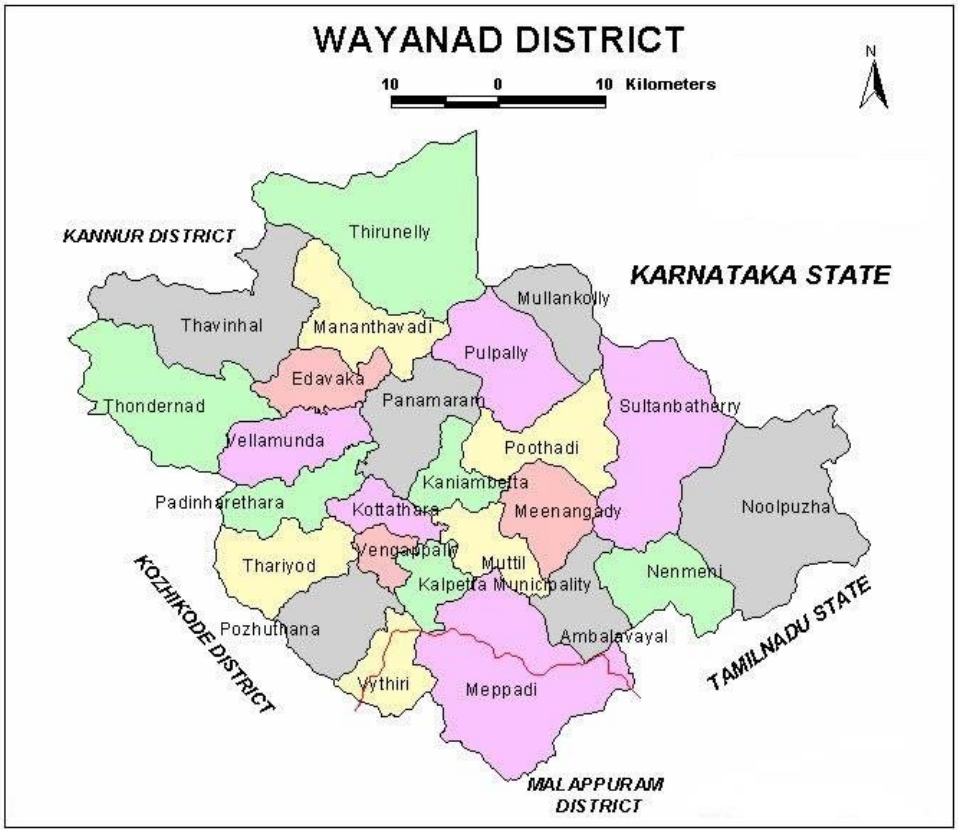
6. In Kerala, the Department of Women and Child Development (WCD) of GoK[3] implements the ICDS under which nutrimix is provided to the children. Nutrimix production is currently carried out by Kudumbashree units under the Department of Local Self Government. During the conception phase of the project, it was proposed that the Department of Social Justice (the current WCD) will establish a liaison with the Department of Local Self Government and extend requisite coordination support to WFP as well as undertake activities required towards scaling-up and continuation of nutrimix fortifications.
7. During the project, WFP assisted the GoK to provide fortified nutrimix to young children through ICDS. WFP support included setting up a demonstration unit in an existing nutrimix production site in Mananthavady; conducting a gap analysis cum scoping study; development of quality control protocols to ensure delivery of safe and nutritious nutrimix to the beneficiaries; development and dissemination of Information, Education, and Communication (IEC) materials around feeding practices of children (aged 6-36 months); creation of a pool of master trainers and technical assistance and coaching towards scaling-up fortification. WFP assistance evolved throughout the association from more direct implementation to the role of a technical partner.
8. To ensure that fortification of nutrimix is at an adequate level, WFP identified National Accreditation Board Laboratories (NABL) accredited laboratory where nutrimix samples were tested for the retention analysis of

[3] Initially, the Department of social Justice of GoK along with WFP started this project. During the implementation of the project, there was a change in the configuration of the government department of Kerala and at present WCD of Kerala executes ICDS.

micronutrients. Field monitoring visits were conducted to ensure the smooth functioning of the fortification and project-related activities.

9. Micronutrient fortification intervention was initially implemented in the three selected panchayats - Panamaram, Vellamunda, and Thirunelli of Mananthavadi Taluk in Wayanad district. Later Thondernad panchayat was also included in the intervention area.

Map 1: Map of Wayanad district of Kerala



10. Beneficiaries of the project were children in the age group of 6-36 months, who are entitled to receive the benefit of fortified nutrimix provided under the ICDS scheme. The total number of children between six months to three years in these panchayats is given below. Thus, the total estimate of children in the age group of six months to three years is 6364, and the number of Anganwadi/project beneficiaries among them is 3528.

Table 1.3. Total number of children (6 months to 3 years) in selected panchayats

Panchayat	No of Anganwadis	The estimate of total children (6months to 3 years)	The estimate of total beneficiaries
Panamaram	41	2036	943
Vellamunda	41	2051	1155
Thirunelli	40	1341	788
Thondernad	26	936	642
Total	148	6364	3528

11. **The primary goal of the fortification project** undertaken by the WFP was to demonstrate the establishment of an operationally feasible model of fortification of nutrimix, distributed under the ICDS

scheme followed by handing over of the project to the state government for sustained impact on the nutritional status of children (aged 6 to 36 months) and scale-up to other parts in the State.

12. While the project had an in-built system of monitoring, an independent assessment was designed to examine the performance of the project. To conduct this assessment, the Government Medical College Kozhikode (GMCK) was recommended by the Government of Kerala. Accordingly, WFP and GoK signed an agreement with GMCK for conducting the assessment of fortification of nutrimix distributed under ICDS in selected panchayats of Wayanad. Assessment methodology was developed and finalized jointly by GoK, WFP, and GMCK.

13. **The specific objectives of this assessment are**
    1. To assess the nutritional status of children in the age group of 18 months to 24 months attending Anganwadis in Manathavady Thaluq of Wayanad district in Kerala.
    2. To assess the serum levels of selected micronutrients among the above children
    3. To understand various socio-cultural practices like cooking and feeding patterns in the households in this area where the Nutrimix take-home rations are supplied through anganwadis.
    4. To assess the impact of the GoK-WFP Nutrimix fortification project through nutritional status assessment of the above children following the fortification intervention.

Study Parameters:

1. Nutritional status of children under study.
2. Morbidity patterns among target age-group (possible impact on functional outcomes).
3. Knowledge on appropriate complementary feeding and nutrition including anemia and other micronutrient deficiency disorders among the Anganwadi workers and parents/care-givers of children (six months to three years).
4. Acceptability of fortified nutrimix distributed under ICDS to the targeted children and their caregivers.
5. Intra-household consumption pattern of fortified nutrimix.
6. Cooking and eating practices with respect to the fortified nutrimix.
7. Other aspects of operational feasibility of fortified nutrimix distributed under ICDS.
8. To provide recommendations (if any) on improvising the design and activities of the project.
9. To provide recommendations and suggestions on further replication/scale-up.

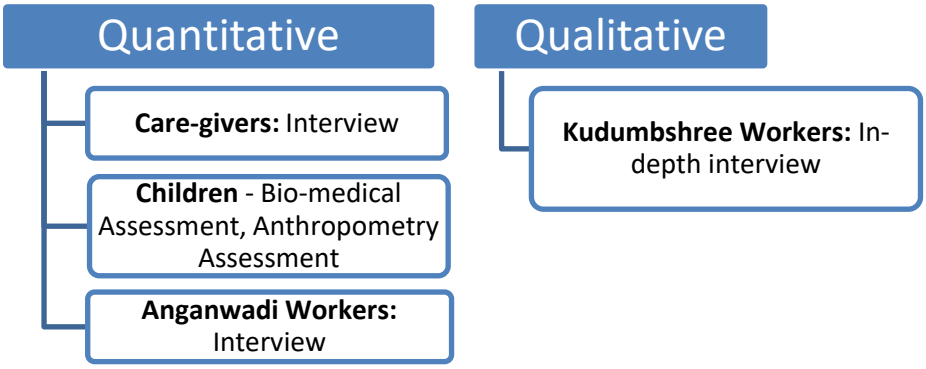
1.2. Assessment Methodology and Limitations

14. The assessment employed the Development Assistance Criteria (DAC) as the overall approach to design, collect data, analyse, and highlight key findings. The DAC consisted of dimensions such as relevance, effectiveness, efficiency, impact, and sustainability.

1.2.1. Assessment Design:

15. The assessment set to examine the effectiveness of the nutrimix fortification has been designed as a quasi-experimental pre-post study. A control area was selected to facilitate the attribution of the effects to the intervention and not to changes in other factors such as time, change in policy, seasonality, etc. To have a control area with similar background characteristics, two Gram Panchayats (GPs) from the same Mananthavady block were identified. As per the Census of India 2011, the Mananthavady block has seven GPs. Based on the population size, percent of 0-6-year-old children, and various other socio-economic characteristics, the two panchayats namely panchayats of Thavinjal and Edavaka were identified as the control area.

16. The assessment exercise adopted mixed methods approaches involving quantitative and qualitative methods. During baseline and endline, quantitative data was collected from the caregivers of sampled children and Anganwadi Workers (AWWs) of the project and control area. Besides, bio-medical and anthropometric data of the sampled children were also collected from both areas. Qualitative data was collected from the Kudumbshree workers employed in the production centers of the project area, where the production of the nutrimix supplied under ICDS takes place. During the baseline round, a few of the community health workers were also interviewed.

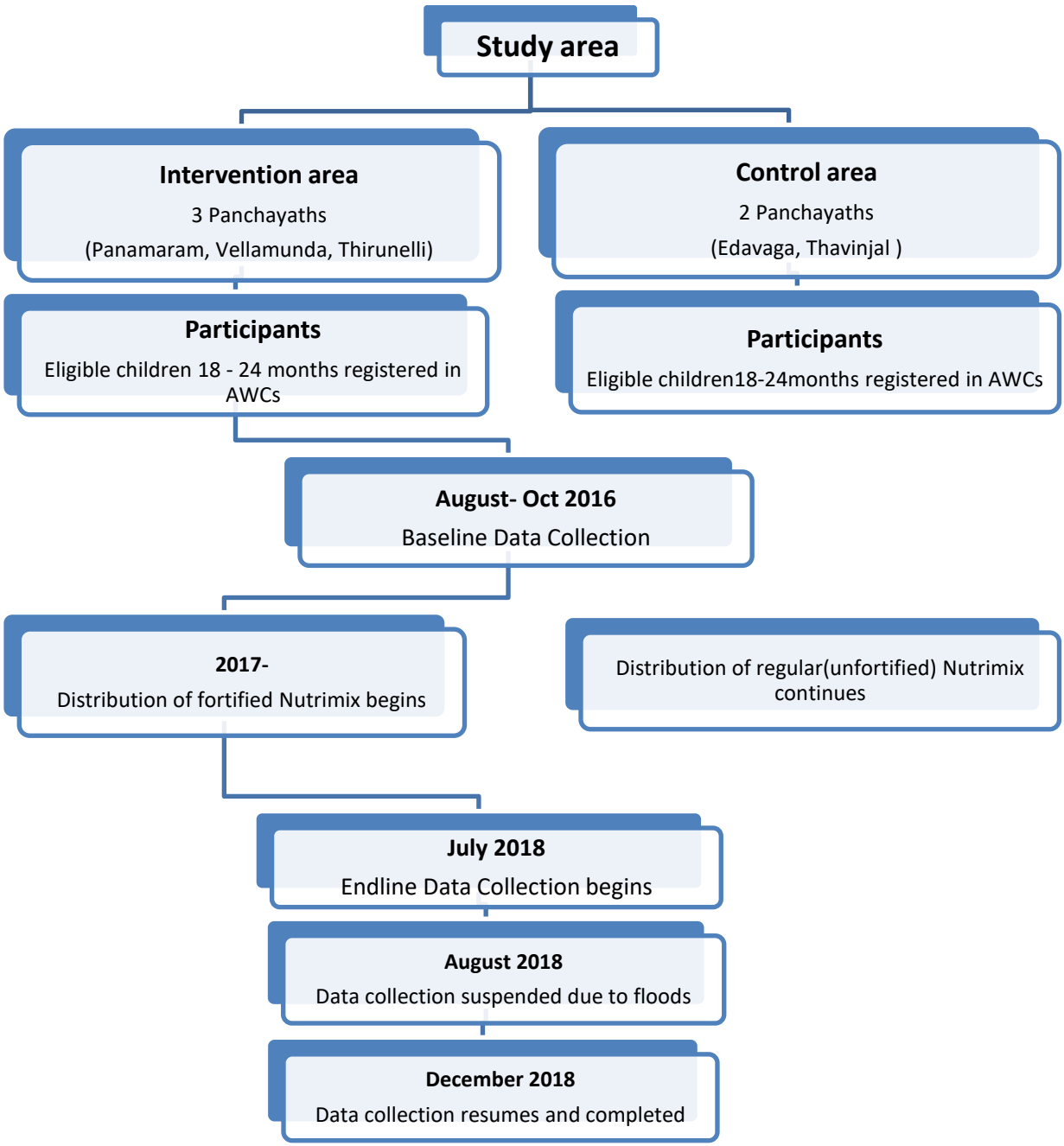


17. An independent assessment comprising of baseline and endline assessment has been conducted. The baseline study provided an in-depth analysis of the situation in the operational area to support benchmarking of key performance indicators, facilitate operational planning and establish a basis for assessment of the impact on the completion of the project along with insights of lessons learned to facilitate the replication by the government and other stakeholders. The endline survey assessed the performance on output and outcome/impact indicators along with the analysis of various aspects of operational feasibility.

18. Following the cross-sectional baseline assessment including micronutrient sufficiency among sampled children, in the study areas, the intervention was rolled out in the intervention panchayats of Wayanad. Afterward, the same cross-sectional assessment was repeated to generate endline data. The control panchayats were not provided with fortified nutrimix but underwent the two rounds of assessment along with the three intervention panchayats. It is to be noted that the endline assessment has not collected data from the same children sampled in the baseline, hence the study has not used panel data that includes repeat measures on the same individuals but has used two rounds of cross-sectional data from children in the same age group. This was to ensure that the children from the intervention area had consumed *Nutrimix* for the past year.

1.2.2. Sampling Technique

19. As initially, the duration of the intervention was of a year, therefore to analyse the effect of consistent consumption of nutrimix for the entire duration of the project (a year) on the beneficiaries, in this assessment, all the children aged 18 months to 24 months were identified from the register maintained by AWWs in project and control areas. The rationale behind selecting the children aged 18 months to 24 months was that after the one year of intervention (at the time of endline) children aged 6-12 months for the period of baseline would be in the age group of 18-24 months during end-line. Therefore, examining the same age group of children during pre and post-intervention would facilitate in attributing the impact of the project interventions and not because of change in the age of children during baseline and endline assessment.
20. Thus, all children in the age group of 18 months to 24 months enrolled in the AWCs whose caregivers consented to participate were studied in the three panchayats of the project and two panchayats of control areas during baseline and endline assessment.


Study area
Intervention area
3 Panchayaths
(Panamaram, Vellamunda, Thirunelli)
Control area
2 Panchayaths
(Edavaga, Thavinjal)
Participants
Eligible children 18 - 24 months registered in AWCs
Participants
Eligible children18-24months registered in AWCs
August- Oct 2016
Baseline Data Collection
2017-
Distribution of fortified Nutrimix begins
Distribution of regular(unfortified) Nutrimix continues
July 2018
Endline Data Collection begins
August 2018
Data collection suspended due to floods
December 2018
Data collection resumes and completed

1.2.3. Tools and Data

21. Tools used in this assessment were developed in consultation with the relevant stakeholders.

22. All the instruments/tools were piloted in the local settings and further modified based on feedback from the field exercises. The local language of the project area is Malayalam. Tools were bi-lingual - in English and Malayalam. During the endline, additional questions relating to the project activities were incorporated into the tools.

a) Caregivers

Interview

23. Information was collected from the consenting primary caregiver of all the children aged 18-24 months enrolled in the anganwadi centers of the intervention and control areas who were receiving nutrimix regularly. As the primary caregivers were mostly mothers, the first preference for the interview was given to the mother of the index child. Only in the absence of mothers, details were collected from the other caregivers of the sampled children.
24. During the baseline and endline survey, a structured interview schedule was used for collecting information from the primary caregivers of children aged 18-24 months. The interview schedule comprised of questions relating to the identification details such as village name, anganwadi center, relationship with the index child, and details of the index child (date of birth, age, sex, birth order, immunization status, birth weight). The caregivers of the index child were asked about their religion, caste category, house type, type of family, type of ration card, source of drinking water, and sanitation. The household profile such as age, sex, education, main occupation, relationship with the index child, and marital status of each member of the household was recorded. Details of the reproductive history of the mothers of the index child (the type of delivery and complications during pregnancy and delivery), breastfeeding (such as time of initiation of breastfeeding, duration of exclusive breastfeeding), and nutrition intake of the child were collected. Information about the services received from the AWCs during the phase of pregnancy and breastfeeding specifically in context to index child only were inquired. Information around knowledge, attitude, and practices for Infant Young Child Feeding (IYCF) and nutrition were asked. Intake of the nutrimix provided by the AWW and morbidity profile of the child were also asked.
25. During the endline round, caregivers who were interviewed post-floods were also asked few additional questions relating to the effect of floods on their property, hygiene practices, consumption of nutrimix by the children, morbidity status of children, etc.

b) Children

Anthropometry Measurements

26. Details of the weight and length/height of each sampled child were collected using standard procedures. The length of the children was measured using infantometers. Properly calibrated digital weighing scales were used to record the weight of the children. The procedures followed for length/height and weight measurements have been described in detail in the annexure.

Bio-medical assessment

27. Following anthropometric measurements, blood samples from the sample children were taken after obtaining consent from their parent/guardian. The blood samples were collected by trained and experienced laboratory technicians and these samples were analysed at the Multidisciplinary Research Unit (MRU) – a center established by the Indian Council for Medical Research at Medical Research Unit, GMCK. The blood draw was done through venepuncture from the cubital region. Samples of blood serum were transported from Wayanad to the laboratory of GMCK maintaining the cold chain. Till the laboratory analysis was conducted, blood serum was stored at -80 degrees Celsius in the laboratory of GMCK. The procedures followed for blood collection, dispatch, and storage are mentioned in detail in the annexure section.
28. The nutrimix is fortified with 11 nutrients - Iron, calcium, Vitamin A, Zinc, Thiamine, Riboflavin, Niacin, Vitamin B6, Vitamin C, folic acid, and vitamin B12. But only Iron, vitamin A, folic acid, and vitamin B12 were selected as indicators for deficiencies in blood biochemical analysis. This was decided due to the higher volume of blood that needs to be drawn from each child for analysing all the nutrients as well as the high cost of laboratory analysis.

Table 1.4. Micronutrients, bio-markers, and laboratory tests

Micronutrient Analysed	Bio-marker	Laboratory test
Iron	Haemoglobin	Cyan meth
	C-reactive protein(CRP)	Erba 360 (Clinical Chemistry analyser)
	Serum Ferritin	Beckman Immunoassays analyser
Folate	Serum Folate	Beckman Immunoassays analyser
Vitamin B12	Serum Vitamin B12	Beckman Immunoassays analyser
Vitamin A	Serum retinol	Vitamin A Elisa

c) Anganwadi Workers

Interview

29. In-Depth Interviews (IDIs) were conducted among all the AWWs of the intervention and control areas. A semi-structured interview schedule for AWW was used for collecting details of the background information of the AWWs (such as religion, caste category, educational level, marital status, and working experience), information about the maintenance of different registers, the total number of children (6-36 months) registered, kind of food normally provided to children 6-36 months in the AWC, *Nutrimix* supplied for children (6-36 months) in the AWC, overall regularity and timeliness of delivery of supplementary food *Nutrimix* for children (6-36 months), frequency of distribution of *Nutrimix* to the parents/caregivers of children, hygiene practices, parent's opinion about nutrimix, type of information provided to parents/caregivers of children aged 6-36 months about the importance of consuming nutrimix, preparation, storage, utilization and frequency of feeding of nutrimix. Information about the anganwadi centers such as the number of days AWC was opened during the last 30 days, the number of hours usually AWC is open on a working day, the number of children enrolled at the AWC, services provided in the AWC for the children, availability of medicines in the AWC, medicines which have been utilized in the last one month, and details of the training received by the AWW were also collected from the AWWs. AWWs were asked about their knowledge and perceptions of different aspects of nutrimix and fortification. The awareness levels of AWWs for Infant and Young Child Feeding (IYCF) practices, undernutrition, anemia, and vitamin A diseases were also obtained through the schedule.

d) Kudumbshree Workers

Interview

30. In-depth interviews were conducted among the workers of Kudumbshree units manufacturing Nutrimix, to understand the various dynamics including the quality aspects of nutrimix distributed under the scheme. The in-depth interview guidelines for Kudumbashree workers collected background details of the workers and other information such as the number of days the unit was open during the last 30 days, the average number of hours unit is open on a working day, worker's opinion about the production of nutrimix, main ingredients used to prepare *Nutrimix*, procurement of main-ingredients, details of the supply related issues (if any) for the raw material of nutrimix, adequacy of the equipment, the quantity of nutrimix supplied for children in the AWCs in a month, overall quality, regularity and timeliness of delivery/supply of *Nutrimix* to AWC, how the *nutrimix* could be improved, packaging, hygiene practices, quality protocols, the usefulness of *nutrimix* for children, details (if any) of direct interaction with the mothers/caregivers of the children, usage and intra-household distribution of *nutrimix.*

1.2.4. Recruitment, Composition, and Training of Field Staff

31. At the time of the baseline, the field staff was recruited after newspaper advertisements given by the team of GMCK. The interview was held at the District Medical Office by a board composed of the team members of GMCK and a Community Development Programme Officer (CDPO). The minimum qualification of the field investigators was B.Sc. Nursing or Master of Social Work. During the endline, the first preference was given to those who were part of the field team of the baseline round. Thus, the majority of the baseline field staff members with experience were also involved in the endline data collection activity.
32. During both rounds, the field team consisted of Medical officers, coordinators, field investigators, and a minimum of two phlebotomists. The field team comprised an almost equal number of men and women.
33. At the time of baseline, the field staff were provided three days of extensive training (16-18 August 2016) and during the endline two days of training (21st and 22nd July 2018) using standardised interview modules and field-tested questionnaires. The training was provided by the researchers of GMCK and experts from WFP. The training included theoretical sessions, mock interviews, and practice in the field.

1.2.5. Data Collection

34. To ensure stakeholder participation, meetings were held with Local Self Government (LSG), representatives of DoSJ (during baseline), representatives of DWCD (during endline), and Kudumbshree officials. The Government of Kerala (GoK) prepared a list of eligible children (18-24 months) from individual AWCs from the intervention and control areas. The team members of GMCK addressed the monthly conference of the AWWs in all five Panchayats at the planning stages of data collection. The list of children from each AWC was collected in a structured format during these meetings and this list was triangulated with the list of children provided by the GoK. This list was further edited based on follow-up phone calls with the AWWs of all AWCs in the study areas.
35. The AWWs informed parents/caregivers of the potential participants about the survey dates and time and were given the option to not participate. The willing caregivers brought their children to the AWCs on the appointed dates and times. Teams comprising of the project coordinator, doctor, field staff, and lab technician visited each AWC during office hours for data collection. The children whose parents had expressed willingness to participate but could not turn up at the AWCs during the survey were visited at their homes for data collection. Relevant data were collected by trained field staff using pre-tested schedules/questionnaires and proformas. IDIs among AWWs were conducted by the field investigators and the FGDs were conducted by the team of GMCK. Blood was collected for appropriate biochemical testing to assess micronutrient deficiency. Details on the methodology are provided in the annexes.

36. Baseline data collection activity was conducted from August to October 2016. Data collection for the endline phase which started on 26th July 2018 had to be halted on 08th August 2018 due to the occurrence of heavy floods in the study area. Before the onset of floods, endline data collection was completed in the control area that is the panchayats of Edavaka and Thavinjal. On the advice and recommendation of GoK, post-flood data collection was recommenced from 3rd December 2018. The panchayats of Panamaram, Vellamunda, and Thirunelliwere covered in the post-floods round. One-third of children did not have access to nutrimix powder during the flood-affected period.

1.2.6. Quality Assurance of Data

37. Data collection activity was intensively supervised by the team members of the Department of Community Medicine of GMCK. The techniques used to check the quality of the data at the collection stage were spot-checks, back-checks, and observations - by the various tiers of supervisors and facilitators.
38. Filters were set in the data entry interface to control the quality of data, especially for the nested questions. Few randomly selected caregiver and AWW interview sheets were double entered to check for reliability of data. Blood sample collection protocols were developed, and the phlebotomists were trained using the standard operating protocol. Transportation of samples from the field to the GMCK laboratory situated in Kozhikode was undertaken using standard industry procedures.

1.2.7. Ethical Considerations

39. Ethical considerations were made during the planning stage itself and maintained during the entire assessment process (baseline as well as endline). Participation was voluntary and participants were informed that all their responses were confidential. All interviews, anthropometric measurements, and blood specimen collection procedures were conducted after obtaining written informed consent from their parents/caregivers. The information sheet and the consent forms provided to them were in Malayalam language and English versions were also prepared. The same process of acquiring informed consent was also followed while interviewing AWWs and Kudumbshree workers. The identity of the participants was securely kept with the principal investigator and the databases were anonymized, to conceal the identity of the subjects from others handling the data for analysis. This same de-identification process was undertaken for blood samples where unique identification numbers allotted to subjects were only used on the sample containers. The assessment study was cleared by the Institutional Research Committee and Institutional Ethics Committee (IEC) of GMCK.
40. The assessment adhered to the **ethical protocols** set by the United Nations Ethical Guidelines (UNEG) Norms and Standards for Reviews and UNEG guidance principles on integrating human rights and gender equality perspectives in reviews. The core tenets underscoring the assessment were;
    a. **Utility:** The assessment was designed to help WFP and GoK address and effectively serve the needs of the full range of participants.
    b. **Independence**: The evaluators engaged exercised independent judgment while designing and analysing data and were not influenced by views or statements of any party.
    c. **Credibility**: The assessment used reliable sources for collecting data and making observations. The evaluators ensured that the assessment findings were accurate, relevant, and provided a clear, concise, and balanced presentation of the evidence.
    d. **Conflict of interest**: The evaluators ensured that there is no conflict of interest to strengthen the credibility of the assessment design and findings.
    e. **Respect for dignity and diversity**: During data collection, the evaluators ensured that maximum notice was provided to individuals/institutions, their willingness to engage in the assessment was noted, and that the respondents had their right to privacy.
    f. **Rights**: The respondents were treated as autonomous agents and were given time and information to decide whether they wish to participate and allowed to make an independent decision without

any pressure or fear of penalty for not participating. The stakeholders received enough information to know how to seek redress for any perceived disadvantage suffered from the assessment.

g. **Confidentiality**: The respondent's right to privacy and sharing information in confidence was ensured. Evaluators ensured that sensitive information was de-identified and cannot be traced back to the relevant individuals.
h. **Avoidance of harm**: The evaluators ensured that there was a minimum risk to the respondents and aimed at maximizing benefits and reduce any unnecessary harms that might occur from a negative or critical assessment, without compromising the integrity of the assessment.

1.2.8. Data Analysis

Quantitative data

41. Quantitative data were analysed using STATA and SPSS statistical software version 17.0. Contingency tables were used to describe the distribution of categorical variables across the intervention and control areas during baseline and endline rounds– categorical data summarized using frequency and proportion (n (%)). Many variables were collected as quantitative data at the collection stage but were later categorized using pre-defined cut-points. They were summarized with mean and standardized deviation as well as frequencies and proportions when categorized. Anthropometric data were analysed using the World Health Organization's (WHO) software Anthro.

Qualitative data

42. The data were analysed using the thematic framework approach (Ritchie and Lewis, 2003). The steps involved in this approach are data familiarization, coding, identification of themes, charting, and data interpretation. All the interviews were audio-recorded and after the completion of the interviews, the audio files were downloaded to a computer that is password protected. After listening to the voice recording, the research team did a verbatim translation of all data to English. The sample of transcripts was compared with the recorded digital files for accuracy by the investigators. The interpretation of the study findings was done according to the broad themes. Findings were subsequently presented in consultation with the field notes and the transcripts to create a comprehensive report.
43. Findings of the analyses of quantitative and qualitative data have been presented in the next chapter (chapter 2) of this report.

1.2.9. Limitations of the assessment

44. Inherent differences in the study areas – Differences exist in the socio-economic characteristics of the participants from the intervention and control areas during both phases of the study, which is only a reflection of the difference in the population from these areas. These differences could have influenced some of the findings in this study.
45. The intervention and control panchayats are from the same administrative block. Hence there is a strong possibility of 'spillover effects' from the intervention to the control area, diluting the effects of the intervention.
46. The timing of quantitative data collection: Although the endline assessment was planned just after one-year completion of the implementation period, due to unavoidable circumstances such as the outbreak of the Nipah virus, the assessment had to be deferred till July 2018. But this delay is no cause for concern as the beneficiaries from the intervention area continued to receive the fortified Nutrimix throughout this period without any break in supply.
47. Interruption in data collection - During the data collection between July-December 2018, there was an interruption in data collection activities due to the sudden onset of floods in Kerala. Thus, the season of data

collection was different between baseline and endline phases. These could have affected the baseline-endline comparability of some outcome/impact indicators such as sickness profiles.

48. Data collection in the control area was almost complete pre-flood. But data from the intervention area was mostly collected post-flood. It is a known fact that natural disasters could reduce food availability and consumption, and increase the occurrence of illness during the immediate post-flood period in the affected population. This means that because of floods, the nutritional parameters of the children might be affected, and the impact of fortified nutrimix might be modified.

2. Assessment Findings and Interpretation

49. This chapter presents the assessment findings and interpretation. The assessment's overarching narrative takes into consideration both spatial and temporal comparison. The data has been analysed and contrasted not just between the project and comparison arms of the study (with and without the intervention), but also across the baseline and endline periods (before and after the intervention).
50. Before the key findings are discussed, background characteristics of the caregivers of the children and demographic profile of the children of the two sets of samples (of intervention and comparison areas during baseline to endline) have been illustrated. Along with the background characteristics of caregivers and children, the post-floods situation in the intervention area would also be presented (based on data collected from the study respondents of this study).

2.1. Distribution of Caregivers and Children

51. The number of caregivers interviewed in the endline phase (661) is lower than the baseline phase (728). The percentage of caregivers from the intervention and control area in both the endline and baseline phase is comparable (Table 2.1)

Table 2.1. Distribution of caregivers

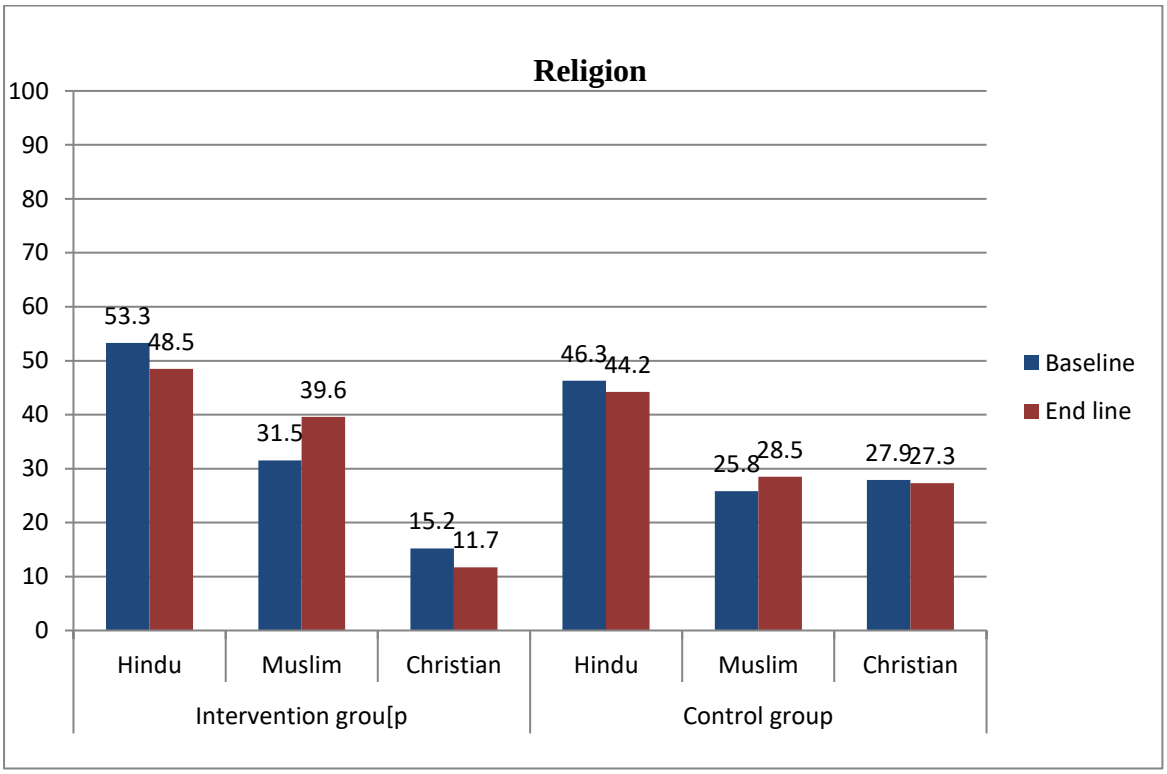
	Area	Caregivers interviewed n (%)	**Total n (%)**
Baseline	Intervention area (3 Panchayats)		
	Panamaram	216 (49)	441 (60.6)
	Thirunelli	123 (27.9)	
	Vellamunda	102 (23.1)	
	Control area (2 Panchayats)		
	Thavinjal	166 (57.8)	287 (39.4)
	Edavaka	121(42.2)	
	Total		728 (100)
Endline	Intervention area (3 Panchayats)		
	Panamaram	143 (34.7)	412 (62.3)
	Thirunelli	112 (27.2)	
	Vellamunda	157 (38.1)	
	Control area (2 Panchayats)		
	Thavinjal	150 (60.2)	249 (37.7)
	Edavaka	99 (39.8)	
	Total		661 (100.0)

2.1.1. Socio-economic and demographic characteristics of caregivers

52. Information was collected from the primary caregiver of all the children in the age group of 18-24 months enrolled in the AWCs of the intervention and project areas. Mothers were the primary caregivers of children in both the baseline (90.4percent) and endline phases (88.1percent). At the time of baseline, fathers constituted 1.6 percent of the interviewed caregivers, whereas during the endline a slightly higher proportion of fathers were interviewed (4.4 percent). Around six percent of caregivers who were interviewed were grandmothers of children.

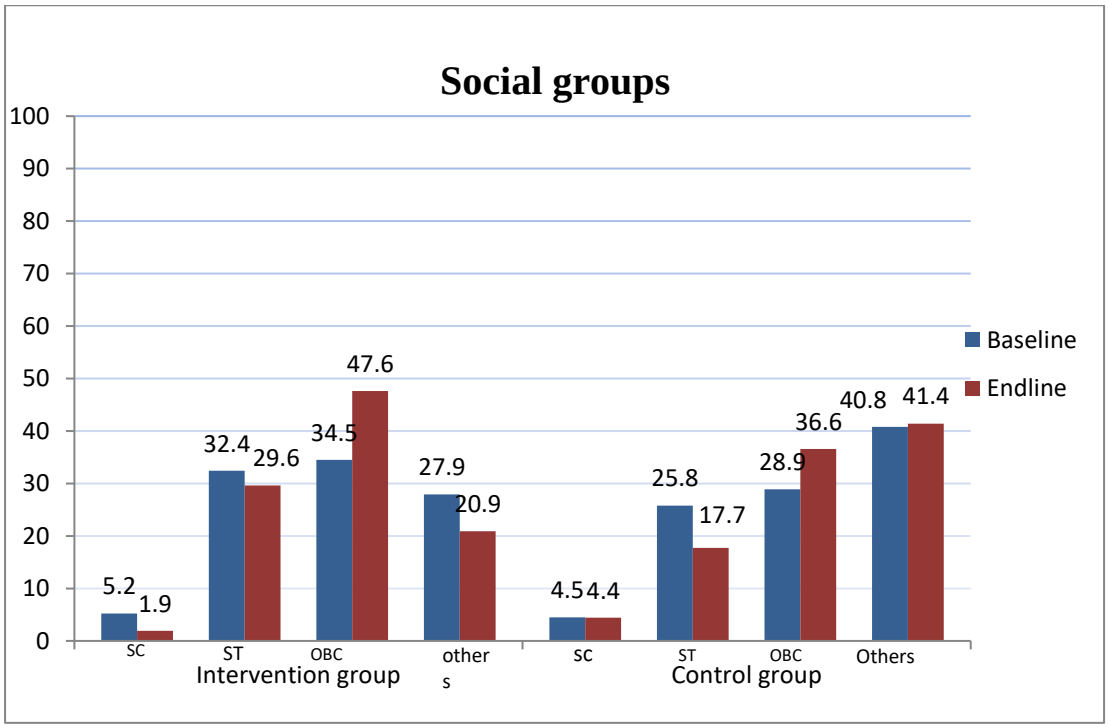
53. As per the GoI's census figures of 2011, the composition of the Hindu, Muslim, and Christian population of Wayanad was 49.48 percent, 28.65 percent, and 21.34 percent respectively. Annexure Table A.1.shows that the religious composition of the study sample is representative of the actual religious composition of the district. An almost similar proportion of Hindus, Muslims, and Christians was represented during the baseline and endline phases of the assessment. A higher proportion of caregivers were Christian in the control arm as compared to the intervention area.

Chart 2.1. Religious distribution of participants from the intervention and control areas during the baseline and endline.



54. Although intervention and control areas are from the same block (Mananthavadi block), findings show that there is a significant difference in the distribution of respondents by religion and caste in both areas. During the endline, as compared to the intervention area (20.9 percent) a much higher percentage of caregivers belonged to the 'others' category (non-OBC/SC/ST) in the control area (41.4 percent). Almost a similar proportion of caregivers who belonged to STs were interviewed during baseline and endline in the intervention area, whereas in the control area a lower percentage of caregivers were STs at the time of the endline survey.

Chart 2.2. Social group distribution of participants from the intervention and control areas during the baseline and endline.



55. The baseline round of the survey was conducted before the implementation of NFSA in the state of Kerala, whereas during the endline NFSA was rolled out. Thus, except for the two categories of cards - that is households with no ration card and AAY card, all other types of cards found during both the rounds of assessment are different. During the baseline, nearly half of the families had BPL ration cards[4]. At the time of the endline, one-fourth of caregivers were priority cardholders. The proportion of state subsidy cardholders among the caregivers in the intervention area was lower compared to the control area (22.0 percent vs. 35.3 percent).
56. Nearly two-thirds of the participants lived in joint families. The majority had pucca houses and flush toilets. Few households still lack toilets and practice open defecation in the intervention area. Dug wells were the main source of drinking water for the majority and boiling was the commonest method for water purification. Details of baseline and endline socio-economic characteristics have been presented in Annexure (Annexure Table A.1).
57. As stated earlier, a significant difference in the panchayat-wise distribution of caregivers by caste and tribe can be observed. Thirunelli had the largest proportion of caregivers who were STs (50.4 percent at the baseline and 57.1 percent at the endline). During the baseline study, the proportion of ST caregivers in Thavinjal, Edavaka, Vellamunda, and Panamaram were 22.3 percent, 30.6 percent, 21.6 percent, and 27.3 percent respectively. from the proportion of SC category has reduced from baseline to the endline (from 4.9 percent to 2.9 percent), whereas the proportion of OBC category has gone up (from 32.3 percent to 43.3 percent). Among all the five panchayats, Vellamunda exhibits the highest proportion of caregivers from the OBC category (46.1 percent during baseline and 58.6 percent at the endline). (Annexure Table A.2).

[4] The baseline study was undertaken before the implementation of National Food Security Act in Kerala.

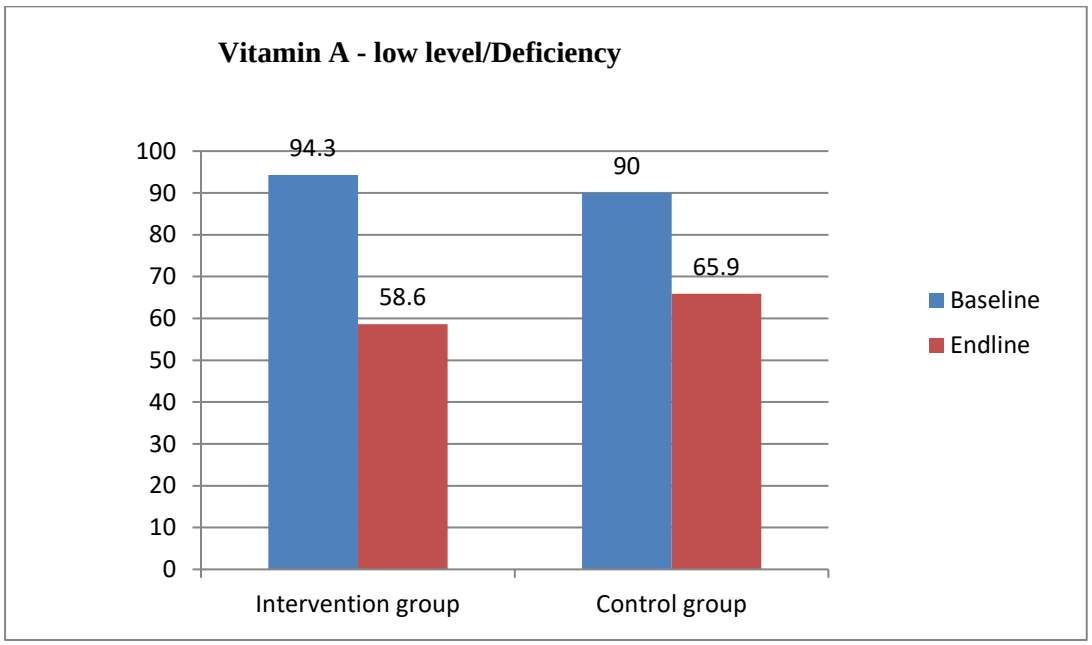
2.1.2. Demographic characteristics of index children

58. The sex ratio of children in both the intervention and control areas during both the baseline and endline phase favored females. This is matching with the sex ratio in Kerala. During both rounds of the survey, most of the children belonged to the second birth order followed by the first birth order. The mean age of children was around 21 months. The mean birth weight was around 2.8 kilograms. Annexure table A.3 presents the demographic characteristics of the sampled index child that is, children aged 18-24 months enrolled in the AWCs of the intervention and control areas covered under the study.

2.1.3. Bio-medical profile of children

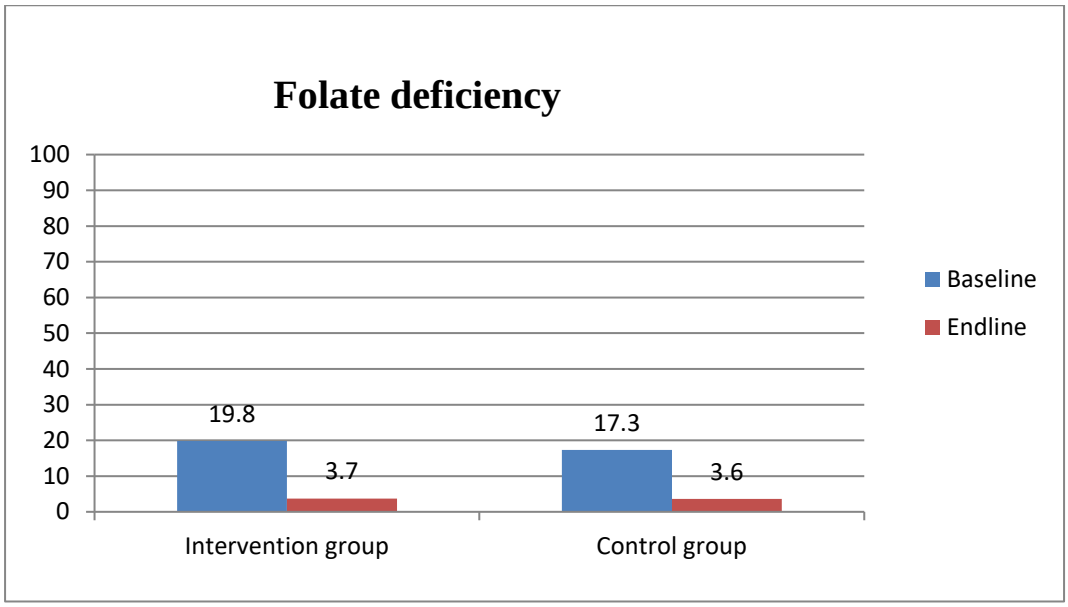
59. Both intervention and study areas have shown a decline in the deficiencies of Folate, Vitamin A, and Vitamin B12, with the intervention area showing a better performance in these parameters.
60. ***Vitamin A:*** The most significant decline in deficiency levels has happened with Vitamin A. The proportion of children with vitamin A deficiency has shown a statistically significant decline in the intervention area, compared to the control area in the pre-post comparison. In the intervention area, the proportion of children with low Vitamin A levels and vitamin A deficiency reduced by 35.7 percentage points (from 94.3 percent during baseline to 58.6 percent at the endline), whereas the corresponding reduction in the control area was by 24.1 percentage points (from 90.0 percent to 65.9 percent).

Chart 2.3 Prevalence of Vitamin A low level/deficiency in the intervention and control areas during the baseline and endline assessment



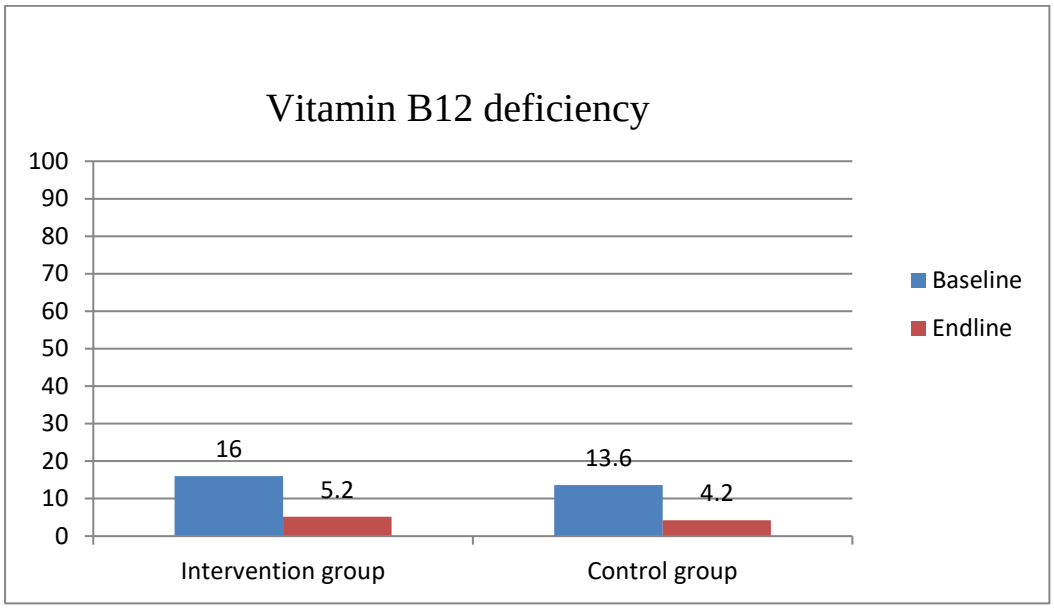
61. ***Folate:*** The proportion of children with possible and actual folate deficiency have decreased in both areas, with the intervention area performing better than the control area. In the intervention area, the percentage of children with possible or actual folate deficiency decreased by 16.1 percentage points (from 19.8 percent to 3.7 percent), whereas in the control area, the decrease was by 13.7 percentage points (from 17.3 percent to 3.6 percent).

Chart 2.4. Prevalence of Folate deficiency in the intervention and control areas during the baseline and endline assessment



62. ***Vitamin B12:*** The proportion of children with Vitamin B12 deficiency too has decreased in both areas, with the intervention area performing slightly better than the control area. In the intervention area, the percentage of children with Vitamin B12 deficiency decreased by 10.8 percentage points (from 16 percent to 5.2 percent), whereas in the control area, the decrease was by 9.4 percentage points (from 13.6 percent to 4.2 percent).

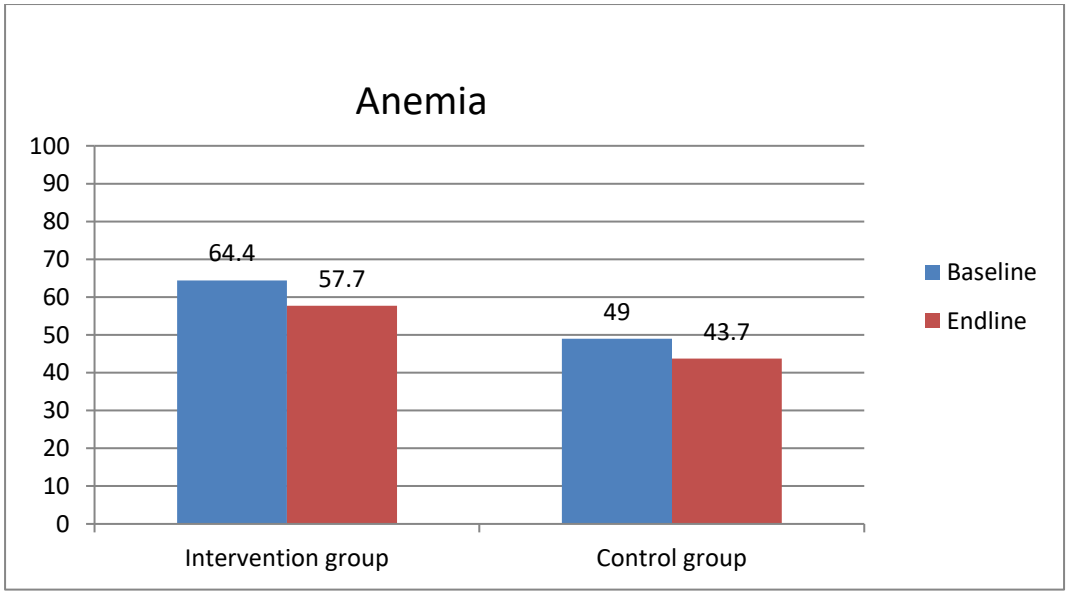
Chart 2.5. Prevalence of Vitamin B12 deficiency in the intervention and control areas during the baseline and endline assessment



63. ***Haemoglobin and Ferritin:***: The two indicators used to assess iron deficiency in the children were hemoglobin for anaemia and serum Ferritin for iron stores.

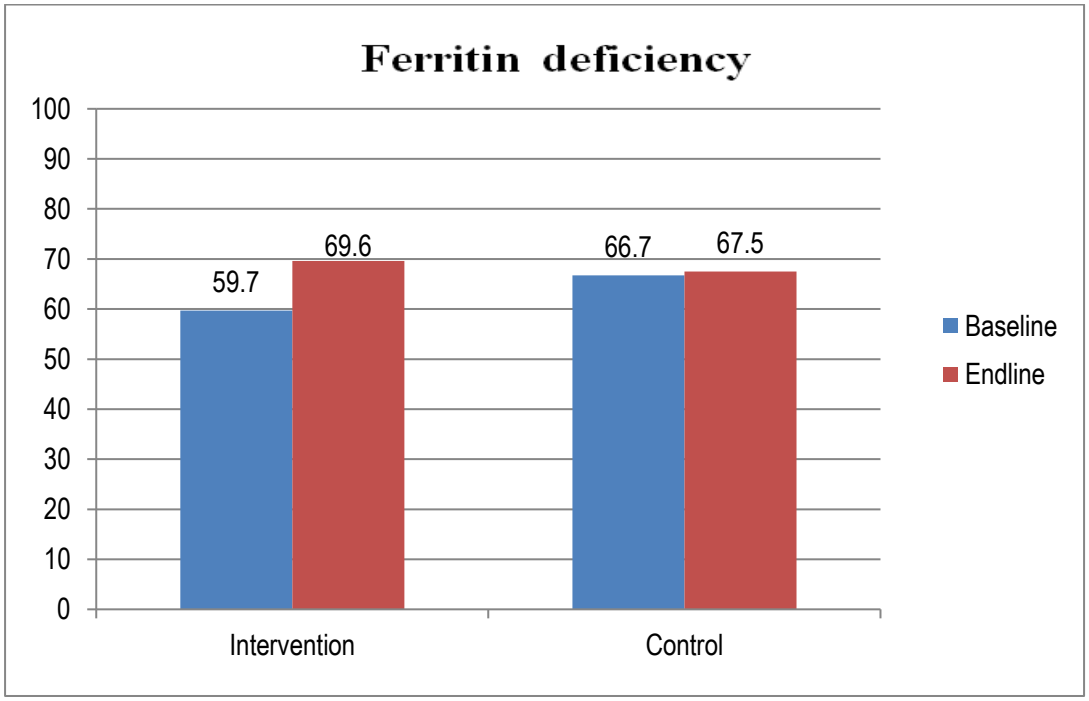
64. The proportion of children with anaemia decreased in both areas. The baseline level of anaemia was higher in the intervention area than the baseline. In the endline, the percentage of children with anaemia decreased by 6.7 percentage points (from 64.4 percent to 57.7 percent) In the intervention area, whereas the reduction was by 5.3 percentage points (from 49.0 percent to 43.7 percent) in the control area. Although there was a reduction in anaemia in the intervention area, the deficiency level continued to be higher than the control area during the endline.

Chart 2.6. Prevalence of Anaemia in the intervention and control areas during the baseline and endline assessment



65. The proportion of children with ferritin deficiency has increased in the intervention and control areas. In the intervention area, the percentage of children with ferritin deficiency increased by 9.9 percentage points (from 59.7 percent to 69.6 percent), whereas in the control area, the increase was by 1.8 percentage points (from 65.7 percent to 67.5 percent).

Chart 2.7. Prevalence of Ferritin deficiency in the intervention and control areas during the baseline and endline assessment



Considering the fortification with iron in the intervention area, and better awareness about nutrition-related best practices in the intervention area, increased nutrimix consumption, and the liking of children for fortified nutrimix, these results are not expected. The study shows that the prevalence of anaemia among tribals is much higher, as compared to non-tribals. During the endline, the proportion of tribals reduced in the intervention area (from 32.4 percent to 29.6 percent), but the reduction was much more in the control area (from 25.8 percent to 17.7 percent). The inherent socio-economic differences between the two study areas could be a possible contributor to the disparity. Another possibility is the impact of the flood. The limitation of these explanations is that they do not explain the contrast in statistically significant improvement in Vitamin A and the improvement in other micronutrients in the intervention area in comparison to the control area following the fortification strategy. Hence further studies with different methodologies are required to determine whether this unexpected result is coincidental.

66. ***C Reactive Protein (CRP):*** The proportion of children with higher CRP levels have decreased in the intervention area by 4.2 percentage points (from 9.8 percent to 5.6 percent), whereas in the control area, the proportion has mildly increased by 0.7 percentage points (from 7.2 percent to 7.9 percent)

67. The following tables present the micronutrient status of children from the intervention and control areas during baseline and endline. Cut-off values for the biomarkers have been given in Annexure 3.

Table 2.2.Micronutrient & CRP levels by Intervention and control areas

Micronutrient	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	**Endline**	**Baseline**	**Endline**	**Baseline**	**Endline**
Hemoglobin	n = 351	n = 319	n = 249	n = 208	n = 600	n = 527
Severe anemia	5 (1.4)	5 (1.6)	5 (2.0)	0 (0.0)	10 (1.7)	5 (0.9)
Moderate anemia	108 (30.8)	100 (31.3)	50 (20.1)	39 (18.8)	158 (26.3)	139 (26.4)
Mild anemia	113(32.2)	79 (24.8)	67 (26.9)	52 (25.0)	180 (30.0)	131 (24.9)
No anemia	**125 (35.6)**	**135 (42.3)**	127 (51.0)	117 (56.3)	252 (42.0)	252 (47.8)
Mean Hemoglobin	10.39	10.53	10.76	11.09	10.54	10.75
Vitamin A	n = 352	n =198	n = 249	n =126	n = 601	n = 324
Vitamin A deficiency	269 (76.4)	25 (12.6)	166 (66.7)	17 (13.5)	435 (72.4)	42 (13.0)
Vitamin A – Low levels	63 (17.9)	91(46.0)	58 (23.3)	66 (52.4)	121 (20.1)	157 (48.5)
No Vitamin A deficiency	**20 (5.7)**	**82 (41.4)**	25 (10.0)	43 (34.1)	45 (7.5)	125(38.6)
Folate	n = 354	n = 243	n = 249	n = 165	n = 603	n = 408
Elevated Folate Levels	22 (6.2)	19(7.8)	10(4)	19(11.5)	32(5.3)	38(9.3)
Possible Folate Deficiency	63(17.8)	9(3.7)	36(14.5)	6(3.6)	99(16.4)	15(3.7)
Folate Deficiency	7(2)	0(0)	7(2.8)	0(0)	14(2.3)	0(0)
Normal Folate levels	**262 (74)**	**215 (88.5)**	196(78.7)	140 (84.8)	458 (76)	355 (87.0)
Ferritin	n = 367	n = 257	n = 254	n = 157	n = 621	n = 414
Ferritin deficiency	219 (59.7)	179 (69.6)	167(65.7)	106 (67.5)	386 (62.2)	285(68.8)
No Ferritin deficiency	**148 (40.3)**	**78 (30.4)**	87 (34.3)	51 (32.5)	235 (37.8)	129 (31.2)
Vitamin B12	n = 368	n = 252	n = 257	n = 167	n = 625	n = 419
Vitamin B12 deficiency	59 (16.0)	13(5.2)	35 (13.6)	7(4.2)	94 (15.0)	20(4.8)
No Vitamin B12 deficiency	**309 (84.0)**	**239(94.8)**	222 (86.4)	160(95.8)	531 (85.0)	399(95.2)
CRP	n = 358	n = 177	n = 251	n = 114	n = 609	n = 291
Higher CRP levels	35 (9.8)	10 (5.6)	18 (7.2)	9 (7.9)	53 (8.7)	19 (6.5)
Normal CRP levels	**323 (90.2)**	**167 (94.4)**	233 (92.8)	105 (92.1)	556 (91.3)	272(93.5)

Note: (i)As compared to baseline, the number of blood samples collected during endline is smaller as some caregivers didn't give consent to provide blood samples of their children and in some cases, an adequate quantity of blood samples could not be obtained to do the testing of all the micronutrients. (ii) As found during the baseline, the micronutrient status of the children belonging to the control area was better than the children of the intervention area. (iii) The majority of data (more than 80 percent) from the intervention area was collected after the floods, whereas data collection of the control area was completed before the onset of the natural disaster. (iv) The local government of Edavaka panchayat (control area) conducted special efforts to improve the nutritional status in Edavaka.

68. Data shows that a higher proportion of boys are anemic, as compared to the girls during both rounds of the survey. Between baseline and endline assessment, anaemia prevalence among boys reduced by 4.5 percentage points in the intervention area and 5.5 percentage points in the control area. The corresponding reduction among girls was 8.8 percentage points and 4.9 percentage points. The annexure table A.4 presents more details on the grades of anaemia and the status of micronutrients by gender during the two rounds of the survey.

Table 2.3. Prevalence of anaemia among boys and girls from both areas during baseline and endline

Micronutrient			Boys n (%)	Girls n (%)	Total n(%)
Intervention	Baseline	Anemia	107 (65.6)	119 (63.3)	226 (64.4)
		No Anemia	56 (34.4)	69 (36.7)	125 (35.6)
	Endline	Anemia	99 (61.1)	85 (54.5)	184 (57.7)
		No Anemia	63 (38.9)	71 (45.5)	135 (42.3)
Control	Baseline	Anemia	66 (55.0)	56 (43.4)	122 (49.0)
		No Anemia	54 (45.0)	73 (56.6)	127 (51.0)
	Endline	Anemia	49 (49.5)	42 (38.5)	91 (43.8)
		No Anemia	50 (50.5)	67 (61.5)	117 (56.3)

69. Between baseline and endline assessment, the proportion of anemic children has decreased by 4.1 percentage points, 7.3 percentage points, 9.9 percentage points, 5.9 percentage points, and 4.3 percentage points in the panchayats of Thirunelli, Vellamunda, Panamaram, Thavinjal, and Edavaka respectively.

Chart 2.8. Prevalence of anaemia among panchayats during baseline and endline

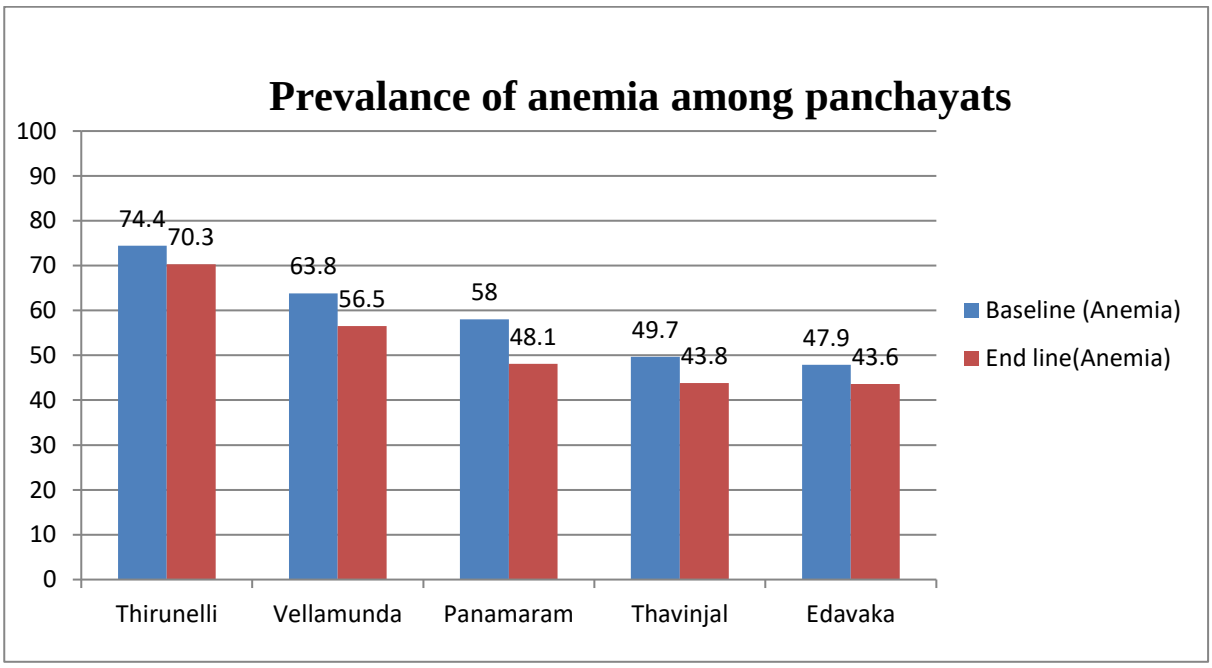


Table 2.4. Prevalence of anaemia among panchayats during baseline and endline

Micronutrient	Thirunelli	Vellamunda	Panamaram	Thavinjal	Edavaka	Total
Baseline						
Severe Anemia	2 (1.7)	0 (0.0)	3 (1.7)	3 (1.9)	2 (2.1)	10 (1.7)
Moderate Anemia	47 (40.2)	24 (41.4)	37 (21.0)	32 (20.6)	18(19.1)	158(26.3)
Mild Anemia	38 (32.5)	13 (22.4)	62 (35.2)	42 (27.1)	25(26.6)	180(30.0)
No Anemia	30 (25.6)	21 (36.2)	74 (42.0)	78 (50.3)	49(52.1)	252(42.0)
Endline						
Severe Anemia	4 (4.4)	1 (.8)	0 (.0)	0 (.0)	0 (.0)	5 (.9)
Moderate Anemia	39 (42.9)	35 (28.2)	26 (25.0)	23 (17.7)	16 (20.5)	139 (26.4)
Mild Anemia	21 (23.10	34 (27.4)	24 (23.1)	34 (26.2)	18 (23.1)	131 (24.9)
No Anemia	27 (29.7)	54 (43.5)	54 (51.9)	73 (56.2)	44 (56.4)	252 (47.8)

70. During baseline, as expected, the anemia prevalence was higher among children from families with BPL cards (64.6 percent), without ration card (66.7 percent), and with AAY cards (70.0 percent), as compared to families with APL cards (51.2 percent) and APL SS families (75.0 percent).
71. Between baseline and endline assessment, the prevalence of anaemia increased among children belonging to households with no ration card (69.7 percent) and reduced among those with AAY card (64.9 percent). During the endline, the prevalence of anaemia is at a much lower level among children from households having priority and state-subsidy cards. As expected, non-priority households have the lowest prevalence (35.8 percent) of anaemia among all types of cards.

Table 2.5. Prevalence of anaemia by type of ration cards

Baseline	No ration card	AAY	BPL	APL	APL SS	Total
Severe Anemia	1 (2.0)	0(0.0)	8 (2.8)	1 (0.4)	0 (0.0)	10 (1.7)
Moderate Anemia	15 (29.4)	6 (60.0)	100(35.1)	37 (14.8)	0 (0.0)	158 (26.3)
Mild Anemia	18 (35.3)	1 (10.0)	76 (26.7)	84 (33.6)	1 (25.0)	180 (30.0)
No Anemia	17 (33.3)	3 (30.0)	101(35.4)	128 (51.2)	3 (75.0)	252 (42.0)
End line	No ration card	AAY	Priority	State subsidy	Non-priority	Total
Severe Anemia	0 (.0)	3 (2.6)	1 (.8)	1 (.7)	0 (.0)	5 (1.0)
Moderate Anemia	26 (34.7)	44 (38.6)	25 (19.2)	30 (21.4)	13 (19.7)	138 (26.3)
Mild Anemia	26 (34.7)	27 (23.7)	33 (25.4)	35 (25.0)	10 (15.2)	131 (25.0)
No Anemia	23 (30.7)	40 (35.1)	71 (54.6)	74 (52.9)	43 (65.2)	251 (47.8)

2.1.4. Anthropometric profile of index children

72. The weight and height/length were measured for all the index children. Classification for assessing the severity of malnutrition by prevalence ranges among children less than five years of age as per the World Health Organization has been given in annexure.
73. While interpreting the anthropometric findings, it must be kept in mind that the fortification intervention is meant primarily to improve the micronutrient deficiencies.
74. Findings of the data show that stunting[5] has increased in both the areas during baseline. The prevalence of underweight[6]has declined among the children residing in the control area. The prevalence of wasting[7] has

[5]Stunting: Stunted growth reflects a process of failure to reach linear growth potential as a result of suboptimal health and/or nutritional conditions. On a population basis, high levels of stunting are associated with poor socio-economic conditions and increased risk of frequent and early exposure to adverse conditions such as illness and/or inappropriate feeding practices.

decreased in the intervention area (from 14.2 percent to 10.8 percent) and control area (from 15.2 percent to 7.7 percent). (Annexure Table A.5.)

75. Stunting has increased among both sexes. The presence of underweight has declined among boys, whereas girls have not experienced any change. Wasting has reduced among boys and girls. (Annexure Table A.6.)

2.1.5. The immunisation status of index children

76. As compared to the baseline study, during endline survey a lower proportion of caregivers reported with immunisation cards for the index child in both the areas. During both rounds, nine out of every ten children were immunized with BCG, OPV, measles, and pentavalent vaccine. The coverage of BCG, OPV, hepatitis B zero dose, pentavalent, and measles remained similar during both rounds of the survey. During the baseline, the proportion of children who had received IPV fractional dose was low (10.6 percent). The probable reason for the low usage of IPV may be that IPV was initiated in the same year of baseline data collection. At the time of the endline survey, more than three-fourth (77.5 percent) of children were covered with IPV dose. During baseline and endline, the coverage of DPT first booster remained the same in the control area, whereas the intervention area witnessed a decline from 69.6 percent to 56.6 percent. As compared to baseline, the proportion of children who are given vitamin A doses has declined in both areas. The proportion of children who had vitamin A doses declined in the intervention area by 8.2 percentage points (from 89.8 percent to 81.6 percent) and in the control area by 9.6 percentage points (from 87.5 percent to 77.9 percent). It was also seen that the availability of Vitamin A in AWCs has declined in both intervention (from 18.3 percent to 17.7 percent) and control area (from 28.4 percent to 6.5 percent). (Annexure Table A.7.)

2.1.6. Morbidity profile of children

77. During the baseline and endline surveys, the morbidity profile of the children was studied. The occurrence of any illness among the index child during the past two weeks preceding the survey was enquired. Reported morbidity among the index child has witnessed a decline from baseline to endline in both areas, with a sharper decline in the intervention area. The reported illness declined in the intervention area by 17.8 percentage points (from 74.6 percent to 56.8 percent), whereas in the control area it decreased by 13.3 percentage points (from 68.3 percent to 55.0 percent). This result should be viewed in the background that Vitamin A aids in the epithelial integrity of the gastrointestinal and respiratory tracts. Hence it provides protection against Acute Respiratory Infections (ARI) and Acute Diarrhoeal Diseases (ADD) - the most common childhood illnesses. The significant decline in Vitamin A deficiency in the endline could be related to the reduced morbidity. Post-flood data shows that although immediately after the natural disaster, one-quarter of the children had an episode of illness, the overall incidence of illness has declined among the children residing in the intervention area.

78. Common causes of illness such as fever, cold, cough, and diarrhoea have declined in the intervention and control areas. The intervention area has witnessed a sharper decline in the prevalence of these illnesses, compared to the control area. Wayanad is an area where sickle cell disease is reported among the ethnic population. Hence, caregivers were enquired whether the child has been diagnosed with sickle cell disease.

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[6]Underweight: Weight-for-age reflects body mass relative to chronological age. Evidence has shown that the mortality risk of children who are even mildly underweight is increased, and severely underweight children are at even greater risk.

[7]Wasting: Wasting or thinness indicates in most cases a recent and severe process of weight loss, which is often associated with acute starvation and/or severe disease. However it may also be the result of a chronic acute malnutrition condition.

Sickle cell disease was reported by two caregivers from the intervention area during the endline. During the baseline, two caregivers from the control area had reported the disease. Health-seeking behavior for illness and hospitalization history were similar in both the intervention and control areas.

Table 2.6. Morbidity profile of children

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline N = 441	Endline N = 412	Baseline N=287	Endline N = 249	Baseline N=728	Endline N= 661
Any illness in the past two weeks	329 (74.6)	234 (56.8)	196 (68.3)	137 (55.0)	525 (72.1)	371 (56.1)
Fever	252 (57.1)	172 (41.2)	151 (52.6)	77 (30.9)	403 (55.4)	249 (37.7)
Cold	235 (53.3)	153 (37.1)	137 (47.9)	93 (37.4)	372 (51.2)	246 (37.2)
Cough	227 (51.5)	145 (35.2)	124 (43.2)	73 (29.32)	351 (48.2)	218 (33.0)
Diarrhea	47 (10.7)	28 (6.8)	13 (4.5)	8 (3.2)	60 (8.2)	36 (5.5)
Difficulty in seeing in dim light	2 (0.5)	6 (1.5)	0 (0.0)	3 (1.2)	2 (0.3)	9 (1.4)
Sickle cell disease	0 (0.0)	2 (0.5)	2 (0.7)	0 (0)	2 (0.3)	2 (0.3)
Child had treatment for any disease for more than two weeks	36 (8.2)	26 (6.3)	27 (9.4)	22 (8.8)	63 (8.7)	48 (7.3)
History of hospitalisation	71 (16.1)	76 (18.5)	50 (17.4)	43 (17.3)	121 (16.6)	119 (18.0)

2.1.7. Eating practices in households

79. At the endline, the proportion of children eating first in the family has increased by 30.6 percentage points in the intervention area and by 7.8 percentage points in the control area. During the baseline, the majority of the caregivers from both areas had reported that everyone in the family ate meals together. This has declined during the endline in the intervention area (from 46.2 percent to 21.1 percent) and in the control area (from 44.9 percent to 33.7 percent). In one-tenth of households, men eat first, and in few families, women eat first.

Table 2.7. Who eats first in the family

Who eats first in the family	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline (n=439)	**Endline (n=411)**	**Baseline (n=287)**	**Endline (n=249)**	**Baseline (n=726)**	**Endline (n=660)**
Men	53 (12.1)	33 (8.0)	31 (10.8)	33 (13.3)	84 (11.6)	66 (10.0)
Children	165 (37.6)	281 (68.2)	108 (37.6)	113 (45.4)	273 (37.6)	394 (59.6)
Women	18 (4.1)	10 (2.4)	19 (6.6)	19 (7.6)	37 (5.1)	29 (4.4)
Everyone eats together	203 (46.2)	87 (21.1)	129 (44.9)	84 (33.7)	332 (45.7)	171 (25.9)

2.1.8. Reproductive history of mother

80. As part of the assessment, the reproductive history of mothers regarding the index children was collected. During the endline, in both areas, the proportion of mothers who had normal delivery has declined, and the percentage of caesarean and assisted deliveries has increased. During the baseline, in both the areas, seven percent of mothers had reported pregnancy complications. At the endline, pregnancy complications were reported by a lower proportion of mothers in the intervention area (11.8 percent) than from the control area (21.6 percent). Time trend analysis shows that the prevalence of delivery complications slightly increased from baseline to endline in the intervention and control areas. (Annexure Table A.8.)

2.1.9. Awareness among caregivers

Breastfeeding and complementary feeding practices

81. Awareness regarding the timely initiation of breastfeeding has improved among the caregivers of the intervention area (from 75.5 percent to 80.3 percent), whereas the control area has not witnessed much change (from 80.8 percent to 81.5 percent). Awareness about the correct duration of receiving only breast milk (which is six months) has improved among the caregivers of the intervention area (from 81.9 percent to 92.2 percent), whereas the control area has experienced a decline (from 86.4 percent to 82.7 percent). As compared to the baseline, during the endline round a higher proportion of caregivers in the intervention area correctly identified the appropriate age to start solid or semi-solid food.
82. Four out of five caregivers have heard a message about exclusive breastfeeding and complementary feeding in the intervention and control areas. During the endline, a higher proportion of caregivers (66.0 percent) in the intervention area received messages on exclusive and complementary feeding from AWW, as compared to the control area (45.8 percent). Regarding the place of information, more than two-thirds of the caregivers belonging to the intervention area have received the information from an anganwadi center (61.7 percent), followed by a health center (around 54.9 percent). Detailed findings of knowledge of breastfeeding and complementary feeding have been provided in the annexure.

Anaemia, vitamin A deficiency, and undernutrition

83. Over the period, awareness about anaemia has marginally improved in both areas. Seven out of every ten caregivers have heard of anaemia. Interestingly in both the areas, during the endline a lower proportion of caregivers consider anaemia as 'serious'. Eating little and lack of iron in diet were identified as the most commonly known causes of anaemia by the caregivers. Less energy/weakness/easy tiredness and paleness were considered as the most common complaints in patients with anaemia. Delayed physical growth milestones were recognized by the caregivers as the most common consequences of anaemia. Eating iron-rich foods/having a diet rich in iron and having vitamin-C-rich foods during or right after meals were the most commonly reported preventions of anaemia. Detailed findings of knowledge about anaemia are provided in the annexure.
84. Awareness about vitamin A has declined among the caregivers of the intervention area (from 59.2 percent to 56.8 percent), whereas the control area has experienced an increase in the proportion of caregivers who have heard of vitamin A (from 61.3 percent to 67.1 percent). In the intervention area, as compared to baseline, a higher proportion of caregivers consider vitamin A deficiency as 'serious', during the endline. The perception of the seriousness of vitamin A has marginally declined in the control area. Eye problem/night blindness is the most commonly identified symptom of vitamin A deficiency. 'Poor variety of food' and 'eating too little' were identified most commonly as the causes of vitamin A deficiency by the caregivers. The most frequently reported measure to prevent vitamin A deficiency is 'eating Vitamin A-rich food', followed by 'eating food fortified with vitamin A'. Reporting of symptoms, causes, or prevention of vitamin A deficiency

has increased from baseline to endline in the intervention area. Detailed findings of knowledge about vitamin A have been provided in the annexure.

85. Lack of energy/weakness and loss of weight were most frequently mentioned by the caregivers as symptoms of undernutrition. Not getting enough food, inappropriate feeding practices, and the prevalence of disease were identified as the most common reasons for undernutrition. Not having enough money and unavailability of food were the commonly reported underlying reasons for not getting enough food. AWWs are the main source for providing nutrition-related information (49.9 percent in the intervention area and 39.0 percent in the control area during the endline). Regarding the place from where the nutrition-related information was received, the proportion of caregivers who have received information from anganwadi center has increased in both the areas: during the endline 59.0 percent and 47.0 percent of caregivers received the information from anganwadi center in intervention and control areas respectively. Detailed results of nutrition knowledge has been provided in the annexure.

Safe preparation of complementary food, responsive feeding, feeding during illness, and recovery from illness

86. Few questions specifically related to the IEC activities conducted as part of this intervention were incorporated in the caregiver schedule at the time of the endline round. IEC materials developed for the intervention were officially scaled up across Kerala during September-October 2018. This section presents the findings of the knowledge levels among the caregivers about the safe preparation of complementary food, responsive feeding, feeding during illness, and recovery from illness phase during the endline phase of assessment. A high percentage of caregivers have heard about the safe preparation of complementary feeding in the intervention (85.7 percent) and control areas (88.0 percent). On being asked about their knowledge for safe preparation for complementary feeding, 79.6 percent, 28.3 percent, 29.5 percent, 21.0 percent, and 34.3 percent of caregivers mentioned keeping hands clean, separating raw and cooked food, thoroughly cooking the food, keeping food at safe temperatures, and using safe water/raw materials respectively.
87. As compared to the control area, a higher percentage of caregivers from the intervention area were aware of the responsive feeding approach (73.5 percent vs. 66.7 percent). As expected, a higher proportion of caregivers of the intervention area reported about the various aspects of responsive feeding approach such as feeding slowly, encouraging the child to eat, not forcing them, feeding times are periods of learning and love, etc. As compared to the control area, a higher percentage of caregivers from the intervention area were aware of the role of nutrimix during illness (35.9 percent vs. 20.5 percent) and the feeding practices during illness (32.3 percent vs. 21.7 percent). Surprisingly, a lower percentage of caregivers from the intervention area, as compared to the control area were aware of the feeding practices during recovery from illness (57.0 percent vs. 63.5 percent). Half of the caregivers of the intervention area and one-fourth from the control area mentioned AWW as their source of information about the safe preparation of complementary food, responsive feeding, feeding during illness, and recovery from the illness phase. (Annexure Table A.12.)

Awareness for the fortification of THR

88. Caregivers were also enquired about the fortification of *Nutrimix*. Results show that 91 percent of respondents from the intervention area were aware that the *Nutrimix* provided in the anganwadi centers are fortified. A high percentage (89.6 percent) of the caregivers of the intervention area mentioned that fortification of *Nutrimix* is beneficial or good. Surprisingly, although fortified *Nutrimix* is not provided in the control area, 39.8 percent of caregivers from the control area also mentioned that the fortification of *Nutrimix* is beneficial or good. On enquiring about the benefits of fortification of THR, 43.7 percent from the intervention area, and 23.7 percent from the control area mentioned that it gives sufficient energy.

2.1.10. Breastfeeding practice

89. During both rounds of the survey, universally all mothers had ever breastfed the index child in the intervention and control area. As compared to baseline, the proportion of mothers who initiated breastfeeding within an hour of their childbirth has increased in the intervention area (from 67.6 percent to 76.2 percent) and in the control area (from 69.3 percent to 77.3 percent) during the endline. The proportion of mothers who were still breasting has marginally declined during the endline (from 88.9 percent to 86.4 percent). Breastfeeding has wider acceptance, but the proportion of mothers who breastfed their child for a longer duration of 19-24 months has declined during the endline (from 78.8 percent to 64.8 percent). The proportion of mothers who had bottle-fed their children the previous day has also declined (from 56.7 percent to 26.9 percent). In the intervention area, the mean duration of breastfeeding is around six months during both the rounds of the survey, whereas the same has slightly declined in the control area from five months and 23 days at the time of baseline to five months and 17 days during the endline. The mean number of times the index child was given solid /semi-solid / soft foods feeding during the previous day has slightly increased in the intervention area, whereas in the control area it is the same. (Annexure Table A.13.)

2.1.11. Liquids or foods that index child had yesterday during the day or at night

90. As compared to baseline findings, a lower proportion of caregivers reported that the index child had taken bread/roti/ chapati /rice/noodles/ biscuits/idli or any other foods made from grains a day before the survey (during the day or at night) at the time of endline (from 91.6 percent to 83.8 percent). Consumption of milk (such as tinned powered or fresh animal milk), clear broth, infant formula, and yogurt has increased in both areas. Consumption of fruits and vegetables a day before the survey has increased by 10.9 percentage points in the intervention area and by 5.4 percentage points in the control area. Consumption of dark green leafy vegetables in intervention is almost the same during both the time points (around 41.0 percent), but the same has declined in the control area. Time trend analysis shows that consumption of liver, kidney, heart, or other organ meat or any other meat or egg has increased in the intervention area, whereas the same has declined in the control area. Interestingly, the consumption of fish or dried fish, or shellfish has declined. A decline in the consumption of fish or dried fish or shellfish in the intervention area may probably be due to the natural disaster. (Annexure Table A.14.)

2.1.12. IFA and de-worming status of children

91. The proportion of children (18-24 months) who have undergone deworming has declined by 16.3 percentage points in the intervention area and 12.9 percentage points in the control areas. The percentage of children who have undergone deworming in the last six months has also declined. The proportion of children who have received IFA has increased in the intervention area (from 1.4 percent to 10.6 percent) and in the control area (from 1.0 percent to 7.2 percent), but this still leaves the tremendous scope of improvement. Among those who were provided with IFA, the majority consumes IFA for less than 30 days. (Annexure Table A.15.)

2.1.13. Services received from anganwadi centers during pregnancy and breast-feeding phase

92. Respondents were asked about the services received by the mothers of the index child during her pregnancy (pregnant with the index child) and breastfeeding (breastfeeding to the index child) phases from the AWCs. The proportion of mothers who have regularly received the supplementary food from the AWCs when they were pregnant with the index child has considerably increased in the intervention and control areas. The regularity of receiving IFA during pregnancy has deteriorated from the baseline to the endline. The proportion of mothers who have regularly received vitamin A supplementation during pregnancy has improved in the intervention and control areas. Findings of the study show that as compared to the time of baseline, during endline a higher proportion of mothers were regularly receiving supplementary nutrition, de-worming, health check-ups, vitamin A supplements, and height measurement from AWC during their breastfeeding phase. Detailed findings of the utilisation of anganwadi services during pregnancy and breastfeeding phases have been provided in the annexure.

2.1.14. Nutrimix

93. Caregivers/mothers were asked about the various aspects of the nutrimix provided at the anganwadi centers. The following section provides information on the availability of nutrimix in the centers, consumption of the supplement, intra-household distribution, and hygiene practices followed while preparing/handling nutrimix and storage of ration.

Receiving nutrimix from AWCs

94. During baseline and endline rounds, almost all caregivers from both the areas reported receiving *nutrimix* from the anganwadi centers. When asked about the type of supplement received from the AWCs, except for a few caregivers, all reported receiving supplement in the form of dry powder during both the time points in the intervention and comparison areas. A probable reason could be that some of the younger children also receive the cooked meals served to older children (three to six years) in the AWCs. This aspect could be further explored in another study. During the baseline, the mean number of packets received per month per child was around six. The approximate weight of one packet is 505-510 grams. Almost all the caregivers receive the entire amount of monthly *nutrimix* once a month, and in most of the cases, the mother collects the nutrimix from the AWCs. As compared to baseline, a slightly higher percentage of caregivers reported that the nutrimix was always available at the AWC during the endline. Respondents who mentioned that THR was not available for distribution at the AWCs were enquired about the number of times in the last three months they did not get *nutrimix*, majority of the caregivers reported that it happened only once. (Annexure Table A.18.)

Consumption of nutrimix

95. The mean quantity of *nutrimix* consumed per child per day has increased in the intervention area (from 57.9 grams to 91.7 grams) and in the control area (from 59.9 grams to 100 grams). The recommended consumption is 135 grams per child per day. The proportion of children who consume *nutrimix* daily has increased in the intervention area by 20.9 percentage points (from 41.7 percent to 62.6 percent), whereas in the control area there is not much change (from 39.1 percent to 41.4 percent). Slightly less than one-third (23.6 percent) consume nutrimix 3-5 days a week 12.4 percent of children consume for less than three days a week in the intervention area. The proportion of the caregivers who have informed that the nutrimix has been consumed by the child in the previous day has increased in the intervention area by 13.7 percentage points (from 50.3 percent to 64 percent) and in the control area by 6.5 percentage points (from 45.3 percent to 51.8 percent). The liking of nutrimix has increased in both areas. As compared to the control, the intervention area has witnessed a sharper increase in the daily consumption and liking of nutrimix. The proportion of caregivers who reported that the child likes nutrimix has increased in the intervention area by

29.8 percentage points (from 56.9 percent to 86.7 percent) and in the control area by 24.0 percentage points (from 52.7 percent to 76.7 percent).

Table 2.8. Consumption of nutrimix

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Mean quantity of nutrimix consumed by child per day	57.89 grams	91.72 grams	59.89 grams	100 grams	58.68 grams	94.80 grams
Frequency of consumption of nutrimix in a week						
Daily	184 (41.7)	258 (62.8)	117 (40.9)	97 (39.1)	301 (41.4)	355 (53.9)
3-5 days a week	134 (30.4)	97 (23.6)	93 (32.5)	71 (28.6)	227 (31.2)	168 (25.5)
Less than 3 days a week	118 (26.8)	51 (12.4)	72 (25.2)	73 (29.4)	190 (26.1)	124 (18.8)
Don't consume	5 (1.1)	5 (1.2)	4 (1.4)	7 (2.8)	9 (1.2)	12 (1.8)
Whether nutrimix was consumed the previous day						
Consumed	222 (50.3)	242 (64.0)	130 (45.3)	117 (51.8)	352 (48.4)	359 (59.4)
Number of times nutrimix was consumed the previous day						
Once	149 (33.8)	139 (57.4)	91 (31.7)	84 (71.8)	240 (33.0)	223 (62.1)
Twice	60 (13.6)	93 (38.4)	29 (10.1)	24 (20.5)	89 (12.2)	117 (32.6)
Thrice	10 (2.3)	9 (3.7)	7 (2.4)	5 (4.3)	17 (2.3)	14 (3.9)
Four times or more	3 (0.6)	1 (.4)	1 (0.3)	3 (2.6)	3 (0.4)	4 (1.1)
Don't know	1 (0.2)	0	2 (0.7)	1 (.9)	3 (0.4)	1 (.3)
Whether the child likes Nutrimix						
Likes nutrimix	243 (56.9)	357 (87.1)	145 (52.7)	191 (77.3)	388 (55.3)	548 (83.4)

Cooking and Eating Practices of nutrimix

96. The nutrimix is consumed mostly with warm water or warm milk. The practice of consuming nutrimix with warm milk has increased in the intervention area, whereas the same has declined in the control area. As compared to the time of the baseline survey, the practice of consuming nutrimix as a dry powder has increased in the intervention area, whereas the same has declined in the control area. Interestingly, consumption of nutrimix in other forms such as puttu, ada, appam, and dosa has increased in the intervention and control areas. Caregivers added additional ingredients to the nutrimix like jaggery or sugar in most cases followed by ghee. This could be due to the effect of the Government's sessions in which the cooking of nutrimix was demonstrated. Time trend analysis shows that the addition of sugar or jaggery by the caregivers in nutrimix has slightly declined in the intervention areas, whereas the same has increased in the control area. The practice of consuming the nutrimix plain without any additional ingredients has marginally declined in both areas. (Annexure Table A.19.)

Intra-Household Distribution of nutrimix

97. During the baseline, one-quarter of the caregivers informed that the nutrimix received from the AWC was consumed solely by the intended child, which has increased to 64.0 percent at the time endline. Consumption of nutrimix along with the sibling has slightly increased in the intervention area, whereas the proportion of caregivers mentioning that the nutrimix was consumed by the child along with the siblings during baseline and endline survey is almost the same in the control area. Interestingly during the baseline round, one-third reported that mothers also consumed the nutrimix, which has increased to more than half (58.0 percent) during the endline. Consumption of nutrimix by other people like neighbours, guests, elderly in

the household, etc has also increased over the period. Unconsumed nutrimix was usually gifted to others such as household members of non-beneficiary of nutrimix. Gifting of the unused nutrimix to others has declined in both areas. Seven respondents during baseline and three respondents during endline from the intervention area had reported giving nutrimix to cattle. The corresponding figures for the control area are five and seven. It should be noted that there was no probing question to ask whether the nutrimix given to cattle was that which remained unused for long (past the expiry period). The (Annexure Table A.20.)

Hygienic Practices

98. A significantly higher proportion of caregivers reported washing hands with soap and water before handling or cooking nutrimix in both the areas at the time of the endline survey. The proportion of caregivers who reported washing hands with soap has increased in the intervention area by 31.6 percentage points (from 51.2 percent to 82.8 percent) and in the control area by 24.7 percentage points (from 46.8 percent to 71.5 percent).

Table 2.9. Hygienic Practices

Hand washing before cooking or handling nutrimix	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
With Soap and water	222 (51.2)	341 (83.0)	132 (46.8)	178 (72.1)	354 (49.4)	519 (78.9)
With water alone	207 (47.7)	65 (15.8)	143 (50.7)	68 (27.5)	350 (48.9)	133 (20.2)
Not washing	5 (1.2)	5 (1.2)	7 (2.5)	1 (0.4)	12 (1.7)	6 (0.9)

Storage of nutrimix

99. The majority of the caregivers (around 90.0 percent) in the control and intervention areas stored the contents of the nutrimix packet in a closed airtight jar during both the time points. Few of them retained the contents in the same packet. Kudumbshree may provide a closed jar to THR beneficiaries, which can store half a kilogram of nutrimix. (Annexure Table A.21.)

2.1.15. The impact of flood

100. The data collection from the control area was already complete before the interruption on account of floods. To assess the situation after the floods, respondents who were interviewed after the floods were asked a few additional questions specifically related to the floods. This section presents the findings based on the responses of the respondents from the intervention area who have interviewed post floods during the endline survey. 16.8 percent of the caregivers reported being affected by the flood, 11.3 percent had to move out of their houses, and water entered the house of six percent. Among all the three intervention panchayats, Panamaram was most affected, and more than one-quarter (26.6 percent) of caregivers of this panchayat were directly affected by the floods. One out of every ten caregivers mentioned that they had to move out of their property during the flood-affected period. Among those who moved out, six percent had moved to a flood relief camp. The toilet and drinking water facility were not affected. 58.6 percent were washing with water and soap before preparing food for the index child during the flood-affected period, 36.3 percent were washing hands with just plain water 5.1 percent of caregivers were not at all washing their hands. 33 percent reported not having access to *Nutrimix* during the flood period. 8.6 percent had interrupted breastfeeding during the flood period. 25.1 percent of children had the illness in the post-flood period Majority of the children who fell ill after the floods had a fever, followed by cold and cough.

Table 2.10. The impact of floods

Items	Panchayat n (%)			Total n (%)
	Thirunelli	Vellamunda	Panamaram	
Directly affected by the recent floods	n=112	n=157	n=64	n=333
Yes	16 (14.3)	23 (14.6)	17 (26.6)	56 (16.8)
Property directly affected by the flooding	n=112	n=157	n=64	n=333
Yes	20 (17.9)	24 (15.3)	18 (28.1)	62 (18.6)
Did water enter your house?	n=112	n=157	n=64	n=333
Yes	3 (2.7)	9 (5.7)	8 (12.5)	20 (6.0)
Did you have to move out of your property due to flooding?	n=112	n=157	n=64	n=333
Yes	8 (7.8)	15 (11.1)	10 (18.5)	33 (11.3)
Kind of toilet facility, used during flood affected period	n=110	n=150	n=54	n=314
Flush or Pour Flush Toilet or Pit Toilet	106 (96.4)	145 (96.7)	50 (92.6)	301 (95.9)
No facility/open space/ field	2 (1.8)	1 (.7)	0	3 (1.0)
Others	2 (1.8)	4 (2.7)	4 (7.4)	10 (3.2)
The main source of drinking water during the flood-affected period	n=112	n=156	n=58	n=317
Piped water	41 (36.9)	21 (14.2)	6 (10.3)	68 (21.5)
Dug well	63 (56.8)	116 (78.4)	43 (74.1)	222 (70.0)
Water from spring/river/pond	4 (3.6)	2 (1.4)	1 (1.7)	7 (2.2)
Tanker truck/Cart with small tank	1 (.9)	2 (1.4)	3 (5.2)	6 (1.9)
Bore well	2 (1.8)	3 (2.0)	2 (3.4)	7 (2.2)
Others	0	4 (2.7)	3 (5.2)	7 (2.2)
Were you washing your hands before preparing food for the index child during the flood affected period?	n=112	n=156	n=63	n=331
No	4 (3.6)	10 (6.4)	3 (4.8)	17 (5.1)
Yes, with water	38 (33.9)	49 (31.4)	33 (52.4)	120 (36.3)
Yes, with water and soap	70 (62.5)	97 (62.2)	27 (42.9)	194 (58.6)
Did you have access to Nutrimix powder during the flood-affected period?	n=112	n=155	n=63	n=330
Yes	83 (74.1)	100 (64.5)	38 (60.3)	221 (67.0)
Was the breastfeeding continued as usual?	n=110	n=154	n=63	n=327
Yes	100 (90.9)	141 (91.6)	58 (92.1)	299 (91.4)
Did child fell ill after floods?	n=109	n=150	n=60	n=319
Yes	28 (25.7)	38 (25.3)	14 (23.3)	80 (25.1)

2.2. Anganwadi Workers

101. Anganwadi workers from all the anganwadi centers situated in intervention and control areas and having registered nutrimix beneficiary children aged 18-24 months were interviewed. AWWs were asked questions about their background, work experience as an AWW, the functioning of the AWCs, services provided at the AWCs, adequacy of the equipment of AWCs, maintenance of registers, level of their knowledge regarding the IYCF practices, nutrition, and fortification. During the endline survey, a few additional questions relating to IEC activities of the project such as safe preparation of complementary food, responsive feeding, feeding during illness, and recovery phase were asked. Besides, AWWs were also enquired about the various

aspects of fortified nutrimix such as taste, nutritive benefits, and change in demand for fortified nutrimix. The following section would present the findings based on the responses shared by the AWWs during the baseline and endline survey.

2.2.1. Distribution of AWWs

102. At the endline, 179 anganwadis from intervention and control areas were covered for the study. Of these 102 (57.0 percent) anganwadis were in the intervention area and the remaining in the control area. Depending on the availability/enrolment of sample children aged 18-24 months in the anganwadi centers, anganwadis were covered during both rounds of assessment. Thus, the number of anganwadis covered from each of the panchayats during baseline and endline may slightly vary.

Table 2.11. Distribution of AW in Panchayats

Area	Anganwadis covered in the study n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline
Intervention Area (3 Panchayats)				
Panamaram	40 (23.4)	38 (21.2)	104 (60.8)	102 (57.0)
Thirunelli	36 (21.1)	26 (14.5)		
Vellamunda	28 (16.4)	38 (21.2)		
Control Area (2 Panchayats)				
Thavinjal	44 (25.7)	46 (25.7)	67 (39.2)	77 (43.0)
Edavaka	23 (13.5)	31 (17.3)		
Total			171 (100)	179 (100)

2.2.2. Profile of AWWs

103. Hindus formed the major (Two-third) religious group among the AWWs, followed by Christians and Muslim AWWs. Regarding the caste distribution, most of the AWWs belonged to the 'others' category which included the castes other than SC, ST, and OBC. The proportion of the 'others' category in the control area is more compared to the intervention area. Almost one-quarter of anganwadi workers belong to the other backward castes in the intervention area. The educational status of the workers in both the control and intervention areas were similar during both rounds. Few AWWs were graduates or postgraduates, and the majority had high school or secondary school education. The age distribution of the workers was similar in the control and intervention areas. Most of the workers were in the age group of 30 to 50 years. Almost all the workers are married. The majority of AWWs are experienced, with most of them having work experience of more than five years. Most of the workers had been working in the current anganwadi center for more than a year. Two-third of the workers were residing in the same village in which the anganwadi center is located, with no difference in the intervention and control area. (Annexure Table A.22.)

2.2.3. Institutional Training of AWWs

104. In this assessment, AWWs were enquired about the details of their institutional training. Even though most of the AWWs had received training at the beginning of their work lasting for 15 – 30 days or more, one-fifth of the AWWs had received no training at the time of employment. The duration of the most recent training received by the majority was for two to seven days. Detailed findings of the institutional training of anganwadi workers have been provided in the annexure. During this project, AWWs of the intervention area were provided with training as part of the fortification project. Effects of these training on the AWWs have been assessed in terms of the awareness and knowledge level of AWWs for IYCF, nutrition, safe

preparation of complementary food, responsive feeding, feeding during illness, and recovery from the illness phase. Details of these results have been discussed in the following sections.

2.2.4. Working days and hours of AWCs

105. During the baseline and endline survey, AWWs were asked about the number of days the AWC was open during the last 30 days and the average number of hours AWC is usually open on a normal working day. During the previous 30 days, anganwadis had functioned for 22 days on an average in both the phases of study and the mean hours of functioning per day was approximately six hours in both areas.

2.2.5. Visits of health workers and others in AWC

106. As found during both rounds of the survey, around two-thirds of the AWWs reported that there are fixed days for the visit of the health workers such as JPHN, ANM, LHS, LHI, and the doctor to the AWCs. A higher number of anganwadis in the intervention area had a fixed day for the visit, as compared to the control area.

Table 2.12. Visits by health workers at the anganwadi

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	**Endline**	**Baseline**	**Endline**	**Baseline**	**Endline**
Fixed days for the visit of health worker	68 (65.4)	80 (78.4)	38 (56.7)	41(53.3)	106 (62)	121(67.6)

2.2.6. Services provided to children between 6-36 months

107. Supplementary nutrition is provided universally in all the AWCs. Immunisation services were being provided in more than two-thirds of the anganwadis. The reason for the rest of the anganwadis not providing immunization services was that the number of children enrolled in these centres is low. In such cases, outreach immunization is provided at a common AWC or at a sub-centre where children from two or three anganwadis visit and take immunization to avoid the wastage of resources.

108. As compared to baseline, during endline percentage of anganwadis providing health check-ups, referral services, nutrition health education, and pre-school education in both the control and intervention area has declined. Usually, health check-ups and referral services are provided along with immunization services. More or less control and intervention areas exhibit a similar pattern as regards the services provided by the AWCs.(Annexure Table A.25.)

2.2.7. Supplementary Nutrition

Survey, distribution, and child weight registers

109. As found in the endline survey, all the anganwadis were maintaining the survey[8]and distribution register. As per the survey register, there was no significant difference in the number of children registered in the anganwadi in both the control and intervention areas. Detailed findings of the registers maintained by the anganwadi workers have been provided in the annexure.

[8] Each AWC is expected to carry out a survey of the population lying within its jurisdiction and make an exhaustive list of eligible beneficiaries and note their names and other relevant details in the survey register.

Type of food provided at the AWCs

110. As reported by the AWWs, the majority of the anganwadis provided 'mainly' dry take-home ration or ready to eat food to children in the age group of 6-36 months whereas a few centres 'mainly' gave cooked food. Most likely THR and ready to eat are the same.

Table 2.13. Type of food 'mainly' provided to children aged 6-36 months

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Cooked food, same every day	4 (3.8)	6 (5.9)	1(1.5)	3 (3.9)	5 (2.9)	9 (5.0)
Cooked food, as per weekly menu	7 (6.7)	6 (5.9)	8 (11.9)	3 (3.9)	15 (8.8)	9 (5.0)
Ready to eat food	1 (1.0)	7 (6.9)	1 (1.5)	10 (13.0)	2 (1.2)	17 (9.5)
Dry take home ration	92 (88.5)	83 (81.4)	57 (85.1)	60 (77.9)	149 (87.1)	143 (79.9)
Other	NA	0 (0.0)	NA	1(1.3)	NA	1 (0.6)

Distribution of Supplementary Nutrition

111. AWWs were asked whether there is a specified/designated day for the distribution of amrutham to the parents/caregivers of children in their AWC. As compared to baseline, during the endline, the percentage of anganwadis with specified days for distribution of nutrimix in both the control and intervention area has increased.

Table 2.14. Distribution of Supplementary Nutrition

Item	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Specified days for distribution of nutrimix	57 (54.8)	76 (74.5)	27 (40.3)	51 (66.2)	84 (49.1)	127 (71.0)

Frequency of nutrimix distribution to beneficiaries

112. AWWs were enquired about the frequency of the distribution of nutrimix to the parents/caregivers of children in the AWC were. There is a difference in the nutrimix distribution in the control area when compared to the intervention area. As compared to baseline, during endline percentage of anganwadis distributing nutrimix once a month has increased in the intervention area, whereas the control area does not exhibit any change between the two rounds. A higher proportion of AWCs in the control area distributes nutrimix more than one time in a month. (Annexure Table A.27.)

Regularity and timeliness of nutrimix supply

113. AWWs were enquired about the regularity and timeliness of the supply of nutrimix. The proportion of AWWs reporting supply of nutrimix as highly regular has improved in the intervention area from the time of baseline to endline, whereas the percentage of AWWs reporting supply of nutrimix as highly regular has declined in the control area. AWWs were asked about the frequency of the supply of nutrimix in the last month. It was found that there was no difference in the supply of nutrimix in both the areas in the last one month preceding both the rounds of the survey.

Table 2.15. Timeliness of nutrimix supply

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	**Endline**	**Baseline**	**Endline**	**Baseline**	**Endline**
Overall regularity and timeliness of supply of supplementary food (amrutham) for children (6-36 months) in AWC						
Highly Regular	27 (26.0)	41 (40.2)	14 (20.9)	13 (16.9)	41 (24.0)	54 (30.2)
Regular	48 (46.2)	33 (32.4)	14 (20.9)	42 (54.6)	62 (36.3)	75 (41.9)
Irregular	29 (27.9)	25 (24.5)	36 (53.7)	22 (28.6)	65 (38.0)	47 (26.3)
Highly Irregular	0 (0.0)	3 (2.9)	3 (4.5)	0	3 (1.8)	3 (1.7)
Frequency of supply of supplementary food (amrutham) to AWC in last month [From the kudumbasree Unit]						
Once in a month	93 (89.4)	102 (100.0)	60 (89.6)	74 (96.1)	153(89.4)	176 (98.3)
Once/twice/thrice in a week or once in a fortnight	10 (9.7)	0	7 (10.5)	1 (1.3)	17(10.5)	1 (0.6)
Others	1 (1.0)	0	0(0.0)	2 (2.6)	1 (0.6)	2 (1.2)

Quality and packaging of nutrimix

114. In the intervention area, as compared to findings of the baseline round (55.8 percent), during the endline phase, a much higher proportion of AWWs of the intervention area reported that the quality of nutrimix is 'very good' (82.7 percent). On the contrary, in the control area, reporting of the quality of nutrimix as 'very good' has slightly declined from baseline (58.2 percent) to endline (55.1 percent). In the intervention area, all the AWWs mentioned that the quality of the packaging of the nutrimix was either 'very good' or 'all right'. Whereas, in the control area, the reported quality of the packaging of nutrimix as 'very good' has significantly declined from baseline (52.2 percent) to endline (20.5 percent). During the endline, around 13.0 percent of AWWs claimed that the quality was either 'not so good' or 'bad' in the control area.

Table 2.16. Quality and packaging of nutrimix

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Quality of nutrimix						
Very good	58 (55.8)	85 (83.3)	39 (58.2)	43 (55.8)	97 (56.7)	128 (71.5)
All right	40 (38.5)	17 (16.7)	26 (38.8)	32 (41.6)	66 (38.6)	49 (27.4)
Not so good	6 (5.8)	0	2 (3)	2 (2.6)	8 (4.7)	2 (1.1)
Bad	0	0	0	0	0	0
Packaging quality of the Nutrimix						
Very good	69 (66.3)	60 (58.8)	35 (52.2)	15 (19.7)	104 (60.8)	75 (42.1)
All right	33 (31.7)	42 (41.2)	27 (40.3)	51 (67.1)	60 (35.1)	93 (52.2)
Not so good	2 (1.9)	0	4 (6)	9 (11.8)	6 (3.5)	9 (5.1)
Bad	0	0	1 (1.5)	1 (1.3)	1 (0.6)	1 (0.6)

The usefulness of nutrimix – as perceived by AWWs

115. From the time of baseline to endline, rating about the usefulness of nutrimix by the AWWs as 'very helpful' has increased in the intervention area by 28.1 percentage points (from 52.3 percent to 80.4 percent) and in the control area by 5.2 percentage points (from 59.7 percent to 64.9 percent) - a sharper increase in the intervention area. AWWs were asked their opinion about the perception of parents/caregivers regarding the nutrimix provided to children (6-36 months). During the endline, the proportion of AWWs who opinioned that parents feel that the quality of nutrimix is 'very good' in the intervention area has increased by 28.3 percentage points (from 44.2 percent to 72.5 percent), whereas the proportion has decreased in the control area by 4.5 percentage points (from 55.2 percent to 50.7 percent).

***Table2.17.* Perception of the usefulness of nutrimix**

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Perception of AWWs						
Very useful	55 (52.9)	82 (80.4)	40 (59.7)	50 (64.9)	95 (55.6)	135 (73.7)
All right	39 (37.5)	16 (15.7)	19 (28.4)	21 (27.3)	58 (33.9)	37 (20.7)
Not so useful	9 (8.7)	4 (3.9)	8 (11.9)	6 (7.8)	17 (9.9)	10 (5.6)
Useless	1 (1.0)	NA	0 (0)	NA	1 (0.6)	NA
According to AWW, parent's opinion about nutrimix						
Very good	46 (44.2)	74 (72.5)	37 (55.2)	39 (50.7)	83 (48.5)	113 (63.1)
All right	53 (51.0)	26 (25.5)	27 (40.3)	35 (45.5)	80 (46.8)	61 (34.1)
Not so good	5 (4.8)	2 (2.0)	3 (4.5)	3 (3.9)	8 (4.7)	5 (2.8)

Fortification of nutrimix

During the endline phase, AWWs were enquired about the various aspects of fortification of nutrimix. All the AWWs of the intervention area were aware that the nutrimix provided by Anganwadi is fortified. On enquiring about the difference between the nutrimix which was distributed before the start of the fortification project (non-fortified nutrimix) and fortified nutrimix, almost all (98.0 percent) mentioned that the fortified nutrimix is better than non-fortified. Only two AWWs mentioned that fortified nutrimix is the same as the non-fortified nutrimix. Universally all AWWs opined that fortification of nutrimix is nutritionally beneficial. On asking about the nutritional benefits of fortification of nutrimix, 69.3 percent, 40.6 percent, 36.6 percent, 34.7percent

and15.8 percent of AWWs mentioned that it gives sufficient energy, gives protein, gives micronutrients such as iron, Vit A, etc., prevents malnutrition, and other benefits respectively.

AWWs were asked about the taste-wise difference between the nutrimix which was distributed before (the start of the fortification project) and now (fortified nutrimix). A high percentage (95.0 percent) mentioned that the fortified nutrimix tastes better than non-fortified. Few (4.0 percent) mentioned that fortified nutrimix tastes the same as non-fortified. Interestingly, on enquiring about the impact of fortification of nutrimix on the demand for THR, 90.2 percent mentioned that demand has increased, whereas 7.8 percent mentioned that demand is the same and the remaining (two percent) said the demand has decreased. AWWs were asked about the impact of fortification of nutrimix on the consumption of nutrimix among children aged 6-36 months. Regarding consumption of nutrimix among children, a high percentage of AWWs reported that consumption has increased (94.1 percent), whereas five percent mentioned that consumption is the same and the remaining one percent said the consumption has decreased. One-quarter (24.0 percent) of AWWs reported that they have complaints against the fortified nutrimix. Reported complaints were gastric irritation due to soya, irregularity in the supply from the manufacturing unit, and the presence of sand or stone.

2.2.8. Interventions for malnourished children

116. As reported by the AWWs, interventions for malnourished children provided from the anganwadis have slightly improved in the intervention area (from 92.3 percent to 95.1 percent). The control area does not show any change in these interventions. These interventions included referral services to the nearest health centre, regular follow-up in the form of house visits by the worker, and nutrition education. Parents of malnourished children were also encouraged to give more nutrimix to the children.

Table 2.18. Interventions for malnourished children at the AWC

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Interventions are provided for malnourished children	96 (92.3)	97 (95.1)	63 (94)	71 (93.4)	159(93)	168 (94.4)

2.2.9. Assessment of AWC infrastructure - based on the observation by the research team

117. Most anganwadis from both areas had the prescribed equipment. Few anganwadis were lacking basic amenities like utensils for cooking or storing water, weighing scales, and medicine kits. Most of the centres had a salter weighing scale to measure the weight of the baby. Few AWCs had baby weighing scales, in addition to the salter scales. Most anganwadis had wall charts or wall paintings and many of these charts were on IEC regarding nutrition or hygiene. As compared to baseline, during the endline a much lower percentage of AWCs of intervention area reported having indoor play equipment. (Annexure Table A.28.)

118. During the baseline, only 11.5 percent of the intervention area had electricity connections. This significantly increased to 66.3 percent during the endline. Over the same period, the proportion of anganwadis with electricity connection in the control area has also improved from 22.4 percent to 40.3 percent. The number of AWC with electricity fans has increased in both areas. Availability of clean safe drinking water and toilet facility on the premises of AWC has increased in both areas, but there is scope for improvement. The proportion of anganwadis having indoor activity space, and separate kitchen/cooking areas have declined in the intervention and control areas. Storage facilities for food have improved. (Annexure Table A.29.)

2.2.10. Availability and utilization of medicines at anganwadi centres

119. During the baseline, essential medicines and supplies like paracetamol, albendazole, ORS, cotton bandage, and Iron tablets (big) were available in most of the anganwadis in both areas. But eye ointments, antiseptic solution, metronidazole, and vitamin A solution were not available in the majority of the anganwadis. During the endline, availability of all the medical supplies has declined in both areas. The control area has experienced a sharper decline in the availability of medical supplies. Corresponding to the reduced availability of medical supplies, utilization has also declined in both areas. (Annexure Table A.30.)

2.2.11. Knowledge Level of AWW for IYCF and nutrition

120. Almost all the AWWs have heard about anaemia (98.3 percent) and vitamin A deficiency (98.3 percent). Even though most of the workers knew that weakness or lack of energy was the major sign of undernutrition, the majority were not aware that frequent infections, loss of weight, and growth faltering were also signs of malnutrition. The pattern of lack of knowledge regarding the signs of malnutrition was similar in both groups. Even though most of the workers knew that anaemia could be caused by inadequate diet and lack of iron-rich foods, infections (malaria, hookworm infection, other infection such as HIV/AIDS) as a cause for anaemia was not recognized by many. The level of knowledge regarding the ways of prevention of anaemia was similar across both groups. Even though the majority of the workers knew that anaemia could be prevented by consuming iron-rich food in the diet only a small percentage knew that consuming Vitamin C-rich food along with meals, consuming iron supplements, treating infections, and consumption of nutrimix could also prevent anaemia. In context to knowledge regarding the health risks posed by anaemia, the majority recognized that it could cause physical retardation of growth. Awareness about the risk of delay in mental development due to lack of iron was higher in the intervention area as compared to the control area. (Annexure Table A.31.)

121. Almost all the AWWs had correct knowledge regarding the time of initiation of breastfeeding. Nearly all were aware that exclusive breastfeeding should be continued for six months. Detailed findings of knowledge for nutrition, breastfeeding, and complementary feeding has been provided in Annexure Table A.32.

2.2.12. Awareness and knowledge level of AWW for safe preparation of complementary food, responsive feeding, feeding during illness, and recovery from illness phase

122. As done with the caregiver schedule, few questions specifically related to the IEC activities conducted as part of this project were incorporated in the AWW schedule at the time endline study. This section presents the findings of the knowledge levels among the AWWs about the safe preparation of complementary food, responsive feeding, feeding during illness, and recovery from illness phase during the endline phase of assessment. Almost all AWWs (97.8 percent) of the intervention and control area have heard about the safe preparation of complementary feeding. On asking about their knowledge for safe preparation for complementary feeding in the intervention area, 94.1percent, 44.1percent, 38.2 percent, 18.6 percent, and 35.3 percent of AWWS mentioned keeping hands clean, separating raw and cooked food, thoroughly cooking the food, keeping food at safe temperatures, and using safe water/raw materials respectively.

123. AWWS from the intervention area were more aware of the responsive feeding approach (99.0 percent vs. 88.3 percent). As expected, a higher proportion of AWWS from the intervention area reported about the various aspects of responsive feeding approach such as feed slowly, encourage the child to eat, do not force them, feeding times are periods of learning and love, etc. AWWs from the intervention area were more aware of the role of nutrimix during illness (86.3 percent vs. 80.5 percent). Similarly, a higher percentage of AWWS from the intervention area were aware of the feeding practices during recovery from illness (92.3 percent vs. 84.6 percent).

Table 2.20. Safe preparation of complementary food, responsive feeding, feeding during illness, and recovery from illness phase

Items	Intervention Area n (%)	Control Area n (%)	Total n (%)
Awareness about the safe preparation of complementary foods			
Yes	101 (99.0)	74 (96.1)	175 (97.8)
Knowledge about safe preparation of complementary food *(Multiple Response)*			
Keep hands clean	96 (94.1)	68 (88.3)	164 (91.6)
Separate raw and cooked food	45 (44.1)	20 (26.0)	65 (36.3)
Food should be thoroughly cooked	39 (38.2)	30 (39.0)	69 (38.6)
Keep food at safe temperatures	19 (18.6)	20 (26.0)	39 (21.8)
Use safe water and raw materials	36 (35.3)	39 (50.7)	75 (41.9)
Awareness about the responsive feeding approach			
Yes	101 (99.0)	68 (88.3)	169 (94.4)
Knowledge about responsive feeding approach*(Multiple Response)*			
Feed slowly	81 (79.4)	46 (59.7)	127 (71.0)
Encourage the child to eat, do not force them	67 (65.7)	46 (59.7)	113 (63.1)
Feeding times are periods of learning and love	46 (45.1)	18 (23.4)	64 (35.8)
If the child refuses certain foods, give them different food combinations, tastes, and textures	18 (17.7)	5 (7.5)	23 (12.9)
Minimum distractions during meals if the child loses interest easily	18 (17.7)	5 (7.5)	23 (12.9)
A young child should be encouraged to take feed by praising them and their food	11 (10.8)	5 (6.5)	16 (8.9)
Self-feeding should be encouraged	11 (10.8)	9 (11.7)	20 (11.2)
Each child should be fed under the supervision	5 (4.9)	6 (7.8)	11 (6.2)
Talk to children during feeding, with eye-to-eye contact	25 (24.5)	17 (22.1)	42 (23.5)
Awareness about the role of amrutham during illness			
Yes	88 (86.3)	62 (80.5)	150 (83.98)
Awareness about the feeding practices during illness			
Yes	89 (87.3)	69 (89.6)	158 (88.3)
Knowledge about the feeding practices during illness? *(Multiple Response)*			
Breastfeed more frequently and longer at each feed	53 (52.0)	37 (48.1)	90 (50.3)
Increase fluid intake and offer food	58 (56.9)	46 (59.7)	104 (58.1)
If a breastfeeding infant is too weak to suckle	16 (15.7)	7 (9.1)	23 (12.9)
Give nutrient-dense foods that are soft, varied, and the child's favorite foods	15 (14.7)	6 (7.8)	21 (11.7)
Give mashed or soft foods	19 (18.6)	18 (23.4)	37 (20.7)
Do not dilute food or milk	7 (6.9)	7 (9.1)	14 (7.8)
Feed the child slowly and patiently encourage the child to eat but do not force	10 (9.8)	9 (11.7)	19 (10.6)
Give frequent small feeds	29 (28.4)	24 (31.2)	53 (29.6)

Awareness about the feeding practices during recovery from illness			
Yes	94 (92.2)	65 (84.4)	159 (88.8)
Knowledge about the feeding practices during recovery from illness *(Multiple Response)*			
Increase the amount of food after illness until the child regains weight and is growing well	58 (56.9)	34 (44.2)	92 (51.4)
Continue to feed frequently	60 (58.8)	45 (58.4)	105 (58.7)
Be responsive to the recovering child's increased hunger	18 (17.7)	17 (22.1)	35 (19.6)
Increased attention to feeding should continue for 2 or more weeks following an illness	14 (13.7)	8 (10.4)	22 (12.3)
Older infants and young children continue to need high-quality food	5 (4.9)	5 (6.5)	10 (5.6)

2.3. Kudumbashree workers

In-Depth Interviews:

124. There are two nutrimix production units in the study area - Udaya at Edavaka panchayat and Snehadeepam at Vellamunda panchayats. In-depth interviews (IDIs) were conducted among workers of both units during baseline data collection. Thereafter nutrimix fortification is being carried out in the Snehadeepam unit for the intervention. During the endline, IDIs of Kudumbshree workers of the Snehadeepam unit were conducted to assess the working of the unit, production, and fortification of nutrimix. At the time of the endline survey, two workers from the production unit were interviewed and the following are the results of the analysis of the IDIs of these two workers.

2.3.1. Background characteristics of Kudumbshree workers

125. Both workers interviewed were females in age ranging from 41 - 51 years with a mean age of 47 years. One of the workers had a secondary school education level up to 12th standard while the other was a graduate.

126. **Work experience**: Both workers were experienced, working as Kudumbshree workers for more than 15 years and working in the current production unit for more than 10 years. Both were involved in all steps of the nutrimix manufacturing process (cleaning, roasting, grinding, blending, and packing).

127. **Training**: Workers had undergone training in nutrimix preparation. The content of the training included sessions on the nutritional advantages of nutrimix, methods of preparation, hygienic practices, and maintenance of records. The duration of the training was 50 days for one of the workers and 40 days for the other. Time elapsed since the last training session attended for both was ≤ one year and all felt that their training was adequate for performing their overall responsibilities concerning nutrimix. Both of them had also received training on fortification of the nutrimix.

2.3.2. Working on the production unit & Preparation of Nutrimix

128. The production unit had worked for twenty-two days in the last thirty days. The number of hours worked by the production units was seven hours a day. Even though the workers felt that the present equipment of the production unit was adequate, but at the same time, they felt there was scope for improvement. Some of the processes were still being done manually and the improvements suggested were the further mechanisation of the process of nutrimix production (namely introduction of drying machine and mixing) and the introduction of automatic packaging and printing machines. The introduction of the drier would decrease the consumption of fuel according to one of the workers. Another suggestion put forward was to use a motor with more power as it would lead to a significant increase in the production of nutrimix. One of the workers put forward the suggestion of owning a more spacious building for the production unit instead of the present rented premises.
129. **Knowledge regarding Nutrimix preparation**: Both workers were aware of the ingredients used to prepare the nutrimix and could correctly list down the ingredients used. They were aware of the correct procedure for the preparation of nutrimix. One of the workers specifically mentioned the addition of the premix (fortifying agent).

130. **The supply and quality of raw materials**: The unit receives wheat from the Government warehouse (Food Corporation of India) at a subsidy while the rest of the ingredients were being procured from wholesale/retail outlets. According to the workers, they have faced a delay in raw material supply. The workers were unanimous in citing financial constraints as the main issue for purchasing raw materials. According to them the prices of raw materials especially pulses and nuts had gone up in the last few years. Another problem

cited was their inability to pay the dealers on time since there was always a delay in the allotment of funds by the Local Self Government (LSG) institution. At present, the raw materials were being procured on a loan basis. The raw material supply was delayed in the last month. The quality of the raw materials was ensured in both units by gross inspection of the raw materials. The groundnut and pulses were examined visually for the presence of fungus and the dryness of the raw materials were routinely checked. If the presence of pests or mold was found in the raw materials, it is sent back to the dealer.

131. **The quality of Nutrimix**: Both the workers considered that the nutrimix provided to children aged six months to 36 months was of very good quality. Nevertheless, they had some suggestions for further improvement of the nutrimix. One of the workers suggested the addition of almonds (badam) and milk powder to further improve the quality of nutrimix while the other opined that nothing further needs to be added. Both believed that since the premix is added, no additional ingredients are required.

132. In contrast to the baseline survey where the workers recommended the removal of soya from the nutrimix, during the endline, the workers did not suggest the removal of any ingredient (including soybean). One of the respondents even opined that the taste of soya was no longer a problem. Regarding the packing of the Nutrimix, both workers considered the current packing to be very good.

133. **Hygienic practices and quality protocols**: Both workers followed the hygienic practice of washing hands with soap and water before preparation of nutrimix. Both followed the quality protocols of wearing protective wear (gloves, cap, mask, and apron) and removing ornaments while preparing nutrimix. Foot and hand hygiene was practiced by all. Washing feet in potassium permanganate ($KMnO_4$) solution was mentioned by all. According to the workers the raw materials were stored over a metal stand and away from the walls to prevent dampness and pest invasion. The batch number was being put correctly during packaging to ensure first in first out. Roasting and cooling were being conducted with great care at the right temperature.

134. **Perception of the Kudumbshree workers regarding supplementary nutrition**: Both workers perceived nutrimix as a very useful nutritional intervention for children. They reported interacting with the caregivers of the beneficiary children regularly in the form of health education sessions and demonstration sessions and competitions where the workers demonstrated the various preparations that could be made with the nutrimix powder. Health education sessions regarding the benefits of nutrimix are being conducted for mothers.

135. Different methods of preparation were practiced. Porridge seems to be the most common form in which nutrimix was consumed by the beneficiary children. It is also consumed as a dessert (*kheer*). Vegetables were added by some to make cutlets and also along with *puttu* (a steamed form of the nutrimix powder). Some parents made *ladoos* after roasting the powder and some consumed it in the baked form (cake, biscuit). Other forms included *Unniappam* (batter fried in the shape of balls) and *avulose* powder (powder roasted with coconut and oil). Nutrimix was also being used to make breakfast for the whole family in many households

136. **Regarding intra-household consumption of the Nutrimix**: Both workers believed that the supplied nutrimix is being consumed in several families by members other than the intended beneficiary child. School-going children, adolescents, and the elderly seemed to the major people consuming it apart from the beneficiary child.

137. **Suggestions for improvement**: Even though palatability issues due to soya were mentioned by the workers during the baseline phase, according to them, there were no further complaints of similar nature after the addition of the premix. The suggestions for improvement put forward by the parents to the Kudumbshree

workers included supply in biscuit/cake forms, the addition of flavouring agents as in commercial health drinks. A decrease in the amount of sugar was also one of the suggestions. This is in contrast to the baseline phase where removal of soya as one of the ingredients and to add flavouring agents like chocolate, milk powder, and nuts to improve the taste was reported as the major suggestion by parents.

138. Some of the suggestions put forward by the workers to improve community support for nutrimix included charging a nominal price for the nutrimix. Since it is given free of cost parents may not attach much importance to the nutrimix and nominal payment for the product (social marketing) was suggested. Another suggestion was to train the field staff under health services and anganwadi workers and LSG members around the benefits of nutrimix so that they can promote community support. As they are in direct contact with the mothers and children the public has faith and confidence in them. Mothers can be encouraged to participate in a health education session in anganwadis about nutrimix.

2.3.3. Perceptions of the Kudumbshree workers regarding fortification and Nutrimix

139. All the Kudumbshree workers had a positive attitude towards the fortification of food and agreed that fortification provides a better nutritive value to foodstuff and is acceptable among the people too.

140. One of the challenges was the non-availability of a cooler for roasted powder. In the absence of a cooling machine, the cooling process is time-consuming at present. Initially, the workers found it difficult to use the dosing machine but now the issue has been resolved after the introduction of the standardised premix packets. The issue of manual blending has also been resolved after the introduction of the blending machine. According to them, the process is functioning smoothly, with blending and mixing taking place adequately.

3. Conclusions and Recommendations

141. Based on the findings presented in the previous section, a conclusion to meet the assessment objective is provided below. This is followed by recommendations on how government and WFP can take action to build on the lessons learned.

3.1. Conclusions

1. ***Fortification of nutrimix results in an improvement in folate, Vitamin A, and Vitamin B12 levels of the beneficiaries:*** The assessment revealed that the children from the intervention area had a better reduction of Folate, Vitamin A, and Vitamin B12 deficiencies at the endline compared to the baseline. Reduction in the deficiency levels for the above three vitamins was observed in the control area too, but not to the same extent. The most remarkable drop was in Vitamin A deficiency, with the intervention area demonstrating a statistically significant difference from the control area.
2. ***Anaemia in the intervention area has reduced, but not to the levels expected:*** The baseline level of anaemia was higher in the intervention area than the baseline. Although there was a higher reduction in anaemia in the intervention area, the deficiency level was higher than the control area during the endline, despite the fortification. The inherent socio-economic differences between the two study areas which widened during endline could be a possible contributor to the disparity. Another possibility is the impact of the flood. But further studies with different methodologies are required to determine this.
3. ***Knowledge levels of caregivers and anganwadi worker of project area regarding the various aspects of feeding practices of young children has improved***: Awareness regarding the time of initiation of breastfeeding, duration of receiving exclusive breast milk, and age of the child as an appropriate age to start solid or semi-solid food has improved among the caregivers of the project area as compared to the control area. The awareness levels for safe preparation of complementary food, responsive feeding, feeding during illness, and recovery from illness phase are comparatively higher among the caregivers of the intervention area during the endline.
4. ***Fortification of nutrimix distributed under ICDS is an operationally feasible model***: Assessment findings show that there is a wider acceptance of fortified nutrimix among the stakeholders, as a high percentage of the caregivers and anganwadi workers mentioned that fortification of THR is beneficial or good and the taste of fortified nutrimix is better than the non-fortified nutrimix. Barring the flood period, there was no gap in the supply of fortified nutrimix to the anganwadi centres, and the production of fortified nutrimix in the Kudumbshree centres was regular. Kudumbshree workers also exhibited capacities to fortify nutrimix without many challenges.

3.2. Recommendations

Based on the findings and conclusions of this assessment, the recommendations are listed below.

Recommendation 1: As fortification of nutrimix is an operationally feasible model, and as it leads to improvement in the micronutrient levels, it is recommended to the Government of Kerala to sustain the scale-up of the project in the state of Kerala

Recommendation 2: The reduction in anaemia in the intervention area was not as much as expected. Hence further studies are required to explore the reasons.

Recommendation 3: The Scheduled Tribe children have higher levels of deficiencies compared to the general population. It is recommended that the Government of Kerala strengthen the nutritional interventions for this vulnerable group.

Recommendation 4: Nutrimix consumption by the beneficiaries is short of the recommended levels and frequency. Hence innovative methods to ensure the beneficiary children are consuming the THR regularly need to be attempted by the Government of Kerala during the scale-up phase and by WFP in similar projects in other geographies.

Recommendation 5: As compared to the control area, awareness regarding breastfeeding and complementary feeding practices has improved among the caregivers from the fortification project area, but there is scope for improving the awareness about the various aspects of feeding practices. Thus, it is recommended to strengthen IEC activities among the caregivers towards improving the feeding practices of children.

Annexures

Annexure 1: Tables

Annexure Table A.1. Socio-economic and demographic characteristics of caregivers

Background Characteristics	Intervention Area		Control Area		Total	
	Baseline n=441 n (%)	Endline n=412 n (%)	Baseline n=287 n (%)	Endline n=249 n (%)	Baseline n=728 n (%)	Endline n=661 n (%)
Relationship of primary caregiver						
Mother	397 (90.0)	363 (88.1)	261 (90.9)	219 (87.9)	658 (90.4)	582 (88.1)
Grandmother	21 (4.8)	25 (6.1)	16 (5.6)	13 (5.2)	37 (5.1)	38 (5.8)
Father	7 (1.6)	16 (3.9)	5 (1.7)	13 (5.2)	12 (1.6)	29 (4.4)
Grandfather	4 (0.9)	1 (0.2)	3 (1.0)	2 (0.8)	7 (1.0)	3 (0.5)
Others	12 (2.7)	7 (1.7)	2 (0.7)	2 (0.8)	14 (1.9)	9 (1.4)
Religion						
Hindu	235 (53.3)	200 (48.5)	133 (46.3)	110 (44.2)	368 (50.5)	310 (46.9)
Muslim	139 (31.5)	163 (39.6)	74	71 (28.5)	213 (29.3)	234 (35.4)
Christian	67 (15.2)	48 (11.7)	80	68 (27.3)	147 (20.2)	116 (17.6)
Social group						
OBC	152 (34.5)	196 (47.6)	83	91 (36.6)	235 (32.3)	287 (43.4)
ST	143 (32.4)	122 (29.6)	74	44 (17.7)	217 (29.8)	166 (25.1)
SC	23 (5.2)	8 (1.9)	13 (4.5)	11 (4.4)	36 (4.9)	19 (2.9)
Others	123 (27.9)	86 (20.9)	117 (40.8)	103 (41.4)	240 (33.0)	189 (28.6)
Type of ration card						
BPL	221 (50.1)	NA	122 (42.5)	NA	343 (47.1)	NA
APL	171 (38.8)	NA	133 (46.3)	NA	304 (41.8)	NA
AAY	9 (2.0)	100 (24.4)	4 (1.4)	39 (15.7)	13 (1.8)	139 (21.1)
APL SS	1 (0.2)	NA	3 (1.0)	NA	4 (0.5)	NA
No ration card	39 (8.8)	70 (17.1)	25 (8.7)	27 (10.8)	64 (8.8)	97 (14.7)
Priority/pink	NA	108 (26.3)	NA	55 (22.1)	NA	163 (24.7)
State subsidy/blue	NA	90 (22.0)	NA	88 (35.3)	NA	178 (27.0)
Non-priority/non-s	NA	42 (10.2)	NA	40 (16.1)	NA	82 (12.4)
Type of family						
Joint	291 (66.0)	263 (63.8)	199 (69.3)	185 (74.3)	490 (67.3)	448 (67.8)
Nuclear	147 (33.3)	148 (35.9)	88 (30.7)	63 (25.3)	235 (32.3)	211 (31.9)
Extended	3(0.7)	1 (0.2)	0 (0.0)	1 (0.4)	3 (0.4)	2 (0.3)
Type of house						
Kutcha	57 (12.9)	63 (15.3)	44	53 (21.3)	101 (13.9)	116 (17.6)
Pucca	322 (73.0)	294 (71.4)	209 (72.8)	176 (70.7)	531 (72.9)	470 (71.1)
Mixed	62 (14.1)	55 (13.4)	34	20 (8.0)	96	75 (11.4)
Source of drinking water						
Dug well	307 (69.6)	325 (78.9)	202 (70.4)	190 (76.3)	509 (69.9)	515 (77.9)
Piped water	105 (23.8)	68 (16.5)	71	39 (15.7)	176 (24.2)	107 (16.2)
Spring/River/Pond	13 (2.9)	7 (1.7)	11 (3.8)	16 (6.4)	24 (3.3)	23 (3.5)
Bore well	8 (1.8)	12 (2.9)	2 (0.7)	4 (1.6)	10 (1.4)	16 (2.4)
Tanker Lorry	1 (0.2)	NA	1 (0.3)	NA	2 (0.3)	NA
Others	7 (1.6)	NA	0 (0.0)	NA	7 (1.0)	NA
Method of drinking water purification						
Boiling	392 (88.9)	399 (96.8)	266	240 (96.4)	658 (90.4)	639 (96.7)
Doesn't purify	49 (11.1)	11 (2.7)	21 (7.3)	9 (3.6)	70 (9.6)	20 (3.0)
Filter/RO	NA	2 (0.5)	NA	0 (0)	NA	2 (0.3)
Toilet facility						
Flush toilet	410 (93.0)	388 (94.2)	275	241 (96.8)	685 (94.1)	629 (95.2)

Pit latrine	16 (3.6)	20 (4.9)	11 (3.8)	8 (3.2)	27 (3.7)	28 (4.2)
Open defecation	10 (2.3)	4 (1.0)	0 (0.0)	0 (0)	10 (1.4)	4 (0.6)
Neighbors toilets	5 (1.1)	NA	1 (0.3)	NA	6 (0.8)	NA

Annexure Table A.2. Panchayat-wise distribution of caregivers by caste and tribe

Caste	Intervention area n (%)			Control area n (%)		Total n (%)
	Thirunelli	**Vellamunda**	**Panamaram**	**Edavaka**	**Thavinjal**	**N=728**
Baseline	**N = 123**	**N= 102**	**N=216**	**N= 121**	**N= 166**	
SC	2(1.6)	8(7.8)	13(6)	2(1.7)	11(6.6)	36 (4.9)
ST	62(50.4)	22(21.6)	59(27.3)	37(30.6)	37(22.3)	217 (29.8)
OBC	32(26)	47(46.1)	73(33.8)	33(27.3)	50(30.1)	235(32.3)
Others	27(22)	25(24.5)	71(32.9)	49 (40.5)	68(41)	240 (33)
Endline	**N= 112**	**N= 157**	**N= 143**	**N= 99**	**N= 150**	**N= 661**
SC	3 (2.7)	2 (1.3)	3 (2.1)	4 (4.0)	7 (4.7)	19 (2.9)
ST	64 (57.1)	31 (19.8)	27 (18.9)	8 (8.1)	36 (24.0)	166 (25.1)
OBC	31 (27.7)	92 (58.6)	73 (51.1)	46 (46.5)	45 (30.0)	287 (43.4)
Others	14 (12.5)	32 (20.4)	40 (28.0)	41 (41.4)	62 (41.3)	189 (28.6)

Annexure Table A.3. Demographic characteristics of index children

Demographic Characteristics	Intervention area n (%)		Control Area n (%)		Total n (%)	
	Baseline	**Endline**	**Baseline**	**Endline**	**Baseline**	**Endlinen=66**
Sex						
Male	214 (48.5)	208 (50.5)	137 (47.7)	120 (48.2)	351 (48.2)	328 (49.6)
Female	227 (51.5)	203 (49.3)	150 (52.3)	129 (51.8)	377 (51.8)	332 (50.2)
Intersex	-	1 (0.2)	-	0 (0)	-	1 (0.2)
Birth Order						
First	154 (34.9)	138 (33.5)	111 (38.7)	94 37.8)	265 (36.4)	232 (35.1)
Second	169 (38.3)	154 (37.4)	105(36.6)	98 (39.4)	274 (37.6)	252 (38.1)
Third	96 (21.8)	87 (21.1)	54 (18.8)	48 (19.28)	150 (20.6)	135 (20.4)
Fourth or more	22 (5.0)	33 (8.0)	17(5.9)	9 (3.6)	39 (5.4)	42 (6.4)
Mean Age	21 months 2 days	20.8	21 months 5 days	20.9	21 months 4 days	20.8
Mean birth weight (in	2785 gms	2819.1	2801 gms	2835.2	2793 gms	2825.8

Annexure Table A.4. Micronutrient & CRP levels by gender

Micronutrient	Boys n (%)		Girls n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline*
Hemoglobin						
Severe anemia	8(2.8)	3 (1.1)	2 (0.6)	2 (.8)	10 (1.7)	5 (.9)
Moderate anemia	79(27.9)	77 (29.5)	79(24.9)	62 (23.4)	158(26.3)	139 (26.4)
Mild anemia	86(30.4)	68 (26.1)	94(29.7)	63 (23.8)	180(30)	131 (24.9)
No anemia	110(38.9)	113 (43.3)	142(44.8)	138 (52.1)	252(42.0)	252 (47.8)
Ferritin						
Ferritin deficiency	194(65.1)	151 (72.9)	192(59.4)	133 (64.6)	386(62.2)	285 (68.8)
No Ferritin deficiency	104(34.9)	56 (27.1)	131(40.6)	73 (35.4)	235(37.8)	129 (31.2)
Vitamin A						
Vitamin A deficiency	195(67.9)	26(15.5)	240(76.4)	16 (10.3)	435(72.4)	42(13.0)
Vitamin A – Low levels	66(23)	87(51.8)	55(17.5)	70(44.9)	121(20.1)	157 (48.5)
No Vitamin A deficiency	26(9.1)	55(32.7)	19(6.1)	70(44.9)	45(7.5)	125(38.6)
Folate						
Elevated Folate Levels	14(4.9)	11(5.4)	18(5.7)	27(13.2)	32(5.3)	38 (9.3)
Normal Folate levels	213(74)	181(89.6)	245(77.8)	173 (84.4)	458(76)	355(87.0)
Possible Folate Deficiency	51(17.7)	10(5.0)	48(15.2)	5(2.4)	99(16.4)	15 (3.7)
Folate Deficiency	10(3.5)	0(0)	4(1.3)	0(0)	14(2.3)	0(0)
Vitamin B12						
Vitamin B12 deficiency	52(17.4)	3(1.5)	42(12.8)	17(8.0)	94(15)	20 (4.8)
No Vitamin B12 deficiency	246(82.6)	203 (98.5)	285(87.2)	195 (92.0)	531(85)	399 (95.2)
CRP						
Higher CRP levels	25 (8.6)	12(11.8)	28 (8.8)	7(7.9)	53 (8.7)	19(9.9)
Normal CRP levels	267(91.4)	90(88.2)	289 (91.2)	82(92.1)	556 (91.3)	172(90.1)

Total also includes the results of an intersex child.

Annexure Table A.5. Stunting, underweight, and wasting in study areas

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Stunting	179 (40.9)	190 (46.5)	101 (35.6)	94 (37.9)	280 (38.8)	284 (43.2)
Underweight	116 (26.4)	107 (26.2)	57 (19.9)	41 (16.5)	173 (23.8)	148 (22.5)
Wasting	62 (14.2)	44 (10.8)	43 (15.2)	19 (7.7)	105 (14.6)	63 (9.6)

***Annexure* Table A.6. *Stunting, underweight, and wasting* among boys and girls**

Items	Male n (%)		Female n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Stunting	141 (40.6)	144 (43.9)	139 (37.1)	141 (42.5)	280 (38.8)	284 (43.2)
Underweight	95 (27.1)	81 (24.7)	78 (20.7)	68 (20.5)	173 (23.8)	148 (22.5)
Wasting	51 (14.7)	35 (10.7)	54 (14.4)	28 (8.4)	105 (14.6)	63 (9.6)

AnnexureTable A.7. Immunization among children aged 18-24 months

Immunization card	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline (n=441)	Endline (n=412)	Baseline (n=287)	Endline (n=249)	Baseline (n=728)	Endline (n=661)
Available	421 (95.5)	348 (84.5)	266 (92.7)	214 (85.9)	687(94.4)	562 (85.0)
Not available	20 (4.5)	64 (15.5)	21 (7.3)	35 (14.1)	41 (5.6)	99 (15.0)

Immunisation						
BCG	427 (96.8)	383 (93.0)	271 (94.4)	230 (92.4)	698 (95.9)	613 (92.7)
OPV	405 (91.8)	377 (91.5)	247 (86.1)	222 (89.2)	652 (89.6)	599 (90.6)
Hepatitis B (Zero Dose)	320 (72.6)	298 (72.3)	191 (66.6)	166 (66.7)	511 (70.2)	464 (70.2)
Pentavalent	415 (94.1)	373 (90.5)	264 (92.0)	220 (88.4)	679 (93.3)	593 (89.7)
Measles	420 (95.2)	356 (86.4)	265 (92.3)	220 (88.4)	685 (94.1)	576 (87.1)
IPV	42 (9.5)	325 (78.9)	35 (12.2)	187 (75.1)	77(10.6)	512 (77.5)
DPT First Booster	307 (69.6)	233 (56.6)	199 (69.3)	172 (69.1)	506 (69.5)	405 (61.3)
Vitamin A	396 (89.8)	336 (81.6)	251 (87.5)	194 (77.9)	647 (88.9)	530 (80.2)

Annexure Table A.8. Reproductive history of mothers (with reference to the index children)

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Type of delivery						
Normal	332	257 (67.3)	203 (70.7)	152 (65.0)	535 (73.5)	409 (66.4)
Caesarian	103	110 (28.8)	81 (28.2)	77 (32.9)	184 (25.3)	187 (30.4)
Assisted	6 (1.4)	15 (3.9)	3 (1.0)	5 (2.1)	9 (1.2)	20 (3.2)
Presence of Complications during pregnancy	28 (6.3)	45 (11.8)	20 (7.0)	50 (21.6)	48 (6.6)	95 (15.5)
Presence of Complications during delivery	48 (10.9)	62 (16.3)	35 (12.2)	36 (15.7)	83 (11.4)	98 (16.0)

Annexure Table A.9. Knowledge of breastfeeding and complementary feeding

Items	Intervention area		Control Area		Total	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Time of initiation of breastfeeding after delivery						
Less than an hour	333 (75.5)	331 (80.3)	232 (80.8)	203 (81 .5)	565 (77.6)	534 (80.8)
1-24 hours	39 (8.8)	34 (8.3)	25 (8.7)	17 (6.8)	64 (8.8)	51 (7.7)
>24 hours	4 (0.9	2 (0.5)	5 (1.7)	0 (0)	9 (1.2)	2 (0.3)
Don't know	65 (14.7)	45 (10.9)	25 (8.7)	29 (11.7)	90 (12.4)	74 (11.2)
Duration of receiving only breast milk						
1-2 Months	6 (1.4)	1 (0.2)	3 (1.0)	2 (0.8)	9 (1.2)	3 (0.5)
3-4 Months	13 (2.9)	6 (1.5)	13 (4.5)	10 (4.0)	26 (3.6)	16 (2.4)
5 Months	8 (1.8)	1 (0.2)	2 (0.7)	6 (2.4)	10 (1.4)	7 (1.1)
6 Months	361 (81.9)	380 (92.2)	248 (86.4)	206 (82.7)	609 (83.7)	586 (88.7)
7-9 Months	15 (3.4)	24 (5.8)	7 (2.8)	25 (10.0)	22 (3.2)	49 (7.4)

12 Months	0 (0)	NA	1 (0.3)	NA	1 (0.1)	NA
24 Months	1 (0.2)	NA	0 (0)	NA	1 (0.1)	NA
Don't know	37 (8.4)	NA	13 (4.5)	NA	50 (6.9)	NA
Heard any message about exclusive breastfeeding						
Yes	359 (81.4)	332 (81.8)	239 (83.3)	204 (82.3)	598 (82.1)	536 (82.0)
No	42 (9.5)	54 (13.3)	24 (8.4)	31 (12.5)	66 (9.1)	85 (13.0)
Don't remember	40 (9.1)	20 (4.9)	24 (8.4)	13 (5.2)	64 (8.8)	33 (5.0)
How long after the birth a baby should start to receive semisolid and solid foods						
1-2 Months	5 (1.1)	1 (0.2)	0 (0)	1 (0.4)	5 (0.6)	2 (0.3)
3-4 Months	16 (3.6)	4 (1.0)	14 (4.8)	9 (3.6)	30 (4.1)	13 (2.0)
5 Months	4 (0.9)	2 (0.5)	4 (1.4)	5 (2.0)	8 (1.1)	7 (1.1)
6 Months	309 (70.1)	242 (58.7)	196 (68.3)	80 (32.1)	505 (69.4)	322 (48.7)
7 Months	70 (15.9)	139 (33.7)	55 (19.2)	133 (53.4)	125 (17.2)	272 (41.2)
8-12 Months	2 (0.5%)	24 (5.8)	4 (1.3)	21 (8.4)	6 (0.7)	45 (6.8)
Don't Know	35 (7.9)	NA	14 (4.9)	NA	49 (6.7)	NA
Heard any message about introducing complementary feeding						
Yes	375 (85)	333 (82.0)	239 (83.3)	213 (85.5)	614 (84.3)	546 (83.4)
No	45 (10.2)	55 (13.5)	33 (11.5)	28 (11.2)	78 (10.7)	83 (12.7)
Don't remember	21 (4.8)	18 (4.4)	15 (5.2)	8 (3.2)	36 (4.9)	26 (4.0)
Source of information about exclusive breastfeeding and complementary feeding						
Doctor	218 (56.2)	134 (32.5)	156 (60.2)	116 (46.6)	374 (57.8)	250 (37.8)
Nurse/ANM	54 (13.9)	107 (26.0)	35 (13.5)	61 (24.5)	89 (13.8)	168 (25.4)
AWW	71 (18.3)	272 (66.0)	45 (17.4)	114 (45.8)	116 (17.9)	386 (58.4)
ASHA	6 (1.5)	62 (15.1)	1 (.4)	40 (16.1)	7 (1.1)	102 (15.4)
Family member/friend	24 (6.2)	104 (25.2)	14 (5.4)	93 (37.4)	38 (5.9)	197 (29.8)
TV/Radio/Newspaper	5 (1.3)	26 (6.3)	5 (1.9)	37 (14.9)	10 (1.5)	63 (9.5)
Others *(From books, College, Vaccine card)*	10 (2.6)	14 (3.4)	3 (1.2)	7 (2.8)	13 (2.0)	21 (3.2)
Place of information about exclusive breastfeeding and complementary feeding						
Health facility	279 (71.9)	226 (54.9)	191 (73.7)	152 (61.0)	470 (72.6)	378 (57.2)
Community event	9 (2.3)	37 (9.0)	6 (2.3)	25 (10.0)	15 (2.3)	62 (9.4)

AWC	64 (16.5)	254 (61.7)	43 (16.6)	125 (50.2)	107 (16.5)	379 (57.3)
Others *(From books, mothers, family members, College, Vaccine card)*	36 (9.3)	31 (7.5)	19 (7.3)	48 (19.3)	55 (8.6)	79 (12.0)

Annexure Table A.10. Knowledge about anaemia and vitamin A deficiency

Background Characteristics	Intervention area		Control Area		Total	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Heard about anaemia						
Yes	299 (67.8)	287 (69.7)	215 (74.9)	196 (78.7)	514 (70.6)	483 (73.1)
No	70 (15.9)	86 (20.9)	42 (14.6)	40 (16.1)	112 (15.4)	126 (19.1)
Don't know	72 (16.3)	39 (9.5)	30 (10.5)	13 (5.2)	102 (14)	52 (7.9)
Seriousness of anemia						
Not serious	22 (7.6)	14 (4.8)	12 (5.6)	11 (5.5)	34 (6.8)	25 (5.1)
Not sure	83 (28.6)	123 (42.0)	68 (31.9)	65 (32.5)	151 (30.0)	188 (38.1)
Serious	185 (63.8)	156 (53.2)	133 (62.4)	124 (62.0)	318 (63.2)	280 (56.8)
Causes of anaemia (*Multiple responses permitted)*						
Eat little	169 (56.9)	181 (61.6)	117 (55.2)	124 (62.3)	286	305
Lack of iron in the diet	66 (22.2)	145 (49.3)	60 (28.3)	102 (51.3)	126	247
Sickness/infection	NA	19 (6.5)	NA	7 (3.5)	NA	26
Don't know	81 (27.3)	54 (18.4)	50 (23.6)	29 (14.6)	131	83
Others	34 (11.4)	10 (3.4)	18 (8.5)	15 (7.5)	52	25
Common complaints in patients with anaemia (*Multiple responses permitted)*						
Less energy/weakness/easy tiredness	152 (50.8)	206 (69.8)	112 (52.1)	128 (64.0)	264	334
Paleness/pallor	128 (42.8)	152 (51.6)	92 (42.8)	106 (53.0)	220	258
Spoon nails/bent nails	8 (2.7)	12 (4.1)	12 (5.6)	7 (3.5)	20	19
Frequent illness	18 (6.0)	37 (12.5)	24 (11.2)	16 (8.0)	42	53
Shortness of breath	1 (.3)	7 (2.4)	1 (.5)	3 (1.5)	2	10
Palpitations	NA	1 (0.3)	NA	2 (1.0)	NA	3
Pounding headache	1 (.3)	0	0 (.0)	2 (1.0)	1	2
Don't know	76 (25.4)	56 (19.0)	47 (21.9)	44 (22.0)	123	100
Others	34 (11.4)	12 (4.1)	19 (8.8)	9 (4.5)	53	21

Health risks due to lack of iron in diet among infants and young children (*Multiple responses permitted)*						
Delay of mental development	24 (8.1)	87 (29.6)	17 (7.9)	44 (22.2)	41	131
Delay of physical development	98 (32.9)	138 (46.9)	88 (40.9)	87 (43.9)	186	225
Frequent illness	51 (17.1)	68 (23.1)	35 (16.3)	53 (26.8)	86	121
Others	13 (4.4)	7 (2.4)	11 (5.1)	9 (4.5)	24	16
Don't know	148 (49.7)	109 (37.1)	88 (40.9)	77 (38.9)	236	186
Prevention of anaemia (*Multiple responses permitted)*						
Eat iron-rich foods/Having a diet rich in iron	177 (59.4)	179 (60.7)	122 (56.7)	145 (72.5)	299	324
Eat vitamin-C-rich foods during or right after meals	76 (25.5)	116 (39.3)	52 (24.2)	68 (34.0)	128	184
Take iron supplements if prescribed	30 (10.1)	60 (20.3)	20 (9.3)	41 (20.5)	50	101
Treat other causes of anaemia (diseases and infections) – seek health-care	10 (3.4)	17 (5.8)	7 (3.3)	8 (4.0)	17	25
Continue breast feeding (for infants 6-23 months old) consuming nutrimix received from the AWC	11 (3.7)	11 (3.7)	11 (5.1)	13 (6.5)	22	24
Others	23 (7.7)	7 (2.4)	20 (9.3)	2 (1.0)	43	9
Don't know	84 (28.2)	68 (23.1)	59 (27.4)	38 (19.0)	143	106
Heard about Vitamin A deficiency						
Yes	261 (59.2)	234 (56.9)	176 (61.3)	167 (67.9)	437(60.0)	401 (61.0)
No	180 (40.8)	177 (43.1)	111 (38.7)	79 (32.1)	291(40.0)	256 (39.0)
The seriousness of vitamin A deficiency						
Serious	142 (55.7)	110 (58.8)	103 (59.2)	55 (22.1)	245 (57.1)	165 (25.0)
Not serious	13 (5.1)	1 (0.24)	12 (6.9)	0	25 (5.8)	1 (0.2)
Not sure	100 (39.2)	76 (18.5)	59 (33.9)	48 (19.3)	159 (37.1)	124 (18.8)
Symptoms of Vitamin A deficiency (*Multiple responses permitted)*						
Eye problems-night blindness	99 (37.9)	124 (51.2)	66 (37.5)	80 (47.9)	165	204
Weakness/feels less energetic	42 (16.1)	47 (19.4)	36 (20.5)	26 (15.6)	78	73
Be more likely to become sick	28 (10.7)	57 (23.6)	22 (12.5)	21 (12.6)	50	78
Other	11 (4.2)	5 (2.1)	6 (3.4)	10 (6.0)	17	15
Don't know	118 (45.2)	73 (30.2)	67 (38.1)	59 (35.3)	185	132
Causes of lack of Vitamin A in the body (*Multiple responses permitted)*						

Poor variety of food	99 (38.4)	98 (40.7)	79 (45.4)	67 (39.9)	178	165
Eat too little food	64 (24.8)	130 (53.9)	49 (28.2)	70 (41.7)	113	200
Other	2 (0.8)	2 (0.8)	3 (1.7)	4 (2.4)	5	6
Don't know	118 (45.7)	75 (31.1)	68 (39.1)	56 (33.3)	186	131
Prevention of lack of vitamin A (*Multiple responses permitted)*						
Eat/feed Vitamin A rich food	107 (42.5)	115 (47.5)	81 (47.1)	89 (53.0)	188	204
Eat/feed food fortified with Vit A	44 (17.5)	92 (38.0)	43 (25.0)	65 (38.7)	87	157
Give Vit A supplements or sprinkles	17 (6.7)	44 (18.2)	15 (8.7)	40 (23.8)	32	84
Other	6 (2.4)	2 (0.8)	1 (0.6)	2 (1.2)	7	4
Don't know	108 (42.9)	80 (33.1)	59 (34.3)	39 (23.2)	167	119

Annexure Table A.11. Knowledge about undernutrition

Background Characteristics	Intervention area		Control Area		Total	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
What are the signs of undernutrition? (Multiple responses permitted)						
Lack of energy/weakness: cannot work, study or play as normal (disability)	182 (41.6)	175 (43.0)	147 (51.2)	108 (44.4)	329	283
Weakness of immune system	69 (15.8)	117 (28.7)	47 (16.4)	85 (35.0)	116	202
Loss of weight/thinness	140 (32.0)	215 (52.8)	112 (39.0)	117 (48.1)	252	332
Children do not grow as they should (growth faltering)	45 (10.3)	45 (11.1)	35 (12.2)	48 (19.8)	80	93
Don't know	173 (39.6)	112 (27.5)	85 (29.6)	54 (22.2)	258	166
Other signs	7 (1.6)	4 (1.0)	9 (3.1)	9 (3.7)	16	13
What are the reasons why people are undernourished? (Multiple responses permitted)						
Not getting enough food	157 (35.9)	199 (48.8)	132 (46.0)	142 (58.0)	289	341
Disease/ill	49 (11.2)	72 (17.6)	36 (12.5)	47 (19.2)	85	119
Inappropriate feeding practices	84 (19.2)	101 (24.8)	66 (23.0)	51 (20.8)	150	152
Lack of knowledge	32 (7.3)	46 (11.3)	37 (12.9)	31 (12.7)	69	77
Other	9 (2.1)	5 (1.2)	4 (1.4)	6 (2.4)	13	11

Don't know	187 (42.8)	133 (32.6)	88 (30.7)	61 (24.9)	275	194
Reasons for not getting enough food (Multiple responses permitted)						
Not having enough money to buy food	103 (23.7)	153 (38.2)	87 (31.1)	118 (48.0)	190	271
Food is not available	100 (23.0)	89 (22.2)	84 (30.0)	53 (21.5)	184	142
Other	25 (5.7)	15 (3.7)	15 (5.4)	10 (4.1)	39	25
Don't know	225 (51.7)	194 (48.4)	110 (39.3)	93 (37.8)	335	287
Who is the main source of nutrition related information?						
Doctor	145 (33.4)	33 (8.0)	115 (40.1)	35 (14.1)	260 (36.1)	68 (10.3)
Nurse/ANM	40 (9.2)	59 (14.4)	29 (10.1)	29 (11.6)	69 (9.6)	88 (13.3)
AWW	173 (39.9)	205 (49.9)	89 (31.0)	97 (39.0)	262 (36.3)	302 (45.8)
ASHA	0 (0)	0 (0)	2 (0.7)	1 (0.4)	2 (0.3)	1 (0.2)
Family member/Friend	20 (4.6)	19 (4.6)	11 (3.8)	22 (8.8)	31 (4.3)	41 (6.2)
TV/Radio/Newspaper	24 (5.5)	6 (1.5)	30 (10.5)	16 (6.4)	54 (7.5)	22 (3.3)
Don't know	NA	80 (19.5)	NA	36 (14.5)	NA	116 (17.6)
Others	32 (10.4)	9 (2.2)	11 (3.8)	13 (5.2)	43 (6.0)	22 (3.3)
From where was the nutrition related information received?						
Health Facility	213 (49.1)	44 (10.8)	150 (52.8)	55 (22.1)	363 (50.6)	99 (15.0)
Community event	12 (2.8)	34 (8.3)	21 (7.4)	9 (3.6)	33 (4.6)	43 (6.5)
AW Centre	151 (34.8)	241 (58.9)	87 (30.6)	117 (47.0)	238 (33.1)	358 (54.4)
Don't know	NA	75 (18.3)	NA	36 (14.5)	NA	111 (16.9)
Others	58 (13.4)	15 (3.7)	26 (9.2)	32 (12.9)	84 (11.7)	47 (7.1)

Annexure Table A.12. Awareness among caregivers for safe preparation of complementary food, responsive feeding, feeding during illness, and recovery from illness phase

Items	Intervention Area N (%)	Control Area N (%)	Total N (%)
Heard about the safe preparation of complementary foods			
Yes	353 (85.7)	219 (88.0)	572 (86.5)
What has been heard about the safe preparation of complementary food			
Keep hands clean	232 (78.4)	203 (81.5)	526 (79.6)
Separate raw and cooked food	141 (34.2)	46 (18.5)	187 (28.3)
Food should be thoroughly cooked	123 (29.9)	72 (28.9)	195 (29.5
Keep food at safe temperatures	85 (20.6)	54 (21.7)	139 (21.0)
Use safe water and raw materials	138 (33.5)	89 (35.7)	227 (34.3)
Heard about the responsive feeding approach			

Yes	303 (73.5)	166 (66.7)	469 (70.9)
What has been heard about the responsive feeding approach			
Feed slowly and patiently	219 (53.2)	121 (48.6)	340 (51.4)
Encourage the child to eat, but do not force them	224 (54.4)	119 (47.8)	343 (51.9)
Feeding times are periods of learning and love	137 (33.3)	61 (24.5)	198 (29.9)
If the child refuses certain foods, give different food combinations, tastes, and textures	41 (9.9)	19 (7.6)	60 (9.1)
Minimum distractions during meals if the child loses interest easily	32 (7.8)	10 (4.0)	42 (6.4)
A young child should be encouraged to take feed by praising them and their food	30 (7.3)	13 (5.2)	43 (6.5)
Self-feeding should be encouraged, despite spillage	47 (11.4)	30 (12.1)	77 (11.7)
Each child should be fed under supervision in a separate plate to develop an individual identity	20 (4.9)	15 (6.0)	35 (5.3)
Talk to children during feeding, with eye-to-eye contact	15 (3.6)	2 (0.8)	17 (2.6)
Others	3 (0.7)	2 (0.8)	5 (0.8)
Ever been informed about the role of amrutham during illness			
Yes	148 (35.9)	51 (20.5)	199 (30.1)
Ever been informed about the feeding practices during illness			
Yes	133 (32.3)	54 (21.7)	187 (28.3)
What were you informed about the feeding practices during illness			
Breastfeed more frequently and longer at each feed	85 (20.6)	26 (10.4)	111 (16.8)
Increase fluid intake and offer food	77 (18.7)	34 (15.7)	111 (16.8)
If a breastfeeding infant is too weak to suckle, the mother can express her milk and feed it from a spoon or cup	16 (3.9)	1 (0.4)	17 (2.6)
Give nutrient-dense foods that are soft, varied, and the child's favorite foods	17 (4.1)	3 (1.2)	20 (3.0)
Give mashed or soft foods if the child has trouble swallowing	33 (8.0)	18 (7.2)	51 (7.7)
Do not dilute food or milk	13 (3.2)	4 (1.6)	17 (2.6)
Feed the child slowly and patiently encourage the child to eat but do not force	16 (3.9)	12 (4.8)	28 (4.2)
Give frequent, small feeds	50 (12.1)	14 (5.6)	64 (9.7)
Others	8 (1.9)	2 (0.8)	10 (1.5)
Have you been informed about the feeding practices during recovery from illness			
Yes	235 (57.0)	158 (63.5)	393 (59.5)
What were you informed about the feeding practices during recovery from illness?			
Increase the amount of food after illness until the child regains weight and is growing well	118 (28.6)	55 (22.1)	173 (26.2)
Continue to feed frequently	174 (42.2)	125 (50.2)	299 (45.2)
Be responsive to the recovering child's increased hunger	69 (17.8)	39 (15.7)	108 (16.3)
Increased attention to feeding should continue for 2 or more weeks following an illness	38 (9.2)	23 (9.2)	61 (9.2)
Older infants and young children continue to need high-quality food such as meat, fish, liver, eggs, milk, and oil	11 (2.7)	12 (4.8)	23 (3.5)
Source of Information - Safe Preparation of complementary food, responsive feeding, feeding during illness, and recovery from illness phase			
Doctor	34 (8.4)	39 (16.1)	73 (11.3)
Nurse	44 (10.9)	27 (11.2)	71 (11.0)
AWW	207 (51.1)	65 (26.9)	272 (42.0)
ASHA	2 (0.5)	2 (0.8)	2 (0.6)

Family Member	37 (9.1)	56 (23.1)	93 (14.4)
Don't remember	76 (18.8)	50 (20.7)	126 (19.5)
Others	5 (1.2)	3 (1.2)	8 (1.2)

Annexure Table A.13. The practice of breastfeeding and complementary feeding

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Ever breastfed						
Yes	441 (100.0)	379 (99.7)	287 (100.0)	225 (99.1)	728 (100.0)	604 (99.5)
No	0 (0)	1 (0.3)	0 (0)	2 (0.9)	0 (0)	3 (0.5)
Time of initiation of breastfeeding						
Within an hour	298 (67.6)	288 (76.2)	199 (69.3)	174 (77.3)	497 (68.3)	462 (76.6)
From 1 hour to 24 hours	118 (26.8)	73 (19.3)	69 (24.0)	40 (17.8)	187 (25.7)	113 (18.7)
More than 24 hours	8 (1.8)	8 (2.1)	11 (3.8)	5 (2.2)	19 (2.6)	13 (2.2)
Don't remember	17 (3.9)	9 (2.4)	8 (2.8)	6 (2.7)	25 (3.4)	15 (2.5)
Whether still Breastfeeding						
Yes	392 (88.9)	330 (87.3)	255 (88.9)	191 (84.9)	647 (88.9)	521 (86.4)
No	49 (11.1)	48 (12.7)	32 (11.1)	34 (15.1)	81 (11.1)	82 (13.6)
For how many months have you breastfed the child						
1-6 Months	13 (2.9)	16 (3.7)	10 (3.5)	11 (4.9)	23 (3.2)	25 (4.1)
7-12 Months	13 (2.9)	75 (19.8)	9 (3.1)	35 (15.6)	22 (3.0)	110 (18.2)
13-18 Months	65 (14.7)	47 (13.3)	41 (14.3)	30 (13.3)	106 (14.6)	77 (12.8)
19-24 Months	347 (78.7)	242 (64.0)	227 (79.1)	149 (66.2)	574 (78.8)	391 (64.8)
Don't know	3 (0.7)		0 (0)		3 (0.4)	
Whether bottle-fed the previous day						
Yes	239 (54.2)	89 (23.5)	174 (60.6)	74 (32.6)	413 (56.7)	163 (24.7)
No	202 (45.8)	288 (76.0)	113 (39.4)	153 (67.4)	315 (43.3)	441 (66.7)
Don't know	0 (0)	2 (0.5)	0 (0)	0 (0)	0 (0)	2 (0.3)
Mean duration of exclusive breast feeding of index child	5 Months & 23 days	5 Months & 24 days	5 Months & 23 days	5 Months &17 days		
Mean number of times of solid /semi-solid / soft foods feeding during previous day	3.4 times	3.6 times	3.24 times	3.2 times		

Annexure Table A.14. ***Liquids or foods that index child had yesterday during the day or at night****

Items		Intervention area n (%)		Control area n (%)		Total n (%)	
		Baseline	Endline	Baseline	Endline	Baseline	Endline
Plain water	Yes	438 (99.3)	364 (96.3)	284(99.0)	226 (100)	722(99.2)	590 (97.7)
Juice or juice drinks	Yes	6 (1.4)	39 (10.3)	9 (3.2)	8 (3.5)	15 (2.1)	47 (7.8)
Clear broth	Yes	2 (0.5)	21 (5.6)	0 (0)	44 (19.7)	2 (0.3)	65 (10.8)
Milk such as tinned, powdered, or fresh animal milk	Yes	52 (11.8)	75 (19.8)	43 (15.1)	44 (19.5)	95 (13.1)	119 (19.7)
Infant formula	Yes	7 (1.6)	58 (15.3)	8 (2.8)	18 (8.0)	15 (2.1)	76 (12.6)
Any other liquids?	Yes	90 (20.5)	150 (39.7)	67 (23.7)	90 (39.8)	157 (21.7)	240 (39.7)
Yogurt	Yes	42 (9.8)	57 (15.1)	31 (11.1)	27 (11.9)	73 (10.3)	84 (13.9)

Fortified baby food other than nutrimix, available commercially e.g. Cereal, Forex, etc.	Yes	21 (4.8)	25 (6.6)	15 (5.3)	8 (3.5)	36 (5.0)	33 (5.5)
Bread, roti, chapati, rice, noodles, biscuits, idle, or any other foods made from grains?	Yes	408 (92.5)	348 (92.1)	257 (90.2)	206 (91.2)	665 (91.6)	554 (91.7)
Any pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside?	Yes	121 (27.6)	114 (30.2)	59 (20.8)	61 (27.0)	180 (24.9)	175 (29.0)
Any white potatoes, white yam, manioc, cassava, tapioca, or any other foods made from roots?	Yes	104 (24.8)	113 (29.9)	83 (29.2)	86 (38.1)	187 (26.6)	199 (32.9)
Any dark green, leafy vegetables?	Yes	179 (40.7)	168 (44.4)	94 (33.1)	62 (27.4)	273 (37.7)	230 (38.1)
Any ripe mangoes, papayas, cantaloupe, or jackfruit?	Yes	44 (10.1)	59 (15.6)	39 (13.7)	57 (25.2)	83 (11.5)	116 (19.2)
Any other fruits or vegetables?	Yes	218 (49.8)	250 (66.1)	149 (52.8)	145 (64.2)	367 (51.0)	395 (65.4)
Any liver, kidney, heart, or other organ meat?	Yes	20 (4.6)	31 (8.2)	20 (7.1)	9 (4.0)	40 (5.6)	40 (6.6)
Any other meat	Yes	100 (22.8)	100 (26.5)	54 (19.4)	62 (27.4)	154 (21.4)	162 (26.8)
Any eggs	Yes	100 (22.8)	129 (34.1)	74 (27.0)	79 (35.0)	174 (24.5)	208 (34.4)
Any fresh or dried fish or shellfish?	Yes	248 (56.8)	190 (50.3)	178 (62.7)	132 (58.4)	426 (59.1)	322 (53.3)
Any foods made from beans, peas, lentils, or nuts?	Yes	233 (53.2)	212 (56.1)	147 (51.4)	119 (52.7)	380 (52.5)	331 (54.8)
Any cheese or other food made from milk?	Yes	78 (18.3)	81 (21.4)	55 (19.5)	57 (25.2)	133 (18.8)	138 (22.8)
Any other solid, semi-solid, or soft food?	Yes	162 (37.3)	262 (69.3)	104 (36.6)	105 (46.5)	266 (37.0)	367 (60.8)
Breast Milk	Yes	NA	331 (87.6)	NA	185 (81.9)	NA	516 (78.1)
Take home ration (Amrutham)	Yes	NA	271 (71.7)	NA	128 (56.6)	NA	399 (66.1)

** Total 604 caregivers responded (378 from the intervention area and 226 from the control area). Percentages of no, don't know and missing cases have not been shown in the table.*

Annexure Table A.15. IFA and de-worming

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Whether the index child had undergone deworming						
Deworming done	359 (81.4)	268 (65.1)	241 (84)	177 (71.1)	600 (82.4)	445 (67.3)
Deworming not done	82 (18.6)	142 (34.5)	46 (16.0)	71 (28.5)	128 (17.6)	213 (32.2)

Do not know	0 (0)	2 (0.5)	0 (0)	1 (0.4)	0 (0)	3 (.5)
Last deworming						
Within last 6 months	339 (94.4)	213 (79.5)	224 (92.9)	134 (75.7)	563 (93.8)	347 (78.0)
Within 6 months to 1 year	18 (5.0)	52 (19.4)	16 (6.6)	43 (24.3)	34 (5.7)	95 (21.3)
More than 1 year	2 (0.6)	3 (1.1)	1 (0.4)	0 (0)	3 (0.5)	3 (0.7)
Whether IFA was provided						
Provided	6 (1.4)	45 (10.9)	3 (1.0)	18 (7.2)	9 (1.2)	63 (9.5)
Not provided	435 (98.6)	335 (81.3)	284 (99.0)	222 (89.2)	719 (98.8)	557 (84.3)
Do not know	0 (0)	32 (7.8)	0 (0)	9 (3.6)	0 (0)	41 (6.2)
Since the birth number of days, the index child has been given Iron and Folic acid						
30 Days	5 (83.3)	30 (93.8)	2 (66.7)	7 (46.7)	7 (77.8)	37 (78.7)
50 Days	1 (16.7)	0 (0)	0 (0.0)	3 (20)	1 (11.1)	3 (6.4)
120 days	0 (0.0)	2 (6.2)	1 (33.3)	5 (33.3)	1 (11.1)	7 (14.9)

Annexure Table A.16. Utilization of anganwadi services during pregnancy

Services		Intervention area n (%)		Control area n (%)	
		Baseline	Endline	Baseline	Endline
Supplementary food	Regular	227 (51.5)	386 (95.5)	147 (51.2)	226 (92.6)
	Irregular	12 (2.7)	3 (0.7)	7 (2.4)	6 (2.5)
	Not received	202 (45.8)	15 (3.7)	133 (46.3)	12 (4.9)
IFA Supplements	Regular	134 (30.4)	77 (19.1)	64 (22.3)	38 (15.6)
	Irregular	18 (4.1)	43 (10.6)	17 (5.9)	27 (11.1)
	Not received	289 (65.5)	284 (70.3)	206 (71.8)	179 (73.4)
Vitamin A Supplements	Regular	29(6.7)	71 (17.6)	21 (7.3)	27 (11.1)
	Irregular	7 (1.6)	33 (8.2)	14 (4.9)	21 (8.6)
	Not received	397 (91.7)	300 (74.3)	251 (87.8)	196 (80.3)
TT Injection	Regular	149 (33.8)	109 (27.0)	91 (31.9)	43 (17.6)
	Irregular	10 (2.3)	40 (9.9)	13 (4.6)	24 (9.8)
	Not received	282 (63.9)	255 (63.1)	181 (63.5)	177 (72.5)
Deworming	Regular	24 (5.5)	23 (5.7)	17 (6)	8 (3.3)
	Irregular	8 (1.8)	60 (14.9)	14 (4.9)	29 (11.9)
	Not received	407 (92.7)	320 (79.4)	254 (89.1	207 (84.8)
Health Check-Ups	Regular	157 (35.6)	137 (34.0)	81 (28.4)	92 (37.7)
	Irregular	14 (3.2)	28 (6.9)	17 (6.0)	11 (4.5)
	Not received	270 (61.2)	238 (59.1)	187 (65.6)	141 (57.8)

Annexure Table A.17. Utilization of Anganwadi Services - During the Breastfeeding phase

Items		Intervention area n (%)		Control area n (%)	
		Baseline	Endline	Baseline	Endline
Supplementary food	Regular	262 (59.5)	382 (94.8)	175 (61.2)	218 (89.3)
	Irregular	5 (1.1)	2 (0.5)	4 (1.4)	5 (2.0)
	Not received	173 (39.3)	19 (4.7)	107 (37.4)	21 (8.6)
IFA Supplements	Regular	45 (10.2)	37 (9.2)	20 (7)	5 (2.1)

	Irregular	6 (1.49)	51 (12.7)	16 (5.6)	28 (11.5)
	Not received	390 (88.4)	315 (78.2)	249 (87.4)	210 (86.4)
Vitamin A Supplements	Regular	5 (1.1)	66 (16.4)	6 (2.1)	17 (7.0)
	Irregular	3 (0.7)	43 (10.7)	12 (4.2)	24 (9.9)
	Not received	432 (98.2)	293 (72.9)	266 (93.7)	202 (83.1)
Immunization	Regular	142 (32.3)	127 (31.5)	92 (32.1)	58 (23.9)
	Irregular	9 (2)	47 (11.7)	13 (4.5)	29 (11.9)
	Not received	289 (65.7)	229 (56.8)	182 (63.4)	159 (64.2)
Deworming	Regular	58 (13.2)	102 (25.4)	30 (10.5)	54 (22.2)
	Irregular	16 (3.6)	56 (13.9)	13 (4.5)	22 (9.1)
	Not received	366 (83.2)	244 (60.7)	243 (85)	167 (68.7)
Health Check-Ups	Regular	124 (28.5)	147 (36.7)	90 (31.6)	92 (37.9)
	Irregular	9 (2.1)	52 (13.0)	11 (3.9)	19 (7.8)
	Not received	302 (69.4)	202 (50.4)	184 (64.6)	132 (54.3)
Weight Measurement	Regular	350 (79.5)	309 (76.7)	223 (77.7)	190 (78.2)
	Irregular	17 (3.9)	37 (9.2)	15 (5.2)	22 (9.1)
	Not received	73 (16.6)	57 (14.1)	49 (17.1)	31 (12.8)
Height Measurement	Regular	120 (27.7)	208 (51.9)	88 (31)	134 (55.4)
	Irregular	9 (2.1)	58 (14.5)	11 (3.9)	17 (7.0)
	Not received	304 (70.2)	135 (33.7)	185 (65.1)	91 (37.6)

Annexure Table A.18. Receiving nutrimix from anganwadi centers

	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Those receiving nutrimix						
Yes	441 (100)	411 (99.8)	286 (99.7)	248 (99.6)	727 (99.9)	659 (99.7)
No	0 (0)	1 (0.2)	0 (0)	1 (0.4)	0 (0)	3 (0.3)
Type of supplement received						
Dry powder	440 (99.8)	400 (97.6)	283 (99.0)	246 (99.2)	723 (99.4)	646 (98.2)
Cooked	1 (0.2)	9 (2.2)	3 (1.0)	1 (0.4)	4 (0.6)	10 (1.5)
Others		1 (0.2)		1 (0.4)		2 (0.3)
Mean number of packets received (SD) per month	6.0 (0.60)	6.16 (0.42)	5.89 (0.65)	6.0 (0.55)	5.96 (0.62)	6.1 (0.47)
Mean Frequency of receiving nutrimix in a month						
Monthly	436 (98.9)	399 (97.1)	280 (97.9)	244 (98.4)	716 (98.5)	643 (97.3)
Once in every two weeks	5 (1.1)	9 (2.2)	5 (1.7)	4 (1.6)	10 (1.4)	13 (2.0)
Weekly	0 (0.0)	3 (0.7)	1 (0.3)	0	1 (0.1)	3 (0.5)
Who collects nutrimix from AWC						
Mother	359 (81.4)	331 (80.5)	227 (79.4)	177 (71.4)	586 (80.6)	508 (77.1)

Grandparents	47 (10.7)	40 (9.7)	28 (9.8)	33 (13.3)	75 (10.3)	73 (11.0)
Father	20 (4.5)	30 (7.3)	21 (7.3)	28 (11.3)	41 (5.6)	58 (8.8)
Aunt	3 (0.7)	3 (0.7)	6 (2.1)	3 (1.2)	9 (1.2)	6 (0.9)
Others	12 (2.7)	7 (1.7)	4 (1.4)	7 (2.8)	16 (2.2)	14 (2.1)
THR availability for distribution at AWC						
Always available	421 (95.5)	398 (96.8)	257 (89.9)	232 (93.9)	678 (93.3)	630 (95.7)
Not always available	20 (4.5)	13 (3.2)	29 (10.1)	15 (6.1)	49 (6.7)	28 (4.3)

Annexure Table A.19. *Cooking and Eating Practices of nutrimix*

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Form in which nutrimix is most often consumed*(Multiple Response)*						
Mixed with warm milk	186(42.2)	183 (44.6)	151 (52.6)	123 (50.2)	337 (46.3)	306 (46.7)
Mixed with normal milk	3 (7)	11 (2.7)	1(.3)	13 (5.3)	4(0.5)	24 (3.7)
Mixed with warm water	247 (56.0)	201 (49.0)	122 (42.5)	83 (33.9)	369 (50.7)	284 (43.4)
Mixed with normal water	14 (3.2)	38 (9.3)	4(1.4)	21 (8.6)	18 (2.5)	59 (9.0)
Consumed as dry powder	21 (4.8)	34 (8.3)	26 (9.1)	12 (4.9)	47 (6.5)	46 (7.0)
Roasted and added to milk/water	37 (8.4)	46 (11.2)	41 (14.3)	27 (11.0)	78 (10.7)	73 (11.1)
Other	85 (19.37)	128 (31.2)	54(18.81)	93 (37.4)	139 (19.1)	221 (33.7)
Whether nutrimix is heated before consumption						
Yes	393(89.7)	402 (97.6)	248(87.0)	225 (90.4)	641(88.7)	627 (94.9)
Any Additional Ingredients added to nutrimix *(Multiple Response)*						
Nothing	105 (23.8)	84 (20.6)	44 (15.3)	26 (10.6)	149 (20.5)	110 (16.8)
Jaggery/sugar	269 (61.0)	242 (59.3)	183 (63.8)	168 (68.6)	452 (62.1)	410 (62.9)
Salt	100 (22.7)	76 (18.6)	76 (26.5)	45 (18.4)	176 (24.2)	121 (18.5)
Vegetables	13 (2.9)	20 (4.9)	21 (7.3)	11 (4.5)	34 (4.7)	31 (4.7)
Fruit	36 (8.2)	26 (6.4)	40 (13.9)	27 (11.0)	76 (10.4)	53 (8.1)
Ghee	86 (19.5)	92 (22.5)	72 (25.1)	91 (37.1)	158 (21.7)	183 (28.0)
Others	65 (14.7)	78 (19.1)	55 (19.2)	59 (24.1)	120 (16.5)	137 (21.0)

Annexure Table A.20. Intra-Household Distribution of nutrimix

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Who consumes the supplement (Multiple Responses)						
Child only	110 (24.9)	253 (61.7)	76 (26.5)	168 (67.7)	186 (25.5)	421 (64.0)
Child & Siblings	268 (60.8)	266 (64.9)	165 (57.5)	142 (57.3)	433 (59.5)	408 (62.0)
Mother	159 (36.1)	236 (57.6)	102 (35.5)	148 (59.7)	261 (35.9)	384 (58.3)
Other	53 (12.0)	93 (22.7)	32 (11.1)	62 (25.0)	85 (11.7)	155 (23.6)
Mean quantity consumed by others						
Half	179 (41.7)	229 (57.0)	139 (48.9)	110 (45.3)	318 (44.6)	339 (52.6)
1/3rd	116 (27)	105 (26.0)	63 (22.2)	67 (27.6)	179 (25.1)	172 (26.7)
1/4th	74 (17.2)	48 (11.9)	56 (19.7)	41 (16.9)	130 (18.2)	89 (13.8)

Not shared	42 (9.8)	11 (2.7)	22 (7.7)	11 (4.5)	64 (9)	22 (3.4)
Others	18 (4.2)	9 (2.2)	4 (1.4)	14 (5.8)	22 (3.1)	

Annexure Table A.21. Storage of nutrimix

How nutrimix is stored after a package is opened?	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	**Endline**	**Baseline**	**Endline**	**Baseline**	**Endline**
Covered for protection	22 (5.0)	9 (2.2)	8 (2.8)	19 (7.7)	30 (4.1)	28 (4.2)
In closed jar	391(88.7)	387 (94.6)	264 (92.0)	222 (89.9)	655 (90.0)	609 (92.1)
In the same packet	21 (5.4)	11 (2.7)	12 (4.2)	2 (0.8)	33 (4.9)	13 (2.0)
In the refrigerator	NA	0 (0)	NA	1 (0.4)	NA	1 (0.2)
Separated from cooked food	NA	0 (0)	NA	1 (0.4)	NA	1 (0.2)
Other	NA	2 (0.5)	NA	2 (0.8)	NA	4 (0.6)

Annexure Table A.22. *The Profile of Anganwadi workers*

Characteristics	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	**Endline**	**Baseline**	**Endline**	**Baseline**	**Endline**
Religion						
Hindu	72 (69.2)	68 (66.7)	41 (61.2)	49 (63.6)	113 (66.1)	117 (65.4)
Muslim	10 (9.6)	8 (7.8)	1 (1.5)	2 (2.6)	11 (6.4)	10 (5.6)
Christian	22 (21.2)	26 (25.5)	25 (37.3)	26 (33.8)	47 (27.5)	52 (29.1)
Caste						
Scheduled Caste	8 (7.7)	4 (3.9)	5 (7.5)	5 (6.5)	13 (7.6)	9 (5.0)
Scheduled Tribe	11 (10.6)	9 (8.8)	6 (9.0)	6 (7.8)	17 (9.9)	15 (8.4)
Other Backward Caste	30 (28.8)	25 (24.5)	6 (9.0)	12 (15.6)	36 (21.1)	37 (20.7)
Others	55 (52.9)	64 (62.7)	50 (74.6)	54 (70.1)	105 (61.4)	118 (65.9)
Educational Status						
12th Pass	34 (32.7)	41 (40.2)	20 (29.9)	33 (42.9)	54 (31.6)	74 (41.3)
Graduate	7 (6.7)	8 (7.8)	3 (4.5)	10 (13.0)	10 (5.8)	18 (10.1)
Post-graduate	2 (1.9)	1 (1.0)	0 (.0)	0 (0)	2 (1.2)	1 (0.6)
Others (10th Pass)	61 (58.7)	52 (51.0)	44 (65.7)	34 (44.2)	105 (61.4)	86 (48.0)
Age						
21-30 years	8(7.7)	5 (4.9)	5(7.5)	2 (2.6)	13(7.6)	7 (3.9)
31-40 years	21(20.2)	19 (18.6)	14(20.9)	13 (16.9)	35(20.5)	32 (17.9)
41-50 years	41(39.4)	49 (48.0)	25(37.3)	28 (36.4)	66(38.6)	77 (43.0)
above 50 years	34(32.7)	29 (28.4)	23(34.3)	34 (44.2)	57(33.3)	63 (35.2)
Marital Status						
Unmarried	2 (1.9)	8 (7.8)	0 (.0)	4 (5.2)	2 (1.2)	12 (6.7)
Married	102 (98.1)	94 (92.2)	65 (97.0)	70 (90.9)	167 (97.7)	164 (91.6)
Divorced/Separated/Widow	0 (.0)	0 (0)	2 (3.0)	3 (3.9)	2 (1.2)	3 (1.7)
How Long have you worked as an AWW?						
Less than 1 year	9 (8.7)	12 (11.8)	4 (6.0)	8 (10.4)	13 (7.6)	20 (11.2)
1-5 years	13 (12.5)	7 (6.9)	12 (17.9)	7 (9.1)	25 (14.6)	14 (7.8)
6-10 years	32(30.8)	28 (27.5)	23(34.3)	20 (26.0)	55(32.2)	48 (26.8)

11-15 years	9(8.7)	26 (25.5)	3(4.5)	12 (15.6)	12 (7.0)	38 (21.2)
16-20 years	8 (7.7)	5 (4.9)	5 (7.5)	8 (10.4)	13 (7.6)	13 (7.3)
21-30 years	11 (10.6)	6 (5.9)	6 (9.0)	5 (6.5)	17 (9.9)	11 (6.2)
31-45 years	22 (21.2)	18 (17.7)	14 (20.9)	17 (22.1)	36 (21.1)	35 (19.6)
How Long have you worked in this center						
Less than 1 year	17 (16.3)	25 (24.5)	7 (10.6)	14 (18.2)	24 (14.1)	39 (21.8)
1-5 years	23 (22.1)	19 (18.6)	23 (34.8)	18 (23.4)	46 (27.1)	37 (20.7)
6-10 years	33 (31.7)	31 (30.4)	21 (31.8)	24 (31.2)	54 (31.8)	55 (30.7)
11-15 years	8 (7.7)	12 (11.8)	0 (.0)	5 (6.5)	8 (4.7)	17 (9.5)
16-20 years	7 (6.7)	4 (3.9)	5 (7.6)	4 (5.2)	12 (7.1)	8 (4.5)
21-30 years	2 (1.9)	5 (4.9)	5 (7.6)	4 (5.2)	7 (4.1)	9 (5.0)
31-40 years	14 (13.5)	6 (5.9)	6 (9.1)	8 (10.4)	20 (11.8)	14 (7.8)
Reside in the village in which the AWC is located						
Yes	68 (65.4)	66 (64.7)	45 (67.2)	53 (68.8)	113 (66.1)	119 (66.5)
No	36 (34.6)	36 (35.3)	22 (32.8)	24 (31.2)	58 (33.9)	60 (33.5)

Annexure Table A.23. Training of AWWs

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
How many days of training have you received, approximately at the time of starting work as an AWW						
No training received	20 (19.2)	22 (22.6)	12 (17.9)	13 (16.9)	32 (18.7)	35 (19.6)
One day	4 (3.8)	2 (2.0)	3 (4.5)	2 (2.6)	7 (4.1)	4 (2.2)
2-7 days	6 (5.8)	13 (12.8)	6 (9.0)	5 (6.5)	12 (7.0)	18 (10.1)
8-14 days	0 (0)	2 (2.0)	2 (3.0)	3 (3.9)	2 (1.2)	5 (2.8)
15-30 Days	25 (24.0)	30 (29.4)	22 (32.8)	26 (33.7)	47 (27.5)	56 (31.3)
31-60 Days	11 (10.6)	7 (6.9)	8 (11.9)	6 (7.8)	19 (11.1)	13 (7.3)
61-90 days	26 (25.0)	14 (13.7)	7 (10.4)	14 (18.2)	33 (19.3)	28 (15.6)
91-130 Days	12 (11.5)	9 (8.8)	7 (10.4)	6 (7.8)	19 (11.1)	15 (8.4)
How many days of training have you received, during the most recent training?						
Zero day	20 (19.2)	21 (20.6)	12 (17.9)	10 (13.0)	32 (18.7)	31 (17.3)
One day	3 (2.9)	0	2 (3.0)	2 (2.6)	5 (2.9)	2 (1.1)
2-7 days	63 (60.6)	58 (56.9)	41 (61.2)	53 (68.8)	104 (60.8)	111 (62.0)
8-14 Days	11 (10.6)	7 (6.9)	8 (11.9)	7 (9.1)	19 (11.1)	14 (7.8)
15-30 Days	7 (6.7)	5 (4.9)	4 (6.0)	3 (3.9)	11 (6.4)	8 (4.5)
31-130 Days	NA	9 (8.8)	NA	0	NA	9 (5.0)
How many years have elapsed since the last training you attended?						
Zero	30 (28.8)	32 (32.0)	18 (26.9)	24 (31.6)	48 (28.1)	56 (31.8)
One	20 (19.2)	27 (27.0)	9 (13.4)	27 (35.5)	29 (17.0)	54 (30.7)
Two	46 (44.2)	29 (29.0)	30 (44.8)	19 (25.0)	76 (44.4)	48 (27.3)
Three	2 (1.9)	7 (7.0)	7 (10.4)	3 (3.9)	9 (5.3)	10 (5.7)
Four	4 (3.8)	3 (3.0)	1 (1.5)	1 (1.3)	5 (2.9)	4 (2.3)
Five	0 (0)	0 (0)	1 (1.5)	0 (0)	1 (0.6)	0 (0)
Seven +	2 (1.9)	2 (2.0)	1 (1.5)	2 (2.6)	3 (1.8)	4 (2.4)
Adequacy of the training received						
Adequate	84 (80.8)	76 (74.5)	48 (71.6)	64 (83.1)	132 (77.2)	140 (78.2)

Inadequate	3 (2.9)	9 (8.8)	5 (7.5)	4 (5.2)	8 (4.7)	13 (7.3)
Don't know	17 (16.3)	17 (16.7)	14 (20.9)	9 (11.7)	31 (18.1)	26 (14.5)

Annexure Table A.24. Working days and hours of the AWCs

Items	Intervention area		Control area		Total	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Mean number of days AWC has functioned in the last 30 days	22.6	22.4	22.4	20.8	22.5	21.7
Mean hours the AWC functions on a working day	6.7	6.1	6.1	6.1	6.4	6.1

Annexure Table A.25. Services provided in the AWCs for the children (6-36 months)

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Supplementary Nutrition	104 (100.0)	101 (99.0)	67 (100.0)	73 (94.8)	171(100.0)	174 (97.2)
Immunization	73 (70.2)	69 (67.7)	48 (71.6)	49 (63.6)	121(70.8)	118 (65.9)
Health Check-ups	79 (76.0)	67 (65.7)	57 (85.1)	50 (64.9)	136 (79.5)	117 (65.4)
Referral Services	72 (69.2)	60 (58.8)	44 (65.7)	34 (44.2)	116 (67.8)	94 (52.5)
Nutrition and Health Education	97 (93.3)	90 (88.2)	61 (91.0)	65 (84.4)	158 (92.4)	155 (86.6)
Pre-School Education	101 (97.1)	84 (82.4)	63 (94.0)	71 (92.2)	164 (95.9)	155 (86.6)

Annexure Table A.26. *Registers maintained in the anganwadi centres*

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Survey register maintained	104 (100)	102 (100.0)	67 (100)	77 (100.0)	171 (100)	179 (100.0)
Distribution register maintained	104 (100)	102 (100.0)	65 (97)	77 (100.0)	169 (98.8)	179 (100.0)
As per the Survey Register, the total number of children (6-36 months) registered in the AW jurisdiction						
1-10 Children	5 (4.8)	2 (2.0)	1 (1.5)	4 (5.2)	6 (3.5)	6 (3.4)
11-20 Children	21 (20.2)	20 (19.6)	9 (13.4)	16 (20.8)	30 (17.5)	36 (20.1)
21-30 Children	19 (18.3)	23 (22.5)	23 (34.3)	30 (39.0)	42 (24.6)	53 (29.6)
31-40 Children	21 (20.2)	17 (16.7)	15 (22.4)	13 (16.9)	36 (21.1)	30 (16.8)
41-50 Children	16 (15.4)	13 (12.8)	11 (16.4)	10 (13.0)	27 (15.8)	23 (12.9)
51-60 Children	7 (6.7)	10 (9.8)	4 (6.0)	4 (5.2)	11 (6.4)	14 (7.8)
61-70 Children	8 (7.7)	7 (6.9)	2 (3.0)	0	10 (5.8)	7 (3.9)
71-80 Children	4 (3.8)	6 (5.9)	1 (1.5)	0	5 (2.9)	6 (3.4)
81-90 Children	2 (1.9)	2 (2.0)	0 (0)	0	2 (1.2)	2 (1.1)
111-160 Children	1 (1.0)	1 (1.0)	1 (1.5)	0	2 (1.2)	1 (0.6)
The total number of children (6-36 months) registered by parents/guardians/caregivers themselves to receive the nutrimix from each AWC						
0 Children	0 (0.0)	1 (1.0)	1 (1.5)	0	1 (0.6)	1 (0.6)
1-5 Children	2 (1.9)	1 (1.0)	1 (1.5)	1 (1.3)	3 (1.8)	2 (1.1)
6-10 Children	14 (13.5)	8 (7.8)	6 (9.0)	8 (10.4)	20 (11.7)	16 (8.9)
11-15 Children	30 (28.8)	13 (12.8)	18 (26.9)	13 (16.9)	48 (28.1)	26 (14.5)

16-20 Children	25 (24.0)	24 (23.5)	21 (31.3)	28 (36.4)	46 (26.9)	52 (29.1)
21-25 Children	16 (15.4)	19 (18.6)	15 (22.4)	12 (15.6)	31 (18.1)	31 (17.3)
26-30 Children	12 (11.5)	13 (12.8)	3 (4.5)	12 (15.6)	15 (8.8)	25 (14.0)
31-35 Children	2 (1.9)	9 (8.8)	1(1.5)	1 (1.3)	3 (1.8)	10 (5.6)
36-40 Children	2 (1.9)	4 (3.9)	1(1.5)	1 (1.3)	3 (1.8)	5 (2.8)
41-45 Children	1 (1.0)	2 (2.0)	0 (0)	1 (1.3)	1 (0.6)	3 (1.7)
46-75 Children	NA	7 (6.9)	NA	0	NA	7 (3.9)
As per the Distribution (Delivery) Register, the total number of children 6-36 months to whom nutrimix was distributed last month						
1-5 Children	1 (1.0)	2 (2.0)	1 (1.5)	0	2 (1.2)	2 (1.1)
6-10 Children	15 (14.4)	9 (8.8)	6 (9.0)	15 (19.5)	21(12.3)	24 (13.4)
11-15 Children	29 (27.9)	19 (18.6)	19 (28.4)	21 (27.3)	48 (28.1)	40 (22.4)
16-20 Children	24 (23.1)	20 (19.6)	19 (28.4)	26 (33.8)	43 (25.1)	46 (25.7)
21-25 Children	21 (20.2)	18 (17.7)	13 (19.4)	9 (11.7)	34 (19.9)	27 (15.1)
26-30 Children	8 (7.7)	16 (15.7)	4 (6.0)	6 (7.8)	12(7.0)	22 (12.3)
31-35 Children	4 (3.8)	8 (7.8)	3 (4.5)	0	7 (4.1)	8 (4.5)
36-40 Children	1 (1.0)	4 (3.9)	0 (0.0)	0	1(0.6)	4 (2.2)
41-45 Children	0 (0)	3 (2.9)	1(1.5)	0	1 (0.6)	3 (1.7)
46-50 Children	1 (1.0)	2 (2.0)	0 (0)	0	1 (0.6)	2 (1.1)
61-65 Children	0 (0)	NA	1(1.5)	NA	1 (0.6)	NA
As per the Child Weight register, how many children 6-36 months have been weighed in last month?						
Zero children	NA	1 (1.0)	NA	1 (1.3)	NA	2 (1.1)
1-5 Children	4 (3.8)	1 (1.0)	3 (4.5)	3 (3.9)	7 (4.1)	4 (2.2)
6-10 Children	17 (16.3)	12 (11.8)	12 (17.9)	13 (16.9)	29 (17.0)	25 (14.3)
11-15 Children	27 (26.0)	18 (17.7)	17 (25.4)	18 (23.4)	44 (25.7)	36 (20.1)
16-20 Children	27 (26.0)	18 (17.7)	15 (22.4)	19 (24.7)	42 (24.6)	37 (20.7)
21-25 Children	18 (17.3)	15 (14.7)	8 (11.9)	9 (11.7)	26 (15.2)	24 (13.4)
26-30 Children	4 (3.8)	13 (12.8)	4 (6.0)	5 (6.5)	8 (4.7)	18 (10.1)
31-35 Children	2 (1.9)	10 (9.8)	2 (3.0)	1 (1.3)	4 (2.3)	11 (6.2)
36-40 Children	2 (1.9)	6 (5.9)	1 (1.5)	2 (2.6)	3 (1.8)	8 (4.5)
41-45 Children	1 (1.0)	2 (2.0)	1 (1.5)	4 (5.2)	2 (1.2)	6 (3.4)
46-50 Children	0 (0)	1 (1.0)	2 (3.0)	1 (1.3)	2 (1.2)	2 (1.1)
51-55 Children	1 (1.0)	2 (2.0)	0 (0)	0	1 (0.6)	2 (1.1)
61-70 Children	0 (0)	2 (2.0)	2 (3.0)	0	2 (1.2)	2 (1.1)
71-75 Children	NA	0	NA	1 (1.3)	NA	1 (0.6)
85-90 Children	1 (1.0)	NA	0 (0)	NA	1 (0.6)	NA

Annexure Table A.27. Frequency of nutrimix distribution to beneficiaries

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Once in a month	96 (93.3)	98 (96.1)	54 (80.6)	61 (79.2)	150(87.7)	159 (88.8)
More than one time in a month	8 (7.7)	NA	13 (19.3)	NA	21 (12.3)	NA

Daily	NA	2 (2.0)	NA	0	NA	2 (1.1)
Twice a week	NA	0	NA	1 (1.3)	NA	1 (0.6)
Once a week	NA	2 (2.0)	NA	1 (1.3)	NA	3 (1.7)
Once in a fortnight	NA	0	NA	11 (14.3)	NA	11 (6.2)
Whenever parents/caregivers visit AWW for demanding nutria-mix	NA	0	NA	3 (3.9)	NA	3 (1.7)

Annexure Table A.28. Availability of equipment in the AWCs

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Medicine Kit/ First Aid Box	100 (96.2)	96 (95.0)	64 (95.5)	68 (89.5)	164 (95.9)	164 (91.6)
Baby Weighing Scale	94 (90.4)	89 (88.1)	54 (80.6)	75 (98.7)	148 (86.5)	164 (91.6)
Wall charts or wall painting	90 (86.5)	91 (90.1)	61 (91.0)	67 (88.2)	151(88.3)	158 (88.3)
Vessels for Cooking	99 (95.2)	98 (97.0)	64 (95.5)	74 (97.4)	163 (95.3)	172 (96.1)
Vessel for Storing Drinking water	91 (87.5)	93 (92.1)	61 (91.0)	73 (96.1)	152 (88.9)	166 (92.7)
Indoor Play Equipment	99 (95.2)	76 (75.2)	65 (97.0)	74 (97.4)	164 (95.9)	150 (83.8)

Annexure Table A.29. Availability of Facilities in the AWCs

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Electricity	12 (11.5)	67 (66.3)	15 (22.4)	31 (40.3)	27 (15.8)	98 (54.8)
Electric fan	3 (2.9)	21 (20.8)	11 (16.4)	22 (28.6)	14 (8.2)	43 (24.0)
Clean, safe drinking water on premises	80 (76.9)	87 (86.1)	54 (80.6)	65 (84.4)	134 (78.4)	152 (84.9)
Toilet	95 (91.3)	93 (92.1)	58 (86.6)	70 (90.9)	153 (89.5)	163 (91.1)
Indoor activity space	87 (83.7)	65 (64.4)	57 (85.1)	52 (67.5)	144 (84.2)	117 (65.4)
Functional weighing machine	93 (89.4)	88 (87.1)	61 (91.0)	71 (92.2)	154 (90.1)	159 (88.8)
Kitchen/separate space for cooking	98 (94.2)	89 (88.1)	64 (95.5)	73 (94.8)	162 (94.7)	162 (90.5)
Storage facilities for food	93 (89.4)	95 (94.1)	58 (86.6)	74 (96.1)	151 (88.3)	169 (94.4)
Storage facilities for equipment	83 (79.8)	75 (74.3)	50 (74.6)	67 (87.0)	133 (77.8)	142 (79.8)

Annexure Table A.30. Availability and utilization of medicines at Anganwadi centres

Items	Intervention area n (%)		Control area n (%)		Total n (%)	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Medicines available at the AWC						
Paracetamol	103 (99)	92 (90.2)	67 (100)	62 (86.1)	170 (99.4)	154 (86.0)
Albendazole	100 (96.2)	89 (89.0)	61 (91)	41 (56.9)	161 (94.2)	130 (72.6)
ORS	96 (92.3)	89 (89.0)	64 (95.5)	60 (83.3)	160 (93.5)	149 (83.2)
Cotton bandage	95 (91.3)	74 (74.0)	63 (94)	50 (69.4)	158 (92.4)	124 (69.3)
IFA tablets	83 (79.8)	51 (50.0)	58 (86.6)	28 (38.9)	141 (82.4)	79 (44.1)

(big)						
IFA tablets (small)	64 (61.5)	56 (56.0)	42 (62.7)	18 (25.0)	106 (62)	74 (41.3)
Iodine	69 (66.3)	56 (56.0)	50 (74.6)	31 (43.1)	119 (69.6)	87 (48.6)
Betnovate	65 (62.5)	30 (30.0)	45 (67.2)	17 (23.6)	110 (64.3)	47 (26.3)
Vitamin B Complex	63 (60.6)	9 (9.0)	30 (44.8)	14 (19.4)	93 (54.4)	23 (12.9)
Eye Ointment Tubes	40 (38.5)	12 (12.0)	19 (28.4)	10 (13.9)	59 (34.5)	22 (12.3)
Antiseptic solution	36 (34.6)	36 (36.0)	15 (22.4)	8 (11.1)	51 (29.8)	44 (24.6)
Metronidazole	30 (28.8)	8 (7.8)	20 (29.9)	5 (6.5)	50 (29.2)	13 (7.3)
Vitamin A	19 (18.3)	18 (18.0)	19 (28.4)	5 (6.9)	38 (22.2)	23 (12.9)
Medicines utilized in the last one month						
Paracetamol	88 (84.6)	86 (84.3)	54 (80.6)	55 (71.4)	142 (83)	141 (78.8)
Albendazole	83 (79.8)	66 (64.7)	45 (67.2)	20 (26.0)	128 (74.9)	86 (48.0)
ORS	50 (48.1)	61 (59.8)	28 (41.8)	28 (36.4)	78 (46)	89 (49.7)
Cotton bandage	48 (46.2)	38 (37.3)	31 (46.3)	19 (24.7)	79 (46.2)	57 (31.8)
IFA tablets (big)	43 (41.3)	23 (22.6)	15 (22.4)	6 (7.8)	58 (33.9)	29 (16.2)
Iodine	26 (25.0)	32 (31.4)	13 (19.4)	15 (19.5)	39 (23)	47 (26.3)
Betnovate	22 (21.2)	14 (13.7)	16 (23.9)	5 (6.5)	38 (22.2)	19 (10.6)
IFA tablets (small)	16 (15.4)	25 (24.5)	6 (9.0)	5 (6.5)	22 (12.9)	30 (16.8)
Vitamin B Complex	16 (15.4)	6 (5.9)	3 (4.5)	0	19 (11.1)	6 (3.4)
Antiseptic solution	14 (13.5)	21 (20.6)	5 (7.5)	2 (2.6)	19 (11.1)	23 (12.9)
Vitamin A	7 (6.7)	9 (8.8)	8 (11.9)	2 (2.6)	15 (8.8)	11 (6.2)
Eye Ointment Tubes	5 (4.8)	6 (5.9)	3 (4.5)	2 (2.6)	8 (4.7)	8 (4.5)
Metronidazole	4 (3.8)	3 (2.9)	1 (1.5)	0	5 (2.9)	3 (1.7)

Annexure Table A.31. Knowledge of AWW regarding Undernutrition and deficiency disorders

Background Characteristics	Intervention area		Control Area		Total	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Signs of undernutrition among children *(Multiple Response)*						
Lack of energy/weakness: cannot work, study or play as normal (disability)	95 (91.3)	82 (83.7)	57 (85.1)	68 (95.8)	152(88.8)	150 (88.8)
Weakness of the immune system	45 (43.3)	60 (61.2)	23 (34.3)	37 (52.1)	68 (39.8)	97 (57.3)
Loss of weight/Being lean	38 (36.5)	33 (33.7)	27 (40.3)	16 (22.5)	65 (38)	49 (28.9)
Children do not grow as they should (growth faltering)	48 (46.2)	29 (29.6)	25 (37.3)	30 (42.3)	73 (42.6)	59 (34.9)
Other	24 (23.1)	0 (0)	19 (28.4)	0 (0)	43 (25.1)	0 (0)
Reasons for undernutrition among children *(Multiple Response)*						
Not getting enough food	83 (79.8)	73 (73.7)	49 (73.1)	63 (84.0)	132(77.2)	136 (78.2)
Disease/ill	25 (24.)	29 (29.3)	15 (22.4)	28 (37.3)	40 (23.4)	57 (32.8)
In-appropriate feeding practices	56 (53.8)	52 (52.5)	36 (53.7)	24 (32.0)	92 (53.8)	76 (43.7)
Lack of knowledge	31 (31.3)	31 (29.8)	26 (38.8)	20 (26.7)	51 (29.8)	51 (29.3)
Other	20 (19.2)	13 (12.5)	8 (11.9)	8 (10.1)	28 (16.4)	21 (12.1)
Don't Know		1 (1.0)		4 (5.3)		5 (2.8)
Have heard about anemia	104 (100)	99 (98.0)	66 (98.5)	77 (98.7)	170 (99.4)	175 (98.3)
Causes of anemia *(Multiple Response)*						
Eat too little/not much	65 (62.5)	62 (69.7)	40 (59.7)	43 (62.3)	105(61.4)	105 (66.5)
Lack of iron in the diet	76 (73.1)	73 (82.0)	44 (65.7)	56 (81.2)	120(70.2)	129 (81.6)
Sickness/infection (malaria, hookworm infection, other infection such as HIV/AIDS)	6 (5.8)	7 (7.9)	12 (17.9)	6 (8.7)	18 (10.5)	13 (8.2)
Prevention of anemia (*Multiple Response*)						
Eat/feed iron-rich foods/having a diet rich in iron	86 (82.7)	87 (87.9)	52 (77.6)	64 (84.2)	138(80.7)	151 (86.3)
Eat/give vitamin-C-rich foods during or right after meals	42 (40.4)	47 (47.5)	28 (41.8)	36 (47.4)	70 (40.9)	83 (47.4)
Take/give iron supplements if prescribed	33 (31.7)	35 (35.4)	22 (32.8)	24 (31.6)	55 (32.2)	59 (33.7)
Treat other causes of anaemia (diseases & infections)- seek health care assistance	16 (15.4)	9 (9.1)	8 (11.9)	6 (7.9)	24 (14)	15 (8.6)
Continue breastfeeding (for infants 6–23 months) consuming nutrimix	15 (14.4)	19 (19.2)	14 (20.9)	14 (18.4)	29 (17)	33 (18.8)
Others	19 (18.3)	8 (8.1)	9 (13.4)	3 (3.9)	28 (16.3)	11 (6.2)
Don't know	0 (0)	0 (0)	0 (0)	1 (1.3)	0 (0)	1 (0.6)
Health risks due to iron deficiency in the diet *(Multiple Response)*						
Delay in mental development	24 (23.1)	54 (54.5)	18 (26.9)	29 (38.7)	42 (24.5)	83 (47.7)
Delay in physical development	72 (69.2)	67 (67.7)	44 (65.7)	56 (74.7)	116(67.8)	123 (70.6)

Frequent illness	28 (26.9)	34 (34.3)	16 (23.9)	31 (41.3)	44 (25.7)	65 (37.3)
Others	24 (23.1)	22 (22.2)	14 (20.9)	7 (9.3)	38 (22.2)	29 (16.6)
Don't Know	7 (6.7)	1 (1.0)	7 (10.4)	5 (6.7)	14 (8.2)	6 (3.4)
Have heard about vitamin A deficiency	104 (100)	98 (99.0)	65 (97.0)	74 (97.4)	169 (98.8)	172 (98.3)
How to recognize someone who lacks vitamin A in the body (*Multiple Response*)						
Weakness/feels less energetic	29 (27.9)	36 (36.7)	15 (22.4)	25 (34.7)	44 (25.7)	61 (35.8)
Be more likely to become sick	27 (26.0)	42 (42.9)	18 (26.9)	27 (37.5)	45 (26.3)	69 (40.6)
Eye problems: night blindness, dry eyes, corneal damage, blindness	81 (77.9)	75 (76.5)	56 (83.6)	57 (79.2)	137 (80.1)	132 (77.6)
Don't Know	7 (6.7)	0 (0)	3 (4.5)	1 (1.4)	10 (5.8)	1 (0.6)
Other	11 (10.6)	4 (4.1)	5 (7.5)	8 (11.1)	16 (9.4)	12 (7.1)

Annexure Table A.32. Knowledge of AWWs regarding breastfeeding and feeding practices

Background Characteristics	**Intervention area**		**Control Area**		**Total**	
	Baseline	**Endline**	**Baseline**	**Endline**	**Baseline**	**Endline**
How long after birth do you think a baby should start breastfeeding?						
Less than an hour	101 (97.1)	100 (98.0)	65 (97.0)	76 (98.7)	166 (97.1)	179 (98.4)
More than 1 hour and less than 24 hours	2 (1.9)	2 (2.0)	2 (3.0)	1 (1.3)	4 (2.3)	3 (1.7)
Don't Know	1 (1.0)	0 (0)	0 (0.0)	0 (0)	1 (0.6)	0 (0)
Age in months a baby should receive only breast milk and nothing else						
4 Months	1 (1.0)	0 (0)	1 (1.5)	0 (0)	2 (1.2)	0 (0)
5 Months	0 (0.0)	1 (1.0)	1 (1.5)	0 (0)	1 (0.6)	1 (0.6)
6 Months	103 (99.0)	97 (96.0)	65 (97.0)	76 (98.7)	168 (98.2)	173 (97.2)
7-24 Months	0 (0.0)	3 (3.0)	0 (0.0)	1 (1.3)	0 (0.0)	4 (2.4)
Age in Months a baby should start to receive semi-solid and solid foods						
One	0 (0.0)	1 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)
Two	1 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)	0 (0.0)
Four	1 (1.0)	0 (0.0)	2 (3.0)	1 (1.4)	3 (1.8)	1 (.6)
Five	0 (0.0)	0 (0.0)	1 (1.5)	0 (0.0)	1 (0.6)	0 (0.0)
Six	94 (90.4)	64 (64.0)	57 (85.1)	31 (41.9)	151 (88.3)	95 (54.6)
Seven	5 (4.8)	31 (31.0)	7 (10.4)	42 (56.8)	12 (7.0)	73 (42.0)
Eight	1 (1.0)	1 (1.0)	0 (0.0)	0 (0.0)	1 (0.6)	1 (.6)
Nine +	2 (1.9)	3 (3.0)	0 (0.0)	0 (0.0)	2 (1.2)	3 (1.8)
Minimum meal frequency for children 6-8 months who are currently breastfed						
Zero	0 (0.0)	0 (0.0)	1 (1.5)	0 (0.0)	1 (0.6)	0 (0.0)
One	11 (10.6)	3 (2.9)	3 (4.5)	12 (15.6)	14 (8.2)	15 (8.4)
Two	27 (26.0)	26 (25.5)	16 (23.9)	24 (31.2)	43 (25.1)	50 (27.9)
Three	19 (18.3)	33 (32.4)	19 (28.4)	16 (20.8)	38 (22.2)	49 (27.4)
Four	28 (26.9)	26 (25.5)	11 (16.4)	13 (16.9)	39 (22.8)	39 (21.8)
Five	10 (9.6)	6 (5.9)	8 (11.9)	5 (6.5)	18 (10.5)	11 (6.1)
Six	8 (7.7)	7 (6.9)	6 (9.0)	4 (5.2)	14 (8.2)	11 (6.1)

Seven	1 (1.0)	0 (0)	0 (0.0)	1 (1.3)	1 (0.6)	1 (0.6)
Eight	0 (0.0)	0 (0)	2 (3.0)	2 (2.6)	2 (1.2)	2 (1.1)
Ten +	0 (0.0)	1 (1.0)	1 (1.5)	0 (0)	1 (.6)	1 (0.6)
Minimum meal frequency for Children 9-23 months who are currently breastfed						
Zero	0 (0)	1 (1.0)	0 (0)	0 (0)	0 (0)	1 (0.6)
One	0 (0)	2 (2.0)	0 (0)	1 (1.3)	0 (0)	3 (1.7)
Two	12 (11.5)	7 (6.9)	6 (9.0)	10 (13.0)	18 (10.5)	17 (9.5)
Three	19 (18.3)	28 (27.5)	15(22.4)	18 (23.4)	34 (19.9)	46 (25.7)
Four	27 (26.0)	34 (33.3)	22 (32.8)	25 (32.5)	49 (28.7)	59 (33.0)
Five	21 (20.2)	16 (15.7)	8 (11.9)	15 (19.5)	29 (17.0)	31 (17.3)
Six	20 (19.2)	7 (6.9)	10 (14.9)	7 (9.1)	30 (17.5)	14 (7.8)
Seven	2 (1.9)	3 (2.9)	2 (3.0)	0 (0)	4 (2.3)	3 (1.7)
Eight	2 (1.9)	2 (2.0)	4 (6.0)	1 (1.3)	6 (3.5)	3 (1.7)
Nine	0 (0)	1 (1.0)	0 (0)	0 (0)	0 (0)	1 (0.6)
Ten	1 (1.0)	1 (1.0)	0 (0.0)	0 (0)	1 (0.6)	1 (0.6)
Minimum meal frequency for Children 6-8 months who are currently NOT breastfed						
Zero	0 (0.0)	1 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)
One	0 (0.0)	1 (1.0)	3 (4.5)	6 (7.8)	3 (1.8)	7 (3.9)
Two	7 (6.7)	16 (15.7)	2 (3.0)	5 (6.5)	9 (5.3)	21 (11.7)
Three	10 (9.6)	10 (9.8)	4 (6.0)	6 (7.8)	14 (8.2)	16 (8.9)
Four	14 (13.5)	23 (22.5)	15 (22.4)	16 (20.8)	29 (17.0)	39 (21.8)
Five	25 (24.0)	15 (14.7)	10(14.9)	20 (26.0)	35 (20.5)	35 (19.6)
Six	22 (21.2)	20 (19.6)	15 (22.4)	13 (16.9)	37 (21.6)	33 (18.4)
Seven	8 (7.7)	7 (6.9)	5 (7.5)	5 (6.5)	13 (7.6)	12 (6.7)
Eight	15 (14.4)	4 (3.9)	7 (10.4)	5 (6.5)	22 (12.9)	12 (6.7)
Nine	0 (0.0)	2 (2.0)	0 (0.0)	1 (1.3)	0 (0.0)	3 (1.7)
Ten	2 (1.9)	2 (2.0)	3 (4.5)	0 (0.0)	5 (2.9)	2 (1.1)
Twelve	1 (1.0)	1 (1.0)	2 (3.0)	0 (0.0)	3 (1.8)	1 (0.6)
Sixteen	0 (0.0)	0 (0.0)	1 (1.5)	0 (0.0)	1 (0.6)	0 (0.0)
Minimum meal frequency for Children 9-23 months who are currently NOT breastfed						
Zero	0 (0.0)	1 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.6)
One	0 (0.0)	3 (2.9)	0 (0.0)	0 (0.0)	0 (0.0)	3 (1.7)
Two	2 (1.9)	9 (8.8)	2 (3.0)	9 (11.7)	4 (2.3)	18 (10.1)
Three	10 (9.6)	11 (10.8)	4 (6.0)	6 (7.8)	14 (8.2)	17 (9.5)
Four	16 (15.4)	15 (14.7)	5 (7.5)	7 (9.1)	21 (12.3)	22 (12.3)
Five	21 (20.2)	17 (16.7)	15 (22.4)	16 (20.8)	36(21.1)	33 (18.4)
Six	16 (15.4)	13 (12.7)	17 (25.4)	16 (20.8)	33 (19.3)	29 (16.2)
Seven	12 (11.5)	6 (5.9)	7 (10.4)	13 (16.9)	19 (11.1)	19 (10.6)
Eight	13 (12.5)	19 (18.6)	8 (11.9)	6 (7.8)	21 (12.3)	25 (14.0)
Nine	2 (1.9)	0 (0.0)	2 (3.0)	0 (0.0)	4 (2.3)	0 (0.0)
Ten	9 (8.7)	6 (5.9)	3 (4.5)	2 (2.6)	12 (7.0)	8 (4.5)
Twelve	3 (2.9)	2 (2.0)	4 (6.0)	2 (2.6)	7 (4.1)	4 (2.2)
Number of cups of milk required daily for Children 9-23 months who are currently NOT breastfed						
Zero	1 (1.0)	4 (3.9)	3 (4.5)	0 (0.0)	4 (2.3)	4 (2.2)

One	37 (35.6)	52 (51.0)	22 (32.8)	31 (40.8)	59 (34.5)	83 (46.7)
Two	45 (43.3)	36 (35.3)	27 (40.3)	32 (42.1)	72 (42.1)	68 (38.2)
Three	12 (11.5)	4 (2.9)	10 (14.9)	6 (7.9)	22 (12.9)	10 (5.6)
Four	6 (5.8)	3 (2.9)	1 (1.5)	3 (3.9)	7 (4.1)	6 (3.4)
Five	1 (1.0)	1 (1.0)	2 (3.0)	2 (2.6)	3 (1.8)	3 (1.7)
Six	1 (1.0)	1 (1.0)	0 (0.0)	1 (1.3)	1 (0.6)	2 (1.1)
Seven	1 (1.0)	1 (1.0)	2 (3.0)	0 (0.0)	3 (1.8)	1 (.6)
Twelve	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.3)	0 (0.0)	1 (.6)

Annexure 2 – Cut-off values of micronutrients

Table A2.1. Haemoglobin levels to diagnose anaemia at sea levels

Haemoglobin (g/dl)	Interpretation
<=11.0 g/dl	Normal
10.0 to 10.9 g/dl	Mild anemia
= 7.0 to 9.9 g/dl	Moderate anemia
< 7.0 g/dl	Severe anemia

Source: World Health Organization

Table A2.2. Ferritin

Serum ferritin	Interpretation
< 12 µg/L	Deficiency
= or 12 µg/L	No deficiency

Source: DeMaeyer EM, et al. Preventing and Controlling Iron Deficiency Anaemia Through Primary Health Care. Geneva. World Health Organization, 1989; pp 8-9.

Table A2.3. Vitamin A

Plasma retinol concentrations	Interpretation
< 0.70 µmol/L(< 20 µg/dL)	Vitamin A Deficiency (VAD)
0.70 to 1.05 µmol/L(between 20 and 30 µg/dL)	Low vitamin A status

Source: Control of vitamin A deficiency and xerophthalmia. World Health Organ Tech Rep Ser. 1982, 672: 1-70.

Table A2.4. Vitamin B12 (children)

Serum Vitamin B12	Interpretation
< (15µmol/L) or < 150 pmol/L	Vitamin B12 deficiency
150- 700 pmol/L	Normal range

Source: World Health Organization

Table A2.5. Folate (children)

Serum/plasma folate levels ng/mL (nmol/L)	Interpretation
>20 (>45.3)	Elevated
6−20 (13.5−45.3)	Normal range
3−5.9 (6.8−13.4)	Possible deficiency
<3 (<6.8)	Deficiency

Source: WHO. Serum and red blood cell folate concentrations for assessing folate status in populations. Vitamin and Mineral Nutrition Information System. Geneva: World Health Organization; 2015

Table A2.6. CRP concentration

CRP concentration	Interpretation
≥ 8.0 mg/L	Abnormal

Annexure 3 – IEC Material – Flyer for caregivers of children

IEC Material – Flyer for caregivers of children aged 6-8 months

CHILDREN AGED 6 – 8 MONTHS

5 KEYS
FOR SAFE PREPARATION OF COMPLEMENTARY FOODS

KEEP CLEAN

SEPARATE RAW AND COOKED

COOKED THOROUGHLY

KEEP FOOD AT SAFE TEMPERATURES

USE SAFE WATER AND RAW MATERIALS

Social Justice Department
Government of Kerala

WFP World Food Programme
wfp.org

CHILDREN AGED 6 – 8 MONTHS

CONGRATULATIONS..!!
CHILDREN AGED 6 – 8 MONTHS

YOUR CHILD IS NOW MORE THAN 6 MONTHS OLD AND NEEDS ADDITIONAL FOODS FOR GROWTH AND DEVELOPMENT

- CONTINUE FREQUENT, ON-DEMAND BREASTFEEDING UNTIL 2 YEARS OF AGE OR BEYOND
- START WITH SMALL QUANTITY OF COMPLEMENTARY FEEDS (2-3 SPOONS) AND INCREASE IT TO ½ OF A 250 ML CUP/BOWL
- 2-3 MEALS DAILY, 1 - 2 SNACKS MAY BE OFFERED (DEPENDING ON CHILD'S APPETITE)

CHILDREN AGED 6 – 8 MONTHS

- AFTER 6 MONTHS OF AGE, CHILD REQUIRES MORE NUTRIENTS AND ENERGY. BREASTFEEDING ALONE IS NOT SUFFICIENT

HOW TO START COMPLEMENTARY FEEDING?

- INTRODUCE ONE FOOD AT A TIME. WAIT 2 – 3DAYS BEFORE INTRODUCING ANOTHER FOOD
- START WITH MILD TASTING FRUITS AND VEGETABLES AND USE SMOOTH TEXTURED FOODS. THE FOOD SHOULD BE OF SEMI-SOLID CONSISTENCY FOR EASY SWALLOWING
- QUANTITY: START WITH SMALL AMOUNTS OF FOOD (2 – 3 SPOONS), INCREASE IT TO ½ OF 250 ML BOWL

WHAT CAN BE GIVEN AS COMPLEMENTARY FOODS?

- QUALITY: COMPLEMENTARY FOODS MUST BE PREPARED AT HOME, MADE FROM CEREALS AND PULSES, (LOCALLY AVAILABLE FOODS), NUTRIENT AND CALORIE RICH
- CONSISTENCY: THICK PORRIDGE/ WELL MASHED/ PUREED FOODS – INCREASE QUANTITY AND CONSISTENCY AS CHILD GETS OLDER

CHILDREN AGED 6 – 8 MONTHS

- IF A BREASTFEEDING INFANT IS TOO WEAK TO SUCKLE, THE MOTHER CAN EXPRESS HER MILK AND FEED IT FROM A SPOON OR CUP
- FREQUENCY: 2 -3 MEALS PER DAY, 1 – 2 SNACKS MAY BE OFFERED (DEPENDING UPON THE CHILD'S APPETITE)

- INTRODUCE FORTIFIED AMRUTHAM NUTRIMIX AS ONE OF THE MEAL IN A DAY AS IT ENSURES ALL NUTRIENTS NEEDS OF THE CHILD
- IF BABY IS NOT BREASTFED, GIVE IN ADDITION: 1–2 CUPS OF MILK PER DAY, AND 1–2 EXTRA MEALS PER DAY

FOLLOW RESPONSIVE FEEDING APPROACH

- FEED SLOWLY AND PATIENTLY, ENCOURAGE THE CHILD TO EAT, BUT DO NOT FORCE THEM
- IF THE CHILD REFUSES CERTAIN FOODS, GIVE DIFFERENT FOOD COMBINATIONS, TASTES AND TEXTURES. TRY DIFFERENT METHODS OF ENCOURAGEMENT
- MINIMIZE DISTRACTIONS DURING MEALS IF THE CHILD LOSES INTEREST EASILY
- FEEDING TIMES ARE PERIODS OF LEARNING AND LOVE. TALK TO CHILDREN DURING FEEDING, MAKE EYE – TO - EYE CONTACT

IEC Material – Flyer for caregivers of children aged 9-11 months

IEC Material – Flyer for caregivers of children aged 12-23 months

IEC Material – Flyer on feeding practices during illness

Annexure 4 - Infant weight and length measurement

Infant weight measurement

Infant weight was taken using an electronic weight measurement device - Personal Weighing scale (Equinox – Model EB-EQ 90). After seeking the co-operation of the parent/guardian, weighing was done. The parent's presence helped the child to relax. Children, especially small children are much more likely to be co-operative if an adult known to them is involved in the procedure. Children wearing nappies were weighed after removing the nappy since a wet diaper can weigh up to 0.5 kg. For accurate readings, the child getting their weight measured was made to stand still. The children were weighed with minimum clothing; however, if it was socially unacceptable to undress the child, we asked the guardians to remove as many clothes as possible. At first, the adult was weighed alone and the reading was recorded. Then weight measurement of the adult holding the child was done. Subtracting the first value from the second gave the weight of the child.

Infant length measurement

The infant length measurement, taken along with weight, was used as an indicator of an infant's nutritional status. Infant length measurement using infantometers is recommended for children aged six months or more and under two years. For measuring the length of participant children, Infantometers (by track manufacturing company) and Frankfort plane cards were used. The procedure involves the following steps:

- The steps of measurement of the length of the child were explained to the parent.
- The parent was asked to remove any bulky clothing or shoes/ hair accessories that the infant was wearing as it may result in an inaccurate measurement.

- The infantometer was laid on a suitable flat, firm surface, preferably the floor.
- The surface of the Infantometer was wiped with a wet wipe and allowed to dry for 30 seconds.
- The child was placed on the Infantometer with his/her head touching the headpiece (Fixed end).
- The child's head was placed so that the Frankfort Plane was in a position at right angles to the floor/table.
- The Frankfort Plane is an imaginary line passing through the external ear canal and across the top of the lower bone of the eye socket, immediately under the eye (see Figure below).
- This position is important if an accurate reading is to be obtained. The parent was told to hold the child in this position and make sure their head is in contact with the headpiece.
- The child's legs were straightened by holding the ankles/ knees with one hand to straighten the legs as far as possible and applying a gentle downward pressure
- With the freehand, the footrest was slid down to touch the child's heels.
- The measurement was read from the red cursor in the tape window. The measurement was recorded in centimeters and millimeters to the nearest millimeter.
- If the measurement lay between two millimeters then it was rounded to the nearest even millimeter
- Infantometer was wiped with wet wipe before placing back into the carry bag

Annexure 5 - Overview of blood taking procedures

General eligibility for blood sampling was children aged 18 to 24 months from whom interview details and anthropometric details had been collected, and who had given consent.

Blood samples were collected by phlebotomists during the survey. Necessary steps of hand hygiene were followed. A sterile pair of gloves per participant was used. The entry site was disinfected with an alcohol swab. Syringe and needle were used to collect blood samples. The blood collection site was allowed to dry before inserting the needle. The volume of blood taken was 4 ml from each child. Once sufficient blood had been collected, the blood was transferred to vials. The vials were labelled with pre-printed labels. Labels contained the code for each child. It was ensured that the code in the proforma matched the code on the blood sample tube. The blood collection-related waste was collected after each phlebotomy and brought back to the GMC, Kozhikode for safe disposal as per guidelines. A maximum of two attempts at blood taking was permitted with children. The blood samples were stored in temporary storage at 4-8 degree Celsius for at least 1-2 hours for clot retraction at the local designated private laboratory, collected blood was centrifuged at 1500 RPM for 5-10 min to separate the clot from the serum tubes were kept upright on racks for blood sample tubes. The associated dispatch documents were kept along with the samples. Cold boxes were used to transport the separated serum sample tubes to the Multidisciplinary Research Unit (MRU) established by the Indian Council for Medical Research at Government Medical College Kozhikode. The samples reaching the MRU were immediately stored in a -80 degree freezer. The samples at the MRU were frozen at -80 degrees Celsius till they were subjected to the analytical procedures. Repeated freeze-thaw cycles were avoided to prevent hemolysis.

List of Acronyms

Acronym	Expansion
AAY	Antyodaya Anna Yojana
APL	Above Poverty Line
ASHA	Accredited Social Health Activist
AWC	Anganwadi Centre
AWW	Anganwadi Worker
BPL	Below Poverty Line
CDPO	Child Development Project Officer
CRP	C-Recative Protein
DAC	Development Assistance Criteria
DoSJ	Department of Social Justice
FGD	Focus Group Discussion
GMCK	Government Medical College Kozhikode
GoI	Government of India
GoK	Government of Kerala
GP	Gram Panchayat
Hb	Haemoglobin
ICDS	Integrated Child Development Services
IDI	In-depth interview
IEC	Institutional Ethics Committee, Information Education & Communication
IFA	Iron and folic acid
IPV	Inactivated Polio Vaccine
IYCF	Infant and Young Child Feeding
JPHN	Junior Public Health Nurse
LSG	Local Self Government
MRU	Multidisciplinary Research Unit
NFHS	National Family Health Survey
NFSA	National Food Security Act
NNMB	National Nutrition Monitoring Bureau
OBC	Other Backward Caste
OPV	Oral Polio Vaccine
RDA	Recommended Dietary Allowance
SC	Scheduled Caste
ST	Scheduled Tribe
THR	Take-Home Ration
UNEG	United Nations Ethical Guidelines
WCD	Women & Child Development Department
WFP	World Food Programme
WHO	World Health Organisation