Evaluation for evidence-based decision making

Assessment of fortification of Mid-Day Meal Programme in Dhenkanal, Odisha

2016-2018

Evaluation Report

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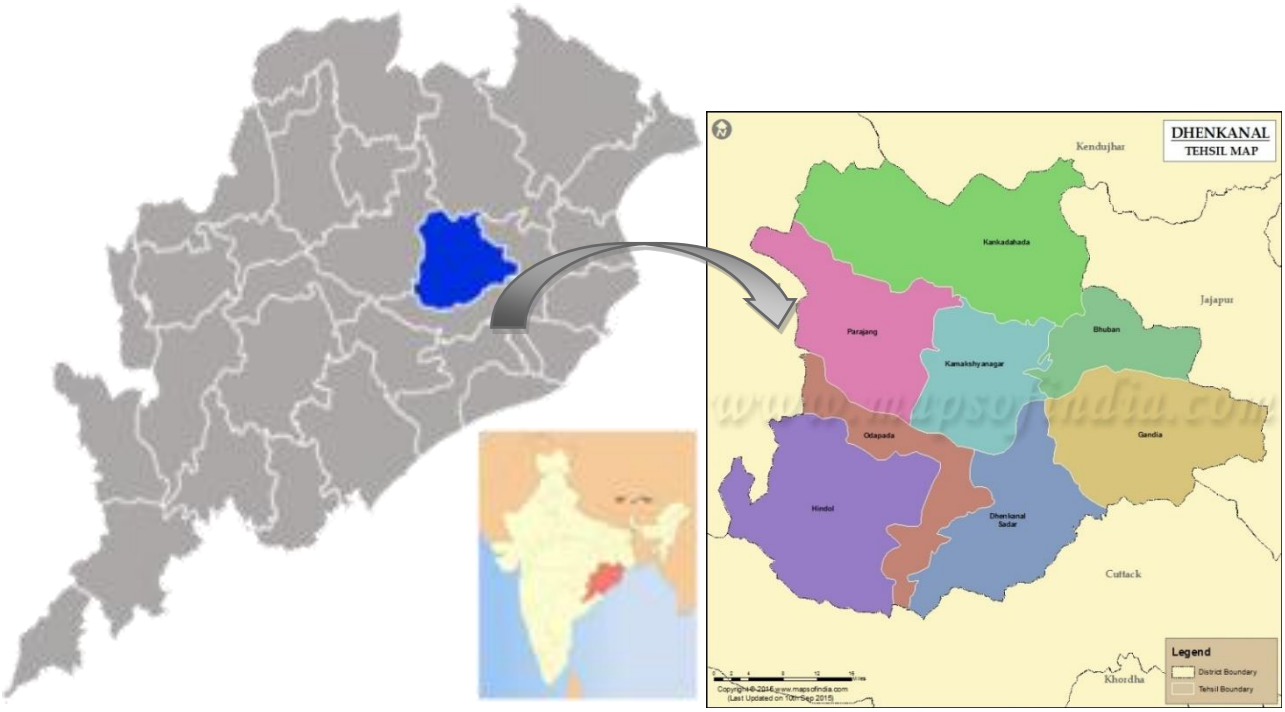
Map of district Dhenkanal with the intervention blocks



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Executive Summary

Evaluation Context

Micronutrient deficiency continues to affect sizeable sections of the global population and this "hidden hunger" extracts a substantial toll in terms of morbidity, mortality, reduced economic productivity and poor quality of life from those who are affected. The major Micronutrient Deficiency (MND) driven health conditions include anaemia due to various nutrient deficiencies such as iron, vitamin B12 and folate; vitamin A deficiency diseases; and iodine deficiency disorders. India, similar to many other low and middle income nations, have a large swathe of its populace suffering from these conditions, the effect of which is often more critically felt in the deficient children of school-going age among them. Odisha, a nutritionally vulnerable state has a relatively larger burden of such deficiency related disorders afflicting its children. It is known that food fortification is a one of the most effective, equitable and cost-efficient ways to mitigate the MND problem.

The Mid-day Meal (MDM) programme of India entails nutritional support in the form of school-served lunch to the students of grade 1-8 (age group 6-14 years), attending mainly government and government-aided schools. It constitutes one of the largest nutritional supplementation programmes of the world. A pilot project conducted in the Gajapati district of Odisha state established operational model for fortified rice with iron. Learning from this success, the Department of School and Mass Education (DSME), Government of Odisha and World Food Programme (WFP) planned to demonstrate the model in Dhenkanal through multi-micronutrient fortification using two modalities- This time the multi-micronutrient fortification of MDM rice (Fortified Rice Kernel – FRK) was one strategy and use of Multi-micronutrient Powder (MNP) to fortify MDM curries was the other. Although the modality for delivery of the micronutrients was different, the micronutrient profile of both modalities (FRK and MNP) was similar in terms of the level and salt of the micronutrients which were added. Accordingly, all eligible schools in four of the eight blocks (sub-district administrative unit in the Indian administrative system) of Dhenkanal were chosen for FRK mode of fortification and the schools of the remaining four blocks of the district were to receive MNP mixed MDM.

An evaluation study was built-in the project right from the stage of conceptualization with the objectives of measuring a) changes in selected nutrition-related indicators; b) the attributability of these changes (if any) to the fortification strategies; c) the contribution of other factors to the changes (if any); and d) comparing the two strategies with regards to their costs and operational feasibility and convenience. Therefore, the evaluation exercise was designed as a pre-post study of the interventions with a counterfactual—a classical quasi-experimental study design. As a part of the evaluation baseline and endline studies were carried out by the Indian Institute of Public Health Bhubaneswar to record the characteristics of the school children and school MDM system of the Dhenkanal district. A control district – Angul—four socio-economic matched blocks of which were selected to function as the counterfactual. The control blocks were not to receive any intervention, but it was planned that the baseline and also the endline study

would be administered to it to measure the same variables as those of the intervention blocks. Following the baseline study, the two interventions were rolled out in the respective schools. After 17 months of intervention in MNP and around 15 months in FRK modality the endline study was carried out which measured the same variables as was done in the baseline. Additionally, at the endline, the cost of the two intervention strategies were estimated and their operational feasibilities and conveniences were assessed. Therefore, the objective of this report is to present the results of the evaluation of the MDM fortification project of Dhenkanal.

A multistage, stratified, clustered sampling method was undertaken to draw a probability sample of 18 schools from each arm of the intervention. Similarly, 18 schools were selected from four control blocks. In the baseline phase of the evaluation, 597 students in FRK arm and 578 students from MNP arm, studying in grades 1 to 8 in the sampled schools were selected. 589 students were sampled from the control arm of the study, who did not receive any of the above interventions. The same procedure was repeated in endline phase of the evaluation. The sample size of the endline comprised 597 students from 18 schools in MNP, 574 students from 18 schools in FRK and 467 students from 14 schools in the control arm. The same schools featured in the sample in both the phases of evaluation, but not the same students. The students were chosen using a stratified (class being the stratum) random method in both the occasions from the sampled schools. In addition to repeating exactly the methods that were carried out in the baseline phase of the evaluation, the endline phase conducted costing exercise to estimate the incremental cost of the two fortification strategies. Also, the endline phase undertook qualitative study to examine the operational feasibilities of the two fortification strategies.

Questionnaires were administered to the students and their parents to record information regarding their households' socio-demographic characteristics, their MDM consumption patterns, their hygiene-related behaviours in schools, their intake pattern of iron-folate supplements and deworming medications, their knowledge of anaemia and malnutrition and how they receive health education in schools. Their physical endurance was tested by timing their 200 metres run. Blood specimens were collected from the students to measure blood haemoglobin for detection of anaemia; and serum ferritin, zinc, retinol, folate and vitamin B12 were also measured to estimate the prevalence of deficiencies of these micronutrients in the school children. Blood biomarkers were tested in the laboratories of All India Institute of Medical Sciences, Bhubaneswar. School teachers were also administered questionnaire regarding the school MDM system and regarding availability of other hygiene-related facilities in the school. The sickness absenteeism patterns of the students were enquired and estimated from the records. A checklist was used to study the relevant facilities present in the sampled schools. The costing exercise accounted for all the relevant costs incurred in the pilot project of MDM fortification that was addition to the routine MDM system. The rice miller involved in mixing FRK to routine MDM rice was interviewed in the FRK arm, so were the NGO partners facilitating the implementation of the fortification strategies and supervisors

from another stakeholder of the project: World Food Programme. The operational feasibility study carried out in-depth interviews of district and block education office personnel, school teachers, school management committee members and cook cum helpers.

Key findings

Decline in prevalence of anaemia: A marked reduction in prevalence of anaemia has been observed in the treatment group in comparison to the control group. The results show increase in the mean values of Hb of 8.9%, 7.3% and 5.6% in MNP, FRK and Control arms respectively (p value of F test of ANOVA is <0.05). **The difference between MNP and FRK was statistically not significant**. There was no discernible gender difference as well as difference across grades in terms of the impact on anaemia of the two fortification measures.

Bio-medical status of children: Similarly marked reduction had been observed in prevalence of deficiencies of Folate (in FRK arm from 34.0% to 23.4% and in MNP from 51% to 15.3%). Folate deficiency has increased in control arm from 39.7% to 46.0%. The decline in deficiency status of Vit B12 was also discernible in two intervention arms, whereas there was remarkable decline of Vit B12 deficiency in control. Again, the decline in Ferritin deficiency, from its low prevalence in baseline was tangible in intervention arms but not in control. This further reinforces the positive effects of micronutrient fortification in reducing malnutrition in the district of Dhenkanal.

The quasi-experimental design provides us the opportunity to attribute this impact to the MDM fortification initiative primarily with possibility of contributions from other components of the school system.

Distribution of IFA and de-worming among students in schools: The proportion of students receiving Iron Folic Acid (IFA) supplementary formulations at school increased considerably in the endline phase in MNP arm (97.7% from 67% in baseline), however the percentages of receiving IFA declined quite significantly in the FRK arm (78% in endline from 91% in baseline). The receipt of deworming medications was more in the FRK arm both during baseline and endline as compared to the MNP arm.

Consumption of MDM: Approximately 90% of the students consumed MDM for all 6 days in a week in both the phases of the study. However, the endline phase witnessed a few points increase in MDM consumption for 6 days from the baseline despite the initial high bases. Only 50-60% of the parents were aware of the MDM fortification out of which ~40% reported that fortified MDM tasted better, as per their acquired information from their wards. Majority of the parents agreed that fortified MDM is beneficial and provides essential micronutrients alongside preventing malnutrition. Moreover, 40% parents felt there had been an increase in the consumption of MDM post fortification. Similarly, when inquired from children, 70% of them reported that fortified MDM tasted better and nearly 50% children recognized it to be beneficial.

The **knowledge and awareness about anaemia and undernutrition** seemed to have increased in the endline phase modestly, albeit remaining at a low level, especially for under-nutrition

Teacher's interview and school facility survey showed a greater proportion of teachers are aware of signs and symptoms of anaemia.

- All the teachers unanimously agreed that fortified MDM was beneficial
- 85% of teachers reported that fortified MDM tasted better and had therefore increased the MDM consumption.
- 60% of the teachers said that the training received on fortification was adequate.
- A considerable increase was observed during the endline phase in the proportion of schools conducting routine health check-ups for their students and the most common frequency was yearly (~67%).
- A rise was observed in the proportion of students who washed hands with soap before eating. However, soap-applied hand washing by the students after toilet was a practice in only 56% of schools. There had been a marked rise in the number of cooks washing hands before cooking (100% in the FRK and MNP arm).

Operational feasibility: Based on analysis of stakeholders' views about MDM fortification it was found that the **fortification process with FRK was operationally more convenient than MNP and had a few unintended advantages**.

- Cooking of fortified rice is simple and does not require any additional skill or time and can be handled by the cook-cum-helpers easily whereas fortification of curry with MNP needs additional time and skill as the amount of MNP to be mixed with the curry has to be carefully measured as per the number of students present in the school and as per their ages. This needs involvement of teacher-in-charge of MDM, and in his/her absence the calculation may be difficult. Few Government officials highlighted the difficulties in calculating the MNP requirement for indenting and the challenges to ensure streamlining of MNP supply.
- Few instances of MNP expiry and stock outs were reported. In addition to health hazards due to the consumption of expired MNP, expiry of MNP also leads to negative financial implications. Therefore, the presence of risk of under or overdosing was felt in MNP arm.
- The record-keeping and reporting of MNP indenting, supply and utilization was fraught with weaknesses.
- The teachers of MNP blocks looked at the MNP system (the mixing, record-keeping and reporting activities) as an additional burden on them.
- It was also felt that MNP process would need more intense monitoring by the block, district and state-level officials of Department of School and Mass Education
- It was also found that the contact period of MNP was more than that of FRK as MNP was rolled-out instantly after baseline study as compared to FRK which took time to fully cover the beneficiaries. In the MNP arm 100 percent coverage of schools was achieved over 15 days to one month time after the start of project

while 100 percent coverage of schools in the FRK arm was achieved over a longer period (around 2 months) as there were left over balances of unfortified rice which needed to be consumed before schools could consume fortified rice.

- The schools delivering FRK started cooking rice using watertight technique (which is considered healthier than water-draining method) after the MDM fortification training. However, adoption of this technique in MNP arm was also seen after training.
- The fortification of rice with FRK led to improved quality and quantity of rice supplied to schools. It also improved packaging and timeliness of rice supply. Quality issues prevalent with non-fortified rice, such as having unwanted materials including stones, husk, dust and strings of gunny bags etc. have reduced in FRK arm. Further, concerns related to supply of lesser quantity of rice than what is specified on bags, were also reduced due to supply of fortified rice in better quality of bags.

The **cost for fortification** was calculated on the basis of the pilot. Each meal by MNP for the primary and upper primary student were estimated to be marginally lesser (INR 0.87 and INR 1.15 respectively) than the FRK (INR 0.94 and INR 1.41 for primary and upper primary children, respectively). A separate scale-up costing exercise could bring in different results. An exercise conducted by the WFP earlier to estimate the scaled-up costs of implementing rice fortification and micronutrient powders modality has shown lesser cost of scaling-up FRK than MNP when calculated for scale-up (Annex 32).

Conclusions and Recommendations

To conclude, fortification of MDM is an effective method of improving the nutritional status of school children. Findings of the evaluation shows that MNP and FRK were both effective methods of MDM fortification. In the project area, MNP shows slightly better improvement in hb levels than FRK, but the difference between FRK and MNP is statistically not significant. This could be because of increased IFA receipt and greater "contact period" in MNP arm. FRK on the other hand is operationally more convenient than MNP.

Based on which the recommendations are

- The Department of School and Mass Education, Government of Odisha may decide to scale-up state-wide the fortification of MDM initiative(s) in a large-scale programme mode. Between the two modalities, the difference in the impact is not statistically significant. Piloting of MNP is slightly more cost-effective, but the costing analysis is based on the costs incurred in implementing the pilot. The costs for scale-up however would change as economies of scale will also play its role. The training and monitoring costs for MNP might be much higher due to more intense efforts at huge number of locations as the evaluation findings shows that the risk of wrong dosage of MNP is high. FRK has more operational convenience and other significant advantages associated as compared to MNP. **Based on the**

evaluation findings most critical recommendation to government is to scale-up fortification of MDM in other districts.

- As the evaluation findings shows that FRK is operationally more feasible than MNP, thus if the decision is to scale-up FRK, then supervision of the blending of the fortified kernel with the routine MDM rice, which is the key step to this modality of fortification, has to be closely monitored.
- If the decision is in favour of MNP as the only or one of the fortification modalities then more rigorous training of CCH, their role definition in mixing MNP with MDM curry and much enhanced supervision and monitoring of the entire MNP-fortified MDM system should be ensured. In addition, details of transportation and storage of the MNP as well as indenting the same on a regular basis needs to be worked out.
- The IFA, deworming medication delivery and consumption along with school health check-ups need to be strengthened further.
- The knowledge of the children, teachers and the parents with regards to malnutrition, undernutrition, anaemia and MDM fortification need further strengthening through the routine school system. Customizing knowledge content and delivery to children of different age-groups should be considered.
- Handwashing of the children by soap before meals should become almost universal.

1. Introduction

1.1 Overview of the evaluation subject

1. This report presents the assessment of the fortification of Mid-Day Meal (MDM) designed to reduce micro-nutrient deficiencies (MNDs) in school children in the district of Dhenkanal of Odisha, India. MDM is a national program by the Government of India which aims at boosting school attendance and supporting the dietary requirements of school children studying in government, local body and government-aided primary and upper primary schools. This evaluation has been commissioned by the World Food Programme (WFP) India Country Office (CO) and is based on the Terms of Reference (ToR) provided by them (Annex 1).

2. State of Odisha is economically poor and nutritionally vulnerable. The children of school-going age in the state are perennially plagued by the ill consequences of MNDs such as impaired cognitive development, weak immune systems and increased morbidity rates due to gaps in their intake of most of micronutrients. Notwithstanding the MDM programme is strategically placed in the school system for providing nutritional support to the school children which mostly helps meet the calorie and protein requirements of the children to a certain extent, there still exists a large gap with regards to catering to their daily micro-nutrient needs. Given the long felt need by the state government to fill the existing gaps in micronutrient intake by school children, thereby alleviating MNDs, fortification of MDM was considered the ultimate choice. This is because food fortification remains a proven efficient and effective strategy for combating MNDs and MDM is an efficient vehicle for food fortification which can favourably impact the nutritional status of innumerable children at a reasonable cost with no requirement for behavioural change on the part of the children.

3. Hence, the Department of School and Mass Education (DSME) of the state government of Odisha with the support from WFP initiated implementation of MDM fortification project in Dhenkanal district in Odisha targeted at all the school children in the age group 6 to 14 years (Grade I to Grade VIII), who are enrolled at all the MDM-providing schools of the district. Two models of fortification were used in the project. This included use of multi-micronutrient fortified rice kernel (FRK[1]) in all the schools of four revenue blocks and the multi-micronutrient powder (MNP) in all the schools of remaining four blocks of Dhenkanal district. The constituent/composition[2] of both the models—FRK and MNP was the same. The FRK and MNP were provided by the

[1] FRKs were manufactured by combining rice flour with micronutrients and converting this into rice-like kernels using appropriate extrusion technology. The FRKs closely resembled the sheen, transparency, consistency and flavour of rice. In order to fortify the rice, these fortified rice kernels were blended with the rice procured from government's Food Corporation of India (FCI)[1] in 1:100 ratio.

[2] The micronutrients in both FRK and MNP comprised iron, zinc, vitamin A, thiamine, niacin, pyridoxine, folate, vitamin B12

WFP as in-kind support to the school system. MDM was provided as regular government provision to each school. Schools were responsible for storage of food commodities and preparation of the school meals. It was expected that, these models of fortification in Odisha would offer programmatic and logistics solutions for reducing the prevalence of MND among children of school-going age.

4. To ensure effective implementation of the MDM fortification initiative in the schools of Dhenkanal, the project had an in-built system of monitoring, which was further bolstered by the DSME's regular monitoring mechanism. The project engaged two NGOs in Dhenkanal- Arun Institute of Rural Affairs (AIRA) and Social Organization for Voluntary Action (SOVA), to have support in the implementation and monitoring of the project activities.

5. In the schools of the FRK blocks, the FRK fortified MDM rice was cooked and served to the schoolchildren. For the blocks using fortified rice in the MDM, an FRK manufacturer and a local rice miller were selected to ensure procurement and distribution of fortified rice to the schools. The fortified rice kernel producer delivered the FRK to the rice miller in Dhenkanal. The project equipped the rice miller with blending equipment for fortification of the rice lifted by the miller from the Food Corporation of India (FCI)[1] storehouse; the fortified rice was further distributed to the schools through the government transporter. The SOVA looked after the FRK fortification activities in the schools of FRK blocks.

6. Similarly, in schools of other four implementation blocks, MNP in measured amounts was added to the cooked and cooled curry dishes served in the MDM. In these blocks, a system for delivery of the MNP up to the schools had been worked out. The manufacturer of the MNP delivered the same up to a single identified location in the district, which was the local civil society agency AIRA; further distribution to schools from this point was through the government systems. The MNP was added to the curry cooked in the mid-day meals in the schools at pre-defined quantities by the school Head-masters/teacher in-charge towards fortification. The recommended quantities of MNP for MDM curry fortification were 0.6 gm and 0.8 gm for primary and upper primary school children, respectively. The local agency AIRA supported the MNP fortification.

7. To ensure that fortification of both cooked rice and cooked curry was at an adequate level, the project had identified a National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited laboratory where the cooked food samples were tested for appropriate micro-nutrients. Raw fortified rice was also tested.

8. The overarching objective of the project was to support the Government of Odisha (GoO) in choosing the most effective, operationally feasible and economically viable model for potential scale-up across the state. To evaluate the project, the WFP partnered with Public Health Foundation of India/Indian Institute of Public Health, Bhubaneswar (IIPHB) and All India Institute of Medical Sciences (AIIMS), Bhubaneswar which conducted the assessment of the project. The assessment covered the period from July 2016- September 2018, which included a baseline assessment conducted in 2016-17 just before the field intervention components of the project started, followed by an endline assessment conducted during September-November 2018.

9. This assessment exercise was designed to provide a comparative representation of the impact of the two modalities of nutrition interventions—fortifying MDM with FRK and MNP—on the micronutrient deficiency status and related performance indicators among school children aged 6-14 years (class I to class VIII). It also aimed to provide comparative picture of the two modalities in terms of their costs and operational features. Each of interventions covered all the schools in four revenue blocks (out of total eight blocks) of Dhenkanal district in Odisha. This means four revenue blocks constituted FRK arm and the remaining four blocks represented the MNP arm. For assessment purpose (both in baseline and endline),18 sampled schools from each arm were considered. Additionally, schools under four revenue blocks of Angul district (18 in the baseline and 14 in the endline) were taken as the counterfactual for the assessment, hereinafter referred to as the control arm. This was envisaged to help appropriately select the most suitable method(s) with proven benefits, and scale-up state-wide to combat the MND situation in Odisha's school children.

10. **Overall, the purpose of the assessment was to inform the operational and strategic decision-making and therefore facilitating the state-wide rollout of the MDM fortification modality(s) by GoO**. Additionally, the assessment results are expected to be important for informing national policies and as an advocacy tool for the mobilization of resources on the scale up of micro-nutrient fortification of school-served meals.

11. As per the ToR of the assessment exercise, the study focused on the fortification project's intended objectives and outcomes and assessed it against its planned indicators. The specific objectives of the assessment were to:
    - Understand whether there is any change in the area under study after the intervention.
    - Examine whether the change (if any) was because of the intervention (ATTRIBUTION).
    - Explore what factors were responsible for the change (CONTRIBUTION).

- Examine which of the intervention model is more cost-effective and operationally feasible in terms of demonstrating the impact for potential scale-up in the state.

12. The expected outcomes related to changes in key nutritional outcomes among the school children included blood bio-markers of micronutrients. The changes in awareness of health and nutrition among school children and the larger community, and internal changes to the school MDM systems and processes of cooking were also among the expected outcomes.

13. Based upon the above stated evaluation objectives and purpose, the exercise was designed to answer the following four evaluation questions (EQs):

- **EQ1:** What is the impact of MDM fortification project (with FRK or MNP) on health outcomes, nutrition-related knowledge, and self-reported dietary practices of school children attending grades 1 to 8 (age group 6-14)?
- **EQ2:** What is the impact of MDM fortification project (with FRK or MNP) on nutrition-related knowledge, self-reported MDM service-related practices of school teachers and other school functionaries; and nutrition and hygiene-related facilities in school?
- **EQ3:** What are the comparative operational features of these two intervention strategies?
- **EQ4:** What are the comparative costs of implementation of these two strategies?

14. The expected users of this evaluation are the WFP, India CO and its main implementing partner DSME, GoO, which is expected to take over the management and monitoring of the MDM fortification activities soon after this assessment exercise. Apart from it, other state governments and the central government of India will also be benefitted through this evidence. It is also expected that the evaluation report will be of interest to the broader nutrition community.

    The assessment process included a gender focus in the evaluation scope which complied with the ToR. This was reflected in the approach and analysis of the assessment results.

1.2 Context

15. In recent decades, there has been gradual but remarkable progress on socio-economic front in India, resulting in high economic growth, significant rise in per capita income and poverty reduction. Nevertheless, the country lags behind on many crucial development indicators, nutritional status being one of them. India is home to one in every three malnourished children in the world[1]. There is under-nutrition among large segments of the population, specifically among vulnerable groups like infants, young children, adolescents, women and the elderly[1]. Malnutrition, a reality for the children of our country, is becoming evident according to United Nations

Children's Fund (UNICEF)'s 'The State of the World's Children 2016' Report. The report ranks India 10th in terms of prevalence of underweight children in the world and 17th in terms of stunting prevalence[2]. According to a survey carried out by the National Nutrition Monitoring Bureau (NNMB) in 2012 across 10 states, the median intake for most nutrients was less than 70% of the recommended dietary allowance (RDA) for Indians, especially for school children, adolescents, and pregnant women[3]. Among the children in school-going age, the problem of malnutrition and especially MND is widely prevalent.[3]

16. The information on nutritional status of Indian children of primary school age (6-11 years) is sparse. The limited data from the NNMB survey of 2006 (NNMB report no. 24) in nine states found that more than half the children studied were undernourished[4]. The survey found the underweight prevalence to be 63% in 6 to 9 year olds, 57% in 10 to 13 year olds and 63% in 14 to 17 year olds[4]. The NNMB data also showed a high prevalence of micronutrient deficiencies in children, especially calcium, iron and vitamin A. In fact, diets of school-age children were more deficient in minerals and vitamins than in energy and protein. MND disorders among school children are associated with a range of short and long-term consequences including increased illness, mental retardation, and poor cognitive and physical development. The consequences, therefore, negatively affect socioeconomic development at a household, state and national level.

17. In an effort to improve nutritional levels and address the issue of classroom hunger among school-aged children, and to encourage school attendance by providing a cooked meal every day, the Indian Supreme Court mandated a school feeding program in 2001, known as the "mid-day meal scheme". However, the MDM programme has been found to be a substitute rather than a supplement for the home meal and the contribution of micronutrients through this programme is negligible[5].

18. Odisha is one of the most nutritionally vulnerable states in India; with 45% of children aged between 6 to 59 months are anaemic (National Family Health Survey-4)[6]. As per the Clinical Anthropometric Biochemical report (2014), 81.2 percentages of children in the age group of 5-9 years are anaemic whereas it is 74.5% in the age group of 10-17 years[7]. As per the third repeat survey conducted by National Nutrition Monitoring Bureau (NNMB) in 2011-12, the average daily intake of micronutrients as against the recommended dietary allowance (RDA) reflects a gap ranging between 50-70% across the school age for both sexes for most micronutrients[3].

19. Given the nature of the prevalent micronutrient deficiencies and the identified culture-specific gaps in the intake of most of the micronutrients amongst the school

children in the state of Odisha, the DSME of Odisha government with support from WFP planned to implement an MDM fortification project. This joint initiative is also in congruent with the Food Safety and Standards Authority of India (FSSAI)'s Food Safety and Standards (Fortification of Foods) Regulations, 2016 which promotes fortification as a means to address micro nutrient deficiencies and time to time mandates fortification of any food article specified under the regulations on the directions of the Government of India or on the recommendations of the States/Union Territories and in consultation with stakeholders. Food fortification is a proven method for rapid improvements in the micronutrient status of a population, especially of vulnerable groups[8]. The two possible modalities of fortification of MDM envisaged by the planners included the use of multi-micronutrient FRK and use of MNP to fortify curries. Both of these methods have proven efficacy under controlled trial conditions[9–11].

20. Proven efficacy of micro-nutrient fortification world-wide and its cost-effectiveness led to designing of this pilot project aimed at assessing the comparative impacts of FRK and MNP under natural field conditions, which further led to the evaluation initiative aimed at examining the operational and cost effectiveness of these two modalities of fortification. WFP's previous experience of experimenting MDM rice fortification (using FRK) in the Gajapati district, Odisha which brought about favourable results in addressing anaemia prevalence among school children. Regional Medical Research Centre (RMRC) data pointed out that among all the districts surveyed in Odisha, anaemia status among school children in Gajapati is the lowest. Post-pilot, GoO is sustaining the fortification of MDM in Gajapati. Fortification of rice has been incorporated in the policy and programmatic ecosystem at the national level. The Food Safety & Standards Authority of India (FSSAI) has gazetted recommendations and standards on rice fortification based on review of efficacy, effectiveness and programmatic experience. The Ministry of Human Resource Development in its communication to States on Revision/modifications of the Centrally Sponsored National Programme for Mid-day meal in schools dated February 2019 has approved the fortification of food items in a systematic manner in the mid-day meals starting from introduction of fortified rice. No such guidelines have been put forth for micronutrient powder addition to curry. The Ministry of Consumer Affairs, Food and Public Distribution in its letter dated 14th Feb 2019 has approved the Centre Sector (CSS) pilot scheme on fortification of rice and its distribution under the Public Distribution System, and vide letter dated 11th April 2019 will also provision fortified rice for MDM beneficiaries in the district covered by the scheme. Government of Odisha has initiated process for the fortification of rice in PDS as a part of CSS in Malkangiri district.

1.3 Evaluation Methodology

21. The assessment adopted a mixed methods approach—quantitative and qualitative along with costing analysis. The evaluation methods demonstrated consideration of gender equality at each and every stage/aspect of evaluation. To conduct this evaluation, Indian Institute of Public Health, Bhubaneswar (IIPHB) was selected through a competitive process. Another partner of the evaluation, All India Institute of Medical Sciences (AIIMS), Bhubaneswar, conducted the laboratory tests of the blood specimens collected from the sampled students (see below).

1.4 Evaluation Approach

21. The assessment employed the Development Assistance Criteria (DAC) as the overall approach to design, data collection, data analysis and presentation of key findings.

1.5 Evaluation Methodology

22. The quantitative component followed a quasi-experimental study approach employing a Pre-Post (repeated cross-sectional data) Non-Equivalent Group Design with Multiple Dependent Variables. Following the cross-sectional baseline assessment of the indicators of micronutrient insufficiency among sampled students from sampled schools, the interventions were rolled-out in all the Dhenkanal schools – each school receiving either FRK or MNP, depending on the arm of intervention their hosting block was assigned to. The same cross-sectional assessment was repeated in the end line evaluation. The control blocks did not receive any intervention but underwent two rounds of assessments along with the intervention blocks in both the baseline and endline assessments.

23. The **quantitative survey,** the mainstay of the quantitative component of the evaluation exercise, addressing the EQ1 & EQ2, replicated the same methodology as the 2016-17 baseline survey to enable direct comparison. The survey utilized local enumerators, comprising both men and women, for the data collection, ensuring that language and cultural barriers were minimized, and political sensitivities were addressed. Enumerators spoke the local language (Odia) to ensure both questions and responses were well understood. The quantitative survey generated primary data by interviewing students and their parents, collecting blood specimen from sampled students and interviewing teachers. The quantitative exercise also included secondary sources of quantitative data covering information about school infrastructure, school staff position, MDM related information, health services being provided at schools, health and hygiene education. The secondary quantitative data were collected through record verification. The endline evaluation did not collect data from the same children sampled in the baseline in order to avoid age related effects and potential biases due to programme implementation. Hence, the study instead of using repeat measures on same individuals, used two rounds of cross-sectional data, i.e. in baseline and endline.

24. The quantitative survey was conducted in all the 8 constituent blocks (sub-district administrative units) of the Dhenkanal district chosen for piloting these two intervention strategies. Of these, 4 blocks of the district were assigned for FRK intervention and the rest for MNP. Likewise, four blocks of the neighbouring Anugul district were selected as control blocks for the trial, after they were matched, as closely as possible, with the blocks of Dhenkanal, using a few key socio-demographic and health indicators. Therefore, this project and its subsequent assessment emerged with a three-arm quasi-experimental design employing a pre-post analysis of the indicators**.** The unit of intervention was schools in the blocks - as the MDM system of the entire school, depending on the block the school belonged to, were to be fortified using one of the two fortification strategies.

25. The baseline study used a multi-stage stratified clustered sampling method to draw a probability sample of school and students, the strata being types of schools at higher level and grades at lower level. 18 schools of different categories from each of the three arms were sampled in the baseline from the entire universe of schools in Dhenkanal (Table 1). The number of students sampled from different categories of these 18 schools, but all restricted to grades I-VIII, are given below arm-wise (Table 2). Similarly, the endline study sampled 18 schools from each of the intervention arms and 14 schools from control arm. The type of school-wise and arm-wise distribution of endline students are also depicted. The gender-wise and grade-wise distribution of the sampled students are also presented (*Table 3*).

Table 1. Types of schools from where students were sampled

Types of schools from where the students were sampled	**Students in each arm**					
	FRK		**MNP**		**Control**	
	Baseline	**Endline**	**Baseline**	**Endline**	**Baseline**	**Endline**
Primary	221	227	245	243	259	151
Primary with upper primary	275	292	232	243	261	293
Upper primary	101	78	101	88	69	23
Total	**597**	**597**	**578**	**574**	**589**	**467**

Table 2. Sample of Schools

	MNP		**FRK**		**Control**	
	Baseline	***Endline***	***Baseline***	***Endline***	***Baseline***	***Endline***
Primary	9	9	9	9	9	6
Upper Primary	5	5	5	5	5	6
Both	4	4	4	4	4	2
Total	18	18	18	18	18	14

Table 3 Grades of sampled students across three arms, disaggregated by sex

	FRK				**MNP**				**Control**			
	Baseline		Endline		Baseline		Endline		Baseline		Endline	
Grades studying in	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
1	30	31	33	31	35	36	33	39	32	40	25	27
2	41	28	36	25	36	36	32	40	39	39	31	18
3	37	43	34	50	40	35	30	44	39	39	30	36
4	41	40	39	45	35	37	46	31	37	38	28	24
5	43	41	44	42	37	36	34	30	32	45	28	38
6	39	39	41	35	34	38	38	30	42	33	37	32
7	30	40	31	40	35	36	40	34	39	36	37	27
8	42	32	38	33	35	37	35	38	36	23	30	19
Total	**303**	**294**	**296**	**301**	**287**	**291**	**288**	**286**	**296**	**293**	**246**	221

26. The quantitative component included the administration of three structured data collection tools: a student-parent questionnaire, a teacher interview schedule and a school survey checklist. While the student- parent questionnaire was administered to address the EQ1, the teacher interview schedule and school survey checklist together were used to answer the EQ2. Details of each of the data collection tools are described in more detail below.

27. The student-parent questionnaire included basic information on composition and education of the household members, socio-demographic profile (age, sex, religion and caste of the students), student and parent's knowledge about undernutrition and fortification, student's dietary and hand-washing practices, their illness and school absenteeism as well as experience of Iron Folic Acid (IFA) and deworming medication consumption in their schools. Information about household information: parents age, educational attainment and occupation, eating habits of the household members that encompassed information about who ate first and who ate last and who ate less if the household experienced any food shortage were captured by the student-parent questionnaire.

28. Data on blood samples were collected from the students to examine the level of micronutrients in their serum and physical endurance test result of the sampled students.

29. In order to conduct cost analysis, cost related data of piloting the project from both the arms were collected. The procurement costs that were used in the costing analysis includes the costs for purchasing the raw materials-FRK, MNP and plastic scoops. Likewise, the transportation cost was the cost required to transport the materials

required for fortification- FRK and MNP packets from the manufacturer to the designated points in the district and thereafter to deliver at the schools. The analysis included the human resources (HR) costs that had incurred towards implementation, monitoring and supervision of the MDM fortification programme. The information about the HR cost was collected from the implementing NGOs- AIRA for the MNP and SOVA for the FRK as well as the WFP. For the WFP, appropriate apportioning criteria was used for the staffs based upon their time contribution for monitoring and supervision. For instance, if any WFP staff contributed 10% of the total time for an activity, only 10% of the total cost (from the gross salary of WFP staff) spent for his/her time contribution was considered. The analysis estimated the travel cost, by calculating total number of visits by different categories of WFP staff and their entitlements (Travel allowance and other perks) per day as per the United Nations norms. The information about blending, processing & packaging cost was collected from the rice miller. This included-labour cost, Supervisor's & Machine operators' salary, purchasing cost of HDPE bags, labelling cost, electricity for fortification and rent for space. This cost was borne by the WFP. The cost data for this component were obtained from both the rice miller and WFP officials. The Information Education Communication (IEC) cost in the analysis covered the cost of developing of information, education and communication materials as well as wall painting. The implementing Non-government Organization (NGO)s- AIRA and SOVA conducted trainings for its own staffs along with the training of master trainers, school teachers, cook-cum helpers. Besides, they also organized district and block level workshops. The cost related data on organizing training and workshop were obtained from implementing NGOs and the WFP, and included in the costing analysis. The office and administrative costs for implementing NGOs included office stationary, contingencies and was collected from the implementing agency. The quality of MNP and FRK fortified meals were tested by National Accreditation Board for Testing and Calibration Laboratories (NABL). This cost was also borne by WFP. The cost of "blender with the vibratory feeder for feeding FRK" and related maintenance cost were considered for analysis. This cost was obtained from the WFP and the annualized cost for the machine was estimated as the machine was expected to work for more than a year.

30. For cost estimation of FRK or MNP, all the cost components (Annex 8) for the entire project period were calculated, separately. Then, the total cost for FRK or MNP was shared between primary and upper primary children. The estimation of incremental cost for FRK or MNP fortification per meal for primary or upper-primary school children was calculated dividing total cost of fortification (FRK or MNP) by total number of meals consumed by the two categories of students during the project period. The sources of costing data were WFP, SOVA, AIRA, rice-miller and officials of

district education office. The details of component-wise distribution of costs and step-wise estimation process are provided in the Annex 9 and 10, respectively.

31. **Validity and reliability of data:** To ensure **validity and reliability** of data, the evaluation questionnaires were designed using an evaluation matrix (Annex 2). These were used in both baseline and endline assessments. The evaluation also used an independent team of enumerators, who collected the quantitative, qualitative and costing data from relevant sources. The evaluation which used a mixed-methods approach also triangulated information from different methods and sources to enhance the reliability of findings.

32. Quality Assurance of data was undertaken through double-check (10% of forms) by the team supervisors of quantitative data collected from the field, and by double-entering the data (5% of the forms) at the data-entry point.

1.6 Ethical protocols

33. The assessment adhered to ethical protocols set by the United Nations Ethical Guidelines (UNEG) Norms and Standards for Evaluations and UNEG guidance principles on integrating human right and gender equality perspectives in evaluations. The core tenets underscoring the evaluation were;
    a. **Utility:** The evaluation was designed to help WFP India and GoO address and effectively serve the needs of the full range of participants.
    b. **Independence**: The evaluators engaged exercised independent judgement while designing and analysing data and were not influenced by views or statements of any party.
    c. **Credibility**: The evaluation used reliable sources for collecting data and making observations. The evaluators ensured that the evaluation findings were accurate, relevant, timely and provided a clear, concise and balanced presentation of the evidence.
    d. **Conflict of interest**: The evaluators ensured that there no conflict of interest to strengthen the credibility of the evaluation 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 evaluation 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 sufficient information to know how to seek redress for any perceived disadvantage suffered from the evaluation.

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 minimum risk to the respondents and aimed at maximizing benefits and reduce any unnecessary harms that might occur from negative or critical evaluation, without compromising the integrity of the evaluation.

1.7 Ethical considerations

34. The Indian Council of Medical Research (ICMR) ethical guidelines mandated by Indian government were followed to inform the entire evaluation methodology (baseline as well as endline). Participation was voluntary and participants were informed that all their responses were confidential. All interviews of the students and their blood specimen collection procedures were conducted after acquiring written informed assents from the minor participants and written informed consents from their parents. Both the information sheet and the assent/consent forms were in Odia language with English versions also made available for all the stakeholders. The same process of acquiring informed consent was also followed while interviewing teachers. The identity of the participants was securely kept only with the principal investigator and the databases were anonymized to not to reveal the identity of the subjects to others handling the data for analysis. This same data anonymization 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 Ethics Committee (IEC) of Indian Institute of Public Health, Bhubaneswar and the laboratory analysis component of the study was approved by the IEC of All India Institute of Medical Sciences, Bhubaneswar. The assessment further received clearance from the State Research and Ethics Committee of Department of Health, Government of Odisha. Minor suggestions of the committees vetting the proposal were duly incorporated in the tools, information and assent/consent forms.

1.8 Limitations of the evaluation

35. Timing of quantitative data collection: Although the endline assessment was planned just after one-year completion of the implementation period that is March 2018, due to unavoidable circumstances such as school annual examinations followed by early summer vacation declaration by the state government, the evaluation had to be deferred till September 2018, which meant that 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 and endurance tests.

36. The contact period of MNP was more than that of FRK as MNP was rolled-out instantly after baseline study as compared to FRK which took time to fully cover the beneficiaries.

37. Even during the data collection for endline evaluation conducted between September-November, 2018 there was a series of interruptions in data collection activities due to cyclone alarm, bandh and vacations.

38. During quantitative data collection in both the baseline and endline evaluation, due to absence of a few students and their parents during quantitative data collection, the exercise fell short of the desired number of samples by a modest margin.

39. In both the baseline and endline evaluation, due to weakness in the maintenance of records/registers at schools, some required information- details of enrolled students, MDM consumption, and details of stock and consumption data as to IFA and de-worming tablets/syrup could not be captured with the desired accuracy from a few schools.

40. While estimating total cost of interventions, it was decided that the cost related data linked to time contribution of the state government officials at district and block levels involved in monitoring and supervision of the MDM fortification programme would not be included in the analysis as it was already part of the routine MDM system. However, if MNP modality is scaled-up, then cost of monitoring will increase due to the need for additional and intense monitoring to avert undesirable outcomes such as usage of expired MNP or over/under dosage of MNP and other issues found in the MNP arm.

41. Marginal discrepancies were found between the cost data provided by the implementing agencies and the cost paid to them by the WFP. Nonetheless, in this analysis we included only the data collected from the implementing agencies, which were assumed to be the actual cost incurred.

42. Regarding the costing exercise, costs of WFP personnel, their time contribution and travel to the field, who supervised and monitored the pilot project and NGO partners at the district-level for the two arms MNP and FRK were costs that would not be required when the fortification is rolled-out as a routine programme by the government. Therefore, a scale-up costing exercise, when the government decides to adopt one or both of the modalities for the whole state or a bulk of it, which was not the mandate of this project assessment, was not carried out by this exercise. WFP has earlier conducted a separate exercise of calculating the estimated costs of implementing rice fortification and micronutrient powders modality based on

calculations for projected scale-up models (FSSAI recommended formulation). The estimated cost for fortification (not including training and monitoring requirements) for MNP is approximately 0.13 Rs./meal compared to 0.09 Rs./meal when using fortified (FRK) rice blended during milling, or 0.10 Rs. when using fortified rice blended after milling. The total estimated cost of implementing MNP modality, including all required training and monitoring, amounts to INR 0.24 per child per day during the first year and 0.16 Rs. during the following years, whereas total cost of implementing fortified FRK remains same, as rice-modality does not need extra monitoring and training (Annex 32).

43. Contact period of MNP was more than that of FRK as MNP was rolled-out instantly after baseline study as compared to FRK which took time to fully cover the beneficiaries.

2. Evaluation Findings

2.1 Evaluation Question 1: What is the impact of MDM fortification project (with FRK or MNP) on health outcomes, nutrition-related knowledge and self-reported dietary practices of school children attending grades 1 to 8 (age group 6-14 yrs)?

44. The following section underscores the salient features emanating from the quantitative study of students and parents. Few tables are in the body and the rest are in *Annexes.*

45. The following table (Table 4) describes the changes in Hb concentration and changes in prevalence of different categories of anaemia (based on their severity) as well as non-anaemic children in the baseline and endline samples across three arms.

Table 4 Prevalence of Anaemia

Anaemia	**FRK**		**MNP**		**CONTROL**	
	Baseline (n=595)	**Endline (n=592)**	***Baseline (n=578)***	**Endline (n=555)**	***Baseline (n=581)***	**Endline (n=459)**
Hb gm/dl Mean (SD)	10.26 (1.31)	11.01 (1.19)	10.12 (1.48)	11.02 (1.31)	10.38 (2.28)	10.96 (1.27)
Anemia						
Severe	22 (3.7%)	2(0.3%)	32 (5.5%)	3(0.5%)	59 (10.2%)	7(1.5%)
Moderate	411 (69.1%)	288 (48.6%)	396 (68.5%)	288 (51.9%)	343 (59.0%)	219(47.7%)
Mild	58 (9.7%)	135(22.8%)	68 (11.8%)	108 (19.5%)	32 (5.5%)	112 (24.4%)
Normal (non-anaemic)	104 (17.5%)	167 (28.2%)	82 (14.2%)	156 (28.1%)	147 (25.3%)	121(26.4%)

46. The results show increase in the mean values of Hb of 8.9%, 7.3% and 5.6% in MNP, FRK and Control arms respectively (p value of F test of ANOVA is <0.05). During end line round, double fortified salt (fortified with iodine and iron) was universally used in all the schools of control area, where as the same was not used in the schools of intervention area. The table also shows increase of proportion of children without anaemia (non-anaemic) in the endline phase for FRK and MNP arms whereas the prevalence remained almost unaltered in the control arm. The estimate of Difference-in-Difference or the DID estimator is presented in the following section.

47. The following table (
48. Table *5*) describes the impact of fortification using the critical impact indicator that is absence of anaemia or prevalence non-anaemia (>11.99 gm% for children aged 12-14 years and >11.49 gm% aged 5-11 years). The haemoglobin values of students in various arms were also considered to estimate the mean difference across groups.

Table 5 Impact of Fortification

	Outcome is absence of anemia (proportion of non-anaemic children)		**Outcome is average haemoglobin**	
	Prevalence Ratio (95% Confidence Interval)	***p* value**	***Beta* coefficient (95% Confidence Interval)**	***p* value**
FRK				
Baseline vs endline comparison in FRK arm – unadjusted	1.61 (1.3,2.01)	<0.0001	0.76 (0.62,0.90)	<0.0001
Baseline vs endline comparison in FRK arm – adjusted*	1.64 (1.3,2.06)	<0.0001	0.78 (0.63,0.93)	<0.0001
Baseline vs endline comparison in FRK arm – unadjusted; after factoring in changes (in control	1.58 (1.17,2.13)	0.002	0.10 (-0.03,0.17)	<0.0001
Baseline vs endline comparison in FRK arm – adjusted*; after factoring in changes (in control	1.71 (1.25,2.35)	<0.0001	0.21 (-0.08,0.48)	<0.0001
MNP				
Baseline vs endline comparison in MNP arm – unadjusted	1.98 (1.56,2.53)	<0.0001	0.91 (0.74,1.07)	<0.0001
Baseline vs endline comparison in MNP arm – adjusted*	2.06 (1.57,2.57)	<0.0001	0.82 (0.64,1.00)	<0.0001
Baseline vs endline comparison in MNP arm – unadjusted; after factoring in changes (in control)	1.94 (1.41,2.66)	<0.0001	0.13 (0.06,0.20)	<0.0001

	Outcome is absence of anemia (proportion of non-anaemic children)		Outcome is average haemoglobin	
	Prevalence Ratio (95% Confidence Interval)	***p* value**	***Beta* coefficient (95% Confidence Interval)**	***p* value**
Baseline vs endline comparison in MNP arm – adjusted*; after factoring in changes (in control)	1.96 (1.41,2.75)	<0.0001	0.13 (0.05,0.20)	<0.0001
MNP versus FRK				
Baseline vs endline comparison across FRK and MNP arm – adjusted*	1.22 (0.86,1.72)	0.27	0.03 (-0.04,0.09)	0.48

* adjusted for standard of living index, receipt of IFA and receipt of deworming medications

49. It shows that there was a 61% crude increase in non-anaemic students in FRK arm in the endline as compared to baseline phase. After adjusting for covariates like differences in standard of living index and variations in receipt of IFA and deworming medications between baseline and endline phase, the difference increased to 64%. After adjusting for the changes in the control arm and also factoring in aforementioned co-variates, the pre-post rise in non-anaemic children in FRK arm was 71%. The corresponding figures for MNP were 98%, 106% and 96% respectively. **However, the increase witnessed in MNP after factoring in the changes in FRK was not statistically significant.**

50. The above finding was also corroborated by changes in average haemoglobin levels between baseline and endline and across arms (
51. Table *5*).

52. There was **no discernible gender difference** in terms of the impact on anaemia of the two fortification measures, as we found the interaction of the DID estimator with gender (explained in Methods) to be statistically not significant. Similarly, **the effect of fortification did not also vary in different age-groups (grades used as a proxy for age).** Table 6 and Table 7 describe the grade and sex-disaggregated status of average haemoglobin and anaemia among school children. The disaggregated results show that there is no systemic gender or grade differentials in impact of fortification (also observed through regression results), rather girl students benefitted more from fortification (though not statistically significant).

Table 6. Sex and grade-disaggregated data of average haemoglobin and anaemia status, baseline

			FRK		MNP		Control	
			Male	**Female**	**Male**	**Female**	**Male**	**Female**
Haemoglobin								
	Mean(SD)		10.4 (1.3)	10.1 (1.4)	10.1 (1.5)	10.1 (1.5)	10.3 (2.2)	10.4 (2.4)
	Anaemia							
		Mild	29 (9.9%)	29 (9.6%)	32 (11.0%)	36 (12.5%)	19 (6.6%)	13 (4.4%)
		Moderate	197 (67.0%)	214 (70.9%)	197 (67.7%)	199 (69.3%)	172 (59.3%)	170 (57.6%)
		Severe	7 (2.4%)	16 (5.3%)	19 (6.5%)	13 (4.5%)	26 (9.0%)	34 (11.5%)
		No anaemia	61 (20.7%)	43 (14.2%)	43 (14.8%)	39 (13.6%)	73 (25.2%)	78 (26.4%)
			Grades 1-5	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**
	Mean (SD)		10.4 (1.4)	10.0 (1.3)	10.2 (1.4)	10.0 (1.6)	10.7 (2.4)	9.8 (2.0)
	Anaemia							
		Mild	32 (8.6%)	26 (11.7%)	47 (12.9%)	21 (9.8%)	14 (3.7%)	18 (8.6%)
		Moderate	244 (65.2%)	167 (75.2%)	247 (68.0%)	149 (69.3%)	195 (51.9%)	147 (70.3%)
		Severe	13 (3.5%)	10 (4.5%)	15 (4.1%)	17 (7.9%)	34 (9.0%)	26 (12.4%)
		No anaemia	85 (22.7%)	19 (8.6%)	54 (14.9%)	28 (13.0%)	133 (35.4%)	18 (8.6%)

Table 7. Sex and grade-disaggregated data of average haemoglobin and anaemia status, endline

			FRK		MNP		Control	
			Male	**Female**	**Male**	**Female**	**Male**	Female
Haemoglobin								
	Mean (SD)		10.95(1.22)	11.09(1.16)	10.99(1.27)	11.05(1.37)	10.97(1.34)	10.95(1.21)
	Anaemia							
		Mild	64(21.4%)	71(24.2%)	55(19.7%)	53(19.2%)	51(23.5%)	61(25.2%)
		Moderate	157(52.5%)	131(44.7%)	145(52%)	143(51.8%)	102(47%)	117(48.3%)
		Severe	1(0.3%)	1(0.3%)	0	3(1.1%)	4(1.8%)	3(1.2%)
		No anaemia	77(25.8%)	90(30.7%)	79(28.3%)	77(27.9%)	60(27.6%)	61(25.2%)
			Grades 1-5	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**
	Mean (SD)		10.90(1.21)	11.14(1.16)	10.83(1.36)	11.22(1.24)	10.93(1.21)	10.99(1.33)
	Anaemia							
		Mild	55(18.8%)	80(26.7%)	36(12.6%)	72(26.7%)	38(17.8%)	74(30.2%)
		Moderate	152(52.1%)	136(45.3%)	172(60.4%)	116(43.0%)	111(51.9%)	108(44.1%)
		Severe	2(0.7%)	0	1(0.4%)	2(0.7%)	2(0.9%)	5(2.0%)
		No anaemia	83(28.4%)	84(28.0%)	76(26.7%)	80(29.6%)	63(29.4%)	58(23.7%)

53. The socio-demographic profile varied mildly across the three arms such that the major evaluation findings are unlikely to be influenced significantly by the socio-demographic profile differentials of the sample. The students and parents were

similar in their age, educational qualification, occupation. Majority of the respondents were Hindus and belonged to the Other Backward Caste (OBC) category. All the respondents (100%) were Hindus in MNP arm, where as FRK had 3% Muslims and .3% Christian respondents. Unprotected well was the commonest source (53%) of drinking water in the intervention arms while tube well (68%) was a common source in the control arm. A greater proportion of households of the MNP arm also conducted regular purification of drinking water (36% in MNP vs 34% in FRK and 18% in Control). Nearly half of the respondents lived in the katcha (mud-made or made of similar material) houses with kitchen nested within the households and wood as the primary cooking fuel. The details of socio-demographic profile of the respondents and household characteristics are in Annex 11.

54. Similar to the baseline findings, even in the endline study we found that the adult male (38%) and the boy child (~20%) were most frequently "eating first" within the household. However, the frequency of girl child eating first was found to be a little less (~14%) as compared to the baseline phase. Female adults continued "eating last" in 85% of the households in our sample, with no other member even coming close to them in terms of this metrics. The male adults were found to be eating the most quantity of food in the majority (50%) of the households in our sample. The adult women were the ones in almost 95% of the households deciding the menu of the meals. Almost 35% households (42% in MNP, 35% in FRK and 28% in control, $p<0.0001$) replied that some members eat less on occasions when there are food shortages experienced by the family; on more than 95% on such crisis situations the adult women of the household sacrificed by eating less – consistently in all the arms. The details of eating practice in the household can be found in annex 12.

55. More than 90% of the students consumed MDM for all 6 days in a week in both the phases of the study. As compared to baseline findings, proportion of children consuming MDM for 6 days increased by 5.4 percentage points in MNP and by 6.7 percentage points in FRK arm. The proportion of children, who finished the MDM served to them, was also very high (approx. 98%). However, there seemed to be a very slight decline in the proportion of students taking second helpings of MDM especially in the MNP arm (from 100% during baseline to 91.3 percent at the time of endline), where as FRK arm has not witnessed any change (around 97% during baseline and end line). Only very few children reported lunch being eaten by them outside the school whereas a very large majority reported eating breakfast, evening snack and dinner outside school on schooldays as would be expected. All student from MNP arm (99.3%) reported sufficient portions for meals and snacks served to them outside the school, whereas in FRK and control in endline, 22% and 65% respectively reported of insufficient portions for meals and snacks served to them outside the school. MDM is complementary in nature, sufficiency of meals outside MDM is also critical towards improving the nutritional status. The details of MDM consumption pattern of the students in baseline versus endline are in Table 8 below.

Table 8 Mid-day meal consumption pattern

	MNP (Baseline)	MNP (Endline)	FRK (Baseline)	FRK (Endline)	Control (Baseline)	Control (Endline)
	N=578	N=574	N=597	N=597	N=589	N=467
Number of days of a full week the children eat MDM						
0 days	19 (3.3%)	2 (0.4%)	26 (4.4%)	0 (0.0%)	10 (1.7%)	1 (0.2%)
1-2 days	9 (1.6%)	0 (0.0%)	13 (2.2%)	2 (0.3%)	3 (0.5%)	3 (0.6%)
3-4 days	9 (1.6%)	1 (0.2%)	15 (2.5%)	2 (0.3%)	8 (1.4%)	2 (0.4%)
5-6 days	541 (93.6%)	566 (99.5%)	543 (91.0%)	587 (99.3%)	568 (96.4%)	456 (98.7%)
Those who have eaten MDM for 6 days						
Yes	536 (92.7%)	563 (98.1%)	536 (89.8%)	576 (96.5%)	561 (95.2%)	450 (96.4%)
Finishing MDM						
Yes	545 (97.5%)	563 (98.4%)	557 (97.7%)	580 (97.2%)	569 (98.3%)	459 (98.5%)
Getting second helping of MDM						
Yes	558 (100.0%)	522 (91.3%)	563 (98.9%)	587 (98.3%)	573 (99.1%)	449 (96.4%)
Like MDM						
Yes	541 (97.0%)	566 (99.0%)	563 (98.8%)	590 (99.0%)	564 (97.4%)	461 (98.9%)
Other meals eaten outside school						
breakfast	574 (99.3%)	574 (100.0%)	594 (99.5%)	581 (97.3%)	585 (99.3%)	164 (35.1%)
lunch	18 (3.1%)	11 (1.9%)	26 (4.4%)	0 (0.0%)	13 (2.2%)	9 (1.9%)
evening snack	455 (78.7%)	550 (95.8%)	573 (96.0%)	561 (94.0%)	479 (81.3%)	269 (57.6%)
dinner	563 (97.4%)	567 (98.8%)	597 (100%)	590 (98.8%)	546 (92.7%)	10 (2.1%)
Are the servings outside of school sufficient						
Yes	575 (99.5%)	565 (99.3%)	593 (99.3%)	466 (78.2%)	578 (98.1%)	140 (35.0%)

56. Only 50-60% of the parents were aware of the MDM fortification out of which ~40% reported that fortified MDM tasted better, as per their acquired information from their wards. Majority of the parents agreed that fortified MDM is beneficial and provides essential micronutrients alongside preventing malnutrition. Moreover, there had been a 40% increase in the consumption of MDM post fortification. Similarly, when inquired from children, 70% of them reported that fortified MDM tasted better and nearly 50% children recognized it to be beneficial. There had been a considerable increase in the consumption of MDM after fortification, especially in FRK arm: In MNP arm, proportion of children who eat MDM for 6 days has increased from 92.7% (baseline) to 98.1% (end line) and in FRK arm the same has increased from 89.8% (baseline) to 96.5% (end line). Thus, the increase in proportion of children consuming.

57. Availability of drinking water was almost universal as reported by the students, so was handwashing practices. The most common cleansers for hand washing was soap and water. The second most common cleanser was water (without soap) in all the arms. However, use of plain water for handwashing (without soap) was in substantial frequency, almost in all the arms.
58. The knowledge and awareness about anaemia and undernutrition seemed to have increased in the endline phase modestly, albeit it remains at a low level. Certainly, on expected lines, the knowledge increased with age (table not shown). About 27% students had heard about anaemia and ~15% had heard about undernutrition. Among those who had heard of these two conditions, the most common source of information was the teacher(s) and then followed by peers – which could be teased out from analysing the "others" category recorded as the source of information in the dataset. This proportion also showed an increase to approximately 90%. Lack of energy emerged as the most common symptom (almost 60%) for both the deficiencies known to the students who had heard of these two conditions. Not getting enough food and especially food rich in iron and other nutrients were the commonest (~50%) underlying causes of both the conditions as per the discerning students. Approximately 55% respondents noted that giving iron and iron rich food is a measure to prevent anaemia and giving enough food can prevent undernutrition. In spite of such rise in figures, a majority of students remained unaware of anaemia as well as undernutrition and imparting knowledge to such young children would remain a great challenge.

59. **The proportion of students receiving IFA supplementary formulations at school increased considerably in the endline phase in MNP arm (97.7% from 67.3 % in baseline), however the rates of receiving IFA declined quite significantly in the FRK arm (78. 4% in endline from 90.6% in baseline).** The commonest frequency of receiving IFA was weekly throughout in all arms. The rates of receipt of IFA was significantly higher in intervention schools of Dhenkanal as compared to control schools of Anugul—a phenomenon that can be ascribed to the fortification initiative related activation of the overall school nutrition and supplementation system (Table 9).

Table 9. IFA Supplementation

	MNP (Baseline)	MNP (Endline)	FRK (Baseline)	FRK (Endline)	Control (Baseline)	Control (Endline)
	N= 578	**N=574**	**N=597**	**N=597**	**N=589**	**N= 467**
Received IFA	389 (67.3%)	561 (97.7%)	541 (90.6%)	468 (78.4%)	337 (57.2%)	255 (54.6%)

60. As far as deworming is concerned, proportion of children who have received deworming has slightly increased in FRK arm (71.7% to 79.8%), where as MNP arm has

not witnessed any change (58.7% during both the both the rounds). Proportion of deworming medication has declined in the control area. (Table 10).

Table 10 Deworming medications

	MNP (Baseline)	MNP (Endline)	FRK (Baseline)	FRK (Endline)	Control (Baseline)	Control (Endline)
	N= 578	N= 574	N=597	N=599	N=589	N=467
Receiving deworming medications						
Receiving - tablets	339 (58.7%)	337 (58.7%)	428 (71.7%)	478 (79.8%)	368 (62.5%)	231 (49.5%)
Receiving - syrup	1(0.2%)	0	0	0	0	17 (3.6%)

61. Students (almost 66% in MNP, 42% in FRK and 45% in control) confirmed that they underwent health check-ups at school time to time, which was at a substantially lesser frequency than that of the baseline in all the three arms (Table 11). Again, something that can be attributed to different seasons of data collection for baseline and endline initiatives.

62. Table 12 and Table 13 describe the sex and grade-disaggregated data of the following key indicators that is receipt of IFA and deworming tablets and whether health of the students was checked-up or not. Again, no systemic gender or grade differentials are observed in these indicators.

Table 11. Health Check-ups in school

	MNP (Baseline)	MNP (Endline)	FRK (Baseline)	FRK (Endline)	Control (Baseline)	Control (Endline)
	N= 578	N= 574	N= 597	N= 599	N= 589	No. 467
Health checkups conducted in school						
Students underwent health check-ups	490 (84.8%)	378 (65.9%)	358 (60.0%)	250 (41.7%)	374 (63.5%)	212 (45.4%)

Table 12. Sex and grade disaggregated data on receipt of IFA, deworming medication and health check-ups, baseline

	MNP		FRK		Control	
	Male	Female	Male	Female	Male	Female
Received IFA	192 (66.9%)	197 (70.9%)	259 (89.6%)	282 (94.9%)	168 (59.6%)	167 (58.2%)
Received Deworming	165 (56.7%)	175 (61.0%)	202 (68.7%)	226 (74.6%)	187 (64.5%)	179 (60.7%)
Received Check-up	246 (87.2%)	244 (87.1%)	181 (66.5%)	177 (65.6%)	182 (67.7%)	190 (69.1%)
	Grades 1-5	Grades 6-8	Grades 1-5	Grades 6-8	Grades 1-5	Grades 6-8

Received IFA	232 (66.1%)	157 (73.4%)	354 (96.5%)	187 (85.4%)	216 (59.3%)	119 (58.0%)
Received Deworming	202 (55.6%)	138 (64.2%)	260 (69.3%)	168 (75.7%)	228 (60.6%)	138 (66.0%)
Received Check-up	297 (84.9%)	193 (91.0%)	210 (63.4%)	148 (70.1%)	214 (63.1%)	158 (77.1%)

Table 13. Sex and grade disaggregated data on receipt of IFA, deworming medication and health check-ups, endline

	MNP		**FRK**		**Control**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Received IFA	279(97.6%)	282(97.9%)	245(81.4%)	223(75.3%)	123(55.7%)	132(53.7%)
Received Deworming	168(58.7%)	169(58.7%)	228(75.7%)	248(83.8%)	111(50.2%)	137(55.7%)
Received Check-up	181(63.3%)	195(67.7%)	129(42.9%)	121(40.9%)	96(43.4%)	116(47.2%)
	Grades 1-5	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**
Received IFA	283(95.9%)	278(99.6%)	235(80.2%)	233(76.6%)	102(46.6%)	153(61.7%)
Received Deworming	145(49.2%)	192(68.8%)	245(83.6%)	231(76.0%)	111(50.7%)	137(55.2%)
Received Check-up	159(53.9%)	217(77.8%)	147(50.2%)	103(33.9%)	63(28.8%)	149(60.1%)

63. 31% students reported of suffering from some sickness in the last 15 days prior to the interview day (MNP 23.5%, FRK 35% and control 36%), the most common causes being fever (61%) and cold (31%), with expected variations of these two illnesses across the three arms. The reporting of illness declined in MNP but increased in FRK, between baseline and endline. However, absenteeism due to sickness increased in all the three arms and this increase was mainly due to fever, which was also corroborated by the school attendance register. This could be mainly attributed to the season during which data collection was carried out- winter and early spring during baseline as compared to monsoon during endline. This might have triggered this excess of absenteeism in endline due to almost similar rate of reported illnesses, as parents are often reluctant to send their wards to school on rainy days.

64. There was a decline in the completion rate of 200 metres of endurance test in MNP and FRK arm in endline as compared to baseline—a finding that can be ascribed to monsoon rains and wet ground conditions during endline as opposed to more favourable ground conditions in baseline. However, the completion rate in the control increased. The average time taken to complete 200 metres declined in MNP, increased slightly in FRK and increased considerably in Control arm. (Table *14*). The sex and grade disaggregated data of 200 metres endurance test is presented in Table 15

Table 14 Physical Endurance

	MNP (Baseline)	**MNP (Endline)**	**FRK (Baseline)**	**FRK (Endline)**	**Control (Baseline)**	**Control (Endline)**

	No. 578	No. 574	No. 597	No. 599	No. 589	No. 467
Students who completed 200 meters						
Yes	560 (96.9%)	453 (79.1%)	563 (94.3%)	458 (76.5%)	456 (77.4%)	423 (90.6%)
Time(seconds) taken for 200 metres						
Mean (SD)	62.5 (8.5)	59.7 (6.4)	63.1 (7.4)	65.2 (7.7)	61.5 (6.7)	69.6 (12.4)

Table 15. Sex and grade disaggregated physical endurance data, both baseline and endline

			FRK		MNP		Control	
Baseline								
Time taken to complete 200 meters run								
			Male	**Female**	**Male**	**Female**	**Male**	**Female**
	Mean SD)		61.74(8.33)	64.39(8.02)	59.36(7.13)	64.53(7.36)	58.47(9.81)	63.35(11.24)
			Grades 1-5	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**
	Mean (SD)		64.42(9.32)	61.87(9.18)	62.44(8.61)	61.23(9.27)	62.43(9.38)	59.39(10.62)
Endline								
Time taken to complete 200 meters run								
			Male	**Female**	**Male**	**Female**	**Male**	**Female**
	Mean(SD)		63.53(7.91	66.88(7.07)	57.80(6.09)	61.47(6.46)	68.58(10.95)	70.44(13.54)
			Grades 1-5	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**
	Mean (SD)		65.91(8.34)	64.46(7.03)	60.06(6.59)	59.30(6.49)	73.57(13.32)	66.32(10.55)

65. Marked reduction had been observed in prevalence of deficiencies of Folate (especially in MNP from 51% to 15.3%). The decline in deficiency status of Vit B12 was also discernible in two intervention arms, whereas there was remarkable decline of Vit B12 deficiency in control as well. Again, the decline in Ferritin deficiency, from its low prevalence in baseline was tangible in intervention arms but not in control. This further reinforces the positive effects of micronutrient fortification in reducing malnutrition in the district of Dhenkanal (Table *16*). The other two tables (Table 17 and

	FRK		MNP		Control	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Folate (<5 ng/ml)	105 (35.7%)	98 (32.3%)	149 (51.2%)	146 (50.9%)	121 (41.7%)	111 (37.8%)
Vit B12 (<200 pg/ml)	37 (12.6%)	30 (9.9%)	34 (11.7%)	39 (13.6%)	75 (25.9%)	70 (23.8%)
Ferritin (<10ng/ml)	1 (0.3%)	9 (3.0%)	7 (2.4%)	5 (1.7%)	1 (0.3%)	8 (2.7%)
Zinc (<0.66 mcg/ml)	61 (20.7%)	53 (17.5%)	67 (23.0%)	83 (28.9%)	NA	NA
CRP (>5mg/dl)*	8 (2.7%)	6 (2.0%)	9 (3.1%)	15 (5.2%)	9 (3.1%)	6 (2.0%)
	Grades 1-5	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**
Folate (<5 ng/ml)	113 (30.1%)	90 (40.5%)	183 (50.4%)	112 (52.1%)	141 (37.6%)	91 (43.5%)
Vit B12 (<200 pg/ml)	27 (7.2%)	40 (18.0%)	35 (9.6%)	38 (17.7%)	75 (20.0%)	70 (33.5%)
Ferritin (<10ng/ml)	4 (1.1%)	6 (2.7%)	5 (1.4%)	7 (3.3%)	4 (1.1%)	5 (2.4%)
Zinc (<0.66 mcg/ml)	84 (22.4%)	30 (13.5%)	100 (27.5%)	50 (23.3%)	NA	NA
CRP (>5mg/dl)*	7 (1.9%)	7 (3.2%)	20 (5.5%)	4 (1.9%)	13 (3.5%)	2(1.0%)

*Excess of CRP is reported. For other bio-markers deficiency rates are described.

66. Table 18) describe the sex and grade disaggregated status of bio-markers which show very little sex and grade differentials.

Table 16 Prevalence of micronutrient deficiency/excess (cut-offs in parenthesis)

	FRK (Baseline)	FRK (Endline)	MNP(Baseline)	MNP(Endline)	Control (Baseline)	Control (Endline)
	N=578	**N=574**	**N =597**	**N =597**	**N=589**	**N=467**
Folate (<5 ng/ml)	203 (34.0%)	138 (23.4%)	295 (51.0%)	85 (15.3%)	232 (39.7%)	211 (46.0%)
Vit B12 (<200 pg/ml)	67 (11.2%)	49 (8.3%)	73 (12.6%)	48 (8.7%)	145 (24.8%)	25 (5.4%)
Ferritin (<10ng/ml)	10 (1.7%)	8 (1.4%)	12 (2.1%)	4 (0.7%)	9 (1.5%)	7 (1.5%)
Zinc (<0.66 mcg/ml)	114 (24.4%)	113(19.0%)	150 (31.2)	122(21.8%)	NA	135 (29.4%)
CRP (>5mg/dl)*	14 (2.3%)	13 (2.2%)	24 (4.2%)	13 (2.3%)	15 (2.6%)	13 (2.8%)

*Excess of CRP is reported. For other bio-markers deficiency rates are described.

Table 17. Sex and grade disaggregated prevalence of micronutrient deficiency/excess (cut-offs in parenthesis), baseline

	FRK		MNP		Control	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Folate (<5 ng/ml)	105 (35.7%)	98 (32.3%)	149 (51.2%)	146 (50.9%)	121 (41.7%)	111 (37.8%)
Vit B12 (<200 pg/ml)	37 (12.6%)	30 (9.9%)	34 (11.7%)	39 (13.6%)	75 (25.9%)	70 (23.8%)
Ferritin (<10ng/ml)	1 (0.3%)	9 (3.0%)	7 (2.4%)	5 (1.7%)	1 (0.3%)	8 (2.7%)
Zinc (<0.66 mcg/ml)	61 (20.7%)	53 (17.5%)	67 (23.0%)	83 (28.9%)	NA	NA
CRP (>5mg/dl)*	8 (2.7%)	6 (2.0%)	9 (3.1%)	15 (5.2%)	9 (3.1%)	6 (2.0%)
	Grades 1-5	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**
Folate (<5 ng/ml)	113 (30.1%)	90 (40.5%)	183 (50.4%)	112 (52.1%)	141 (37.6%)	91 (43.5%)
Vit B12 (<200 pg/ml)	27 (7.2%)	40 (18.0%)	35 (9.6%)	38 (17.7%)	75 (20.0%)	70 (33.5%)
Ferritin (<10ng/ml)	4 (1.1%)	6 (2.7%)	5 (1.4%)	7 (3.3%)	4 (1.1%)	5 (2.4%)
Zinc (<0.66 mcg/ml)	84 (22.4%)	30 (13.5%)	100 (27.5%)	50 (23.3%)	NA	NA
CRP (>5mg/dl)*	7 (1.9%)	7 (3.2%)	20 (5.5%)	4 (1.9%)	13 (3.5%)	2(1.0%)

*Excess of CRP is reported. For other bio-markers deficiency rates are described.

Table 18. Sex and grade disaggregated prevalence of micronutrient deficiency/excess (cut-offs in parenthesis), endline

	FRK		MNP		Control	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Folate (<5 ng/ml)	70 (23.6%)	68 (23.2%)	46 (16.5%)	39 (14.1%)	113 (52.1%)	98 (40.5%)
Vit B12 (<200 pg/ml)	21 (7%)	28 (9.6%)	22 (7.9%)	26 (9.4%)	12 (5.5%)	13 (5.4%)
Ferritin (<10ng/ml)	2 (0.7%)	6 (2%)	2 (0.7%)	2 (0.7%)	1 (0.5%)	6 (2.5%)

	FRK		MNP		Control	
	Male	Female	Male	Female	Male	Female
Zinc (<0.66 mcg/ml)	66 (22.1%)	47 (15.9%)	65 (23.3%)	57 (20.3%)	62 (28.6%)	73 (30.2%)
CRP (>5mg/dl)*	8 (2.7%)	5 (1.7%)	6 (2.0%)	8 (2.9%)	7 (2.3%)	6 (2.5%)
	Grades 1-5	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**	**Grades 1-5**	**Grades 6-8**
Folate (<5 ng/ml)	70(23.6%)	68(23.2%)	36(12.6%)	49(18.1%)	103(48.1%)	108(44.1%)
Vit B12 (<200 pg/ml)	12(4.1%)	37(12.3%)	12(4.2%)	36(13.3%)	13(6.1%)	12(4.9%)
Ferritin (<10ng/ml)	3(1.0%)	5(1.7%)	2(0.7%)	2(0.7%)	3(1.4%)	4(1.6%)
Zinc (<0.66 mcg/ml)	62(21.2%)	51(16.9%)	71(24.8%)	51(18.6%)	46(21.5%)	89(36.3%)
CRP (>5mg/dl)*	7(1.9%)	7(2.4%)	8(2.8%)	5(1.8%)	7(3.3%)	6(2.4%)

*Excess of CRP is reported. For other bio-markers deficiency rates are described.

As compared to baseline, prevalence of vitamin A deficiency has declined among students at the time of end line (Annex 33)

2.2 Evaluation Question 2: What is the impact of MDM fortification project (with FRK or MNP) on nutrition-related knowledge, self-reported MDM service-related practices of school teachers and other school functionaries; and nutrition and hygiene-related facilities in school?

67. This section only features the important findings from teacher's interview and school check-list. The rest of the tabular findings are available at Annex 13-28.

68. 50 teachers were interviewed during the endline phase and had a sociodemographic profile similar to that of the baseline. Nearly 60% of the teachers were class teachers of class I, closely followed by class II and III. All teachers were Hindu and majority belonged to the Scheduled Caste. 70% of the teachers were male. There was a considerable increase in the number of post graduate teachers during endline phase.

69. Levels increased in the number of students receiving health and nutrition education. Education was mostly being imparted on personal hygiene, sanitation, anaemia, advantages of consuming IFA, and fortification.

70. Considerable increase (22% baseline and 90% endline) in the number of teachers receiving IEC material for creating awareness. A greater proportion of teachers are aware of signs and symptoms of anaemia. Majority (70%) of teachers believed that anaemia was caused due to iron deficiency followed by poor nutrition as the second leading cause. Similarly, a marked increase (60% baseline and 80% endline) in nutrition awareness was observed. Approximately 85% of the teachers reported that unavailability of good quality food was the leading cause of undernutrition among students leading to delay in physical and mental growth. (Table 19)

Table 19. Teacher's awareness of anaemia and undernutrition

	FRK (Baseline)	FRK (Endline)	MNP (Baseline)	MNP (Endline)	Control (Baseline)	Control (Endline)
	n = 18	n = 18	n = 18	n = 18	n = 18	n = 14
Teachers have IEC material job aid such as resource book/chart available in school for creating awareness on anaemia						
Yes	4 (22.2%)	17 (94.4%)	2 (11.1%)	17 (94.4%)	6 (33.3%)	4 (28.6%)
No	14 (77.8%)	1 (5.6%)	16 (88.9%)	17 (94.4%)	12 (66.7%)	10 (71.4%)
Proportion of teacher who are aware of the following signs and symptoms to recognize someone who has anaemia						
Fatigue	1 (5.6%)	8 (44.4%)	10 (55.6%)	1 (5.6%)	10 (55.6%)	1 (7.1%)
Weakness	6 (33.3%)	17 (94.4%)	16 (88.9%)	12 (66.7%)	13 (72.2%)	11 (78.6%)
Paleness/yellow skin/white tongue and pale eyes	12 (66.7%)	10 (55.6%)	9 (50.0%)	15 (83.3%)	2 (11.1%)	5 (35.7%)
lack of concentration	0 (0.0%)	8 (44.4%)	2 (11.1%)	0 (0.0%)	2 (11.1%)	0 (0.0%)
Proportion of teacher who are aware of the following signs and symptoms to recognize someone who has undernutrition						
lack of energy/ weakness	11 (61.1%)	15 (83.3%)	13 (72.2%)	16 (88.9%)	9 (50.0%)	10 (71.4%)
cannot work, study or play as normal (disability)	3 (16.7%)	6 (33.3%)	5 (27.8%)	5 (27.8%)	4 (22.2%)	4 (28.6%)
weakness of the immune system (becomes ill easily or becomes seriously ill)	0 (0.0%)	5 (27.8%)	2 (11.1%)	4 (22.2%)	1 (5.6%)	3 (21.4%)
loss of weight/ thinness	2 (11.1%)	10 (55.6%)	7 (38.9%)	10 (55.6%)	3 (16.7%)	5 (35.7%)
children do not grow as they should (growth faltering)	2 (11.1%)	8 (44.4%)	1 (5.6%)	2 (11.1%)	0 (0.0%)	3 (21.4%)
don't know	1 (5.6%)	1 (5.6%)	0 (0.0%)	2 (11.1%)	1 (5.6%)	0 (0.0%)

71. All the teachers unanimously agreed that fortified MDM was beneficial and 85% of them reported that it tasted better and had therefore increased the MDM consumption. 60% of the teachers said that the training received on fortification was adequate. (Table 20)

*Table 20. Perception of teachers regarding MDM**

	FRK (Endline)	MNP (Endline)
	No. 18	No. 18
Is MDM Beneficial		
Yes	17 (94.4%)	18 (100.0%)

No	0 (0.0%)	0 (0.0%)
Don't know	1 (5.6%)	0 (0.0%)
Benefits of MDM		
prevents malnutrition	7 (38.9%)	11 (61.1%)
prevents illnesses/improves immunity	10 (55.6%)	3 (16.7%)
Others	1 (5.6%)	8 (44.4%)
gives micronutrients	10 (55.6%)	5 (27.8%)

*Table only applicable for endline survey

72. The teachers observed an increase in the proportion of staff in the MDM Committee with regards to kitchen-in-charge, store-in-charge and cook. However, there were inadequate number of sweepers and helpers.

73. Majority of the teachers were satisfied to a great extent with regards to regularity and timeliness of MDM programme in their schools as compared to the baseline phase. Although quality and variety of MDM menu were viewed slightly less favourably, satisfaction level for hygiene was remarkable (Table 21).

Table 21 Satisfaction levels regarding MDM*

	FRK (Baseline)	FRK (Endline)	MNP (Baseline)	MNP (Endline)	Control (Baseline)	Control (Endline)
	N=18	N=18	N=18	N=18	N=18	N=14
Regularity						
Satisfaction level4	0 (0.0%)	4 (22.2%)	0 (0.0%)	0 (0.0%)	2 (11.1%)	1 (7.1%)
Satisfaction level5	18 (100.0%)	14 (77.8%)	18 (100.0%)	18 (100.0%)	16 (88.9%)	13 (92.9%)
Timeliness						
Satisfaction level4	5 (27.8%)	1 (5.6%)	1 (5.6%)	0 (0.0%)	3 (16.7%)	0 (0.0%)
Satisfaction level5	13 (72.2%)	17 (94.4%)	17 (94.4%)	18 (100.0%)	15 (83.3%)	14 (100.0%)
Quality						
Satisfaction level4	7 (38.9%)	3 (16.7%)	7 (38.9%)	0 (0.0%)	4 (22.2%)	7 (50.0%)
Satisfaction level5	8 (44.4%)	15 (83.3%)	11 (61.1%)	18 (100.0%)	11 (61.1%)	7 (50.0%)
Hygiene						
Satisfaction level3	1 (5.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (5.6%)	1 (7.1%)
Satisfaction level4	7 (38.9%)	4 (22.2%)	11 (61.1%)	0 (0.0%)	8 (44.4%)	7 (50.0%)
Satisfaction level5	10 (55.6%)	14 (77.8%)	7 (38.9%)	18 (100.0%)	9 (50.0%)	6 (42.9%)

	FRK (Baseline)	FRK (Endline)	MNP (Baseline)	MNP (Endline)	Control (Baseline)	Control (Endline)
	N=18	N=18	N=18	N=18	N=18	N=14
Variety						
Satisfaction level3	3 (16.7%)	0 (0.0%)	1 (5.6%)	0 (0.0%)	2 (11.1%)	2 (14.3%)
Satisfaction level4	10 (55.6%)	6 (33.3%)	10 (55.6%)	0 (0.0%)	8 (44.4%)	7 (50.0%)
Satisfaction level5	4 (22.2%)	12 (66.7%)	7 (38.9%)	18 (100.0%)	7 (38.9%)	5 (35.7%)

*Satisfaction measured in a scale of 1 to 5. (1 being least and 5 the highest)

74. Nearly 90% of the teachers had heard about fortification and ~ 80% had attended training sessions on rice fortification. Similarly, 90% of the school teachers had knowledge about anaemia, its symptoms and consequences. Majority of the teachers reported that eating iron rich food would prevent anaemia. Further, according to 85% teachers schools provided IFA and deworming supplements (tablets) to students weekly and half-yearly respectively.

75. 50 schools were visited during the endline phase out of which 50% schools were pucca and ~80% had boundary wall and 45% schools had more than 4 classrooms. All schools had at least 1 kitchen, 80% had at least one boys' toilet and 75% had at least one girls' toilet. The frequently used sources of water were bore well and hand pump. 55% of the schools had water purifying facility out of which majority of them used water filters and Aqua guard. 60% of schools stored drinking water in covered jars. However, just 50% of schools had water supply to toilets which raises questions on hygiene and sanitation.

76. Most of the schools conducted classes for 5:30 hrs which also involved 30-40 minutes of sports and 45 minutes for MDM. Among the schools visited, 90% of the schools had 1 headmaster, more than 1 teacher and 1 cook in position.

77. Almost all schools were pucca. 90% of the schools had facility for storage of grains during endline as compared to 85% during the baseline. Although a slight increase was seen in the endline, yet most schools did not have a separate water supply to the kitchen. The cleanliness of the kitchen and the post-cooking storage facility of food was found to be satisfactory in 90% schools. 95% of schools stated that the food prepared at MDM was being entirely consumed. For those who stated of left-overs, 95% school stated that they were being eaten by others. (Table *22*).

Table 22 MDM Environment in school

	FRK (Baseline)	FRK (Endline)	MNP (Baseline)	MNP (Endline)	Control (Baseline)	Control (Endline)
	N=18	N=18	N=18	N=18	N=18	N= 14
What is the condition of the kitchen						

	FRK (Baseline)	FRK (Endline)	MNP (Baseline)	MNP (Endline)	Control (Baseline)	Control (Endline)
	N=18	N=18	N=18	N=18	N=18	N= 14
Pucca	1 (5.6%)	18 (100.0%)	1 (5.6%)	18 (100.0%)	1 (5.6%)	9 (64.3%)
Katcha	17 (94.4%)	0 (0.0%)	17 (94.4%)	0 (0.0%)	13 (72.2%)	4 (28.6%)
Shed	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (22.2%)	1 (7.1%)
Is there facility for storage of grains/ other items						
Yes	16 (88.9%)	17 (94.4%)	13 (72.2%)	16 (88.9%)	17 (94.4%)	10 (71.4%)
Is there separate water supply to kitchen						
Yes	4 (22.2%)	5 (27.8%)	2 (11.1%)	5 (27.8%)	4 (22.2%)	6 (42.9%)
Cleaning condition of the kitchen						
Yes	18 (100.0%)	17 (94.4%)	17 (94.4%)	18 (100.0%)	12 (66.7%)	8 (57.1%)
Are the food items properly stored after preparation						
Yes	17 (94.4%)	18 (100.0%)	17 (94.4%)	18 (100.0%)	16 (88.9%)	12 (85.7%)
Is the food prepared eaten by students on the same day						
Yes	15 (83.3%)	18 (100.0%)	3 (16.7%)	18 (100.0%)	16 (88.9%)	12 (85.7%)
What is done if MDM food is left over						
Consumed by others	3 (100.0%)	1 (100.0%)	14 (93.3%)	0 (NaN%)	2 (100.0%)	1 (50.0%)
Distributed among children		0 (0.0%)		0 (NaN%)		1 (50.0%)

78. A considerable increase (Table 23) was observed during the endline phase in the proportion of schools conducting routine health check-ups for their students and the most common frequency was yearly (~67%). Doctors were most commonly conducting these check-ups.

Table 23. Health check-ups in school

	FRK (Baseline)	FRK (Endline)	MNP (Baseline)	MNP (Endline)	Control (Baseline)	Control (Endline)
	No. 18	No. 18	No. 18	No. 18	No. 14	No. 14
Does the school conduct health check-ups for students						
Yes	12 (66.7%)	13 (72.2%)	17 (94.4%)	18 (100.0%)	9 (50.0%)	12 (85.7%)

79. A rise was observed in the proportion of students who washed hands with soap before eating. Soap-applied hand washing by the students after toilet was a practice in only 56% of schools. There had been a marked rise in the number of cooks washing hands before cooking (100% in the FRK and MNP arm). Proper washing facility was available only in 67% of the schools around eating premises and in case of 38% of the schools around their toilets.

80. Special education sessions regarding health and hygiene were held in only 71% of schools. Only 30% were visited by NGOs for this purpose and one third had material regarding these topics displayed in the school. A considerable rise in the proportion of display material on health hygiene present in schools.

2.3 Evaluation Question 3: What are the comparative operational features of these two intervention strategies?

81. Almost all the teachers admitted attending MDM fortification training. However, initially, the CCHs could not clearly identify between the trainings received on fortification and other MDM related trainings by the government. However, none of the CCHs were formally trained with regards to amount of MNPs to be mixed with MDM though they learnt about it from the teachers through their day-to-day practice.

82. All the respondents at the school level reported that providing FRK or MNP would help in improving the nutritional status of children. They believed that the students would be able to get essential nutrients through the fortified rice. However, they opined that they were unable to scientifically justify their views, as they could not test the improvement in the nutritional status of the students at school, but, viewed that it would definitely be better than before.

83. The teachers from the FRK blocks perceived, cooking fortified rice did not require any special skills, as they just needed to add water to rice at 2:1 ratio and cook; whereas teachers from MNP block said that they needed to put extra effort to count the number of students, and to accurately calculate the powder required and add it in a process. Therefore, they viewed MNP mixing process as an additional responsibility as they felt they were already overburdened due to routine MDM activities.

84. There were advantages observed in the FRK arm due to fortification of rice and its supply and use—adoption of watertight cooking method being one of them and the other being timeliness of supply and improvement in quantity and quality of rice-packaging.

85. The fortified rice was being cooked using water tight method (which is the appropriate method of cooking rice as opposed to frequently practiced water draining method) in all FRK arm schools, and the same process was being gradually adopted even in schools where curry fortification was being done. Though, few of the schools in MNP arm, have been still following the water draining method, but nevertheless, many of them have adopted the water tight method of cooking. Some officials have thus praised the effectiveness of the training conducted under fortification program, in improving the competency of CCHs to use water tight method of rice cooking, which is universally prescribed to preserve the nutrients in rice.

86. Majority of the CCHs shared that although they initially faced difficulties in the water tight method of cooking, but gradually they have adapted and they now feel more comfortable with the process.

87. The teachers from the schools where FRK was being supplied opined that cooking fortified rice was a simple task and did not require much monitoring efforts. The teachers were confident that CCHs were competent enough to cook fortified rice and that they do not need any extra support or inputs. Consequently, it was observed that the monitoring by the school teachers was mostly focused around the hygiene component and ignored other important steps like cleaning and draining of fortified rice before cooking.

88. The students from the schools, where water tight method of rice cooking was being followed, showed some resistance to consume the rice initially. They admitted that students gradually adapted to the taste of the rice cooked using water tight method. The students took about a few days to 1 month to adjust to the taste and texture of the rice. The respondents shared that the rice cooked using water tight method is a little hard and mostly sticks to the bottom of the vessel.

89. Another important issue—with regards to timeliness of supply and quantity and quality of rice packaging—the school staff and the government officials acknowledged streamlining of the rice supply process since the rice fortification program had been implemented. The study participants, also mentioned, that the introduction of HDPE bags for transportation of FRK, had been instrumental in reducing wastage and damage during transportation. The non-fortified rice which was being supplied in the gunny bags of 50 kilograms (kgs), reportedly, had lesser quantity of rice than the quantity specified. The schools in the MNP blocks who still received the usual gunny-bag rice had pointed receiving lesser quantity of rice in the 50 kgs bag.

90. The same views were echoed by the government officials. The Government officials and the school staff perceived that the fortification of rice with FRK had resulted in removal of unwanted materials like husk, stones, strings of gunny bags etc. from the rice. The study participants perceive that the quality and the quantity of fortified rice delivered at FRK school had improved after the fortification program.

91. Moreover, some of the respondents highlighted using FRK rice packaging bags as a source of information for students. Some schools had displayed it in the classrooms for educational purpose, while some schools have prepared mats for students, to be used while eating MDM. One of the schools have used the empty rice bags for planting trees along the walkway of the school.

92. Additionally, many of the respondents from the FRK blocks and the government officials viewed that the 25 kgs HDPE bags used for transporting fortified rice were

reportedly clean, hygienic and protective against external elements and also prevented loss due to spilling.

93. Regarding storage of the MNP powder, the respondents said that MNP was usually being stored in the office room of the school and the storage process for MNP could be explained eloquently in MNP arm by teachers and CCHs. They informed that the MNP packet if once opened; is fastened and kept in a plastic bottle in the almirah in the office room. The spoons used for mixing MNP are also kept in the same container but in a separate packet.

94. Regarding mixing of MNP, reportedly, only teacher/HM were entitled to operationalize the mixing process. The CCHs shared that they were aware about the measurement and mixing of MNP, as they had been imparted training on the general concept of fortification. However, MNP addition was only done by the teacher/HM. The addition of MNP to the curry required appropriate timing and precision, as opined by many**.** Adding the MNP to curry which was too hot or too cold would result in lump formation and thus would not mix properly. Majority of the teachers and CCHs were aware about the use of red and blue scoops for primary and upper primary students respectively and the calculation for number of scoops of MNP as per children present. They shared that the big scoop is used to calculate MNP for 10 students and the small scoop was for one student. However, only few could tell about the gram specifications of each scoop. Evidently, there were diverse responses on the quantity of powder to be taken in the spoon as some CCHs reported that it should be levelled to the spoon, while others replied that it should be heaped**.**

95. Regarding cooking practices with MNP, the CCHs informed the teachers/HMs after completion of MDM cooking or took the curry in a bowl to the office room where the MNP would be added by the teacher. It was not clear what was being done in those days when the teacher/HM was absent.

96. Majority of the study participants reported that there wasn't any change of taste, colour or smell of curry after adding MNP, still, a few schools pointed change in smell of the curry initially.

97. Regarding supply of MNP, the MNP was supplied from the BEO office through the CRCC to the schools in the MNP blocks. The schools had to maintain an additional MNP register send a monthly report of MNP consumption to the block office and accordingly, the stock was replenished. Some schools reported receiving MNP supply along with the rice. However, the frequency and the quantity of MNP received by the schools could not be recalled by any of the respondent, as there were some ambiguities among respondents regarding the consumption, indenting and receipt of the MNP, and therefore it was perceived as a complex process by the respondents.

98. However, no schools had reported any major shortage in MNP supply during the fortification program. However, occasional shortages have been managed by informing the CRCC and borrowing from the nearby schools. In few instances where the MNP powder had expired (as observed by observers of WFP during their routine field visit), the situation was managed by borrowing MNP from adjacent schools.

99. The teachers opined that, though adding of MNP needs some simple calculation, but still they were extra cautious about it, as they felt the CCHs are not competent enough to carry out the process of mixing independently and there is always a risk of under/overdosing if the calculations are not carried out properly. **Thus, evaluation findings clearly points towards the need of extensive monitoring in case of MNP fortification, as chances of using expired MNP or over/under dosage of MNP exists.**

100. **In a nutshell, the teachers considered the MNP system (record-keeping, reporting and mixing) as an additional burden as opposed to FRK which they considered as simple cooking of the routine MDM rice.**

101. It was also perceived by the assessors while discussing the fortification systems with the teachers and CCHs that the MNP process would require more intense monitoring from the block, district and state-level officials of Department of School and Mass Education as compared to FRK.

102. Another important point that was noted was the time differential for the FRK and MNP rolling-out in Dhenkanal. MNP was rolled-out immediately after completion of baseline study as it was an additional input to MDM curry, whereas the FRK-mixed rice could only be put to use once the previously existing stock of unfortified rice were exhausted. Therefore, the "contact period" of MNP with the school children was greater than that of FRK.

2.4 Evaluation Question 4: What are the comparative costs of implementation between these two strategies?

103. During the implementation period of 20 months covering three financial years (2016-2019), total number of feeding days was 362 in the MNP arm as shown in Table 16. The total number of meals consumed by primary students during that period was 1,25,29,806, which was 78,02,184 for upper primary students. The ratio between the distributions of meal consumption by primary and upper primary was estimated to be 1.6:1.

Table 24 Number of children and meals consumed in MNP intervention schools

Description	Intervention Arm	FY-2016-17	FY-2017-18	FY-2018-19	Total
Numbers of Schools	MNP	907	796	798	*-NA-*

Numbers of Feeding days	MNP	22	229	111	362
Numbers of Primary Students	MNP	41895	40889	38698	*-NA-*
Numbers of Upper Primary Students	MNP	24704	26715	24718	*-NA-*
Numbers of meals consumed by Primary Students	MNP	762146	8221543	3546117	12529806
Numbers of meals consumed by Upper Primary Students	MNP	459404	5145757	2197023	7802184
Ratio of meals consumed by primary and upper primary students					1.6:1

*NA: Not applicable

104. Similarly, Table 17 presents the details about number of feeding days, number of students attended the FRK intervention schools and total numbers of FRK fortified meals consumed by the primary and upper primary students during the intervention period. In the FRK arm, within the 386 feeding days, the primary and upper primary students consumed 1,18,48,441 and 8036181 number of fortified meals with a ratio of 1.47:1, respectively.

Table 25 Number of children and meals consumed in FRK intervention schools

Description	**Intervention Arm**	**FY-2016-17**	**FY-2017-18**	**FY-2018-19**	**Total**
Numbers of Schools	FRK	819	762	755	*-NA-*
Numbers of Feeding days	FRK	46	229	111	386
Numbers of Primary Students	FRK	36856	36126	34809	*-NA-*
Numbers of Upper Primary Students	FRK	24704	25156	23947	*-NA-*
Numbers of meals consumed by Primary Students	FRK	1413120	7290802	3144519	11848441
Numbers of meals consumed by Upper Primary Students	FRK	999764	4749928	2286489	8036181
Ratio of meals consumed by primary and upper primary students					**1.47: 1**

*NA: Not applicable

105. The total cost of fortification in the FRK arm was INR 2,24,43,117.31. The cost of fortification per meal in the FRK arm was calculated to be INR 0.94 and INR 1.41 for primary and upper primary children, respectively. Similarly, the total cost of fortification in the MNP arm was INR 1,98,67,640.80. The cost for fortification of

each meal for the primary and upper primary student were calculated to be INR 0.87 and INR 1.15 respectively (Table 18). This costing results are based on the pilot. Actual scaled-up cost could be much different. WFP has earlier done a costing exercise for both FRK and MNP for scaled-up project. It found FRK cost much lower than the MNP (Annex 32)

Table 26 Total cost of fortification and cost of fortification per meal in both Arms (INR)

FRK-Arm		MNP-Arm	
Details of Cost	**Amount (INR)**	**Details of Cost**	**Amount (INR)**
Total cost of fortification	2,24,43,117.31	Total cost of fortification	1,98,67,640.80
Fortification cost per meal (*Primary Student*)	0.94	Fortification cost per meal (*Primary Student)*	0.87
Fortification cost per meal (*Upper Primary Student)*	1.41	Fortification cost per meal (*Upper Primary Student)*	1.15

3. Conclusions and Recommendations

106. The following section describes the main conclusions of the evaluation. The conclusions are organized as per the UNEG evaluation criteria: relevance, effectiveness, impact, efficiency and sustainability. This is followed by recommendations of how the government and other programme partners can act to build on the key findings.

3.1 Overall Conclusions

Relevance

107. The MDM fortification project aimed to improve the micro-nutrient status of school children of Dhenkanal and improve their knowledge with regards to nutrition, anaemia and overall dietary practices. As because the deficiencies of micronutrients were very widely prevalent in India and that too in states with more risk of nutritional deficiencies such as Odisha, the initiative was very relevant. So was important the commissioning of assessment of the pilot project using rigours of science, so that evidence-based decision to scale-up the effective policies can be taken by the government and its other stakeholders.

108. Additionally, the objective of the project was also to promote quality in provisioning of dietary and health services at the school level. The relevance and importance of these objectives were confirmed by key informant interviews with key Government officials of education department at all levels: school, block and district. These objectives broadly align with Odisha government policies and strategies.

109. Overall, this assessment found MDM fortification pilot initiative to be appropriate to the education, nutrition and gender contexts, and coherent to the policy framework of the state government.

Effectiveness

110. This project has helped increase the nutrition-related knowledge in the children as well as the teachers which is likely to play an important role in their overall dietary practices.

111. The awareness regarding MDM fortification in the parents was also notable, though it can be improved further.

112. The taste of the fortified MDM did not alter, or if altered it became more palatable to the children. During the initial phase of the project, in MNP arm few children complained about the change in taste and smell of curry, but later children got used to the change.

113. The cooking techniques (for example watertight rice cooking) improved significantly in the MDM system of the schools and also cleanliness and hygiene related to it, especially in the FRK arm.

114. The overall school MDM, hygiene and cleanliness environment improved in intervention areas, except washing hands by children with soap which could have undergone more improvement.

115. The knowledge of teachers and their provision of teaching aids regarding anaemia and malnutrition improved

116. The entire system of distribution, receipt and consumption IFA tablet, deworming medications and school health check-ups did not show the desired improvement as would have been envisaged by any project of the stature of MDM fortification. However, there was a substantial increase in receipt of IFA tablets at higher rate in MNP arm as compared to FRK and control

Impact

117. This assessment saw a subsequent and significant decline in prevalence of anaemia, among children receiving fortified MDM as compared to children from the control arm (who were not consuming fortified MDM). Decline in the prevalence of anaemia in the fortification arms was significantly more as compared to the slight decline in anaemia observed in the control arm. MNP vs FRK difference in terms of impact on reducing the prevalence of anaemia was statistically not significant.

118. This decline in anaemia was corroborated by improvement in haemoglobin averages in MNP and FRK arm. Again, between the two modalities no statistically significant difference was observed.

119. The MNP arm also had an improved IFA tablet delivery performance than FRK in the endline, which could have marginally influenced the larger improvement of anaemia and average haemoglobin situation in that arm, however these IFA differentials were accounted for in the estimation models.

120. Moreover, the longer "contact period" of MNP as compared to FRK could have accounted for the small difference between MNP and FRK as this variable could not be adjusted for in the estimation model. The longer contact period led to a greater number of fortified meals provided to children in MNP arm than FRK arm.

121. Two fortifying agents containing exactly same amount of micronutrients yielded marginally different results. There is a likelihood that this MNP vs FRK difference can be apportioned to MNP being used in greater quantity than what was prescribed by the fortification guidelines. This is because the knowledge of the amount (whether heaped or levelled scoops to be used) of MNP to be mixed with MDM varied across individuals responsible for the act, which leaves a possibility that it could have been "over-used."

122. These changes were gender and grade-neutral. So, equity was not compromised. Anyway, in baseline exercise it was reported that female students were not more anaemic or suffering from more micronutrient deficiencies. This equilibrium was undisturbed in the endline as well.

123. The same picture was also true for other micronutrients such as Ferritin and Folate. There was significant (both clinically and statistically) decline in deficiencies for these—again slightly more pronounced in MNP arm as compared to FRK. The control arm registered less or no decline. However, for Vitamin B12 the intervention arms as well the control arm registered significant declines, the control arm showing more favourable results in the case of this micronutrient.

124. A bulk of the main impact that is decline in micronutrient deficiency status can be attributed to MDM fortifications due to the rigorous quasi-experimental design of this assessment study. There may be some contributions to the impact from other components of the larger school system.

125. The sickness of schoolchildren also showed a decline in MNP and FRK arm, albeit the absenteeism due to sickness slightly increased in endline, may be due to monsoon season in end of the assessment exercise.

Efficiency

126. Based on analysis of stakeholders' views about MDM fortification processes and observations, especially on the supply, preparation, competencies and monitoring aspects, it was found that the MDM fortification with FRK is operationally more feasible than MNP. Given below are the specific reasons for suggesting MDM fortification with FRK:

Supply and quality

127. **Fortification of rice leads to improved quality and quantity of rice**: The fortification of rice with FRK has improved quality, quantity and timeliness of rice supply. The study participants including government officials and school staff mentioned that the quality issues prevalent with non-fortified rice, such as having unwanted materials including stones, husk, dust and strings of gunny bags etc. have reduced. Further, concerns related to supply of lesser quantity of rice than what is specified on bags, were also reduced due to supply of rice in better quality of bags.

128. **Fortification of curry with MNP is challenging:** In schools where MNP is supplied, ambiguities regarding placing indents and keeping track on the consumption were reported. The frequency and the quantity of MNP received by the schools can not be recalled by any of the respondents. Instance of expiry of MNP has been reported - There were few instances of MNP expiry and stock outs were reported. In addition to health hazards due to the consumption of expired MNP, expiry of MNP also leads to negative financial implications. Difficulty in calculating the required amount of MNP - Few Government officials highlighted the difficulties in calculating the MNP requirement for indenting and the challenges to ensure streamlining of MNP supply.

Capacities of school staff

129. **Cooking of fortified rice is simple and does not require any additional time**: In schools, where fortified rice is used, the cook cum helpers were found to be competent enough to cook the fortified rice as per the guidelines. They were of the opinion that the process of cooking fortified rice is very simple and easy to do and thus, does not require any special skills to operationalize.

130. **Fortification of curry with MNP needs additional time and skill**: Whereas, to fortify curry with MNP, there is a need for additional time and skills to precisely calculate the MNP required and mix it to curry. Further, as per the protocol the teachers are responsible for mixing the MNP to curry, however, some schools reported that the cooks are doing this job at times, who lack the required capacity do the same. There were also diverse views on the quantity of powder to be taken in the scoop.

Perceptions of school staff about fortification related work

131. **Fortification of curry with MNP is burdensome for teachers**: The teachers of MNP blocks looked at the MNP mixing process as an additional burden on them. There was palpable resentment among few teachers in MNP blocks, which may hinder the MNP fortification program in the long run.

132. **Fortification of rice does not require any additional effort or time from teachers**: On the contrary, the FRK block teachers don't need to put any extra effort for fortification at their end, as rice fortification is done at the rice mill. And the cooks at the schools have to do the cooking of fortified rice, which is a usual responsibility for them, hence, there was comparatively better acceptance for MDM fortification with FRK at the school level.

Monitoring of the fortification program

133. **Fortification of rice does not require additional monitoring efforts**: Cooking of fortified rice in the schools was looked upon as a simple process by the district, block and school staff. Therefore, they view that extra efforts of monitoring the processes of fortified rice cooking is not required.

134. **Fortification of curry with MNP require additional monitoring efforts**: Whereas, considering the ambiguities regarding the MNP indenting, calculating and mixing process at the school level, the government officials indicated the need for additional monitoring efforts in the schools where MDM fortification is being done with MNP. As this was a pilot project in four blocks, thus intensive monitoring by the staff of implementing agency and WFP could be managed. Scaling-up of MNP would require additional efforts, as the expiry of MNP and over/under dosage of MNP have been reported during the implementation of pilot project.

135. The role of rice-miller in mixing FRK in right proportion to the MDM rice was critical and it was found to be a rate-limiting step in the entire process fortification through FRK.

136. Costing-wise MNP had an edge on FRK: 7 paise less for each primary and 26 paise less per each upper primary meal.

Sustainability

137. In fortification of existing MDM—there is no need to set parallel administrative and operational machinery, except very few inputs such as procurement of fortifying agents; as the existing machinery of the existing school MDM system provides a platform for operations of these interventions through-out the state and may be elsewhere in the country. Distribution of fortified food through MDM has a huge sustainable potential to make dent on high level of MNDs that exist among individuals of school-going age-groups.

138. Moreover, the sustainability of the project has already been ensured by the Department of School and Mass Education, Government of Odisha, who has committed to scale-up one or both the modalities of MDM fortification for all (or at least most) of the districts of Odisha with resources to be invested from the state budget, as mentioned during the meeting concerned dissemination of results.

3.2 Summary of conclusions:

139. Summarily, the MNP and FRK were both effective methods of MDM fortification. MNP was slightly more effective (though not statistically significant) and slightly less costly (in the pilot) than FRK, however, increased IFA receipt and greater "contact period" in MNP arm could have contributed to this marginal difference. Whereas, FRK was operationally more convenient than MNP and have some serendipitous advantages. Based on which the recommendations are following.

3.3 Recommendations

140. As the findings of the evaluation shows that MNP and FRK were both effective methods of MDM fortification, thus, the most critical recommendation based on the evaluation findings to government is to scale-up of fortification of MDM in other districts. Since both the interventions were found to have roughly similar efficacy, the Department of School and Mass Education may choose an appropriate model as per its convenience to scale-up state-wide fortification of MDM initiative(s) in a large-scale programme mode. The difference between the two modalities in terms of impact on anaemia is not statistically significant.

141. In context to operational feasibility, between the two fortification approaches, evaluation findings clearly exhibits that FRK fortification is operationally more feasible than MNP. Staff involved in the processes of fortification of MDM with MNP have cited operational issues with MNP fortification. Therefore, it has been concluded that the MDM fortification with FRK has better operational feasibility than the MNP.

142. If the decision is to scale-up through FRK, then supervision of the blending of the fortified kernel with the routine MDM rice, which is the key step to this modality of fortification, has to be closely monitored.

143. If the decision is in favour of MNP as the only or one of the fortification modalities then more rigorous training of CCH, their role definition in mixing MNP with MDM curry and much enhanced supervision and monitoring of the entire MNP-fortified MDM system should be ensured. The recording and reporting of MNP use at school and higher levels also have to be bolstered sufficiently.

144. The costing analysis is based on the actual costs incurred in the pilot- which shows MNP as slightly more cost effective as compared to FRK. However, the analysis does not take into account the economies of scale and for taking such decision, an analysis with these factors

will be required and weighed against ease of operations. WFP has earlier calculated the scaled-up cost of FRK and MNP, which shows that scaling-up FRK is more cost-effective than MNP (Annexure 32). The decision for scale-up thus will need to be based on these considerations in the best interest of the school children for improved nutritional status in long run.

145. The IFA, deworming medication delivery and consumption along with school health check-ups need to be strengthened further.

146. The knowledge of the children, teachers and the parents with regards to malnutrition, undernutrition, anaemia and MDM fortification need further strengthening through the routine school system. Customizing knowledge content and delivery to children of different age-groups should be considered .

147. Handwashing of the children by soap before meals should become almost universal. School authorities should ensure that children are washing their hands.

Annexes

Annex 1: Terms of Reference

World Food Programme

Terms of Reference

Assessment of fortification of Mid-Day Meal Programme in Dhenkanal, Odisha

1. Context:

Micronutrient malnutrition (MNM) is a major impediment to socio-economic development. For school children, it has long-ranging effects on health, learning ability and productivity and has high social and public costs due to high rates of illness, absenteeism and disability. Overcoming MNM is therefore a precondition for ensuring rapid and appropriate national development. Studies across the world shows that food fortification can lead to relatively rapid improvements in the micronutrient status of a population at a very reasonable cost, especially if advantage can be taken of existing technology and local distribution networks.

In view of the overall nutrition status of Odisha and the specific nutritional gaps in the intake of school age children, the Mid-Day Meal (MDM) scheme in the state provides a window of opportunity to address Micronutrient Deficiencies (MNDs) through fortification. ***Fortification of school meals is one of the most efficient and effective route to alleviating micronutrient deficiencies in school children.***

2. Project Details:

Given the nature of micronutrient deficiencies and gaps in intake of most of micronutrients, amongst school children in the state of Odisha, the Department of School &Mass Education (DSME) of Government of Odisha (GoO) with support from WFP is initiating implementation of MDM fortification projects in the Dhenkanal (covering entire district), in Odisha.

The modalities of fortification to be used in ***Dhenkanal project*** will draw upon the past experience of WFP and will include use of

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multi-micronutrient fortified rice in some blocks and using the micro-nutrient powder (MNP) in the remaining blocks of Dhenkanal district. It is expected that these models of fortification in Odisha would offer the programmatic and logistics solutions to enrich the nutritive value of meals provided under the MDM based on which the Government of Odisha will scale up fortification of the mid-day meals.

3. Assessment of the Project:

While the project would have an in-built system of monitoring, for conducting the assessment of the project, WFP, in collaboration of GoO seeks proposals from external renowned research agencies with adequate qualifications, experience and capacity to conduct assessments a baseline and endline (after approximately 24 months of implementation)

The details of the same are discussed in following sections.

3.1. Objectives of the Study:

The assessment will provide a comparative study of operational feasibility and cost-effectiveness of both the models implemented in the project area and analyse the impact on levels of micro-nutrients. WFP proposes a quasi-experimental cross-sectional design with establishment of a counterfactual to study pre and post intervention effects along with analysis of attribution.

More specifically, the objectives are-

- Whether there is any change in the area under study?
- Was the change because of the intervention? (ATTRIBUTION)
- What factors were responsible for the change? (CONTRIBUTION)
- Operationally feasibility of two fortification approaches

Baseline study aims at bench-marking of key performance indicators and facilitating operational planning

End line survey will aim at assessment of performance of the project on output and outcome/impact indicators and conducting comparative operational feasibility and cost-benefit analysis

3.2. Study Parameters:

The agency should propose a list of parameters need to be assessed (but not limited to suggested parameters given as following) under the study to make valid statements at baseline and facilitate attribution of the results at endline.

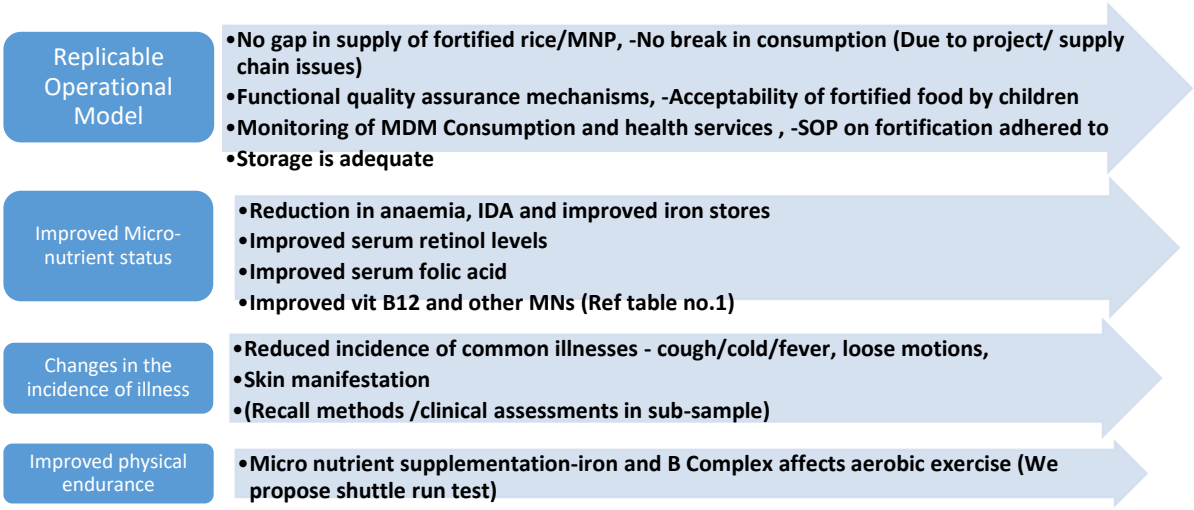
- Micronutrient status, morbidity, physical endurance, awareness, MDM consumption pattern of children
- Enrolment, attendance, health-services, cooking-practices, use of double fortified salt and infrastructure in school
- Capacity and awareness of the concerned stakeholders

- Supply chain and quality assurance
- IEC material
- Model school kitchen in-line with overall GoO guidelines
- Comparative operational and cost analysis of the two models
- Recommendations and suggestions

3.3. Link with project objectives and Causal Pathways:

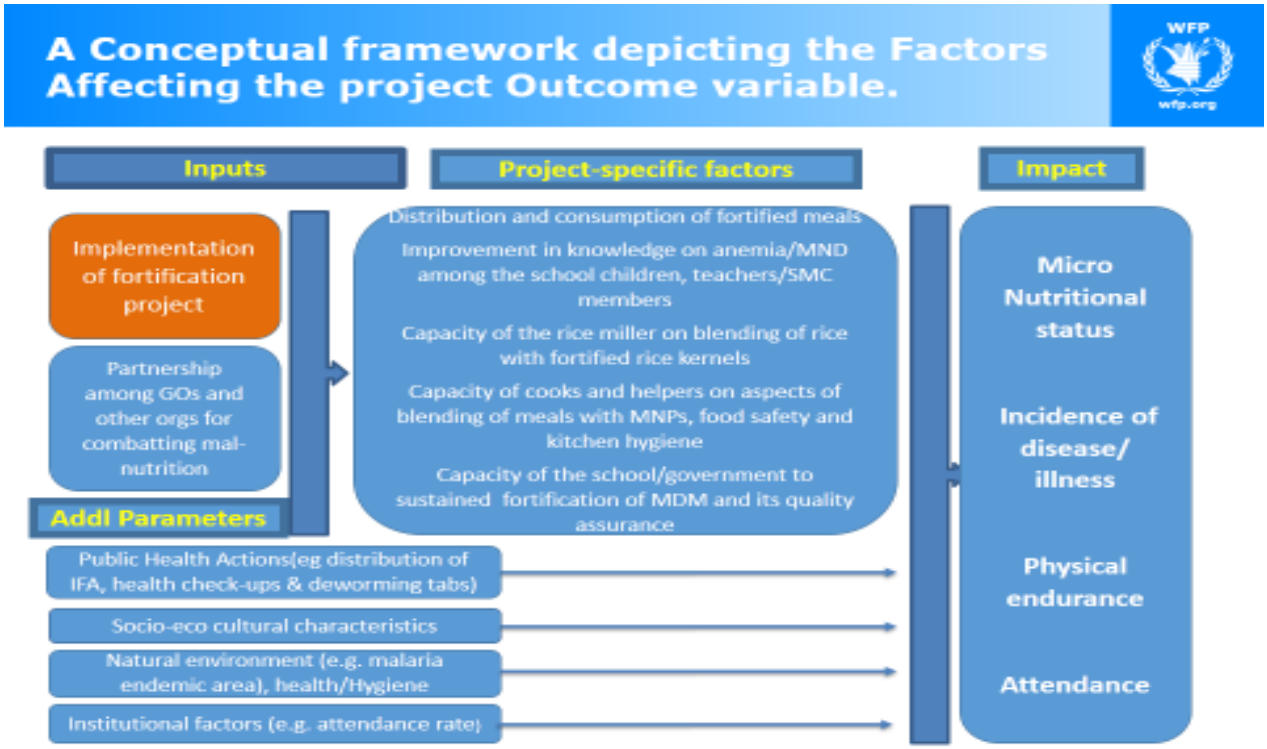
It is a well-documented fact that nutritional status is affected by several parameters and to undertake the attribution, one needs to clearly define the causal pathways (Figure 1) which will be used in the present study.

Figure 1. Framework showing causal pathways



This being a field based study with major focus on operational model and its efficiency, controlled environment required for efficacy trials/Randomized Control Trials will not be possible. An additional list of parameters, which potentially interfere with the results also need to be studied. The framework given below explain the various parameters that need to be studied. The agency should formulate and suggest additional study parameters based on the project outcomes and outputs.

Figure 2. Factors affecting the project outcomes



3.4. Methodology:

The relevant data will be collected at appropriate level by using a combination of desk review, quantitative and qualitative methods as per WFP's corporate guidelines and indicator definitions or the suggested best methodology and tools.

Desk Review: Review of documents such as attendance register, admission register, MDM records/reports etc.

Quantitative Survey of School Children: Assessment of MDM consumption pattern, Morbidity profile, Awareness levels

Bio-chemical Assessment of Children: The key objective of the bio-medical assessment would be to measure and compare changes in project indicators i.e. change in Hb, zinc, Vitamin A, Folate, and Vitamin B12 level among children aged 6-14 years. Analyse the micronutrient status as listed below[3]

Table 1: Proposed Biomarkers and Tests for the analysis of micronutrients

Micronutrient to be analyzed	Proposed biomarker	Laboratory test
Iron	Haemoglobin, Serum ferritin, Serum transferrin receptor, C-reactive protein (CRP), Alpha-1 acid glycoprotein	Haemoglobin- cyan meth or hemocue Serum ferritin, serum transferrin receptor, CRP -ELISA
Vitamin A	Serum retinol	HPLC
Folic acid	Serum folic acid	RIA
Vitamin B12	Serum Methyl malonic acid (this is the method of choice) or serum vitamin B12	Serum MMA:LC-MS/MS Serum vitamin B12:RIA
Zinc	Serum zinc	Atomic absorption spectrophotometer

Physical Endurance Assessment of Children: Examine the physical performance of children in terms of body endurance/aerobic capacity/ speed etc.

School facility survey: School facility survey would be conducted among the schools from where sample school children would be selected for the quantitative and bio-medical assessment in each of model during pre and post intervention phase. Thus using school facility checklist, 25 schools from each of the model areas would be surveyed.

Rice Mill Facility Survey: Survey would be conducted in the rice mill where the fortification would take place.

[3] Please note that final list of bio-markers will depend on the constituents of fortificants finalized

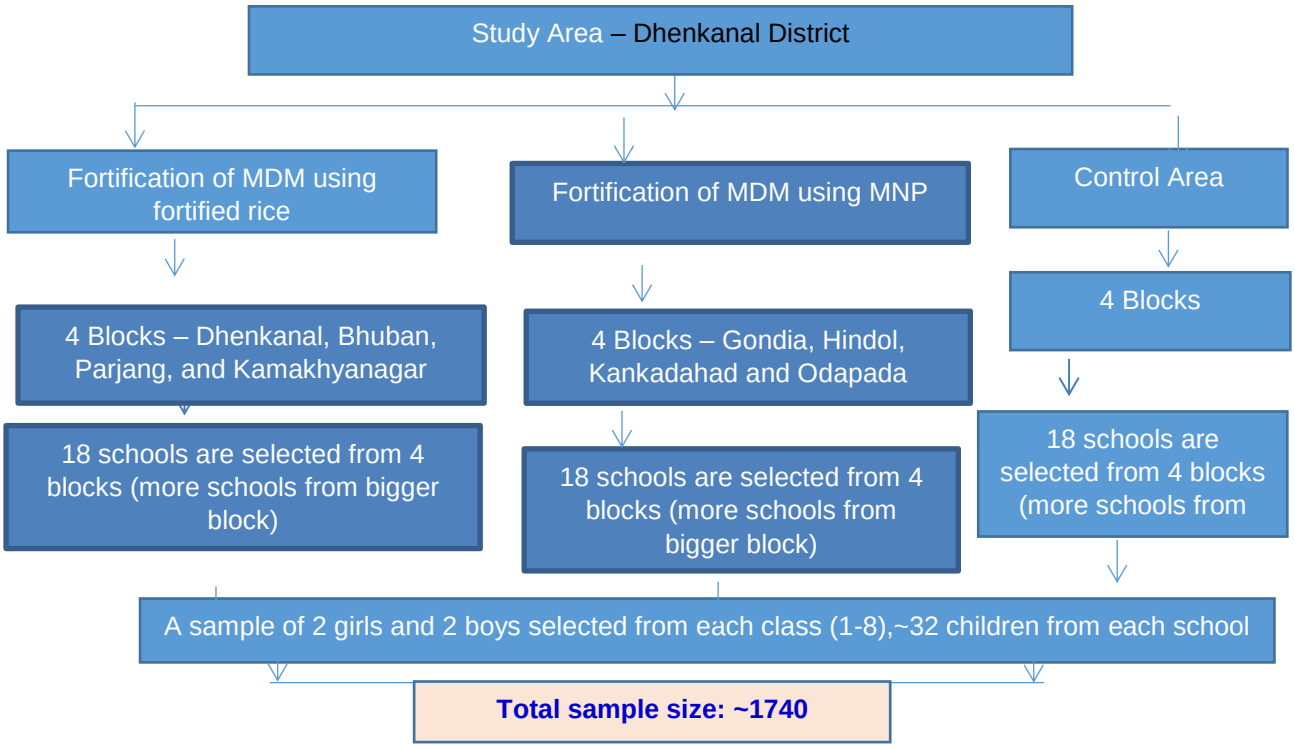
Qualitative assessment: Qualitative assessment would be carried out among the school teachers, head masters, rice-miller, community leaders and government officials to assess the impact, operational-feasibility and effectiveness of models in addition to various quality aspects.

3.5. Sample Size and Design:

To measure changes, which could occur due to project interventions, sample size should be statistically adequate to identify and measure those changes. The study would be a **quasi-experimental cross-sectional design** to study **pre and post intervention effects with establishment of a counterfactual.**

To calculate sample size, a 95% confidence interval to capture a change in the range of 10-12 percent (anaemia levels could be taken as main parameter) with a margin of error of 0.05. The technical proposal should detail out the sampling plan (for the two project modalities and the counterfactual) further with due consideration of 10 percent non-response, design effect and other relevant parameters[4]. The figure 3 below explains the same.

Figure 3. Framework showing Suggested Sample Design



[4] As per CAB, about three fourth children in the age group 5-9 are anaemic. Using that as a base to measure a potential change of approximately 12 percent overall and a design effect of approximately 1.2, and a non response error of 10 percent the sample size is 571 using formula-

$n = D\,[(Z\alpha + Z\beta)2 * (P1\,(1 - P1) + P2\,(1 - P2)) /(P2 - P1)2]$

4. Guidelines for the Proposal:

Technical Proposal (Weightage 70%): The contracted agency/consultant in the technical proposal is expected to detail out -

a. Proposal should be submitted for Dhenkanal (Baseline and Endline) with most appropriate research methodology and sampling design, in line with the suggested methodology, which is cost effective, appropriate and statistically reliable and robust.

b. **The agency will tie-up with an accredited laboratory with adequate experience and infrastructure supervised by a qualified pathologist.** Proposal must mention the details of biomarker measurements to be used along with the test specifications.

c. **The proposal should also highlight the ethical considerations and clearances to be obtained by the agency. The ethical clearance obtained from the subject should be preserved for a period of three years.**

d. End line assessment should facilitate statistically sound estimates for the programme comparison over with the baseline findings. The sample size and sampling method to be used for the survey should be clearly mentioned separately for baseline and end-line evaluation along with separate cost estimates.

e. The training plan for the investigators should be clearly mentioned and the module for the same should clearly detail out the protocols and quality checks. The proposal should also clearly indicate the potential techniques to be used for measuring the change.

f. **Quality Assurance and Oversight**: The proposal should clearly indicate the mechanisms in place to ensure the quality during the survey, data entry and analysis. WFP and GoO through technical agencies will also provide a supervisory and validation support to ensure that the study follows the defined protocols.

Financial Proposal (Weightage-30%): A separate proposal for baseline and endline should be submitted. The lab charges mentioning the cost of assessment of each biomarker should be costed in detail.

5. Specific Activities:

While a lot of information on tools could be leveraged from the tools used for Gajapati assessment, it might require some modifications. The specific activities include:

1. Consultation with concerned programme officers/staff from WFP & GoO,
2. Design of Study
    a. Design of Data Collection Instruments
    b. Pre-testing and finalization of Instruments in real life situation in One Village

c. Selection of Sample
d. Finalization of instruments in consultation with WFP
e. Development of training module for enumerators and supervisors

3. Field work
   a. Training of Field Staff (the detailed agenda of the training of field workers and Field supervisors may be provided). The list of Master trainers to be used in the training may be shared with WFP.
   b. Data Collection Survey
   c. Coordination with an accredited laboratory for timely and effective bio-medical assessment with minimum loss of bio-medical samples
   d. Stakeholders and Key Informant Interviews
4. Supervision, monitoring/ data quality prototcols
5. Data entry, review and analysis
6. Presentation of preliminary findings/validation workshop with TAG
7. Report writing and dissemination consultation

6. Study Duration:

The baseline study and report submission **should be completed within <u>14 weeks</u> of signing the contract. The end-line evaluation study should commence tentatively after completion of implementation and completed within the duration of <u>16 weeks</u>.**

7. Time Plan:

4. The timeline (Baseline)proposed for the assignment (in weeks) is:

Particulars	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Inception meeting , preparation of tools														
Recruitment, Training and Pre-test														
Data Collection														
Data entry, Cleaning and Analysis														
Preliminary Findings														
Validation workshop with TAG committee														
Incorporation of feedback and further Analysis														
Draft and Final Report														
Presentation and Dissemination														

8. Deliverables:

The following documents should be submitted to WFP for both baseline assessment and end-line evaluation, both in hard and soft copy. Deliverables are not considered final until they are of high quality and approved by WFP:

1. Detailed work plan, sampling design and survey instruments & training manual for the field workers and manual for the filed supervisors (Inception Report)
2. Plan of the survey in consultation with the concerned programme/ project officers
3. Chapter scheme of report and data analysis plan
4. Draft final report & dissemination workshop among stakeholders
5. Final Baseline and endline Report and a power point presentation on the reports
6. List of schools surveyed
7. Complete raw data set on CD in .DAT or. SPSS or excel format with complete listing of labels and definitions of each unit record
8. Presentation of the study findings to the concerned Department in Odisha and TAG committee in the presence of WFP staff.

Annex 2: Evaluation Matrix

Criteria	Evaluation Questions	Measure/ Indicator of Progress	Main Sources of information	Data Collection Methods	Data Analysis Methods
Relevance	Were the interventions appropriate to the needs of the target population- school children attending grades 1 to 8? Were the interventions aligned with relevant stated national/state policies, including sector policies and strategies and seek complementarity with the interventions of relevant humanitarian and development stakeholders in school?	Situation of micro-nutrient deficiency in Odisha and similar settings Proven efficacy of fortification Prior experiences with fortification	Literature Project reports Department of School and Mass Education (DSME) School authorities and staff including community (school children and their parents; School Managing Committee) Local NGOs Notices TORs MOUs	Desk review of project documents, Collecting literature, documents, notices and TORs Key Informant Interviews (KII) and discussion	Scoping and descriptive review of literature and comments Thematic framework review of interview transcripts

Criteria	Evaluation Questions	Measure/ Indicator of Progress	Main Sources of information	Data Collection Methods	Data Analysis Methods
Effectiveness	Was there any change in the area under study after the interventions and what were the major factors influencing the change? Did the project deliver results for both boys and girls?	Changes in the school MDM ecosystem Knowledge and practices in the MDM system and the fortification system Dietary practices	Student and parentTeachers and school staff School	Structured interview School checklist and register review Bio-medical and physical endurance assessment of students	Gender and age - stratified Descriptive statistics (before-after comparison)
Efficiency	What were the costs of the interventions? Were the interventions cost-efficient? What were the comparative operational features of the two interventions? Was the intervention implemented in the most efficient way?	Marginal cost per fortified meal Operational features of FRK and MNP	DSME WFP state and country office School teachers and staff NGO partners responsible for administering the interventions Rice Mill personnel	Collection of costing data In-depth interview Key informant interviews	Costing analysis Thematic framework analysis

Criteria	Evaluation Questions	Measure/ Indicator of Progress	Main Sources of information	Data Collection Methods	Data Analysis Methods
Impact	Examine whether the change (if any) was because of the intervention (ATTRIBUTION). Explore what factors were responsible for the change (CONTRIBUTION). Were the impacts gender equitable?	Impact estimates with regards to students' biomarkers, absenteeism (sickness), endurance tests (before-after differences adjusted for changes in the control for key indicators)	Students Parents Teachers Schools	Blood sample collection Structured interview School checklist and register review	Descriptive statistics Difference-in-difference analysis (using regression frameworks for few key indicators)

Criteria	Evaluation Questions	Measure/ Indicator of Progress	Main Sources of information	Data Collection Methods	Data Analysis Methods
Sustainability	To what extent is the state taking ownership of the fortified MDM program? (e.g. demonstrated commitment and contribution to the program) What is the state/national readiness to implement the program? E.g. demonstrated capacity at state and national levels to manage the fortification of MDM. To what extent did the intervention implementation arrangements include considerations for sustainability, such as capacity building of local government institutions, communities and other partners?	Government's buy-in into sustaining the initiatives and scale-up plans Training status of the key school staff responsible for MDM and fortification of MDM	Department of School and Mass Education (DSME) WFP state and country office School authorities and staff including school managing committee	Interviews of key informants	Thematic framework analysis

Annex 3: Documents reviewed

Document Type	Titles	Date Received
Training material	Training Module for Cook cum Helpers - Fortification of MDM using MNP in Dhenkanal	06-02-2018
Training material	Training Module for Cook cum Helpers - Fortification of MDM in Dhenkanal *(for FRK-arm)*	06-02-2018
Training material	Training Module for Teachers - Fortification of MDM using MNP in Dhenkanal*(for MNP-arm)*	06-02-2018
Training material	Training Module for Teachers - Fortification of MDM using MNP in Dhenkanal *(for FRK-arm)*	06-02-2018
IEC material	Flip chart on fortification of MDM using Micro-Nutrient Powder	06-02-2018
	Flip book – Fortification of MDM project *(for FRK-arm)*	06-02-2018
IEC material	Brochure - Multi-Micronutrient Fortification of MDM in Dhenkanal District of Odisha - Fortification through MNP	06-02-2018
IEC material	Brochure - Multi-Micronutrient Fortification of MDM in Dhenkanal District of Odisha *(for FRK-arm)*	06-02-2018
IEC material	Poster - Multi-Micronutrient Fortification of MDM in Dhenkanal District of Odisha - Fortification through MNP	06-02-2018
IEC material	Poster - Fortification of Mid-Day-Meals in Dhenkanal (An intervention to reduce micronutrient deficiency disorders in school going children)	06-02-2018
IEC material	Wall Painting - Fortification of Mid-Day-Meal in Dhenkanal	06-02-2018
Standard Operating Procedure	Standard Operating Procedure of fortification of curry in schools	06-02-2018
Minutes of meeting and communication	Proceedings of the 1st meeting of TAG for fortification of MDM in Dhenkanal district and central kitchen, Cuttack, Odisha (dated 23-05-2016)	06-02-2018

Minutes of meeting and communication	Minutes of the first meeting of District level Monitoring Committee for fortification of MDM in Dhenkanal district held on 01-10-2016	06-02-2018
Minutes of meeting and communication	Minutes of the second meeting of District level Monitoring Committee for fortification of MDM in Dhenkanal district held on 15-04-2017	06-02-2018
Minutes of meeting and communication	Minutes of the third meeting of District level Monitoring Committee for fortification of MDM in Dhenkanal district held on 22-07-2017	06-02-2018
Minutes of meeting and communication	Minutes of the meeting of the fourth District level Monitoring Committee and the meeting of the Information Education and Communication Committee for fortification of MDM in Dhenkanal district held on 22-12-2017	06-02-2018
Monitoring checklist	School monitoring checklist - AIRA	06-02-2018
Monitoring checklist	School monitoring checklist -SOVA	06-02-2018
Progress reports	Quarterly Progress Reports from Implementing agency AIRA	06-02-2018
Progress reports	Quarterly Progress Reports from Implementing agency SOVA	06-02-2018
Progress reports	Progress reports from the rice millers	06-02-2018
Laboratory report	Laboratory test report of raw rice	06-02-2018
Laboratory report	Laboratory test report of cooked rice	06-02-2018
Laboratory report	Laboratory test report of cooked curry	06-02-2018
MoU	MoU between WFP and AIRA	27-09-2018
MoU	MoU between WFP and SOVA	27-09-2018

Annex 4: List of key respondents

S.no	Respondents	Research Instrument	Area of Information
1	School Teachers	School teacher questionnaire	Children's attendance, HR positions, MDM related information,health services,,facilities(water,kitchen,etc.), health and hygiene education
2	Rice Miller	Costing tool	FRK-MDM rice blending cost
3	Block Education Officers	IDI guide	Monitoring & operational features
4	District Education Officer	IDI guide	Monotoring & operational features
5	School Management Committee Members	IDI guide	Monitoring & operational features
6	School Children	Student questionnaire	Knowledge about MNDs &nutritional practices including MDM
7	Staff of SOVA	Costing tool	FRK implementation & monitoring costs
8	Staff of AIRA	Costing tool	MNP implementation & monitoring costs

Annex 5: Quantitative Data Collection Tools

Data Collection Tool 1: Student Parent Questionnaire

For personal use

Block identifier ☐☐	UID ☐☐☐☐☐☐☐☐☐☐	Date ☐☐ ☐☐ ☐☐☐☐ dd mm yy
Start time ☐☐ hrs : ☐☐ min (in 24 hou format)	End time ☐☐ hrs : ☐☐ min	No. Of visits ☐☐

A. Schedule for Parent

Sl.No.	Question	Response		CODE	Skip
1.	Age (in completed years) ବୟସ (ସମ୍ପୂର୍ଣ ବର୍ଣରେ)	**Parent**	**Child being interviewed**		
		Father ☐ Mother ☐	☐		
2.	Completed years of formal education ରେରେ ବର୍ଣ ଶିକ୍ଷି ା ଗ୍ରହର୍ େେିଛନ୍ତି (ସମ୍ପୂର୍ଣ ବର୍ଣରେ)	Father ☐ Mother ☐	**Class** ☐		
3.	Sex of the child ଛୁଆ ଲିଙ୍ଗ	Male	1		
		Female	2		

4.	Time required by the child to reach school **(INMINUTES)** ସ୍କୁଲ େ ୁ ପହଞ୍ଚିବାେ ୁ ରେରେ ସମୟ ଲାରେ**?**	☐☐☐	Minutes			
5.	Distance of school from home **(IN KILOMETRES)** ଘେ ଠାେ ୁ ସ୍କୁଲ େ ଦୂେେ ା ରେରେ?	☐☐☐ Kms				
6.	Occupation ଜୀେବି ା / ବୃେି?		**Code**	**Father**	**Mother**	
		Professional/ Technical	1			
		Managers	2			
		Clerical	3			
		Sales	4			
		Micro, small, medium enterprise	5			
		Skilled Labour (Production/ Transport/ Artisan)	6			
		Farm Managers And Cultivators	7			
		Unskilled Service (Including Agricultural Labour)	8			

		Informally Employed (Father)/ HomeMaker (Mother)	9			
		Unemployed	10			
7.	Number of members in the household ପିବାେରେ ରେରେଜର୍ ସଦସ୍ୟ ଅଛନ୍ତି? (ରୋରେ ହାଣ୍ଡିରେ ରେରେଜର୍ ଖାଆନ୍ତି)	☐☐ Members				
8.	What is the religion of the head of the household? ଘେ ମଖ୍ୟିଆଙ୍କୁ ଧମଣ େର୍?	Hindu			1	
		Muslim			2	
		Christian			3	
		Sikh			4	
		Buddhist/Neo-Buddhist			5	
		Jain			6	
		Jewish			7	
		No Religion			8	
		Other			96	
9.	Which caste category you belong to? ଆପର୍ଙ୍କ ଜାେି େର୍?	General			1	
		Scheduled Caste			2	
		Scheduled Tribe			3	
		Other Backward Class			4	
		None Of Them			5	
		Don't Know			99	
10.	What is the **<u>main source</u>** of drinking water for members of your household?	**Piped water** Piped into dwelling			11	**If 11and**

	(CHOOSE THE MOST COMMON OPTION) ସାଧାରଣରେ ଉତ୍ସ ରେଉଁଠାରୁ ପିଇବା ପାର୍ି ଆର୍ନ୍ତି?	Piped to yard/plot	12	**12 go to Q13** **If 21, 31 or 32 go to Q11, else go to 12**
		Public tap/standpipe	13	
		Tube well or borehole	21	
		Dug well Protected well	31	
		Unprotected well	32	
		Water from spring	41	

		Protected spring		
		Unprotected spring	42	
		Rainwater	51	
		Tanker truck	61	
		Cart with small tank	71	
		Surface water (river/dam/ lake/ pond/stream/canal/ irrigation channel)	81	
		Bottled water	91	
		Community RO plant	92	
		Other	96	
11.	Where is the water source located? ପିଇବା ପାର୍ି ଉତ୍ସ ରେଉଁଠି ଅଛି?	In Own Dwelling	1	**If 1 or 2 go to Q13**
		In Own Yard/Plot	2	
		Elsewhere	3	

12.	How long does it take to go there, get water, and come back in one trip? ରୋଷେଇ ଘର ଯାଇ ପାର୍ି ଆର୍ିବାକୁ ରେରେ ସମୟ ଲାରେ?	☐☐☐ Minutes		**Skip if 11and 12 in Q10**
13.	Does this household do anything to the water to make it safer to drink? ପାର୍ିେକୁ ବଶିଦ୍ଧୁ େକରିବାକୁ େଛି ି େକେନ୍ତି ି?	Yes	1	
		No	0	
		Don't Know	99	
14.	What kind of toilet facility do members of your household usually use? ସାଧାରଣତଃ ରେଉଁଠି ଝାଡା ଯାଆନ୍ତି?	Flush To Piped Sewer System	1	
		Flush To anywhere else except piped sewer system	2	
		Pit Latrine	3	
		No Facility/Uses Open Space Or Field	4	
15.	What is the type of House? ଆପର୍ଙ୍କ ଘ ରେମିେଆି?	Kutcha	1	
		Pucca	2	
		Mixed	3	
16.	Do you have any ration card? ଆପର୍ଙ୍କ ପାଖରେ ରେସନ କାଡଣ ଅଛି ି?	Yes	1	**If 0, skip Q17 and go to Q18**
		No	0	
17.	What is the type of ration card?	APL	1	
		BPL	2	
		AAY	3	

	େି ପ୍ରୋେ ରେସନ େୋଡଣ ଅଛି?	Others (specify)	96	

18.	Does your household have the following? **(MULTIPLEOPTIONS APPLICABLE)**		**(yes = 1, no = 0)**	
		Electricity		
		Mattress		
		Pressure Cooker		
		Chair		
		Cot/Bed		
		Table		
		Electric Fan		
		Radio/Transistor		
		B & W Television		
		Colour Television		
		Sewing Machine		
		Mobile Telephone		
		Land Line Telephone		
		Internet		
		Computer		
		Refrigerator		
		Air Conditioner/Cooler		
		Washing Machine		
		Watch/Clock		
		Bicycle		
		Motorcycle/Scooter		
		Animal-Drawn Cart		
		Car		
		Water Pump		

		Thresher		
		Tractor		
19.	What type of fuel does your household **mainly** use for cooking? **(CHOOSE THE MOST COMMON OPTION)** ରୋରର୍ଇ ପାଇଁ ମଖ୍ୟେ ରୋଉ ଜାରେର୍ୀ ବୟବହାେ େେେନ୍ତି?	Electricity	1	**If 95, skip Q20 and 21**
		LPG/Natural Gas	2	
		Biogas	3	
		Kerosene	4	
		Coal/Lignite	5	
		Charcoal	6	
		Wood	7	
		Straw/Shrubs/Grass	8	
		Agricultural Crop Waste	9	
		Dung Cakes	10	
		No Food Cooked In Household	95	
		Other	96	
20.	Is the cooking usually done in the house, in a separate building, or outdoors? ସାଧାେର୍େଃ ରୋରର୍ଇ ରେଉଁଠି େେେନ୍ତି?	In The House	1	**If 2, 3 or 96, skip Q21 and go to Q22**
		In A Separate Building	2	
		Outdoors	3	
		Other	96	
21.		Yes	1	

	Do you have a separate room which is used as a kitchen? ରୋରଇଁ ପାଇଁ ଅଲଗା ଘ ଅଛି ି?	No	0	
22.	Does any member of this household have a bank account or a post office account? ଘରେ େ ୋହାପାଖରେ ବୟାଙ୍କ ଏୋଉନଟ େମି ବା ରପାଷ୍ଟଅଫିସ ଏୋଉନଟ ଅଛି ି?	Yes	1	
		No	0	
		Don't know	99	
23.	Is any member of this household covered by a health scheme or health insurance? ଆପର୍ଙ୍କ ଘରେ େ ୋହାେ ି ସ୍ୱାସ୍ଥ୍ୟବୀମା ଅଛିେ ି?	Yes	1	**If 0 or 99, skip Q24 and go to Q25**
		No	0	
		Don't know	99	
24.	If yes, then he/ she is covered under which type of health scheme or health insurance? **(MULTIPLE OPTIONS APPLICABLE)** ରେଉଁ ପ୍ରୋେ ସ୍ୱାସ୍ଥ୍ୟବୀମା ଅଛି?	Employees State Insurance Scheme (ESIS)	1	
		Central Government Health Scheme (CGHS)	2	
		Biju Krushak Kalyan Yojna (BKKY)	3	
		Community Health Insurance Programme	4	
		Rashtriya Swasthya Bima Yojana (smart card)	5	

		Other Health Insurance Through Employer/ Other Privately Purchased	6	
		Medical Reimbursement From Employer	7	
		Other	96	

B. Schedule for Child

IFA supplementation, deworming, awareness and morbidity profile:

S.No.	Question	Response	Code	Skip
25.	Who usually eats first in the household? **(MULTIPLE OPTIONS APPLICABLE)** ଘରେ ସାଧାରଣତଃ ପ୍ରଥମ କିଏ ଖାଏ?	Boy Child	1	
		Girl Child	2	
		Male Adult	3	
		Female Adult	4	
		Pregnant	5	
		Lactating	6	
		Male Old	7	
		Female Old	8	
		All eat together	9	
26.	Explore the reason and write down 2 -3 key reasons			
27.	Who usually eats last in the household?	Boy Child	1	
		Girl Child	2	

	(MULTIPLE OPTIONS APPLICABLE) ଘରେ ସାଧାରଣତଃ ଅନ୍ତରେ କିଏ ଖାଏ?	Male Adult	3	
		Female Adult	4	
		Pregnant	5	
		Lactating	6	
		Male Old	7	
		Female Old	8	
28.	Who usually eats most in the family? ଘରେ ସାଧାରଣତଃ ଅଧିକ। କିଏ ଖାଏ?	Boy Child	1	
		Girl Child	2	
		Male Adult	3	
		Female Adult	4	
		Pregnant	5	
		Lactating	6	
		Male Old	7	
		Female Old	8	

S.No.	**Question**	**Response**	**Code**	**Skip**
29.	Why this/these person(s) eat(s) most in the household? Explore the reasons and write down 2 -3 key reasons			
30.	Who mostly decides the items to be cooked in the household?	Children		
		Male Adult		
		Female Adult		

	ଘରେ େର୍ େଣ୍ଢା ହବ େଏି ଠି େରେ ?	Male Old		
		Female Old		
31.	Does it happen that due to food shortage, somebody in the household eats less? ଖାଦ୍ୟ େମ ରହରଲ ରେହ ି େମ ଖାଆନ୍ତ ି େି?	Yes		
		No		
32.	If yes, then who usually eats less? ହଁ ରହରଲ, ସାଧାେର୍େଃ େଏି େମ ଖାଏ?	Children		
		Male Adult		
		Female Adult		
		Male Old		
		Female Old		
33.	Why this/these person(s) eat(s) less during food shortage? Explore the reasons and write down 2 -3 key reasons			
34.	Which other meals you usually take out of school? **(MULTIPLE OPTIONS APPLICABLE)** ସ୍କୁଲ୍ ବାହାରେ ରେରେ ରବରେ / େର୍ େର୍ ଖାଅ?	Breakfast	1	
		Lunch	2	
		Evening snacks	3	
		Dinner	4	
		Other	96	
35.		Yes	1	

	Are the servings outside of school sufficient? ବାହାଘ ଖାଇବାରେ ରପେ ପରୁେ ?	No	0	

S.No.	Question	Response	Code	Skip
36.	How often do you eat the mid-day meal (MDM) in school in a week? **[RANGE 0-6]** ସପ୍ତାହରେ ରେରେ ଥେ ମଧ୍ୟାହ୍ନ ର ାଜନ ଖାଅ?	☐ Day(s)		
37.	Do you finish the whole MDM daily that is given in school? ସ୍କଲୁରେ ମଧ୍ୟାହ୍ନ ର ାଜନ ପୋ ଖାଏଅି?	Yes	1	
		No	0	
		Don't know	99	
38.	Do you get a second helping of MDM? ଖାଇଲା ରବରେ ଦ୍ୱି ୀୟ ଥେ ଦଅି ନ୍ତିଘ?	Yes	1	
		No	0	
39.	Overall Do you like the mid-day meal that is given in school? ମଧ୍ୟାହ୍ନ ର ାଜନ ଖାଇବା ଲ ଲାଗୁଛିଘ?	Yes	1	**If 1, skip Q40 and go to Q41**
		No	0	
		Don't know	99	
40.	Why do you not like the mid-day meal daily that is given in school?	Not tasty	1	
		Do not like the menu	2	
		Less quantity	3	
		Dirty (the way it is served)	4	

	ଓଠାହେଁ ି ମଧ୍ୟାହ୍ନ ର ାଜନ ଲ ଲାଓୁନି?	Other	96	
41.	Do you have drinking water in your school? ସ୍କଲରୁେ ପିଇବା ପାର୍ି ଅଛିଓି?	Yes	1	
		No	0	
		Don't know	99	
42.	Do you wash your hands before eating food? ଖାଇବା ଆଓୁ ହାଓ ରଧାଉଛ ଓି?	Yes	1	**If 1,skip Q43 and go to Q44**
		No	0	
		Don't know	99	
43.	Why do you not wash your hands? ଓଠାହେଁ ି ହାଓ ରଧାଉନ?	No water facility	1	
		No time	2	
		Long queue at the water source	3	
		Not needed	4	
		Others	96	
44.	With what do you wash your hands? ରେଉଁଥିରେ ହାଓ ରଧାଉଛ?	Soap and water	1	
		Water	2	
		Ash	3	
		Mud/ clay	4	

S.No.	Question	Response	Code	Skip
		Others	96	
45.	Have you heard about anaemia?	Yes	1	
		No	0	

	େକ୍ତହୀନେତା (anaemia)େର୍ ଶର୍ିଛୁ ?	Don’t know	99	**If 0 or 99, skip Q46, 47, 48 and 49 and go to Q50**
46.	From whom you heard about anaemia? େୋହା ଠାେୁ େକ୍ତହୀନେତା (anaemia)ବର୍ି ୟରେ ଶର୍ିଲୁ ?	Teacher	1	
		Parents	2	
		Through school health/ education sessions	3	
		Others (specify)	96	
47.	Can you tell me how you can recognize someone who has anaemia? **(MULTIPLE OPTIONS APPLICABLE)** େକ୍ତହୀନେତା (anaemia)ରହାଇଛି ରବାଲି ରେମିେେି ଜାର୍ିବ?	Less energy/weakness	1	
		Paleness/pallor	2	
		Spoon nails/bent nails (koilonychia)	3	
		More likely to become sick (less immunity to infections)	4	
		Other(specify)	96	
		Don’t know	99	
48.	What causes anaemia? **(MULTIPLE OPTIONS APPLICABLE)** େକ୍ତହୀନେତା (anaemia)େୋହେିଁ ି ହୁଏ**?**	Lack of iron in the diet/eat too little, not much	1	
		Sickness/infection (malaria, hookworm infection, other infection such as HIV/AIDS)	2	
		Heavy bleeding during menstruation	3	
		Other(specify)	96	

		Don’t know	99	
49.	How can anaemia be prevented? **(MULTIPLE OPTIONS APPLICABLE)** େର୍ େରାକ େକ୍ତ ହୀନୋ (anaemia)ରହବ ନାହିଁ?	Eat/feed iron-rich foods/having a diet rich in iron	1	
		Eat/give vitamin-C-rich foods during or right after meals	2	
		Take/give iron supplements if prescribed	3	
		Treat other causes of anaemia (diseases and infections) – seek healthcare assistance	4	

S.No.	Question	Response	Code	Skip
		Continue breastfeeding (for infants 6–23 months old)	5	
		Other(specify)	96	
		Don’t know	99	
50.	Have you heard about undernutrition? ପଷ୍ଟ ିହୀନୋ ବର୍ ି ୟରେ ଶର୍ ିଛୁ େି?	Yes	1	**If 0 or 99, skip Q51, 52, 53 and 54 and go to Q55**
		No	0	
		Don’t know	99	
51.	From whom you heard about undernutrition? **(MULTIPLE OPTIONS APPLICABLE)**	Teacher	1	
		Parents	2	
		Through school health/ education sessions	3	
		Others (specify)	96	

	ପଷ୍ଟ ିହୀନୋ ବର୍ି ୟରେ ୋହାଠାୋୁ ଶର୍ିଛୁ ?			
52.	Can you tell me how you can recognize someone who has undernutrition? **(MULTIPLE OPTIONS APPLICABLE)** ଜର୍ୋୁ ପଷ୍ଟ ିହୀନୋ ରହାଇଛି ରବାଲି ରେମିୋି ଜାର୍ିବ?	Lack of energy/ weakness	1	
		Cannot work, study or play as normal (disability)	2	
		Weakness of the immune system (becomes ill easily or becomes seriously ill)	3	
		Loss of weight/ thinness	4	
		Children do not grow as they should (growth faltering)	5	
		Other(specify)	96	
		Don’t know	99	
53.	What causes undernutrition? **(MULTIPLE OPTIONS APPLICABLE)** ପଷ୍ଟ ିହୀନୋୋ ୋାୋର୍ ୋର୍?	Not getting enough food	1	
		Food is watery, does not contain enough nutrients	2	
		Disease/ ill and not eating food	3	
		Other(specify)	96	
		Don’t know	99	
54.	How can undernutrition be prevented? **(MULTIPLE OPTIONS**	Give more food	1	
		Feed frequently	2	
		Give attention during meals	3	

	APPLICABLE) େ◌ରୁ◌େରଲ ପଷ୍ଟ ◌ିହୀନୋ ରହବ ନାହିଁ?	Go to health centre/ hospital and check that the child is growing	4	
		Other(specify)	96	

S.No.	Question	Response	Code	Skip
		Don’t know	99	
55.	Do you **receive** Iron and Folic Acid (IFA) supplement / tablets in school? େ◌ଟୁ ମେ୍ସ କଲଲେ୍ର iron ବେ◌େ◌ି ◌ା ମିରେ◌େ◌ି?	Yes	1	**If 0 or 99,skip Q56, 57 and 58 and go to Q59**
		No	0	
		Don’t know	99	
56.	What is the frequency of **receiving** IFA in school? ରେରବ ରେରବ iron ବେ◌େ◌ି ◌ା ମିରେ?	Daily	1	
		More than once in a week	2	
		Weekly	3	
		Monthly	4	
		Quarterly	5	
		Half Yearly	6	
		Yearly	7	
		Don’t know	99	
57.	Do you **consume** IFA supplements? େ◌ରମ iron ବେ◌େ◌ି ◌ା ଖାଥିେ?	Yes	1	**If 0,skip Q58 and go to Q59**
		No	0	
58.	What is the frequency of **consuming** IFA supplement? ରେରବ ରେରବ iron ବେ◌େ◌ି ◌ା ଖାଅ?	Daily	1	
		More than once in a week	2	
		Weekly	3	
		Monthly	4	
		Quarterly	5	

		Half Yearly	6	
		Yearly	7	
		Don’t know	99	
59.	In school do you **receive** deworming tablets / syrup? େମ୍ଭେ ସ୍କୁଲରେ େ◌ୃମି ବେେ◌◌ି ◌ା ମିଳେେ◌◌ି?	Yes – Tablet	1	**If 0, skip Q60, 61 and 62 and go to Q63**
		Yes – Syrup	2	
		No	0	
60.	What is the frequency of **receiving** deworming tablets / syrup in school? େରବ େରବ େ◌ୃମି ବେେ◌◌ି ◌ା ମିଳେ?	Daily	1	
		More than once in a week	2	
		Weekly	3	
		Monthly	4	
		Quarterly	5	
		Half Yearly	6	
		Yearly	7	
		Don’t know	99	
61.	Do you **consume** deworming tablets / syrup? େରମ େ◌ୃମି ବେେ◌◌ି ◌ା ଖାଆେି?	Yes – Tablet	1	**If 0, skip Q62 and go to Q63**
		Yes – Syrup	2	
		No	0	
62.	What is the frequency of	Daily	1	

S.No.	Question	Response	Code	Skip
	consuming deworming tablets/syrup? େରବ େରବ େ◌ୃମି ବେେ◌◌ି ◌ା ଖାଅ?	More than once in a week	2	
		Weekly	3	
		Monthly	4	
		Quarterly	5	
		Half Yearly	6	
		Yearly	7	

		Don’t know	99	
63.	Do you receive health check-ups in school? ସ୍କୁଲରୁ ଆପଙ୍କେ ସ୍ୱାସ୍ଥ୍ୟ ପୋଷା ଚେକଅପ ହୋଏ କି?	Yes	1	**If 0 or 99,skip Q64, 65 and 66 and go to Q67**
		No	0	
		Don’t know	99	
64.	Who does the health check-ups in school? କିଏ ସ୍କୁଲରୁ ସ୍ୱାସ୍ଥ୍ୟ ପୋଷା ଚେକଅପ କରନ୍ତି?	Doctor/Health Officer	1	
		Nurse/ ANM	2	
		Others (specify)	96	
65.	What is the frequency of health check-ups? କେବେ କେବେ ସ୍ୱାସ୍ଥ୍ୟ ପୋଷା ଚେକଅପ ହୋଏ?	Monthly	1	
		Quarterly	2	
		Half-Yearly	3	
		Yearly	4	
		More than a year	5	
		Don’t know	99	
66.	How many times has the school conducted health-check-ups in the last 15 days? ଚଳିତ 15 ଦିନି ରେ ସ୍କୁଲରୁ କେତେଥର ସ୍ୱାସ୍ଥ୍ୟ ପୋଷା ରହାଇଛି?	☐ No. of times		
67.	Have you fallen sick in the last 15 days? ଚଳିତ 15 ଦିନି ରେ ତୁ ମେ କଦହ ଖୋପ ରହାଇଥିଲା କି?	Yes	1	**If 0 or 99, skip Q68, 69 and 70 and go to Q71**
		No	0	
		Don’t know	99	
68.	What was the illness that you suffered from in the last 15 days?	Fever	1	
		Cold	2	
		Cough	3	

	(MULTIPLE OPTIONS APPLICABLE) େର୍ ରଦହ ଖୋପ ରହଇଥିଲା?	Diarrhoea	4	
		Malaria	5	
		Jaundice	6	
		Others (specify)	96	
69.	Did you discontinue school while you were sick in the last 15 days?	Yes	1	
		No	0	
S.No.	**Question**	**Response**	**Code**	**Skip**
	େ6େ 15 ଦନି ରେ ରଦହ ଖୋପ ପାଇଁ ସ୍କୁଲ୍ ବନ୍ଦ େ6େିଥିଲେି?	Don't know	99	
70.	How many days were you absent due to sickness in the last 15 working school days? େ6େ 15 ଦନି ରେ ରଦହ ଖୋପ ପାଇଁ ରେରେ ଦନି ସ୍କୁଲ୍ ବନ୍ଦ େ6େିଥିଲ?	☐ days		
71.	How many days the child was absent in the last 15 days? **(RECORD FROM THE ATTENDANCE REGISTER)** େ6େ 15 ଦନି ରେ ଛୁଆ ରେରେ ଦନି ସ୍କୁଲ୍ ବନ୍ଦ େ6େିଥିଲା?	☐ days		

C. Physical Endurance Test Results

In how much time test has been completed?	☐☐ mins : secs
Distance covered (in meters)	☐☐☐ meters
No of laps finished	☐☐☐
Signature of FI	
Full name of the FI	

Thank the participant and take permission to contact again, if required.

Data Collection Tool-2

School Survey Checklist

District	Block	Name of School
	Unique Identification Number	Type of school :

Village			Primary-1	Primary with upper primary-2	Upper primary-3

Sl.No.	Question	Response
1.	Number of days school was open for children in 2015-2016 academic year (till date)	

2 Timing of the School

Activity	Timing	Duration	Remarks
Class			
MDM			
Sports			
Heath activity			
Others (specify)			

3 Number of students <u>enrolled</u> in the school (Take from enrolment register yourself. write the total.)

PRIMARY

Class-1		Class-2		Class-3		Class-4		Class-5	
Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls

UPPER PRIMARY

Class-6		Class-7		Class-8	
Boys	Girls	Boys	Girls	Boys	Girls

4 Children <u>attendance</u> rate of last quarter in the school (Take from attendance register yourself. write the total.)

PRIMARY

Class-1		Class-2		Class-3		Class-4		Class-5	
Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls

UPPER PRIMARY

Class-6		Class-7		Class-8	
Boys	Girls	Boys	Girls	Boys	Girls

5 School staff

Position	**Allotted**	**In-position**	**Vacancy**
Head Master/ Headmistress			
Teachers			
Peon			
Sweeper			
Cook			
Others (specify)			

Mid-Day Meal

6	Was mid-day meal served in the school today?	Yes	1
		No	2
7	Is MDM cooked within the school premise? (Observe)	Yes	1
		No	2
8	Is MDM served to the children today (Look for evidence like dirty utensils or meal being bought from outside)? (Observe)	Yes	1
		No	2
9	What is served in MDM during current day and previous 5 days? <u>Codes:</u> Rice and Dalma– 1 Rice &Soybean cake curry -2	Monday	
		Tuesday	
		Wednesday	
		Thursday	

	Rice and egg curry - 3 Other (specify) - 8	Friday	
		Saturday	
10	Number of meals being consumed in MDM in last month (Obtain from monthly MDM report sent by school)	Primary Boys Girls Upper Primary Boys Girls Total Boys Girls	
11	Number of working school days in last month		
12	Which method is used for cooking fortified rice?	Water tight	1
		Drained	2
		Other (specify)	3
13	What salt is used in MDM? **(if 2 or 3, skip Q14)**	Double fortified	1
		Iodised	2
		Non-iodised	3
14	Since when double fortified salt has been used in MDM?	M M / Y YYY	

15	What is the total number of beneficiaries under MDM during last year 2015-16?	Boys	Girls
	January		
	February		
	March		
	April		
	May		

	June		
	July		
	August		
	September		
	October		
	November		
	December		

Health services

Sl.no	Question	Response	Codes
16.	Does the school administer deworming tablets/syrup to students?	Yes	1
		No	2
17.	What is the mode of administration for deworming?	Tablets	1
		Syrup	2
18.	What is the number of students who have been administered deworming tablets/syrup?	Boys	
		Girls	
19.	What is the frequency of administration of deworming tablets/syrup?	Monthly	1
		Quarterly	2
		Half-yearly	3
		Yearly	4
20.	When the last time de-worming tablets/syrup was were given to the children?	Date	
21.	Can you verify above details regarding deworming from register physically?	Yes	1
		No	0
22.	At present what is the stock of deworming supplements in school? (Cross verify from register and physically)	No. of tablets	
		No. of bottles	
		No Record	
		Yes	1

23.	Does the school administer Iron Folic Acid (IFA) supplements to students? **(if 2, skip Q24, 25, 26, 27 and 28)**	No	2	
24.	What is the mode of administration for IFA?	Tablets	1	
		Syrup	2	
25.	What is the number of students who have been administered IFA tablets/syrup?		Primary	Upper primary
		Boys		
		Girls		
26.	What is the frequency of administration of IFA tablets/syrup?	Daily	1	
		Weekly	2	
		Monthly	3	
		Quarterly	4	
		Half-yearly	5	
		Yearly	6	
27.	When the last time IFA tablets/syrup was given to the children?	Date		
28.	At present what is the stock of IFA supplements in school? (Cross verify from register)	No. of tablets		
		No. of bottles		
		No Record		
29.	Does the school conduct health check-ups for students?	Yes	1	
		No	2	
30.	What is the frequency of health check-ups?	Monthly	1	
		Quarterly	2	
		Half-yearly	3	
		Yearly	4	
31.	How many times has the school conducted health check-ups in the last one year?			
32.	Who conducts the health check-ups in school?	Doctor	1	
		ASHA	2	

		Both(Doctor & ASHA)	3
		Others (specify)	96

School Infrastructure (observe)

Sl.no.	Purpose	Number		Condition/ Functionality	
33.	Total number of Rooms in the school building	Kutcha	1		
		Pucca	2		
		Semi-pucca	3		
34.	Class Rooms				
35.	Library				
36.	Store Room				
37.	Kitchen				
38.	Boundary wall / Fencing			Complete	1
				Incomplete	2
39.	Play ground				
40.	Toilet	Boys-			
		Girls-			
41.	Hostel	Boys-			
		Girls-			
42.	First aid Kit				
43.	Any other details worth mentioning (specify)				

Facility of Water and Food

44.	What is the main source of drinking water	Tap	1
		Borewell	2
		Hand pump	3

		Dug well	4
		Others (specify)	5
		No supply	6
45.	Is there any facility to purify the drinking water at school level? **(if 2, skip Q46)**	Yes	1
		No	2
46.	Which method is used to purify water?	Aqua guard	1
		Water filter	2
		Boiling	3
		Chlorination	4
		Simple straining	5
		Others (specify)	6
47.	Is the drinking water stored? **(if 2, skip Q48)**	Yes	1
		No	2
48.	If yes, How?	Covered Jars/pots	1
		Overhead tank	2
		Not required (filter / aqua guard etc)	3
		Not properly stored	4
49.	Is there water available to the toilets (observe)	Yes	1
		No	2
50.	Is there water supply to Kitchen(observe)?	Yes	1
		No	2

Hand washing practice in the school (Observe)

Sl.no.	**Activities**	Yes	No

		With soap	Without soap	
51.	Students wash hands before eating	1	2	3
52.	Students wash hands after use of toilet	1	2	3
53.	Cook washes hands before cooking	1	2	3
54.	School staff – teachers and cook wash hands after use of toilet	1	2	3
55.	Is there hand washing facility available before and after eating	1		2
56.	Is there separate hand washing facility available near toilet facility	1		2

Kitchen facility (Observe)

57.	Separate room for the Kitchen	1 Yes 2 No
58.	Condition of the kitchen	1 Pucca 2Katcha 3 Shed
59.	Facility for storage of grains/ other items	1 Yes 2 No
60.	Separate water supply to kitchen	1 Yes 2 No
61.	Cleaning condition of the kitchen	1 Yes 2 No
62.	Are the food items properly stored after preparation	1 Yes 2 No
63.	Is the food prepared utilized on the same day	1 Yes 2 No

64.	What is done if MDM food is left over? **(cross-check with cooks if observation not possible)**	1. Thrown 2. Consumed by others 3. Distributed among children 4. Used on next day 5. Sold

Health and Hygiene education

65.	Is there any special education class on health and hygiene happening in the school?	1 Yes 2 No
66.	Who takes such classes	
67.	Is the school visited by any NGO for educating the children on health	1 Yes 2 No
68.	If yes, how often	
69.	Is there any display materials on health and hygiene present? **(If 2, skip Q70)**	1 Yes 2 No
70.	If yes, where the materials on health and hygiene are displayed (e.g. principal's office, class rooms, MDM eating place etc.)	

Observe the records

Sl.no	**Name of record/register**	**Date of last updation**	**Remarks**
71.	Enrolment Register		
72.	Attendance Register		
73.	MDM Raw material procurement register		

74.	Rice supply records		
75.	MDM consumption register		
76.	Stock register		
77.	IFA administration		
78.	Deworming		
79	Health check-up		
80	Health/nutrition education sessions		
81	SMC activity		

Name of Research Associate: **Signature:**

Data Collection Tool-3: Teacher's Interview

Semi-structured interview schedule

(School Teachers)

Section 1: Identification

S. No.	Question	Code
101.	School Unique ID (same as in school checklist)	
102.	Teacher Unique ID	
103.	Date of Interview:	

Section 2: Profile of the teacher

S. No.	Question	Response	Code	Skip
201.	Class in which teacher instructs **MULTIPLE RESPONSES POSSIBLE**	Class I	1	
		Class II	2	
		Class III	3	
		Class IV	4	
		Class V	5	
		Class VI	6	
		Class VII	7	
		Class VIII	8	
		Ujwal students (II to V)	9	
202.	Sex	Male	1	
		Female	2	
203.	Age (in completed years)	☐☐ Years		
204.	Religion	Hindu	1	
		Muslim	2	
		Christian	3	
		Others (specify)	8	
205.	Social category	Scheduled Caste (SC)	1	
		Scheduled Tribe (ST)	2	
		Other Backward Class (OBC)	3	
		General	4	
		Don't know/Can't say	9	
206.	Education level	Completed higher secondary (Class 12^{th})	1	
		Graduate	2	
		Post-graduate	3	
		10^{th} Pass	8	
		Teachers' certificate	9	

207.	Place of stay	Same village where school is situated	1	
		Other village	2	
		Block headquarters	3	
		District headquarters	4	

Section 3: Related to schooling

S. No.	Question	Response	Code	Skip
301.	what are the most common reasons for absenteeism? **MULTIPLE RESPONSES POSSIBLE**	Parents do not send the children to school	1	
		Children do not like attending school	2	
		Children help their families in domestic and commercial work	3	
		Children face problem in transportation to reach school	4	
		Parents are busy in work and cannot send older child who has to look after younger children	8	
		Others (specify)	9	
302.		Yes	1	

	Do you think the attendance of children has improved since implementation of MDM/ food fortification project	No	2	
		Don't know/Can't say	99	
303.	Do the students receive health education?	Yes	1	Skip to 305
		No	2	
304.	What topics are covered in health education?	Personal hygiene	1	
		Sanitation	2	
		Precautions taken to avoid illness	3	
		Cleanliness	4	
		Others (specify)	8	
305.	Do the students receive education on nutrition?	Yes	1	Skip to 401
		No	2	
306.	What topics are covered in nutrition education? **MULTIPLE RESPONSES POSSIBLE**	Advantages of taking MDM	1	
		Advantages of taking fortified salt	2	
		Advantages of taking Iron Folic Acid tablets/syrup	3	
		Advantage of eating fruits and vegetables.	4	
		Others (specify)	8	

Section 4: Awareness, attitude and perception

S. No.	Question	Response	Code	Skip
401	Have you heard about the rice fortification project	Yes	1	
		No	2	
402	Did you attend training or capacity building session on rice fortification?	Yes	1	
		No	2	

403	Do you have IEC material job aid such as resource book/chart available in school for creating awareness on anaemia?	Yes	1	
		No	2	
404.	Are you aware of iron deficiency (anemia)?	Yes	1	Skip to Q408
		No	2	
405	What are the symptoms of anemia?	Fatigue	1	
		Weakness	2	
		Paleness/yellow skin/white tongue and pale eyes	3	
		Palpitation	4	
		Lack of concentration	5	
		Others (specify)	8	
406	What are the causes of anemia?	Iron deficiency	1	
		Poor nutrition	2	
		Worm Infestation/ Illness such as TB, malaria etc	3	
		Blood Loss	4	
		Lack of breakfast	8	
		Others (specify)	9	
407	What are consequences of anemia?	Slow growth (physical and mental)	1	
		Reduced learning ability	2	
		Reduced Immunity/ Recurrent Illnesses	3	
		Lesser participation in activities/ dullness	4	
408	What are the preventive behaviors for anemia?	Eating iron rich vegetables	1	
		Eating iron rich fruits	2	
		Eating meat/fish/eggs	3	
		Cooking in iron vessels	4	

		Consuming Deworming Tablets	5	
		Taking Iron fortified food	6	
		Consuming IFA supplements	7	
		Intake of proper breakfast	8	
		Others (specify)	9	
409	Do your school provide IFA tablets	Yes	1	
		No	2	
410	If yes, at what frequency	Daily	1	
		More than once in a week	2	
		Weekly	3	
		Monthly	4	
		Quarterly	5	
		Half Yearly	6	
		Yearly	7	
		Don't know	99	
411	Do your school provide Albendazole tablets	Yes	1	
		No	2	
412	If yes, at what frequency	Daily	1	
		More than once in a week	2	
		Weekly	3	
		Monthly	4	
		Quarterly	5	
		Half Yearly	6	
		Yearly	7	
		Don't know	99	

413	Are you aware of undernutrition?	Yes	1	If 2, Skip to Q414
		No	2	
414	What are the symptoms of undernutrition?	Lack of energy/ weakness	1	
		Cannot work, study or play as normal (disability)	2	
		Weakness of the immune system (becomes ill easily or becomes seriously ill)	3	
		Loss of weight/ thinness	4	
		Children do not grow as they should (growth faltering)	5	
		Other(specify)	96	
		Don't know	99	
415	What are the causes of undernutrition?	Not getting enough food	1	
		Food is watery, does not contain enough nutrients	2	
		Disease/ ill and not eating food	3	
		Other(specify)	96	
		Don't know	99	
416	What are consequences of undernutrition?	Delay in physical growth	1	
		Delay in mental growth	2	
		Other (specify)	96	
		Don't know	99	
417	What are the preventive behaviors for undernutrition?	Give more food	1	
		Feed frequently	2	
		Give attention during meals	3	

		Go to health centre/ hospital and check that the child is growing	4	
		Other(specify)	96	
		Don't know	99	

Section 5: Quality assurance of MDM Programme

MDM	**Satisfaction level with regards to MDM** **Scale (1 being the lowest, 5 being the Highest)**				
Regularity	1	2	3	4	5
Timeliness	1	2	3	4	5
Quality	1	2	3	4	5
Hygiene	1	2	3	4	5
Variety	1	2	3	4	5

Section 6: Information on staff in MDM committee

Sl. No.	**Category**	**Number**	**Adequate (1-Yes, 2-No)**
1	Kitchen-in charge		
2	Store-in charge		

3	Head Cook		
4	Sweeper		
5	Helpers		
6	Any Other (Specify)		

Signature of FI	
Full name of the FI	

Thank the participant and take permission to contact again, if required.

Annex 6: List of key informants & sample size

Sl. No.	Study participants	No. of interviews		Total No. of interviews
		FRK	MNP	
1	Teachers	6	6	12
2	SMC members	4	4	8
3	CCHs	4	4	8
4	BEO	2	2	4
5	DEO	-	-	1
6	Rice Miller	1	-	1

Annex 7: IDI Guides

TOPIC GUIDE (SCHOOL HEADMASTER/TEACHER/SMC MEMBER)

Awareness and Views about MDM program

1. Could you please tell us about the mid-day meal program in detail?

   Probe: Purpose; specific activities under the program; how many days in a week MDM served; your specific role; how much of your time is devoted to this work (approximately)

2. What are the materials supplied for MDM in your school?

   Probe: frequency of supply; are there delays, if yes, reasons for the same; how the delay is managed; Does the suppliers give prior-information regarding delay in supply; what could be possibly done to improve the timely supply of ration for MDM? Who is responsible for receiving the supplies and what is the process followed?

3. Which materials are procured locally for MDM?

   Probe: Pulses, Eggs, soya, spices, vegetables, salt, fuel/wood and oil, Person in charge of procurement and process of procurement, mode of payment to the vendor, Re-imbursement, Challenges faced during local procurement.

Quality mechanisms in place

1. Raw material storage: Where does school keep the raw materials/ ingredients?

   Probe: How do they store individual items (Distance from wall, floor and use of drums/bins? Is the space adequate? Do they face any problems in the available storage facility? How is quality ensured at storage? Does school maintain FIFO and stock register?

2. Food preparation: Steps followed during MDM preparation (cleaning, cutting) and cooking (Water tight method; use of lid and process of adding MNP). What is the source of water used for cooking and cleaning purpose?

3. Post food preparation: What is the quantity served for Primary and Upper Primary children? What measures are taken to ensure quality after cooking? Probe: What is the time lapse between food preparation and food serving; food testing and maintaining record cooking start time, end time and food serving time.

4. Monitoring and Supervision: Does anyone monitor the process of MDM preparation, who, what, and how frequently? Do higher officers visit for inspection of MDM? If yes, who visits and at what frequency? What is their feedback about MDM? What are the records maintained in the school for MDM?
5. Your overall opinion about functioning of MDM in your schools? Do you feel it is good/bad and why do you feel so (Quantity, quality and variety)? Do you think MDM provided meets the nutritional requirements of children? Why do you say so? Do all students consume MDM in the school? If yes, what is their feedback? If no what do you think are three basic reasons for the same? What do you think are the possible solution for it?
6. Is any step being taken to reduce anemia among children in the school? What is being done? How do you involve parents and community leaders?
7. Have you undergone any training on nutrition, health & hygiene practices? If yes, could you tell me about it? When was it, what was told, who trained?
8. Tell us about the School Management Committee (SMC)? Probe: What is it for (the purpose); what all activities SMC does; how many members and who are the members; how many teachers in this committee; how many days in a month do the teachers devote time to SMC?

FRK/MNP fortification process

In FRK arm: Ask Q. 9

9. What is your view on the fortified rice you have been receiving? Probe: About the supply – adequacy, timeliness; process of cleaning, process of cooking, feedback of students, teachers/HM, cook cum helper regarding taste, smell of rice.

In MNP arm: Ask Q. 10, 11, 12

10. Can you please describe how the fortification of curry is carried out? Probe: Detailed process, who does the fortification, when and where, how appropriate quantity is measured for blending and who ensures that, quality checks (recommended quantity per serving, kitchen hygiene & food safety)
11. What is your opinion on the fortification process? Probe: Easy to do job or difficult? Easy/difficult – why do you say so? Any challenges that you faced/usually face while carrying out the curry fortification? Prompt: any lump formation (If yes), what are those?
12. What is your view on the fortified curry (added with MNP)? Probe: Is there a change in taste, smell, color, consistency. What is the view of your children on fortified curry?

Ask for both FRK and MNP

13. Does anyone monitor the process of curry fortification/ cooking of rice? Who, what, and how frequently? Do higher officers visit for supervision of the fortification process/ rice cooking? If yes, who visits and at what frequency? What is their feedback?
14. Have you received any training under this project on fortification of curry/ cooking rice by water tight method? If yes – Probe: Class room training or on the job; could you tell me about it? In your absence, who looks after the fortification of curry/rice preparation? Has he/she received any training on curry fortification/rice preparation? Could you tell me about it?
15. What is your view on this strategy of fortification of mid-day meal? Should this be implemented in schools of other districts in Odisha? Why do you say so?

16. What suggestions would you like to give for improving the program so that it can really benefit the nutritional status of the school children?

THANK THE RESPONDENT FOR THEIR TIME

TOPIC GUIDE FOR COOK CUM HELPER

Awareness about MDM program

1. Could you please tell us about the mid-day meal program in detail?

   Probe: Purpose; specific activities under the program; how many days in a week MDM served; your specific role; how much of your time is devoted to this work (approximately)

2. How do you receive the raw materials for cooking MDM?

   Probe: Who gives the raw materials for cooking MDM regularly, how much quantity, at what time do they provide you with the materials required. Do you face any challenges in receiving materials for MDM cooking? If yes, please explain.

Quality mechanisms in place

3. Raw material storage: Where does school keep the raw materials/ ingredients?

Probe: How do they store individual items (Distance from wall, floor and use of drums/bins? Is the space adequate? Do they face any problems in the available storage facility? How is quality ensured at storage? Does school maintain FIFO and stock register?

4. Food preparation: Steps followed during MDM preparation (cleaning, cutting) and cooking (Water tight method; use of lid and process of adding MNP). What is the source of water used for cooking and cleaning purpose?
5. Post food preparation: What is the quantity served for Primary and Upper Primary children? What measures are taken to ensure quality after cooking? Probe: What is the time lapse between food preparation and food serving; food testing and maintaining record cooking start time, end time and food serving time.
6. Monitoring and Supervision: Does anyone monitor the process of MDM preparation, who, what, and how frequently? Do higher officers visit for inspection of MDM? If yes, who visits and at what frequency? What is their feedback about MDM? What are the records maintained in the school for MDM?

7. Your overall opinion about functioning of MDM in your schools? Do you feel it is good/bad and why do you feel so (Quantity, quality and variety)? Do you think MDM provided meets the nutritional requirements of children? Why do you say so? Do all students consume MDM in the school? If yes, what is their feedback? If no what do you think are three basic reasons for the same? What do you think are the possible solution for it?
8. Have you undergone any training on cooking procedures to preserve nutritional values of food - while cooking, storing and serving? Any other training on nutrition, health &hygiene practices? If yes, could you tell me about it? When was it, what was told, who trained?

FRK/MNP fortification process

In FRK arm: Ask Q. 9

9. What is your view on the fortified rice you have been receiving? Probe: About the supply – adequacy, timeliness; process of cleaning, process of cooking, feedback of students, teachers/HM, cook cum helper regarding taste, smell of rice.

In MNP arm: Ask Q. 10, 11, 12

10. Can you please describe how the fortification of curry is carried out?

    Probe**:** Detailed process, who does the fortification, when and where, how appropriate quantity is measured for blending and who ensures that, quality checks (recommended quantity per serving, kitchen hygiene & food safety)
11. What is your opinion on the fortification process?

    Probe: Easy to do job or difficult? Easy/difficult – why do you say so? Did/do you face any challenges while carrying out the curry fortification? Prompt: any lump formation (If yes), what are those?

12. What is your view on the fortified curry (added with MNP)? Probe: Is there a change in taste, smell, color, consistency. What is the view of your children on fortified curry?

Ask for both FRK and MNP

13. Does anyone monitor the process of curry fortification/ cooking of rice? Who, what, and how frequently? Do higher officers visit for supervision of the fortification process/ rice cooking? If yes, who visits and at what frequency? What is their feedback?
14. Have you received any training under this project on fortification of curry/ cooking rice by water tight method? If yes – Probe: Class room training or on the job; could you tell me about it? In your absence, who looks after the fortification of curry/rice preparation? Has he/she received any training on curry fortification/rice preparation? Could you tell me about it?
15. Do you feel providing fortified rice/ MNP powder will be instrumental in improving the nutritional status of children? Should this be implemented in schools of other districts in Odisha? Why do you say so?
16. What suggestions would you like to give for improving the program so that it can really benefit the nutritional status of the school children?

…Thank the respondent and close the interview…

TOPIC GUIDE FOR DISTRICT AND BLOCK OFFICIALS

Awareness and Views about MDM program

4. Could you please tell us about the mid-day meal program in detail?

   Probe: Purpose; specific activities under the program; how many days in a week MDM served; your specific role; how much of your time is devoted to this work (approximately)

5. What are the materials supplied for MDM in your school?

   Probe: frequency of supply; are there delays, if yes, reasons for the same; how the delay is managed; Does the suppliers give prior-information regarding delay in supply; what could be possibly done to improve the timely supply of ration for MDM? Who is responsible for receiving the supplies and what is the process followed?

Quality mechanisms in place

17. Raw material storage: Where does school keep the raw materials/ ingredients?

    Probe: How do they store individual items (Distance from wall, floor and use of drums/bins? Is the space adequate? Do they face any problems in the available storage facility? How is quality ensured at storage? Does school maintain FIFO and stock register?

18. Food preparation: Steps followed during MDM preparation (cleaning, cutting) and cooking (Water tight method; use of lid and process of adding MNP).

19. Do you or any other higher officers' visit for inspection of MDM? If yes, who visits and at what frequency? What is their feedback about MDM? If no, what do you think could be the reasons? Is there a PTA committee or any health worker involved in this process?

20. Your overall opinion about functioning of MDM in your schools? Do you feel it is good/bad and why do you feel so (Quantity, quality and variety)? Do you think MDM provided meets the nutritional requirements of children? Why do you say so?

21. Is any step being taken to reduce anemia among children in the school? What is being done?
22. Have you undergone any training on nutrition, health & hygiene practices? If yes, could you tell me about it? When was it, what was told, who trained?
23. Tell us about the School Management Committee (SMC)? **Probe**: What is it for (the purpose); what all activities SMC does; how many members and who are the members; how many teachers in this committee

About food fortification

1. Can you please describe how the fortification of curry is carried out? **Probe:** Detailed processes, who does the fortification, when and where, how appropriate quantity is measured for blending and who ensures that, feedback of students, teachers/HM, cook cum helper regarding taste, smell, color and consistency of the curry, quality checks (recommended quantity per serving, kitchen hygiene & food safety)
2. Could you please tell us about the fortified rice that is being supplied for MDM? **Probe**: Detailed process of rice fortification, who does the fortification, when and where? About the supply – adequacy, timeliness, process of cleaning, process of cooking, feedback of students, teachers/HM, cook cum helper regarding taste, smell of rice.-
3. Does anyone monitor the process of curry fortification/ cooking of rice? Who, what, and how frequently? Do you or other officers visit for supervision of the fortification process/ rice cooking? If yes, who visits and at what frequency? What is their feedback?
4. What is your opinion on the fortification process? **Probe**: Easy to do job or difficult? Easy/difficult – why do you say so? Any challenges that you faced/usually face while carrying out the rice/curry fortification? (If yes), what are those? How these challenges could be addressed?

5. What is your view on this strategy for fortification of mid-day meal? Should this be implemented in schools of other districts in Odisha? Why do you say so?
6. What suggestions would you like to give for improving the program so that it can really benefit the nutritional status of the school children?

…Thank the respondent and close the interview…

TOPIC GUIDE FOR RICE MILLER

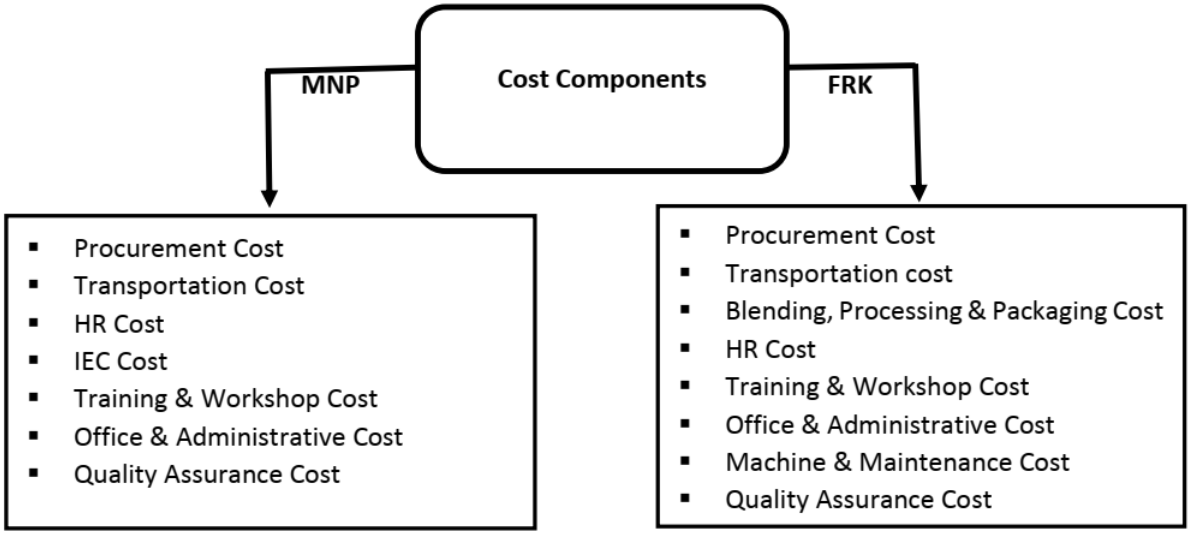
1. Could you tell us about your specific role in the MDM program going in the school?
2. What all materials do you supply to school? Probe: what all items, quantity, frequency and quality;
3. Can you please describe how the fortification of rice is carried out? **Probe:** Detailed process, who does the fortification, when and where, how appropriate quantity is measured for blending and who ensures that, quality checks (recommended quantity per serving, kitchen hygiene & food safety) – monitoring: by whom and frequency. Cost incurred for fortification, payment mode.
4. What is your opinion on the fortification process? Probe: Easy to do job or difficult? Easy/difficult – why do you say so? Any challenges that you faced/usually face while carrying out the rice fortification? (If yes), what are those? How these challenges could be addressed?

5. Have you received any training under this project on fortification of rice? If yes – Probe: Class room training or on the job; Could you tell me about it? What is your view on this strategy for fortification of mid-day meal? Should this be implemented in schools of other districts in Odisha? Why do you say so?
6. What suggestions would you like to give for improving the program so that it can really benefit the nutritional status of the school children?

…Thank the respondent and close the interview…

Annex 8: Cost components

Fig.1: Cost Components of MDM Fortification in Dhenkanal, Odisha



Annex 9: Component-wise distribution of costs

Cost Sub-Heads	**Cost incurred in Preparatory Phase** *(in INR)*		**Cost incurred in Implementation Phase** *(in INR)*		**Total Cost** *(in INR)*	
	FRK Arm	MNP Arm	FRK Arm	MNP Arm	*FRK Arm	*MNP Arm
A. Procurement Cost	-	-	33,46,470.00	31,02,737.00	33,46,470.00(14.9)	31,02,737.00(15.6)
B. Transportation Cost	-	-	2,21,808.00	49,097.27	2,21,808.00(1.0)	49,097.27(0.2)
C. Blending, Processing & Packaging Cost	-	- *NA*-	28,04,802.96	- *NA*-	28,04,802.96(12.5)	- *NA*-
D. Storage Cost	-	-	8,06,676.96	30,800.00	8,06,676.96 (3.6)	30,800.00 (0.2)
D. Machine & Maintenance Cost	-	-	4,83,991.53	-*NA*-	4,83,991.53(2.2)	- *NA*-
E. HR & Monitoring Cost	24,74,917.70	20,67,508.70	77,16,743.26	1,01,79,112.23	1,01,91,660.96(45.4)	1,22,46,620.93(61.6)
F. IEC Cost	15,000.00	80,000.00	24,17,000.00	23,74,690.00	24,32,000.00(10.8)	24,54,690.00(12.4)
G. Training & Workshop Cost	-	-	13,56,440.00	12,75,720.00	13,56,440.00(6.0)	12,75,720.00(6.4)
H. Quality Assurance Cost	-	-	6,60,974.00	6,25,565.00	6,60,974.00(2.9)	6,25,565.00(3.1)
I. Office & Administrative Cost *(for NGO)*	33,920.90	9,167.29	1,04,372.00	73,243.31	1,38,292.90(0.6)	82,410.60(0.4)
Total Cost *(in INR)*	**25,23,838.60**	**21,56,675.99**	**1,99,19,278.71**	**1,77,10,964.81**	**2,24,43,117.31**	**1,98,67,640.80**

Annex 10: Steps: cost estimation procedure

Cost estimation for MNP intervention

In order to calculate the total cost of producing MNP, we added all the above-mentioned components (Figure 1) for the project period. Then, the cost was shared between primary and upper primary children based on two ratios-

(a) 3:4 being the allocation of MNP between primary: upper primary(As the recommended quantities of MNP for addition in MDM curry for per primary and upper primary child are 0.6 gm and 0.8 gm, respectively)

(b) 1.60:1 being the ratio of meals consumed by primary: upper primary (As the total number of mid-day meals consumed by primary and upper primary children during the project period were 12529806 and 7802184, respectively)

Therefore, the total cost of MNP fortification shared between primary: upper primary in 3*1.60:4*1 ratio.

The above mentioned procedure can be denoted as follows:

Total cost of MNP fortification for primary children (m) = $x\times(a\times c)/((a\times c)+(b\times d))$

Total cost of MNP fortification for upper primary children (n)= $x\times(b\times d)/((a\times c)+(b\times d))$

[where, x= total cost incurred in the MNP arm

a = share of MNP consumption per primary child.

b = share of MNP consumption per upper primary child.

c= share of meals consumed by primary.

d= share of meals consumed by upper primary.

Thereafter, we obtained the cost of MNP per meal for primary children by using the following methods.

Cost of MNP fortification per meal for primary children =Total cost of MNP for primary children/total no of meals consumed by primary children during the intervention period

Cost of MNP fortification per meal for upper primary children=Total cost of MNP for upper primary children/total no of meals consumed by upper primary children during the intervention period.

This can be denoted as following:

Cost of MNP fortification per meal for primary (y)
= m/(total no. of meal consumed by primary)

Cost of MNP fortification per meal for upper primary (z)
= n/(total no.of meal consumed by upper primary)

Cost estimation for FRK intervention

Similarly, in order to calculate the total cost of FRK fortification, we added all the cost components (Figure 1) for the entire project period. Then, the cost was shared between primary and upper primary children based on the following two ratios, in the same manner we performed for the MNP.-

(a) 1:1.5 being the allocation of FRK between primary: upper primary(As the recommended quantity of rice per meal for primary and upper primary children to be 100 gm and 150 gm, respectively)

(b) 1.47:1 being the ratio of meals consumed by primary: upper primary (As the total number of mid-day meals consumed by the primary and upper primary children during the intervention period were 11848441 and 8036181,respectively)

Therefore, the share of cost of FRK fortification between primary and upper primary will be at 1*1.47:1.5*1 ratio.

The above mentioned procedures can be denoted as follows:

Total cost of FRK fortification for primary (p) = $x\times(a\times c)/((a\times c)+(b\times d))$

Total cost of FRK fortification for upper primary (q)= $x\times(b\times d)/((a\times c)+(b\times d))$

[where, x= total cost incurred in the FRK arm

a = share of FRK consumption per primary child

b = share of FRK consumption per upper primary child

c= share of meals consumed by primary child

d= share of meals consumed by upper primary

The cost of FRK fortification per meal for primary =Total cost of FRK fortification for primary(p)/total no of meals consumed by primary children

Cost of FRK fortification per meal for upper primary =Total cost of FRK fortification for upper primary/total no of meals consumed by upper primary children

Cost of FRK fortification per meal for primary (r)
= p/(total no.of meal consumed by primary)

Cost of FRK fortification per meal for upper primary (s)
= q/(total no.of meal consumed by upper primary)

Annex 11: Socio-demographic profile of respondents and household characteristics

Household characteristics						
	MNP(Baseline)	**MNP(Endline)**	**FRK(Baseline)**	**FRK(Endline)**	**Control(Baseline)**	**Control(Endline)**
	No. 578	**No. 574**	**No. 597**	**No. 597**	**No. 589**	**No. 467**
Number of permanent household members						
=<4	365 (63.1%)	195 (34.7%)	352 (59.0%)	184 (31.4%)	359 (61.1%)	154 (33.6%)
5-6	162 (28.0%)	266 (47.3%)	159 (26.6%)	284 (48.5%)	177 (30.1%)	249 (54.4%)
>6	51 (8.8%)	101 (18.0%)	86 (14.4%)	118 (20.1%)	52 (8.8%)	55 (12.0%)
Religion of the household						
Hindu	578 (100.0%)	574 (100.0%)	584 (97.8%)	577 (96.6%)	580 (98.5%)	465 (99.6%)
Muslim	0 (0.0%)	0 (0.0%)	11 (1.8%)	18 (3.0%)	8 (1.4%)	1 (0.2%)
Christian	0 (0.0%)	0 (0.0%)	2 (0.3%)	2 (0.3%)	0 (0.0%)	0 (0.0%)
Sikh	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Buddhist/ Neo-Buddhist	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.2%)	1 (0.2%)
Jain	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Jewish	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
No Religion	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Other	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Caste of the household						
General	94 (16.3%)	93 (16.2%)	47 (7.9%)	107 (19.8%)	120 (20.4%)	199 (42.8%)
Scheduled caste	131 (22.7%)	188 (32.8%)	228 (38.3%)	147 (27.2%)	158 (26.9%)	93 (20.0%)
Scheduled tribe	89 (15.4%)	87 (15.2%)	69 (11.6%)	74 (13.7%)	96 (16.3%)	92 (19.8%)
Other Backward Class	264 (45.7%)	206 (35.9%)	241 (40.4%)	206 (38.1%)	205 (34.9%)	81 (17.4%)
None of them	0 (0.0%)	0 (0.0%)	11 (1.8%)	6 (1.1%)	9 (1.5%)	0 (0.0%)
Don't know	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Ration card						
No	9 (1.6%)	48 (8.4%)	30 (5.0%)	81 (13.6%)	6 (1.0%)	47 (10.1%)
Yes	569 (98.4%)	526 (91.6%)	567 (95.0%)	516 (86.4%)	583 (99.0%)	420 (89.9%)
Type of the ration card						
AAY	14 (2.5%)	226 (43.0%)	39 (6.9%)	173 (33.5%)	3 (0.5%)	144 (34.3%)
PHHR	_____	299 (56.8%)	_____	343 (66.5%)	_____	273 (65.0%)
Others	_____	1 (0.2%)	_____	0 (0.0%)	_____	3 (0.7%)
Bank account						

No	29 (5.0%)	17 (3.0%)	29 (4.9%)	31 (5.2%)	30 (5.1%)	22 (4.7%)
Yes	544 (94.1%)	555 (96.7%)	566 (94.8%)	565 (94.6%)	558 (94.7%)	442 (94.6%)
Don't know	5 (0.9%)	2 (0.3%)	2 (0.3%)	1 (0.2%)	1 (0.2%)	3 (0.6%)
Health insurance status of households						
No	322 (55.7%)	122 (21.3%)	522 (87.4%)	352 (59.0%)	404 (68.6%)	249 (53.3%)
Yes	232 (40.1%)	417 (72.6%)	57 (9.5%)	235 (39.4%)	162 (27.5%)	190 (40.7%)
Don't know	24 (4.2%)	35 (6.1%)	18 (3.0%)	10 (1.7%)	23 (3.9%)	28 6.0%)

Characteristics of the children						
	MNP(Baseline)	**MNP(Endline)**	**FRK(Baseline)**	**FRK(Endline)**	**Control(Baseline)**	**Control(Endline)**
	No. 578	**No. 574**	**No. 597**	**No. 597**	**No. 589**	**No. 467**
Age						
Mean (SD)	9.7 (±2.3)	9.7 (±2.4)	9.8 (±2.4)	9.4 (±2.3)	9.7 (±2.3)	9.7 (±2.4)
Sex						
Males	291 (50.3%)	286 (49.8%)	294 (49.2%)	301 (50.4%)	293 (49.7%)	221 (47.3%)
Females	287 (49.7%)	288 (50.2%)	303 (50.8%)	296 (49.6%)	296 (50.3%)	246 (52.7%)
Grade studying in (categorical)						
1-5	363 (62.8%)	359 (62.5%)	375 (62.8%)	379 (63.5%)	380 (64.5%)	285 (61.0%)
6-8	215 (37.2%)	215 (37.5%)	222 (37.2%)	218 (36.5%)	209 (35.5%)	182 (39.0%)
Time required (minutes) by the children to reach school						
<=10	459 (79.4%)	357 (62.2%)	507 (84.9%)	414 (69.3%)	400 (67.9%)	224 (48.0%)
10.1-20	93 (16.1%)	127 (22.1%)	71 (11.9%)	139 (23.3%)	129 (21.9%)	142 (30.4%)
21.1-30	26 (4.5%)	82 (14.3%)	15 (2.5%)	29 (4.9%)	44 (7.5%)	77 (16.5%)
>30	0 (0.0%)	8 (1.4%)	4 (0.7%)	15 (2.5%)	16 (2.7%)	24 (5.1%)
Mean (SD)	9.1 (±6.1)	13.3 (±9.6)	8.8 (±6.4)	10.9 (±9.9)	11.8 (±10.2)	15.5 (±11.1)
Distance (Km) traveled by the children to reach school						
<=0 Km	459 (79.4%)	403 (70.7%)	527 (88.3%)	456 (76.4%)	466 (79.1%)	229 (49.0%)
0-1 Km	84 (14.5%)	118 (20.7%)	64 (10.7%)	85 (14.2%)	78 (13.2%)	165 (35.3%)
>1 Km	35 (6.1%)	49 (8.6%)	6 (1.0%)	56 (9.4%)	45 (7.6%)	73 (15.6%)
Mean (SD)	0.5 (±0.8)	3.4 (±36.3)	0.4 (±1.1)	0.7 (±1.3)	0.7 (±2.2)	1.0 (±1.4)
Sociodemographic characteristics of mother						
	MNP(Baseline)	**MNP(Endline)**	**FRK(Baseline)**	**FRK(Endline)**	**Control(Baseline)**	**Control(Endline)**
	No. 578	**No. 574**	**No. 597**	**No. 597**	**No. 589**	**No. 467**
Age of mother(categorical)						
<=20	2 (0.3%)	3 (0.5%)	0 (0.0%)	1 (0.2%)	9 (0.5%)	3 (0.6%)
21-25	31 (5.4%)	53 (9.4%)	32 (5.4%)	37 (6.3%)	124 (7.1%)	47 (10.1%)

26-30	202 (35.1%)	207 (36.6%)	200 (33.7%)	221 (37.5%)	576 (32.8%)	148 (31.8%)
>30	340 (59.1%)	302 (53.4%)	361 (60.9%)	331 (56.1%)	1,048 (59.6%)	267 (57.4%)
Mean (SD)	33.3 (±5.6)	32.5 (±5.7)	33.2 (±5.6)	32.5 (±5.0)	33.2 (±5.7)	32.6 (±5.3)
Educational qualification of the mother						
Illiterate (0 year)	65 (11.3%)	101 (17.7%)	112 (18.8%)	104 (17.5%)	131 (22.2%)	116 (24.8%)
Primary (1 - 5 years)	210 (36.5%)	151 (26.4%)	136 (22.8%)	131 (22.1%)	213 (36.2%)	144 (30.8%)
Upper primary (6 - 8 years)	123 (21.4%)	110 (19.3%)	113 (19.0%)	110 (18.5%)	91 (15.4%)	87 (18.6%)
High school & Intermediate (9 - 12)	171 (29.7%)	203 (35.6%)	216 (36.2%)	229 (38.6%)	144 (24.4%)	114 (24.4%)
Diploma /Degree & above (13 years & above)	7 (1.2%)	6 (1.1%)	19 (3.2%)	20 (3.4%)	10 (1.7%)	6 (1.3%)
Occupation of the mother						
Professional/ Technical	1 (0.2%)	6 (1.3%)	12 (2.0%)	7 (1.2%)	7 (1.2%)	1 (0.2%)
Managers	0 (0.0%)	1 (0.2%)	0 (0.0%)	1 (0.2%)	0 (0.0%)	0 (0.0%)
Clerical	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.2%)	0 (0.0%)	0 (0.0%)
Sales	1 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (1.1%)
Micro, small/medium enterprise	0 (0.0%)	4 (0.9%)	0 (0.0%)	3 (0.5%)	4 (0.7%)	2 (0.4%)
Skilled Labour (Production/ Transport/ Artisan)	10 (1.8%)	0 (0.0%)	5 (0.8%)	14 (2.4%)	12 (2.0%)	7 (1.5%)
Farm Managers And Cultivators	1 (0.2%)	15 (3.3%)	1 (0.2%)	0 (0.0%)	9 (1.5%)	2 (0.4%)
Unskilled Service (IncludingAgricultural Labour)	54 (9.5%)	16 (3.5%)	54 (9.1%)	57 (9.6%)	103 (17.5%)	89 (19.1%)
Home-Maker	502 (88.2%)	382 (83.2%)	517 (87.2%)	506 (85.3%)	451 (76.7%)	358 (77.0%)
Unemployed	0 (0.0%)	35 (7.6%)	4 (0.7%)	4 (0.7%)	2 (0.3%)	1 (0.2%)

Sociodemographic characteristics of father						
	MNP(Baseline)	**MNP(Endline)**	**FRK(Baseline)**	**FRK(Endline)**	**Control(Baseline)**	**Control(Endline)**
	No. 578	**No. 574**	**No. 597**	**No. 597**	**No. 589**	**No. 467**
Age of father (categorical)						

<= 20 years	0 (0.0%)	0 (0.0%)	1 (0.2%)	0 (0.0%)	1 (0.2%)	0 (0.0%)
21-25 years	1 (0.2%)	4 (0.7%)	3 (0.5%)	3 (0.5%)	8 (1.4%)	7 (1.5%)
26-30 years	42 (7.5%)	63 (11.3%)	33 (5.9%)	44 (7.6%)	58 (10.2%)	47 (10.2%)
> 30 years	519 (92.3%)	491 (88.0%)	521 (93.4%)	529 (91.8%)	499 (88.2%)	407 (88.3%)
Mean (SD)	39.5 (±5.9)	38.5 (±7.8)	39.8 (±6.1)	39.2 (±7.2)	39.0 (±6.5)	38.2 (±7.1)
Educational qualification of the father						
Illiterate (0 year)	48 (8.5%)	76 (13.4%)	92 (16.0%)	95 (16.2%)	94 (16.5%)	74 (15.8%)
Primary (1 - 5 years)	235 (41.6%)	146 (25.8%)	128 (22.3%)	140 (23.9%)	176 (30.9%)	127 (27.2%)
Upper primary (6 - 8 years)	101 (17.9%)	123 (21.7%)	103 (17.9%)	111 (19.0%)	112 (19.7%)	115 (24.6%)
High school & Intermediate (9 - 12)	161 (28.5%)	198 (35.0%)	216 (37.6%)	200 (34.2%)	167 (29.3%)	142 (30.4%)
Diploma /Degree & above (13 years & above)	20 (3.5%)	23 (4.1%)	35 (6.1%)	39 (6.7%)	20 (3.5%)	9 (1.9%)
Occupation of the father						
Professional/ Technical	1 (0.2%)	27 (6.3%)	15 (2.6%)	38 (6.6%)	24 (4.2%)	13 (2.8%)
Managers	0 (0.0%)	2 (0.5%)	2 (0.4%)	6 (1.0%)	2 (0.4%)	1 (0.2%)
Clerical	3 (0.5%)	3 (0.7%)	5 (0.9%)	7 (1.2%)	8 (1.4%)	5 (1.1%)
Sales	3 (0.5%)	3 (0.7%)	10 (1.8%)	23 (4.0%)	3 (0.5%)	59 (12.7%)
Micro, small/medium enterprise	69 (12.6%)	10 (2.3%)	85 (14.9%)	55 (9.5%)	58 (10.2%)	29 (6.3%)

Skilled Labour (Production/ Transport/ Artisan)	165 (30.2%)	154 (36.1%)	141 (24.8%)	247 (42.7%)	134 (23.7%)	148 (32.0%)
Farm Managers And Cultivators	6 (1.1%)	72 (16.9%)	58 (10.2%)	26 (4.5%)	32 (5.7%)	17 (3.7%)
Unskilled Service (IncludingAgricultural Labour)	247 (45.2%)	108 (25.3%)	227 (39.9%)	154 (26.6%)	256 (45.2%)	175 (37.8%)
Informally Employed	50 (9.2%)	35 (8.2%)	17 (3.0%)	19 (3.3%)	42 (7.4%)	8 (1.7%)
Unemployed	2 (0.4%)	13 (3.0%)	9 (1.6%)	3 (0.5%)	7 (1.2%)	8 (1.7%)

Housing features and cooking characteristics

	MNP(Baseline)	**MNP(Endline)**	**FRK(Baseline)**	**FRK(Endline)**	**Control(Baseline)**	**Control(Endline)**
	No. 578	**No. 574**	**No. 597**	**No. 597**	**No. 589**	**No. 467**
Type of house						
Kaccha	285 (49.3%)	288 (50.2%)	239 (40.0%)	210 (35.2%)	302 (51.3%)	160 (34.3%)
Semipucca	206 (35.6%)	250 (43.6%)	255 (42.7%)	307 (51.4%)	108 (18.3%)	118 (25.3%)
Pucca	87 (15.1%)	36 (6.3%)	103 (17.3%)	80 (13.4%)	179 (30.4%)	189 (40.5%)
Place for cooking						
In the house	464 (80.3%)	280 (48.8%)	335 (56.2%)	546 (91.5%)	391 (66.4%)	457 (97.9%)
In a separate building	4 (0.7%)	209 (36.4%)	115 (19.3%)	48 (8.0%)	33 (5.6%)	10 (2.1%)
Outdoors	109 (18.9%)	85 (14.8%)	146 (24.5%)	3 (0.5%)	165 (28.0%)	0 (0.0%)
Others	1 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Separate room for kitchen						
Yes	86 (18.5%)	134 (50.6%)	98 (29.5%)	185 (34.1%)	113 (29.0%)	188 (42.2%)
No	378 (81.5%)	131 (49.4%)	234 (70.5%)	358 (65.9%)	276 (71.0%)	258 (57.8%)

Main type of fuel used for cooking						
Electricity	6 (1.0%)	2 (0.3%)	17 (2.8%)	17 (2.8%)	10 (1.7%)	2 (0.4%)
LPG/Natural Gas	89 (15.4%)	184 (32.1%)	142 (23.8%)	198 (33.2%)	112 (19.0%)	139 (29.8%)
Biogas	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (0.3%)	1 (0.2%)	0 (0.0%)
Kerosene	1 (0.2%)	1 (0.2%)	11 (1.8%)	14 (2.3%)	6 (1.0%)	0 (0.0%)
Coal/Lignite	2 (0.3%)	3 (0.5%)	4 (0.7%)	0 (0.0%)	12 (2.0%)	16 (3.4%)
Charcoal	1 (0.2%)	0 (0.0%)	2 (0.3%)	1 (0.2%)	12 (2.0%)	0 (0.0%)
Wood	474 (82.0%)	383 (66.7%)	417 (69.8%)	362 (60.6%)	430 (73.0%)	309 (66.2%)
Straw/Shrubs/ Grass	2 (0.3%)	1 (0.2%)	4 (0.7%)	0 (0.0%)	6 (1.0%)	1 (0.2%)
Agricultural Crop Waste	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.2%)	0 (0.0%)	0 (0.0%)
Dung Cakes	3 (0.5%)	0 (0.0%)	0 (0.0%)	2 (0.3%)	0 (0.0%)	0 (0.0%)
No Food Cooked In Household	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Other	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Annex 12: Household eating habits

Eating habits						
	MNP (Baseline)	**MNP (Endline)**	**FRK (Baseline)**	**FRK (Endline)**	**Control (Baseline)**	**Control (Endline)**
	No. 578	**No. 574**	**No. 597**	**No. 597**	**No. 589**	**No. 467**
Those who usually eat first in the household						
Yes boy child eat 1st	204 (35.3%)	117 (20.4%)	238 (39.9%)	112 (18.7%)	225 (38.2%)	196 (42.0%)
Yes female adult eat 1st	13 (2.2%)	14 (2.4%)	20 (3.4%)	15 (2.5%)	34 (5.8%)	18 (3.9%)
Yes girl child eat 1st	157 (27.2%)	72 (12.5%)	201 (33.7%)	104 (17.4%)	183 (31.1%)	160 (34.3%)
Yes male adult eat 1st	248 (42.9%)	215 (37.5%)	167 (28.0%)	231 (38.7%)	251 (42.6%)	88 (18.8%)
Yes lactating mother eat 1st	0(0%)	0 (0.0%)	0(0%)	1 (0.2%)	0(0%)	0 (0.0%)
Yes male old eat 1st	0(0%)	110 (19.2%)	0(0%)	117 (19.5%)	0(0%)	40 (8.6%)
Yes female old eat 1st	67 (11.6%)	47 (8.2%)	76 (12.7%)	53 (8.9%)	27 (4.6%)	27 (5.8%)
Yes all eat together	35 (6.1%)	15 (2.6%)	57 (9.5%)	43 (7.2%)	26 (4.4%)	90 (19.3%)
Those who usually eat last in the household						

Yes boy child eats last	3 (0.5%)	0 (0.0%)	2 (0.3%)	4 (0.7%)	11 (1.9%)	4 (0.9%)
Yes female adult eats last	529 (91.5%)	526 (91.6%)	508 (85.1%)	521 (87.3%)	465 (78.9%)	345 (73.9%)
Yes girl child eat last	7 (1.2%)	3 (0.5%)	7 (1.2%)	6 (1.0%)	12 (2.0%)	4 (0.9%)
Yes male adult eat last	26 (4.5%)	25 (4.4%)	41 (6.9%)	23 (3.9%)	41 (7.0%)	31 (6.6%)
Yes male old eats last	0(0%)	2 (0.3%)	0(0%)	4 (0.7%)	0(0%)	1 (0.2%)
Yes female old eat last	2 (0.3%)	11 (1.9%)	8 (1.3%)	11 (1.8%)	22 (3.7%)	22 (4.7%)
Who usually eat most in the house						
Boy child	4 (0.7%)	22 (3.8%)	11 (1.9%)	10 (1.7%)	5 (0.9%)	26 (5.6%)
Girl child	4 (0.7%)	16 (2.8%)	1 (0.2%)	14 (2.3%)	2 (0.3%)	4 (0.9%)
Male adult	123 (21.4%)	370 (64.6%)	313 (52.7%)	347 (58.3%)	204 (34.8%)	248 (53.3%)
Female adult	34 (5.9%)	110 (19.2%)	202 (34.0%)	167 (28.1%)	86 (14.7%)	169 (36.3%)
Pregnant women	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.2%)	0 (0.0%)
Lactating mother	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Male old	2 (0.3%)	39 (6.8%)	31 (5.2%)	41 (6.9%)	7 (1.2%)	12 (2.6%)
Female old	0 (0.0%)	15 (2.6%)	13 (2.2%)	14 (2.3%)	3 (0.5%)	6 (1.3%)
None	407 (70.9%)	1 (0.2%)	23 (3.9%)	2 (0.3%)	278 (47.4%)	0 (0.0%)
Who mostly decides the items to be cooked in the house						
Children	2 (0.3%)	13 (2.3%)	4 (0.7%)	23 (3.9%)	4 (0.7%)	5 (1.1%)
Male adult	6 (1.0%)	36 (6.3%)	21 (3.5%)	33 (5.5%)	14 (2.4%)	7 (1.5%)
Female adult	556 (96.5%)	478 (83.3%)	541 (90.6%)	498 (83.1%)	563 (95.6%)	418 (89.5%)
Male old	1 (0.2%)	15 (2.6%)	6 (1.0%)	14 (2.3%)	1 (0.2%)	5 (1.1%)
Female old	11 (1.9%)	32 (5.6%)	25 (4.2%)	31 (5.2%)	7 (1.2%)	32 (6.9%)
Does it happen that due to food shortage, somebody in the household eats less						
No	335 (58.0%)	233 (40.6%)	379 (63.5%)	277 (46.4%)	422 (71.6%)	339 (72.6%)
Yes	243 (42.0%)	341 (59.4%)	218 (36.5%)	322 (53.6%)	167 (28.4%)	128 (27.4%)
Then who usually eats less						
Children	1 (0.4%)	2 (0.6%)	1 (0.5%)	10 (3.2%)	1 (0.6%)	0 (0.0%)
Male adult	1 (0.4%)	10 (2.9%)	9 (4.1%)	9 (2.9%)	3 (1.8%)	4 (3.1%)
Female adult	235 (98.7%)	322 (93.3%)	206 (94.9%)	292 (92.1%)	160 (97.0%)	123 (95.3%)
Male old	0 (0.0%)	3 (0.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Female old	1 (0.4%)	8 (2.3%)	1 (0.5%)	6 (1.9%)	1 (0.6%)	2 (1.6%)

Annex 13 : Profile of Teachers

Profile of teachers						
	MNP (Baseline)	**MNP (Endline)**	**FRK (Baseline)**	**FRK (Endline)**	**Control (Baseline)**	**Control (Endline)**
	No.18	**No.18**	**No.18**	**No.18**	**No.18**	**No. 14**
Class in which teacher act as class teacher						
class I	4 (22.2%)	9 (50.0%)	8 (44.4%)	6 (33.3%)	5 (27.8%)	7 (50.0%)
class II	4 (22.2%)	7 (38.9%)	8 (44.4%)	7 (38.9%)	8 (44.4%)	6 (42.9%)
class III	6 (33.3%)	6 (33.3%)	7 (38.9%)	5 (27.8%)	9 (50.0%)	6 (42.9%)
class iv	3 (16.7%)	3 (16.7%)	9 (50.0%)	6 (33.3%)	7 (38.9%)	8 (57.1%)
class v	5 (27.8%)	4 (22.2%)	8 (44.4%)	5 (27.8%)	6 (33.3%)	8 (57.1%)
class vi	2 (11.1%)	3 (16.7%)	3 (16.7%)	5 (27.8%)	4 (22.2%)	2 (14.3%)
class vii	1 (5.6%)	3 (16.7%)	5 (27.8%)	5 (27.8%)	5 (27.8%)	5 (35.7%)
class viii	4 (22.2%)	3 (16.7%)	5 (27.8%)	4 (22.2%)	2 (11.1%)	6 (42.9%)
Ujala students	0 (0.0%)	1 (5.6%)	4 (22.2%)	0 (0.0%)	1 (5.6%)	1 (7.1%)
Gender of teacher						
Female	4 (22.2%)	4 (22.2%)	8 (44.4%)	9 (50.0%)	12 (66.7%)	1 (7.1%)
Male	14 (77.8%)	14 (77.8%)	10 (55.6%)	9 (50.0%)	6 (33.3%)	13 (92.9%)
Present age of Teacher						
≤ 30 years	4 (22.2%)	2 (11.1%)	3 (16.7%)	1 (5.6%)	3 (16.7%)	0 (0.0%)
31-40 years	6 (33.3%)	3 (16.7%)	3 (16.7%)	4 (22.2%)	12 (66.7%)	3 (21.4%)
41-50 years	5 (27.8%)	6 (33.3%)	5 (27.8%)	7 (38.9%)	2 (11.1%)	7 (50.0%)
> 50 years	3 (16.7%)	7 (38.9%)	7 (38.9%)	6 (33.3%)	1 (5.6%)	4 (28.6%)
Mean age (SD)	40.5 (±10.9)	45.9 (±9.4)	44.2 (±10.5)	46.8 (±8.7)	35.6 (±11.9)	47.8 (±7.5)
Religion of teacher						
Hindu	18 (100%)	18 (100%)	18 (100%)	18 (100%)	18 (100%)	14 (100%)
Social category of the teacher						
General	3 (16.7%)	2 (11.1%)	1 (5.6%)	1 (5.6%)	4 (22.2%)	4 (28.6%)
Other backward class	3 (16.7%)	5 (27.8%)	2 (11.1%)	2 (11.1%)	2 (11.1%)	2 (14.3%)
Scheduled Caste	5 (27.8%)	6 (33.3%)	6 (33.3%)	6 (33.3%)	6 (33.3%)	4 (28.6%)
Scheduled Tribe	7 (38.9%)	5 (27.8%)	9 (50.0%)	9 (50.0%)	6 (33.3%)	4 (28.6%)
Educational qualification of the teacher						
Completed Secondary	3 (16.7%)	1 (5.6%)	1 (5.6%)	3 (16.7%)	6 (33.3%)	3 (21.4%)
Completed higher Secondary	7 (38.9%)	1 (5.6%)	4 (22.2%)	2 (11.1%)	9 (50.0%)	1 (7.1%)

Profile of teachers						
	MNP (Baseline)	MNP (Endline)	FRK (Baseline)	FRK (Endline)	Control (Baseline)	Control (Endline)
	No.18	No.18	No.18	No.18	No.18	No. 14
Teacher's certificate	4 (22.2%)	1 (5.6%)	11 (61.1%)	6 (33.3%)	2 (11.1%)	6 (42.9%)
Graduation	4 (22.2%)	1 (5.6%)	1 (5.6%)	1 (5.6%)	0	2 (14.3%)
Post graduation	0	14 (77.8%)	1 (5.6%)	6 (33.3%)	1 (5.6%)	2 (14.3%)
Place of stay of the teacher						
Block headquarters	0	1 (5.6%)	0	0 (0.0%)	3 (16.7%)	0 (0.0%)
District headquarters	1 (5.6%)	0 (0.0%)	4 (22.2%)	0 (0.0%)	1 (5.6%)	3 (21.4%)
Other village	13 (72.2%)	12 (66.7%)	8 (44.4%)	15 (83.3%)	9 (50.0%)	3 (21.4%)
Same village where school is situated	4 (22.2%)	5 (27.8%)	6 (33.3%)	3 (16.7%)	5 (27.8%)	8 (57.1%)

Annex 14: Health and nutrition education in Schools

Health and nutrition education in schools						
	MNP (Baseline)	MNP (Endline)	FRK(Baseline)	FRK(Endline)	Control(Baseline)	Control(Endline)
	No. 18	No. 18	No. 18	No. 18	No. 18	No. 14
Do the students receive health education						
No	3(16.7%)	0 (0.0%)	0(0.0%)	1 (5.6%)	1(5.6%)	2 (14.3%)
Yes	15(83.3%)	18 (100.0%)	18(100%)	17 (94.4%)	17(94.4%)	12 (85.7%)
Topics covered in Health Education						
Yes personal hygiene	14(77.8%)	13 (72.2%)	17(94.4%)	17 (94.4%)	14(77.8%)	10 (71.4%)
Yes sanitation	9(50.0%)	10 (55.6%)	8(44.4%)	14 (77.8%)	5(27.8%)	9 (50.0%)
Yes precautions taken to avoid illness	1(5.6%)	0 (0.0%)	4(22.2%)	5 (27.8%)	2(11.1%)	0 (0.0%)
Yes anaemia	_	10 (55.6%)	_	12 (66.7%)	_	6 (42.9%)

Health and nutrition education in schools						
	MNP (Baseline)	MNP (Endline)	FRK(Baseline)	FRK(Endline)	Control(Baseline)	Control(Endline)
	No. 18	No. 18	No. 18	No. 18	No. 18	No. 14
Yes importance of hand wash	7(38.9%)	5 (27.8%)	12(66.7%)	0 (0.0%)	9 (50.0%)	1 (7.1%)
Do the students receive nutrition education						
No	5(27.8%)	0 (0.0%)	4(22.2%)	2 (11.1%)	2(11.1%)	9 (64.3%)
Yes	13(72.2.%)	18 (100.0%)	14(22.2%)	16 (88.9%)	16(88.9%)	5 (35.7%)
Topics covered in Nutrition Education						
Yes advantages of taking mdm	6(33.3%)	15 (83.3%)	4(22.2%)	11 (61.1%)	0 (0.0%)	5 (35.7%)
Yes advantages of taking fortified salt	0 (0.0%)	0 (0.0%)	1(5.6%)	3 (16.7%)	0 (0.0%)	0 (0.0%)
Yes advantages of taking iron folic acid tablets/syrup	5 (27.8%)	5 (27.8%)	3 (16.7%)	12 (66.7%)	0 (0.0%)	1 (7.1%)
Yes advantage of eating fruits and vegetables	6(33.3%)	9 (50.0%)	9(50.0%)	13 (72.2%)	13 (72.2%)	2 (14.3%)
Yes importance of food fortification	_	2 (11.1%)	_	0 (0.0%)	_	0 (0.0%)

Annex 15: Absenteeism in schools

Absenteeism in schools						
	FRK (Baseline)	FRK (Endline)	MNP (Baseline)	MNP (Endline)	Control(Baseline)	Control(Endline)
	n = 18	n = 18	n = 18	n = 18	n = 18	n = 14

Absenteeism						
Most common reasons for absenteeism						
parents do not send the children to school	2 (11.1%)	4 (22.2%)	8 (44.4%)	3 (16.7%)	2 (11.1%)	3 (21.4%)
children do not like attending school	2 (11.1%)	6 (33.3%)	1 (5.6%)	0 (0.0%)	0 (0.0%)	2 (14.3%)
children help their families in domestic and commercial work	1 (5.6%)	3 (16.7%)	13 (72.2%)	7 (38.9%)	6 (33.3%)	3 (21.4%)
children face problem in transportation to reach school	1 (5.6%)	2 (11.1%)	0 (0.0%)	0 (0.0%)	2 (11.1%)	3 (21.4%)
parents are busy in work and cannot send older child who has to look after younger children	10 (55.6%)	6 (33.3%)	5 (27.8%)	7 (38.9%)	10 (55.6%)	3 (21.4%)
others	11 (61.1%)	7 (38.9%)	3 (16.7%)	6 (33.3%)	4 (22.2%)	6 (42.9%)

Annex 16: Knowledge of anaemia and undernutrition

Knowledge of anaemia and undernutrition						
	FRK(Baseline)	**FRK(Endline)**	**MNP(Baseline)**	**MNP(Endline)**	**Control(Baseline)**	**Control(Endline)**
	n = 18	**n = 18**	**n = 18**	**n = 18**	**n = 18**	**n = 14**
Teachers have IEC material job aid such as resource book/chart available in school for creating awareness on anaemia						
Yes	4 (22.2%)	17 (94.4%)	2 (11.1%)	17 (94.4%)	6 (33.3%)	4 (28.6%)
No	14 (77.8%)	1 (5.6%)	16 (88.9%)	17 (94.4%)	12 (66.7%)	10 (71.4%)
Knowledge about anaemia						
Proportion of teacher who are aware of the following signs and symptoms to recognize someone who has anaemia						
Fatigue	1 (5.6%)	8 (44.4%)	10 (55.6%)	1 (5.6%)	10 (55.6%)	1 (7.1%)
Weakness	6 (33.3%)	17 (94.4%)	16 (88.9%)	12 (66.7%)	13 (72.2%)	11 (78.6%)
Paleness/yellow skin/white tongue and pale eyes	12 (66.7%)	10 (55.6%)	9 (50.0%)	15 (83.3%)	2 (11.1%)	5 (35.7%)

Knowledge of anaemia and undernutrition						
	FRK(Baseline)	**FRK(Endline)**	**MNP(Baseline)**	**MNP(Endline)**	**Control(Baseline)**	**Control(Endline)**
	n = 18	**n = 18**	**n = 18**	**n = 18**	**n = 18**	**n = 14**
Palpitation	0 (0.0%)		1 (5.6%)		2 (11.1%)	
lack of concentration	0 (0.0%)	8 (44.4%)	2 (11.1%)	0 (0.0%)	2 (11.1%)	0 (0.0%)
Proportion of teacher who considers the following causes anaemia						
iron deficiency	5 (27.8%)	14 (77.8%)	7 (38.9%)	9 (50.0%)	12 (66.7%)	5 (35.7%)
poor nutrition	14 (77.8%)	14 (77.8%)	12 (66.7%)	14 (77.8%)	12 (66.7%)	8 (57.1%)
worm infestation/ illness such as tb, malaria etc	1 (5.6%)	1 (5.6%)	3 (16.7%)	3 (16.7%)	1 (5.6%)	1 (7.1%)
blood loss	0 (0.0%)	4 (22.2%)	0 (0.0%)	0 (0.0%)	3 (16.7%)	2 (14.3%)
lack of breakfast	1 (5.6%)	2 (11.1%)	0 (0.0%)	1 (5.6%)	0 (0.0%)	0 (0.0%)
Others	2 (11.1%)	1 (5.6%)	0 (0.0%)	3 (16.7%)	0 (0.0%)	0 (0.0%)
Proportion of teacher who considers the following are consequences of anaemia						
slow growth (physical and mental)	8 (44.4%)	16 (88.9%)	5 (27.8%)	16 (88.9%)	16 (88.9%)	10 (71.4%)
reduced learning ability	6 (33.3%)	11 (61.1%)	5 (27.8%)	5 (27.8%)	3 (16.7%)	0 (0.0%)

Knowledge of anaemia and undernutrition						
	FRK(Baseline)	**FRK(Endline)**	**MNP(Baseline)**	**MNP(Endline)**	**Control(Baseline)**	**Control(Endline)**
	n = 18	**n = 18**	**n = 18**	**n = 18**	**n = 18**	**n = 14**
Teachers have IEC material job aid such as resource book/chart available in school for creating awareness on anaemia						
Yes	4 (22.2%)	17 (94.4%)	2 (11.1%)	17 (94.4%)	6 (33.3%)	4 (28.6%)

Knowledge of anaemia and undernutrition						
	FRK(Baseline)	**FRK(Endline)**	**MNP(Baseline)**	**MNP(Endline)**	**Control(Baseline)**	**Control(Endline)**
	n = 18	**n = 18**	**n = 18**	**n = 18**	**n = 18**	**n = 14**
No	14 (77.8%)	1 (5.6%)	16 (88.9%)	17 (94.4%)	12 (66.7%)	10 (71.4%)
Knowledge about anaemia						
Proportion of teacher who are aware of the following signs and symptoms to recognize someone who has anaemia						
Fatigue	1 (5.6%)	8 (44.4%)	10 (55.6%)	1 (5.6%)	10 (55.6%)	1 (7.1%)
Weakness	6 (33.3%)	17 (94.4%)	16 (88.9%)	12 (66.7%)	13 (72.2%)	11 (78.6%)
Paleness/yellow skin/white tongue and pale eyes	12 (66.7%)	10 (55.6%)	9 (50.0%)	15 (83.3%)	2 (11.1%)	5 (35.7%)
Palpitation	0 (0.0%)		1 (5.6%)		2 (11.1%)	
lack of concentration	0 (0.0%)	8 (44.4%)	2 (11.1%)	0 (0.0%)	2 (11.1%)	0 (0.0%)
Proportion of teacher who considers the following causes anaemia						
iron deficiency	5 (27.8%)	14 (77.8%)	7 (38.9%)	9 (50.0%)	12 (66.7%)	5 (35.7%)
poor nutrition	14 (77.8%)	14 (77.8%)	12 (66.7%)	14 (77.8%)	12 (66.7%)	8 (57.1%)
worm infestation/ illness such as tb, malaria etc	1 (5.6%)	1 (5.6%)	3 (16.7%)	3 (16.7%)	1 (5.6%)	1 (7.1%)
blood loss	0 (0.0%)	4 (22.2%)	0 (0.0%)	0 (0.0%)	3 (16.7%)	2 (14.3%)
lack of breakfast	1 (5.6%)	2 (11.1%)	0 (0.0%)	1 (5.6%)	0 (0.0%)	0 (0.0%)
Others	2 (11.1%)	1 (5.6%)	0 (0.0%)	3 (16.7%)	0 (0.0%)	0 (0.0%)
Proportion of teacher who considers the following are consequences of anaemia						
slow growth (physical and mental)	8 (44.4%)	16 (88.9%)	5 (27.8%)	16 (88.9%)	16 (88.9%)	10 (71.4%)
reduced learning ability	6 (33.3%)	11 (61.1%)	5 (27.8%)	5 (27.8%)	3 (16.7%)	0 (0.0%)
reduced immunity/recurrent illnesses	4 (22.2%)	7 (38.9%)	5 (27.8%)	5 (27.8%)	2 (11.1%)	3 (21.4%)
lesser participation in activities/ dullness	5 (27.8%)	4 (22.2%)	8 (44.4%)	5 (27.8%)	3 (16.7%)	2 (14.3%)
Proportion of teacher who considers the following can prevent anaemia						
eating iron rich vegetables	13 (72.2%)	16 (88.9%)	10 (55.6%)	14 (77.8%)	16 (88.9%)	12 (85.7%)
eating iron rich fruits	5 (27.8%)	12 (66.7%)	7 (38.9%)	12 (66.7%)	5 (27.8%)	3 (21.4%)
eating meat/fish/eggs	2 (11.1%)	8 (44.4%)	7 (38.9%)	16 (88.9%)	6 (33.3%)	3 (21.4%)

Knowledge of anaemia and undernutrition						
	FRK(Baseline)	FRK(Endline)	MNP(Baseline)	MNP(Endline)	Control(Baseline)	Control(Endline)
	n = 18	n = 18	n = 18	n = 18	n = 18	n = 14
consuming deworming tablets	0 (0.0%)	4 (22.2%)	0 (0.0%)	0 (0.0%)	1 (5.6%)	0 (0.0%)
taking iron fortified food	3 (16.7%)	3 (16.7%)	0 (0.0%)	3 (16.7%)	1 (5.6%)	1 (7.1%)
consuming ifa supplements	4 (22.2%)	10 (55.6%)	4 (22.2%)	4 (22.2%)	3 (16.7%)	1 (7.1%)
intake of proper breakfast	0 (0.0%)	_	4 (22.2%)	_	0 (0.0%)	
Others	10 (55.6%)	0 (0.0%)	4 (22.2%)	2 (11.1%)	1 (5.6%)	1 (7.1%)
Proportion of teacher who are aware of the following signs and symptoms to recognize someone who has undernutrition						
lack of energy/ weakness	11 (61.1%)	15 (83.3%)	13 (72.2%)	16 (88.9%)	9 (50.0%)	10 (71.4%)
cannot work, study or play as normal (disability)	3 (16.7%)	6 (33.3%)	5 (27.8%)	5 (27.8%)	4 (22.2%)	4 (28.6%)
weakness of the immune system (becomes ill easily or becomes seriously ill)	0 (0.0%)	5 (27.8%)	2 (11.1%)	4 (22.2%)	1 (5.6%)	3 (21.4%)
loss of weight/ thinness	2 (11.1%)	10 (55.6%)	7 (38.9%)	10 (55.6%)	3 (16.7%)	5 (35.7%)
children do not grow as they should (growth faltering)	2 (11.1%)	8 (44.4%)	1 (5.6%)	2 (11.1%)	0 (0.0%)	3 (21.4%)
Other	10 (55.6%)		4 (22.2%)		1 (5.6%)	
don't know	1 (5.6%)	1 (5.6%)	0 (0.0%)	2 (11.1%)	1 (5.6%)	0 (0.0%)
Proportion of teacher who considers the following causes undernutrition						
not getting enough food	14 (77.8%)	17 (94.4%)	15 (83.3%)	15 (83.3%)	10 (55.6%)	13 (92.9%)
food is watery, does not contain enough nutrients	0 (0.0%)	7 (38.9%)	3 (16.7%)	4 (22.2%)	1 (5.6%)	2 (14.3%)
disease/ ill and not eating food	0 (0.0%)	1 (5.6%)	1 (5.6%)	0 (0.0%)	1 (5.6%)	1 (7.1%)
Other	7 (38.9%)	_	2 (11.1%)	_	1 (5.6%)	_
don't know	0 (0.0%)	1 (5.6%)	0 (0.0%)	2 (11.1%)	1 (5.6%)	0 (0.0%)
Proportion of teacher who considers the following are consequences of undernutrition						
delay in physical growth	13 (72.2%)	17 (94.4%)	9 (50.0%)	16 (88.9%)	9 (50.0%)	8 (57.1%)
delay in mental growth	10 (55.6%)	16 (88.9%)	10 (55.6%)	6 (33.3%)	3 (16.7%)	9 (64.3%)
Other	9 (50.0%)	0 (0.0%)	4 (22.2%)	3 (16.7%)	1 (5.6%)	0 (0.0%)
don't know	1 (5.6%)	0 (0.0%)	1 (5.6%)	2 (11.1%)	3 (16.7%)	1 (7.1%)

Knowledge of anaemia and undernutrition						
	FRK(Baseline)	FRK(Endline)	MNP(Baseline)	MNP(Endline)	Control(Baseline)	Control(Endline)
	n = 18	n = 18	n = 18	n = 18	n = 18	n = 14
Proportion of teacher who considers the following can prevent undernutrition						
give more food	12 (66.7%)	17 (94.4%)	13 (72.2%)	16 (88.9%)	9 (50.0%)	13 (92.9%)
feed frequently	0 (0.0%)	7 (38.9%)	1 (5.6%)	6 (33.3%)	3 (16.7%)	3 (21.4%)
give attention during meals	2 (11.1%)	5 (27.8%)	3 (16.7%)	2 (11.1%)	0 (0.0%)	3 (21.4%)
go to health center and check that the child is growing	4 (22.2%)	3 (16.7%)	4 (22.2%)	3 (16.7%)	5 (27.8%)	0 (0.0%)
Other	12 (66.7%)	2 (11.1%)	4 (22.2%)	1 (5.6%)	1 (5.6%)	1 (7.1%)
don't know	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (11.1%)	1 (7.1%)

Annex 17: Teachers knowledge on MDM fortification

Teacher's knowledge on MDM Fortification			
	FRK (Endline)	MNP (Endline)	P-value
	No. 18	No. 18	
Is MDM beneficial?			
Yes	17 (94.4%)	18 (100.0%)	1
No	0 (0.0%)	0 (0.0%)	
Don't know	1 (5.6%)	0 (0.0%)	
Benefits of MDM Fortification			
Yes prevents malnutrition	7 (38.9%)	11 (61.1%)	0.0007
Yes prevents illnesses/improves immunity	10 (55.6%)	3 (16.7%)	0.0007
Yes others	1 (5.6%)	8 (44.4%)	0.002
Yes gives micronutrients	10 (55.6%)	5 (27.8%)	0.002
The difference (if any) in taste of fortified MDM			
Better	13 (72.2%)	16 (88.9%)	0.4
Similar	5 (27.8%)	2 (11.1%)	
Worse	0 (0.0%)	0 (0.0%)	
No feedback	0 (0.0%)	0 (0.0%)	
Is there any impact of fortification on the consumption?			

Teacher's knowledge on MDM Fortification			
	FRK (Endline)	MNP (Endline)	P-value
	No. 18	No. 18	
Increased	10 (55.6%)	14 (77.8%)	0.29
Similar	8 (44.4%)	4 (22.2%)	
Decreased	0 (0.0%)	0 (0.0%)	
No feedback	0 (0.0%)	0 (0.0%)	
Is the training received on fortification adequate			
Adequate	12 (66.7%)	11 (61.1%)	0.11
Inadequate	3 (16.7%)	7 (38.9%)	
Dont know	3 (16.7%)	0 (0.0%)	

Annex 18: Staffs in MDM committee

Staff in the MDM Committee			
	FRK (Endline)	MNP (Endline)	Control (Endline)
	No. 18	No. 18	No. 14
Kitchen-in-charge			
Absent	2 (11.1%)	0 (0.0%)	0 (0.0%)
Present Adequate	12 (66.7%)	13 (72.2%)	11 (78.6%)
Present Inadequate	4 (22.2%)	5 (27.8%)	3 (21.4%)
Store-in-charge			
Absent	6 (33.3%)	0 (0.0%)	5 (35.7%)
Present Adequate	10 (55.6%)	13 (72.2%)	6 (42.9%)
Present Inadequate	2 (11.1%)	5 (27.8%)	3 (21.4%)
Cook cum helper			
Absent	1 (5.6%)	0 (0.0%)	0 (0.0%)
Present Adequate	14 (77.8%)	11 (61.1%)	9 (64.3%)

Staff in the MDM Committee			
	FRK (Endline)	**MNP (Endline)**	**Control (Endline)**
	No. 18	**No. 18**	**No. 14**
Present Inadequate	3 (16.7%)	7 (38.9%)	5 (35.7%)
Sweeper			
Absent	16 (88.9%)	15 (83.3%)	13 (92.9%)
Present Adequate	1 (5.6%)	1 (5.6%)	0 (0.0%)
Present Inadequate	1 (5.6%)	2 (11.1%)	1 (7.1%)
Helpers			
Absent	15 (83.3%)	13 (72.2%)	14 (100.0%)
Present Adequate	2 (11.1%)	2 (11.1%)	0 (0.0%)
Present Inadequate	1 (5.6%)	3 (16.7%)	0 (0.0%)

Annex 19: Teachers satisfaction regarding MDM

Teachers' satisfaction regarding MDM							
	FRK (Baseline)	**FRK (Endline)**	**MNP (Baseline)**	**MNP (Endline)**	**Control(Baseline)**	**Control(Endline)**	**P-value**
	No. 18	**No. 18**	**No. 18**	**No. 18**	**No. 18**	**No. 14**	
Regularity							
Satisfaction level4	0 (0.0%)	4 (22.2%)	0 (0.0%)	0 (0.0%)	2 (11.1%)	1 (7.1%)	0.066
Satisfaction level5	18 (100.0%)	14 (77.8%)	18 (100.0%)	18 (100.0%)	16 (88.9%)	13 (92.9%)	
Timeliness							
Satisfaction level4	5 (27.8%)	1 (5.6%)	1 (5.6%)	0 (0.0%)	3 (16.7%)	0 (0.0%)	1
Satisfaction level5	13 (72.2%)	17 (94.4%)	17 (94.4%)	18 (100.0%)	15 (83.3%)	14 (100.0%)	
Quality							
Satisfaction level4	7 (38.9%)	3 (16.7%)	7 (38.9%)	0 (0.0%)	4 (22.2%)	7 (50.0%)	0.001
Satisfaction level5	8 (44.4%)	15 (83.3%)	11 (61.1%)	18 (100.0%)	11 (61.1%)	7 (50.0%)	

Teachers' satisfaction regarding MDM							
	FRK (Baseline)	**FRK (Endline)**	**MNP (Baseline)**	**MNP (Endline)**	**Control(Baseline)**	**Control(Endline)**	**P-value**
	No. 18	**No. 18**	**No. 18**	**No. 18**	**No. 18**	**No. 14**	
Hygiene							
Satisfaction level3	1 (5.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (5.6%)	1 (7.1%)	0.0006
Satisfaction level4	7 (38.9%)	4 (22.2%)	11 (61.1%)	0 (0.0%)	8 (44.4%)	7 (50.0%)	
Satisfaction level5	10 (55.6%)	14 (77.8%)	7 (38.9%)	18 (100.0%)	9 (50.0%)	6 (42.9%)	
Variety							
Satisfaction level3	3 (16.7%)	0 (0.0%)	1 (5.6%)	0 (0.0%)	2 (11.1%)	2 (14.3%)	0.0002
Satisfaction level4	10 (55.6%)	6 (33.3%)	10 (55.6%)	0 (0.0%)	8 (44.4%)	7 (50.0%)	
Satisfaction level5	4 (22.2%)	12 (66.7%)	7 (38.9%)	18 (100.0%)	7 (38.9%)	5 (35.7%)	

Annex 20: Knowledge about fortification and anaemia of teachers

Knowledge about fortification and anaemia of teachers				
	FRK	**MNP**	**Control**	**P-value**
	No. 18	**No. 18**	**No. 14**	
Teachers heard about the rice fortification project				
No	1 (5.6%)	0 (0.0%)	7 (50.0%)	0.0004
Yes	17 (94.4%)	18 (100.0%)	7 (50.0%)	
Teachers attended training or capacity building session on rice fortification				
No	5 (27.8%)	0 (0.0%)	14 (100.0%)	< 0.0001
Yes	13 (72.2%)	18 (100.0%)	0 (0.0%)	
Teachers have IEC material job aid such as resource book/chart available in school for creating awareness on anaemia				
No	1 (5.6%)	1 (5.6%)	10 (71.4%)	< 0.0001
Yes	17 (94.4%)	17 (94.4%)	4 (28.6%)	
Teachers aware of iron deficiency				
No	1 (5.6%)	0 (0.0%)	2 (14.3%)	0.27
Yes	17 (94.4%)	18 (100.0%)	12 (85.7%)	
Awareness about Anaemia symptoms				
Yes fatigue	8 (44.4%)	1 (5.6%)	1 (7.1%)	0.009
Yes weakness	17 (94.4%)	12 (66.7%)	11 (78.6%)	0.13

Knowledge about fortification and anaemia of teachers				
	FRK	MNP	Control	P-value
	No. 18	No. 18	No. 14	
Yes paleness/yellow skin/white tongue and pale eyes	10 (55.6%)	15 (83.3%)	5 (35.7%)	0.022
Yes lack of concentration	8 (44.4%)	0 (0.0%)	0 (0.0%)	0.0002
Causes of Anaemia				
Yes iron deficiency	14 (77.8%)	9 (50.0%)	5 (35.7%)	0.047
Yes poor nutrition	14 (77.8%)	14 (77.8%)	8 (57.1%)	0.39
Yes worm infestation/ illness such as tb, malaria etc	1 (5.6%)	3 (16.7%)	1 (7.1%)	0.61
Yes blood loss	4 (22.2%)	0 (0.0%)	2 (14.3%)	0.096
Yes lack of breakfast	2 (11.1%)	1 (5.6%)	0 (0.0%)	0.77
Yes others	1 (5.6%)	3 (16.7%)	0 (0.0%)	0.44
Consequences of Anaemia				
Yes slow growth (physical and mental)	16 (88.9%)	16 (88.9%)	10 (71.4%)	0.43
Yes reduced learning ability	11 (61.1%)	5 (27.8%)	0 (0.0%)	0.0007
Yes reduced immunity/recurrent illnesses	7 (38.9%)	5 (27.8%)	3 (21.4%)	0.64
Yes lesser participation in activities/ dullness	4 (22.2%)	5 (27.8%)	2 (14.3%)	0.64
Prevention of Anaemia				
Yes eating iron rich vegetables	16 (88.9%)	14 (77.8%)	12 (85.7%)	0.72
Yes eating iron rich fruits	12 (66.7%)	12 (66.7%)	3 (21.4%)	0.016
Yes eating meat/fish/eggs	8 (44.4%)	16 (88.9%)	3 (21.4%)	0.0003
Yes consuming deworming tablets	4 (22.2%)	0 (0.0%)	0 (0.0%)	0.031
Yes taking iron fortified food	3 (16.7%)	3 (16.7%)	1 (7.1%)	0.77
Yes consuming ifa supplements	10 (55.6%)	4 (22.2%)	1 (7.1%)	0.011
Yes others	0 (0.0%)	2 (11.1%)	1 (7.1%)	0.49
Do schools provide IFA tablets				
No	3 (16.7%)	0 (0.0%)	2 (14.3%)	0.24
Yes	15 (83.3%)	18 (100.0%)	12 (85.7%)	
Frequency of distribution of IFA tablets in school				
Half yearly	0 (0.0%)	0 (0.0%)	2 (14.3%)	0.001
Monthly	0 (0.0%)	0 (0.0%)	2 (14.3%)	
More than once a week	0 (0.0%)	1 (5.6%)	0 (0.0%)	
Weekly	15 (83.3%)	17 (94.4%)	7 (50.0%)	
Yearly	0 (0.0%)	0 (0.0%)	1 (7.1%)	
Missing	3 (16.7%)	0 (0.0%)	2 (14.3%)	
Do schools provide deworming tablets				
No	1 (5.6%)	0 (0.0%)	7 (50.0%)	0.0004
Yes	17 (94.4%)	18 (100.0%)	7 (50.0%)	
Frequency of distribution of deworming tablets in school				

Knowledge about fortification and anaemia of teachers				
	FRK	MNP	Control	P-value
	No. 18	No. 18	No. 14	
Half yearly	17 (94.4%)	18 (100.0%)	3 (21.4%)	0.0003
Monthly	0 (0.0%)	0 (0.0%)	3 (21.4%)	
Yearly	0 (0.0%)	0 (0.0%)	1 (7.1%)	
Missing	1 (5.6%)	0 (0.0%)	6 (50.0%)	

Annex 21: School profile

School Profile								
	FRK (Baseline)	FRK (Endline)	MNP (Baseline)	MNP (Endline)	Control (Baseline)	Control (Endline)	Total	P-value
	No. 18	No. 18	No. 18	No. 18	No. 14	No. 14	No. 50	
Number of class rooms								
1 - 2 rooms	4 (22.2%)	5 (27.8%)	3 (16.7%)	4 (22.2%)	3 (16.7%)	2 (14.3%)	11 (22.0%)	0.81
2 - 4 rooms	5 (27.8%)	5 (27.8%)	8 (44.4%)	7 (38.9%)	7 (38.9%)	4 (28.6%)	16 (32.0%)	
More than 4 rooms	9 (50.0%)	8 (44.4%)	7 (38.9%)	7 (38.9%)	8 (44.4%)	8 (57.1%)	23 (46.0%)	
Number of library								
Nil	15 (83.3%)	13 (72.2%)	15 (83.3%)	7 (58.3%)	2 (11.1%)	9 (64.3%)	29 (65.9%)	0.73
At least 1	3 (16.7%)	5 (27.8%)	3 (16.7%)	5 (41.7%)	16 (88.9%)	5 (35.7%)	15 (34.1%)	
Number of store room								
Nil	4 (22.2%)	3 (16.7%)	9 (50.0%)	2 (14.3%)	3 (16.7%)	3 (21.4%)	8 (17.4%)	1
At least 1	14 (77.8%)	15 (83.3%)	9 (50.0%)	12 (85.7%)	15 (83.3%)	11 (78.6%)	38 (82.6%)	
Number of kitchen								
Nil	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (5.6%)	0 (0.0%)	0 (0.0%)	1
At least 1	18 (100.0%)	18 (100.0%)	18 (100.0%)	18 (100.0%)	17 (94.4%)	14 (100.0%)	50 (100.0%)	
Number of boundary wall								
Nil	2 (11.1%)	3 (16.7%)	4 (22.2%)	3 (16.7%)	0 (0.0%)	1 (7.1%)	7 (14.0%)	0.77
At least 1	16 (88.9%)	15 (83.3%)	14 (77.8%)	15 (83.3%)	18 (100.0%)	13 (92.9%)	43 (86.0%)	
Number of play ground								
Nil	7 (38.9%)	15 (83.3%)	4 (22.2%)	8 (44.4%)	14 (77.8%)	2 (14.3%)	25 (50.0%)	0.0004
At least 1	11 (61.1%)	3 (16.7%)	14 (77.8%)	10 (55.6%)	4 (22.2%)	12 (85.7%)	25 (50.0%)	
Number of boys toilet								

School Profile								
	FRK (Baseline)	FRK (Endline)	MNP (Baseline)	MNP (Endline)	Control (Baseline)	Control (Endline)	Total	P-value
	No. 18	No. 18	No. 18	No. 18	No. 14	No. 14	No. 50	
Nil	3 (16.7%)	2 (11.1%)	3 (16.7%)	2 (11.1%)	3 (16.7%)	4 (28.6%)	8 (16.0%)	0.43
At least 1	15 (83.3%)	16 (88.9%)	15 (83.3%)	16 (88.9%)	15 (83.3%)	10 (71.4%)	42 (84.0%)	
Number of girls toilet								
Nil	4 (22.2%)	5 (27.8%)	1 (5.6%)	2 (11.1%)	1 (5.6%)	4 (28.6%)	11 (22.0%)	0.4
At least 1	14 (77.8%)	13 (72.2%)	17 (94.4%)	16 (88.9%)	17 (94.4%)	10 (71.4%)	39 (78.0%)	
Number of firstaid kit								
Nil	3 (16.7%)	2 (11.1%)	0 (0.0%)	0 (0.0%)	2 (11.1%)	1 (7.1%)	3 (6.0%)	0.49
At least 1	15 (83.3%)	16 (88.9%)	18 (100.0%)	18 (100.0%)	16 (88.9%)	13 (92.9%)	47 (94.0%)	

Annex 22: Schools' characteristics

Schools' characteristics					
	FRK	MNP	Control	Total	P-value
	No. 18	No. 18	No. 14	No. 50	
Avarage number of days school was open till date in current eductional year (for 20 months- study period)					
Mean (SD)	534.6 (±14.1)	533.7 (±15.8)	442.6 (±11.1)	508.5 (±43.7)	< 0.0001
Duration of class activities (hrs:min:sec)					
05:30:00	8 (44.4%)	0 (0.0%)	0 (0.0%)	8 (16.0%)	< 0.0001
05:40:00	2 (11.1%)	0 (0.0%)	0 (0.0%)	2 (4.0%)	
05:45:00	2 (11.1%)	0 (0.0%)	0 (0.0%)	2 (4.0%)	
06:00:00	6 (33.3%)	18 (100.0%)	14 (100.0%)	38 (76.0%)	
Duration of MDM activities (hrs:min:sec)					
00:25:00	2 (11.1%)	1 (5.6%)	0 (0.0%)	3 (6.0%)	0.004
00:30:00	0 (0.0%)	1 (5.6%)	0 (0.0%)	1 (2.0%)	
00:40:00	0 (0.0%)	1 (5.6%)	0 (0.0%)	1 (2.0%)	
00:45:00	12 (66.7%)	6 (33.3%)	12 (85.7%)	30 (60.0%)	
00:50:00	3 (16.7%)	1 (5.6%)	2 (14.3%)	6 (12.0%)	
01:00:00	1 (5.6%)	8 (44.4%)	0 (0.0%)	9 (18.0%)	
Duration of Sports activities (hrs:min:sec)					
00:00:00	1 (5.6%)	0 (0.0%)	1 (7.1%)	2 (4.0%)	0.016

Schools' characteristics					
	FRK	MNP	Control	Total	P-value
	No. 18	No. 18	No. 14	No. 50	
00:15:00	0 (0.0%)	1 (5.6%)	1 (7.1%)	2 (4.0%)	
00:25:00	0 (0.0%)	1 (5.6%)	0 (0.0%)	1 (2.0%)	
00:30:00	9 (50.0%)	3 (16.7%)	10 (71.4%)	22 (44.0%)	
00:35:00	3 (16.7%)	2 (11.1%)	2 (14.3%)	7 (14.0%)	
00:40:00	2 (11.1%)	2 (11.1%)	0 (0.0%)	4 (8.0%)	
00:45:00	3 (16.7%)	8 (44.4%)	0 (0.0%)	11 (22.0%)	
00:50:00	0 (0.0%)	1 (5.6%)	0 (0.0%)	1 (2.0%)	
Headmaster post allocated					
Nil	0 (0.0%)	1 (5.6%)	2 (14.3%)	3 (6.0%)	0.27
Atleast one	18 (100.0%)	17 (94.4%)	12 (85.7%)	47 (94.0%)	
More than one	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Teacher post allocated					
Nil	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.031
Atleast one	4 (22.2%)	0 (0.0%)	0 (0.0%)	4 (8.0%)	
More than one	14 (77.8%)	18 (100.0%)	14 (100.0%)	46 (92.0%)	
Peon post allocated					
Nil	15 (83.3%)	14 (77.8%)	11 (78.6%)	40 (80.0%)	0.81
Atleast one	0 (0.0%)	2 (11.1%)	1 (7.1%)	3 (6.0%)	
More than one	3 (16.7%)	2 (11.1%)	2 (14.3%)	7 (14.0%)	
Sweeper post allocated					
Nil	17 (94.4%)	15 (83.3%)	11 (78.6%)	43 (86.0%)	0.29
Atleast one	1 (5.6%)	3 (16.7%)	1 (7.1%)	5 (10.0%)	
More than one	0 (0.0%)	0 (0.0%)	2 (14.3%)	2 (4.0%)	
Cook post allocated					
Nil	0 (0.0%)	0 (0.0%)	1 (7.1%)	1 (2.0%)	0.89
Atleast one	16 (88.9%)	16 (88.9%)	12 (85.7%)	44 (88.0%)	
More than one	2 (11.1%)	2 (11.1%)	1 (7.1%)	5 (10.0%)	
Headmaster in position					
Nil	5 (27.8%)	5 (27.8%)	6 (42.9%)	16 (32.0%)	0.69
Atleast one	13 (72.2%)	13 (72.2%)	8 (57.1%)	34 (68.0%)	
More than one	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Schools' characteristics					
	FRK	MNP	Control	Total	P-value
	No. 18	No. 18	No. 14	No. 50	
Teacher in position					
Nil	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.066
Atleast one	4 (22.2%)	0 (0.0%)	1 (7.1%)	5 (10.0%)	
More than one	14 (77.8%)	18 (100.0%)	13 (92.9%)	45 (90.0%)	
Peon in position					
Nil	0 (0.0%)	1 (25.0%)	1 (33.3%)	2 (20.0%)	0.83
Atleast one	0 (0.0%)	1 (25.0%)	1 (33.3%)	2 (20.0%)	
More than one	3 (100.0%)	2 (50.0%)	1 (33.3%)	6 (60.0%)	
Sweeper in position					
Nil	0 (0.0%)	1 (33.3%)	1 (33.3%)	2 (28.6%)	1
Atleast one	1 (100.0%)	2 (66.7%)	1 (33.3%)	4 (57.1%)	
More than one	0 (0.0%)	0 (0.0%)	1 (33.3%)	1 (14.3%)	
Cook in position					
Nil	0 (0.0%)	0 (0.0%)	1 (7.1%)	1 (2.0%)	0.28
Atleast one	18 (100.0%)	18 (100.0%)	13 (92.9%)	49 (98.0%)	
More than one	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Headmaster post vacancies					
Nil	13 (72.2%)	13 (72.2%)	9 (64.3%)	35 (70.0%)	0.86
Atleast one	5 (27.8%)	5 (27.8%)	5 (35.7%)	15 (30.0%)	
More than one	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Teacher post vacancies					
Nil	14 (77.8%)	15 (83.3%)	7 (50.0%)	36 (72.0%)	0.3
Atleast one	1 (5.6%)	1 (5.6%)	2 (14.3%)	4 (8.0%)	
More than one	3 (16.7%)	2 (11.1%)	5 (35.7%)	10 (20.0%)	
Peon post vacancies					
Nil	2 (66.7%)	2 (50.0%)	0 (0.0%)	4 (40.0%)	0.46
Atleast one	1 (33.3%)	2 (50.0%)	2 (66.7%)	5 (50.0%)	
More than one	0 (0.0%)	0 (0.0%)	1 (33.3%)	1 (10.0%)	
Sweeper post vacancies					

Schools' characteristics					
	FRK	MNP	Control	Total	P-value
	No. 18	No. 18	No. 14	No. 50	
Nil	1 (100.0%)	2 (66.7%)	0 (0.0%)	3 (42.9%)	0.23
Atleast one	0 (0.0%)	1 (33.3%)	3 (100.0%)	4 (57.1%)	
More than one	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cook post vacancies					
Nil	17 (94.4%)	16 (88.9%)	13 (92.9%)	46 (92.0%)	1
Atleast one	1 (5.6%)	2 (11.1%)	1 (7.1%)	4 (8.0%)	
More than one	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

*Endline findlings presented standalone(without baseline data) due to difference in the character of variables.

Annex 23: School water facility

School water facility					
	FRK (Endline)	MNP (Endline)	Control (Endline)	Total	P-value
	No. 18	No. 18	No. 14	No. 50	
Main source of drinking water					
Tap	6 (33.3%)	3 (16.7%)	0 (0.0%)	9 (18.0%)	0.016
Borewell	8 (44.4%)	7 (38.9%)	3 (21.4%)	18 (36.0%)	
Hand pump	3 (16.7%)	7 (38.9%)	10 (71.4%)	20 (40.0%)	
Dug well	0 (0.0%)	1 (5.6%)	0 (0.0%)	1 (2.0%)	
Others	1 (5.6%)	0 (0.0%)	0 (0.0%)	1 (2.0%)	
No supply	0 (0.0%)	0 (0.0%)	1 (7.1%)	1 (2.0%)	
Facility to purify the drinking water at school level					
No	10 (55.6%)	9 (50.0%)	5 (35.7%)	24 (48.0%)	0.52
Yes	8 (44.4%)	9 (50.0%)	9 (64.3%)	26 (52.0%)	
what is the method of water purification					
Aqua guard	3 (33.3%)	2 (22.2%)	4 (40.0%)	9 (32.1%)	0.25

School water facility					
	FRK (Endline)	**MNP (Endline)**	**Control (Endline)**	**Total**	**P-value**
	No. 18	**No. 18**	**No. 14**	**No. 50**	
Water filter	5 (55.6%)	3 (33.3%)	6 (60.0%)	14 (50.0%)	
Chlorination	0 (0.0%)	2 (22.2%)	0 (0.0%)	2 (7.1%)	
Simple straining	0 (0.0%)	2 (22.2%)	0 (0.0%)	2 (7.1%)	
Others	1 (11.1%)	0 (0.0%)	0 (0.0%)	1 (3.6%)	
Is the drinking water stored?					
No	5 (27.8%)	6 (33.3%)	7 (50.0%)	18 (36.0%)	0.49
Yes	13 (72.2%)	12 (66.7%)	7 (50.0%)	32 (64.0%)	
how drinking water is stored					
Covered Jars/pots	6 (46.2%)	5 (50.0%)	3 (42.9%)	14 (46.7%)	0.52
Overhead tank	1 (7.7%)	3 (30.0%)	3 (42.9%)	7 (23.3%)	
Not required (filter / aqua guard etc)	2 (15.4%)	2 (20.0%)	1 (14.3%)	5 (16.7%)	
Tube filters	3 (23.1%)	0 (0.0%)	0 (0.0%)	3 (10.0%)	
Not properly stored	1 (7.7%)	0 (0.0%)	0 (0.0%)	1 (3.3%)	
Is there water supply to toilet?					
No	10 (55.6%)	6 (33.3%)	7 (50.0%)	23 (46.0%)	0.45
Yes	8 (44.4%)	12 (66.7%)	7 (50.0%)	27 (54.0%)	
Is there water supply to Kitchen??					
No	13 (72.2%)	9 (50.0%)	10 (71.4%)	32 (64.0%)	0.37
Yes	5 (27.8%)	9 (50.0%)	4 (28.6%)	18 (36.0%)	

*Endline findlings presented standalone(without baseline data) due to difference in the character of variables.

Annex 24: MDM practices in schools

MDM practices in schools								
	FRK (Baseline)	FRK (Endline)	MNP(Baseline)	MNP(Endline)	Control (Baseline)	Control (Endline)	Total	P-value
	No. 18	No. 18	No. 18	No. 18	No. 14	No. 14	No. 50	
What is the condition of the kitchen								
Pucca	1 (5.6%)	18 (100.0%)	1 (5.6%)	18 (100.0%)	1 (5.6%)	9 (64.3%)	45 (90.0%)	0.0009
Katcha	17 (94.4%)	0 (0.0%)	17 (94.4%)	0 (0.0%)	13 (72.2%)	4 (28.6%)	4 (8.0%)	
Shed	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (22.2%)	1 (7.1%)	1 (2.0%)	
Is there facility for storage of grains/ other items								
No		1 (5.6%)		2 (11.1%)		4 (28.6%)	7 (14.0%)	0.26
Yes	16 (88.9%)	17 (94.4%)	13 (72.2%)	16 (88.9%)	17 (94.4%)	10 (71.4%)	43 (86.0%)	
Is there separate water supply to kitchen								
No		13 (72.2%)		13 (72.2%)		8 (57.1%)	34 (68.0%)	0.69
Yes	4 (22.2%)	5 (27.8%)	2 (11.1%)	5 (27.8%)	4 (22.2%)	6 (42.9%)	16 (32.0%)	
Cleaning condition of the kitchen								
No		1 (5.6%)		0 (0.0%)		6 (42.9%)	7 (14.0%)	0.002
Yes	18 (100.0%)	17 (94.4%)	17 (94.4%)	18 (100.0%)	12 (66.7%)	8 (57.1%)	43 (86.0%)	
Are the food items properly stored after preparation								
No		0 (0.0%)		0 (0.0%)		2 (14.3%)	2 (4.0%)	0.074
Yes	17 (94.4%)	18 (100.0%)	17 (94.4%)	18 (100.0%)	16 (88.9%)	12 (85.7%)	48 (96.0%)	
Is the food prepared eaten by students on the same day								
No		0 (0.0%)		0 (0.0%)		2 (14.3%)	2 (4.0%)	0.074

MDM practices in schools								
	FRK (Baseline)	FRK (Endline)	MNP(Baseline)	MNP(Endline)	Control (Baseline)	Control (Endline)	Total	P-value
	No. 18	No. 18	No. 18	No. 18	No. 14	No. 14	No. 50	
Yes	15 (83.3%)	18 (100.0%)	3 (16.7%)	18 (100.0%)	16 (88.9%)	12 (85.7%)	48 (96.0%)	
What is done if MDM food is left over								
Consumed by others	3 (100.0%)	1 (100.0%)	14 (93.3%)	0 (NaN%)	2 (100.0%)	1 (50.0%)	2 (66.7%)	1
Distributed among children		0 (0.0%)		0 (NaN%)		1 (50.0%)	1 (33.3%)	

Annex 25: Health check-ups in school

Schools' health check-up practice details								
	FRK (Baseline)	FRK (Endline)	MNP (Baseline)	MNP (Endline)	Control (Baseline)	Control (Endline)	Total	P-value
	No. 18	No. 18	No. 18	No. 18	No. 14	No. 14	No. 50	
Does the school conduct health check-ups for students								
No		5 (27.8%)		0 (0.0%)		2 (14.3%)	7 (14.0%)	0.042
Yes	12 (66.7%)	13 (72.2%)	17 (94.4%)	18 (100.0%)	9 (50.0%)	12 (85.7%)	43 (86.0%)	
Frequency of health checkup								
Monthly	0 (0.0%)	0 (0.0%)	1 (5.9%)	2 (11.1%)	1 (11.1%)	1 (8.3%)	3 (7.0%)	0.94
Quarterly	0 (0.0%)	1 (7.7%)	1 (5.9%)	1 (5.6%)	0 (0.0%)	1 (8.3%)	3 (7.0%)	
Half-yearly	5 (41.7%)	2 (15.4%)	5 (29.4%)	3 (16.7%)	5 (55.6%)	3 (25.0%)	8 (18.6%)	
Yearly	7 (58.3%)	10 (76.9%)	10 (58.8%)	12 (66.7%)	3 (33.3%)	7 (58.3%)	29 (67.4%)	
How many times has the school conducted health check-ups in the last one year								
Mean (SD)	1.0 (±0.8)	1.3 (±0.9)	2.1 (±2.8)	2.5 (±3.1)	1.5 (±1.1)	1.2 (±0.9)	1.8 (±2.2)	0.19

Annex 26: Personal hygiene practice

Personal hygiene practice						
	FRK (Baseline)	FRK (Endline)	MNP (Baseline)	MNP (Endline)	Control(Baseline)	Control(Endine)
	No. 18	No. 18	No. 18	No. 18	No. 18	No. 14
Do students wash hands before eating						
With soap	17 (94.4%)	18 (100.0%)	16 (88.9%)	17 (94.4%)	2 (11.1%)	5 (35.7%)
Without soap	1 (5.6%)	0 (0.0%)	2 (11.1%)	1 (5.6%)	16 (88.9%)	8 (57.1%)
Do not wash		0 (0.0%)		0 (0.0%)		1 (7.1%)
Do students wash hands after use of toilet						
With soap	12 (66.7%)	11 (61.1%)	17 (94.4%)	17 (94.4%)	2 (11.1%)	2 (14.3%)
Without soap	6 (33.3%)	5 (27.8%)	1 (5.6%)	1 (5.6%)	15 (83.3%)	11 (78.6%)
Do not wash	0 (0.0%)	2 (11.1%)	0 (0.0%)	0 (0.0%)	1 (5.6%)	1 (7.1%)
Do cook washes hands before cooking						
With soap	18 (100.0%)	18 (100.0%)	14 (77.8%)	18 (100.0%)	5 (27.8%)	10 (71.4%)
Without soap	0 (0.0%)	0 (0.0%)	4 (22.2%)	0 (0.0%)	13 (72.2%)	4 (28.6%)
Do school staff, teachers and cook wash hands after use of toilet						
With soap	15 (83.3%)	14 (77.8%)	17 (94.4%)	18 (100.0%)	13 (72.2%)	8 (57.1%)
Without soap	3 (16.7%)	3 (16.7%)	1 (5.6%)	0 (0.0%)	3 (16.7%)	5 (35.7%)
Do not wash	0 (0.0%)	1 (5.6%)	0 (0.0%)	0 (0.0%)	2 (11.1%)	1 (7.1%)
Is there hand washing facility available before and after eating						
Yes	18 (100.0%)	12 (66.7%)	5 (27.8%)	17 (94.4%)	3 (16.7%)	6 (42.9%)
Is there separate hand washing facility available near toilet facility						
Yes	14 (77.8%)	10 (55.6%)	5 (27.8%)	7 (38.9%)	0 (0.0%)	3 (21.4%)

*Endline findlings presented standalone(without baseline data) due to difference in the character of variables.

Annex 27: Special education class

Special education classes						
	FRK (Baseline)	FRK (Endline)	MNP (Baseline)	MNP (Endline)	Control (baseline)	Control (Endline)

	No. 18	No. 18	No. 18	No. 18	No. 18	No. 14
Is there any special education class on health and hygiene happening						
Yes	13 (72.2%)	12 (66.7%)	14 (77.8%)	18 (100.0%)	13 (72.2%)	3 (21.4%)
Is the school visited by any NGO for educating the children on health						
Yes	2 (11.1%)	9 (50.0%)	4 (22.2%)	4 (22.2%)	2 (11.1%)	3 (21.4%)
Is there any display materials on health and hygiene present						
Yes	5 (27.8%)	14 (77.8%)	6 (33.3%)	18 (100.0%)	7 (38.9%)	3 (21.4%)

Annex 28: Household access to drinking water and sanitation

Household access to drinking water and sanitation						
	MNP(Baseline)	**MNP(Endline)**	**FRK(Baseline)**	**FRK(Endline)**	**Control(Baseline)**	**Control(Endline)**
	No. 578	**No. 574**	**No. 597**	**No. 597**	**No. 589**	**No. 467**
Most common source of drinking water						
Piped into dwelling	16 (2.8%)	5 (0.9%)	120 (20.1%)	62 (10.4%)	23 (3.9%)	4 (0.9%)
Piped to yard/plot	4 (0.7%)	12 (2.1%)	13 (2.2%)	74 (12.4%)	23 (3.9%)	5 (1.1%)
Public tap/standpipe	34 (5.9%)	38 (6.6%)	69 (11.6%)	116 (19.4%)	55 (9.3%)	93 (19.9%)
Tube well or borehole	195 (33.7%)	154 (26.8%)	185 (31.0%)	150 (25.1%)	407 (69.1%)	318 (68.1%)
Protected well	13 (2.2%)	36 (6.3%)	17 (2.8%)	44 (7.4%)	20 (3.4%)	18 (3.9%)
Unprotected well	305 (52.8%)	305 (53.1%)	191 (32.0%)	146 (24.5%)	56 (9.5%)	21 (4.5%)
Protected spring	1 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.2%)	1 (0.2%)
Unprotected spring	0 (0.0%)	10 (1.7%)	0 (0.0%)	2 (0.3%)	0 (0.0%)	7 (1.5%)
Rainwater	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Tanker truck	0 (0.0%)	3 (0.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Cart with small tank	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Surface water (river/dam/lake/pond/stream/canal)	10 (1.7%)	9 (1.6%)	2 (0.3%)	3 (0.5%)	4 (0.7%)	0 (0.0%)
Bottled water	0 (0.0%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Community RO plant	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Other	0 (0.0%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Water source located						
In own dwelling	2 (0.4%)	34 (7.0%)	23 (5.9%)	48 (14.1%)	14 (2.9%)	61 (17.2%)

Household access to drinking water and sanitation						
	MNP(Baseline)	MNP(Endline)	FRK(Baseline)	FRK(Endline)	Control(Baseline)	Control(Endline)
	No. 578	No. 574	No. 597	No. 597	No. 589	No. 467
In own yard/plot	108 (21.1%)	59 (12.2%)	61 (15.5%)	42 (12.4%)	55 (11.5%)	30 (8.5%)
Elsewhere	402 (78.5%)	392 (80.8%)	309 (78.6%)	250 (73.5%)	408 (85.5%)	264 (74.4%)
Time (min) taken to collect water						
=<5	248 (57.1%)	174 (40.1%)	149 (40.2%)	150 (43.9%)	197 (42.8%)	70 (21.2%)
6-10	105 (24.2%)	116 (26.7%)	140 (37.7%)	83 (24.3%)	153 (33.3%)	48 (14.5%)
>10	81 (18.7%)	144 (33.2%)	82 (22.1%)	109 (31.9%)	110 (23.9%)	212 (64.2%)
Any water purification prior to drinking						
No	380 (65.7%)	362 (63.2%)	422 (70.7%)	356 (59.6%)	484 (82.2%)	381 (81.6%)
Yes	198 (34.3%)	204 (35.6%)	175 (29.3%)	205 (34.3%)	105 (17.8%)	86 (18.4%)
Don't know	___	7 (1.2%)	____	36 (6.0%)		0 (0.0%)
Type of toilet/latrine facility commonly used						
Flush to piped sewer system	6 (1.0%)	81 (14.1%)	24 (4.0%)	43 (7.2%)	8 (1.4%)	48 (10.3%)
Flush to anywhere else except piped sewer system	1 (0.2%)	103 (17.9%)	164 (27.5%)	2 (0.3%)	52 (8.8%)	193 (41.3%)
Pit latrine	176 (30.4%)	49 (8.5%)	34 (5.7%)	238 (39.9%)	210 (35.7%)	48 (10.3%)
No facility/uses open space or field	395 (68.3%)	341 (59.4%)	375 (62.8%)	314 (52.6%)	319 (54.2%)	178 (38.1%)

Annex 29: MDM-related questions to parents

	MNP	FRK	Total
	N=574	N=597	N=1,171
Awareness of fortification of MDM among parents			
No	143 (24.9%)	190 (31.8%)	333 (28.4%)
Yes	311 (54.2%)	367 (61.5%)	678 (57.9%)
Don't know	106 (18.5%)	40 (6.7%)	146 (12.5%)
Not reported	14 (2.4%)	0 (0.0%)	14 (1.2%)
The difference (if any) in taste of fortified MDM			

	MNP	FRK	Total
	N=574	N=597	N=1,171
Better	242 (42.2%)	217 (36.3%)	459 (39.2%)
Similar	16 (2.8%)	36 (6.0%)	52 (4.4%)
Worse	6 (1.0%)	22 (3.7%)	28 (2.4%)
No feedback	41 (7.1%)	86 (14.4%)	127 (10.8%)
Not reported	269 (46.9%)	236 (39.5%)	505 (43.1%)
Is Fortified MDM beneficial?			
Yes	287 (50.0%)	158 (26.5%)	445 (38.0%)
No	3 (0.5%)	69 (11.6%)	72 (6.1%)
Don't know	25 (4.4%)	138 (23.1%)	163 (13.9%)
Not reported	259 (45.1%)	232 (38.9%)	491 (41.9%)
What benefits does fortified MDM provide?			
Gives micronutrients	133 (23.2%)	52 (8.7%)	185 (15.8%)
Prevents malnutrition	35 (6.1%)	42 (7.0%)	77 (6.6%)
Prevents illnesses/improves immunity	92 (16.0%)	64 (10.7%)	156 (13.3%)
Other reasons	20 (3.5%)	5 (0.8%)	25 (2.1%)
Not reported	294 (51.2%)	434 (72.7%)	728 (62.2%)
Is there any impact of fortification on the consumption?			
Increased	238 (41.5%)	120 (20.1%)	358 (30.6%)
Similar	43 (7.5%)	155 (26.0%)	198 (16.9%)
Decreased	3 (0.5%)	15 (2.5%)	18 (1.5%)
No feedback	24 (4.2%)	60 (10.1%)	84 (7.2%)
Not reported	266 (46.3%)	247 (41.4%)	513 (43.8%)

Annex 30: MDM-related questions to students

MDM Questions for students	MNP	FRK	Total
	N=574	No=597	N=1,171
Is there any difference in taste in fortified MDM?			
Better	454 (79.1%)	421 (70.5%)	875 (74.7%)
Similar	38 (6.6%)	69 (11.6%)	107 (9.1%)
Worse	5 (0.9%)	20 (3.4%)	25 (2.1%)
Not reported	77 (13.4%)	87 (14.6%)	164 (14.0%)
Is MDM beneficial to you?			
Yes	455 (79.3%)	235 (39.4%)	690 (58.9%)
No	5 (0.9%)	74 (12.4%)	79 (6.7%)
Don't know	71 (12.4%)	229 (38.4%)	300 (25.6%)
Not reported	43 (7.5%)	59 (9.9%)	102 (8.7%)
What benefits does fortified MDM provide?			
Gives micronutrients	188 (32.8%)	127 (21.3%)	315 (26.9%)
Prevents malnutrition	78 (13.6%)	32 (5.4%)	110 (9.4%)
Prevents illnesses/improves immunity	131 (22.8%)	67 (11.2%)	198 (16.9%)
Don't know	32 (5.6%)	6 (1.0%)	38 (3.2%)
Not reported	145 (25.3%)	365 (61.1%)	510 (43.6%)
Is there any impact of fortification on the consumption?			
Increased	424 (73.9%)	293 (49.1%)	717 (61.2%)
Similar	78 (13.6%)	202 (33.8%)	280 (23.9%)
Decreased	5 (0.9%)	27 (4.5%)	32 (2.7%)
No feedback	0 (0.0%)	0 (0.0%)	0 (0.0%)
Not reported	67 (11.7%)	75 (12.6%)	142 (12.1%)

Annex 31: Bibliography

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Annex 32 A Comparative Scale-up Costing Analysis between FRK &MNP–Conducted by WFP

Cost of rice fortification using Fortified Rice Kernels vs. MicroNutrient Powders

FSSAI recommended formulation: Iron, Folic acid, Zinc, Vitamin A, Vitamin B12, Thiamine, Niaci

	FORTIFICATION MODALITY		
	MNP mixed in curry	FRK blended with rice during milling	FRK blended with rice post-milling
No. of students availing MDM			
Primary	1,216,477	1,216,477	1,216,477
Upper Primary	559,602	559,602	559,602
Total	1,776,079	1,776,079	1,776,079
Quantity of MNP/FRK required (in g/student/day)#			
Primary	0.60	1.00	1.00
Upper Primary	0.80	1.50	1.50
No. of feeding days	232	232	232
Total quantity of MNP or FRK required (in Mt/yr)			
Primary	169.33	282.22	282.22
Upper Primary	103.86	194.74	194.74
Total	273.20	476.96	476.96
Unit Cost of MNP /FRK (INR/kg)	195.00	88.00	88.00
Transportation (INR/kg)	5.00	5.00	5.00
COST ESTIMATES (INR) - FOR ONE YEAR			
Procurement of MNP /FRK			
Primary	33,866,720	26,246,708	26,246,708
Upper Primary	20,253,116	17,137,252	17,137,252
Total	54,119,835	43,383,959	43,383,959
Blending Costs			
Operation and depreciation	-	2,370,934	2,370,934
Supervisory/skilled labour	-	390,000	390,000
Handling / rebagging	-	-	7,160,560
Profit on blending (6%)	-	167,369	577,803
Rice recovery value	-	-10,584,960	-10,584,960
Additional Logistics @INR 5/kg/yr	1,365,979	-	-
Total cost for fortifiying meals	**55,485,814**	**35,727,302**	**42,908,296**
Cost of Fortification (INR/child/day)			
Primary	**0.12**	**0.07**	**0.09**
Upper Primary	**0.16**	**0.11**	**0.13**
All Primary	**0.13**	**0.09**	**0.10**
Cost of setting up / implemening the fortification modality (in INR/yr)*			
Training (first year)	10,000,000	-	-
Monitoring (first year)	30,000,000	-	-
Awareness campaigns (first year)	5,000,000	-	-
Monitoring / training (next years)	10,000,000	-	-
Total cost of implementing Fortification (per child/day)			
Primary (first yr / next yrs)	**0.22 / 0.14**	**0.07 / 0.07**	**0.09 / 0.09**
Upper Primary (first yr / next yrs)	**0.29 / 0.19**	**0.11 / 0.11**	**0.13 / 0.13**
All Primary (first yr / next yrs)	**0.24 / 0.16**	**0.09 / 0.09**	**0.10 / 0.10**

- The rate of addition of MNP for primary and upper primary children in based on actual field conditions

Note: The incremental cost of producing fortified rice is worked out by substituting the actual cost incurred in hiring the rice miller and procurement of the blending equipment

The following assumptions have been made for the costing of FRK: 1) A Chinese extruder with capacity of 250 kg per hour, for 8 hours a day and 300 days a year is considered for production of FRK (2) For blending, a medium-sized mill with 10 MT/hr capacity, 16 hours/day for 298 days/year is considered

Rice recovery cost is calculated by substracting paddy purchase costs (INR 14.6 per kg), Paddy transport and handling (INR 0.26 per kg) considering 68% yield as per Govt. norms, Milling cost (INR 0.20 per kg)

Annex 33 – Prevalence of retinol deficiency among students, baseline and end line

Proportion of students with retinol deficiency during baseline and end line (cut-offs in parenthesis)

	FRK (Baseline) N(%)	FRK (Endline) N(%)	MNP (Baseline) N(%)	MNP (Endline) N(%)	Control (Baseline) N(%)	Control (Endline) N(%)
	N=578	**N=574**	**N =597**	**N =597**	**N=589**	**N=467**
Retinol (<20 µmol/L)	282 (47.2%)	106 (17.91%)	270 (46.7%)	99 (18.03%)	355 (60.7%)	61 (13.35%)

Sex and age(grade)-disaggregated prevalence of retinol deficiency/excess (cut-offs in parenthesis), baseline

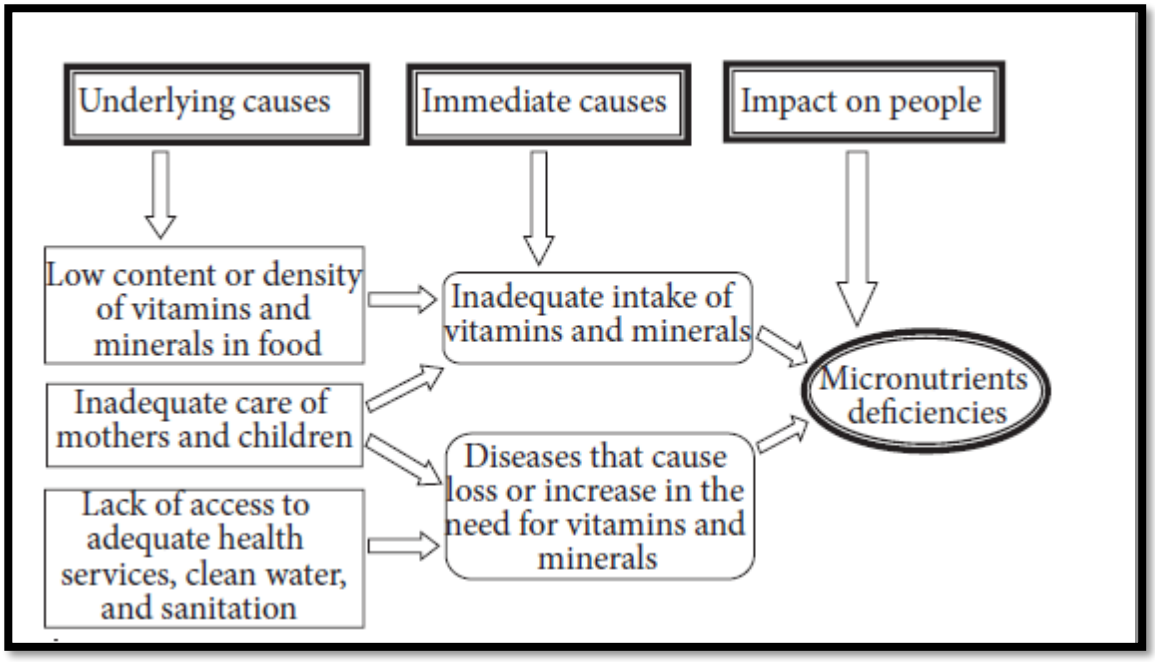
	FRK N (%)		MNP N(%)		Control N(%)	
	Male (294)	**Female (303)**	**Male (291)**	**Female (287)**	**Male (290)**	**Female (295)**
Retinol (<20 micromol/L)	131 (44.6)	151 (49.8)	138(47.4)	132 (46.0)	181 (62.4)	174 (59.0)
	Grades 1-5 (375)	**Grades 6-8 (222)**	**Grades 1-5 (363)**	**Grades 6-8 (215)**	**Grades 1-5 (376)**	**Grades 6-8 (209)**
Retinol (<20 micromol/L)	185 (49.3)	97 (43.7)	158 (43.5)	112 (52.1)	254 (67.6)	101 (48.3)

Sex and age(grade)-disaggregated prevalence of retinol deficiency/excess (cut-offs in parenthesis), endline

	FRK N(%)		MNP N(%)		Control N(%)	
	Male (298)	**Female (294)**	**Male (273)**	**Female (276)**	**Male (216)**	**Female (241)**
Retinol (<20 micromol/L)	50 (16.8%)	56 (19.0%)	48 (17.6%)	51 (18.5%)	34 (15.7%)	27 (11.2%)
	Grades 1-5 (463)	**Grades 6-8 (129)**	**Grades 1-5 (383)**	**Grades 6-8 (166)**	**Grades 1-5 (320)**	**Grades 6-8 (137)**
Retinol (<20 micromol/L)	84 (18.1%)	22 (17.1%)	77 (20.1%)	22 (13.3%)	48 (15.0%)	13 (9.5%)

Annexes – other

Logical Framework



Ethical Clearance

INDIAN INSTITUTE OF PUBLIC HEALTH BHUBANESWAR

Institutional Ethics Committee (IEC)

IEC No: IIPHB-IEC-2016/012

Protection of Human Subjects
IEC Certification/Declaration of Exemption

1. Request Type	2. Type of Mechanism	3. Name of Funding Agency and, if known, Application or Proposal Identification No :
☒ ORIGINAL ☐ CONTINUATION ☐ EXEMPTION	☒ GRANT ☐ CONTRACT ☐ FELLOWSHIP ☐ COOPERATIVE AGREEMENT ☐ OTHER:	**World Food Programme (WFP)**

4. Title of Application or Activity:	5. **Principal Investigator:**
Assessment of fortification of Mid-day Meal programme in Dhenkanal, Odisha	**Dr. Ambarish Dutta**
	6. Key Personnel at IIPHB & Role : Dr. Subrata Palo, Mr. Srinivas Nallala, (Co-Investigator)

7. Certification of IEC Review

☒ This activity has been reviewed and approved by the IEC in accordance with the Indian Council for Medical Research (ICMR) Guidelines and other GCP recommendations.
by: ☒ Full IEC Review on **19th September 2016** or ☐ Expedited Review on [DD/MONTH/YYYY]

☐ This activity contains multiple projects, some of which have not been reviewed. The IEC has granted aporoval on condition that all projects covered by the Indian Council for Medical Research Guidelines will be reviewed and approved before they are initiated and that appropriate further certification will be submitted.

8. Comments/suggestions: After detailed deliberation the ILC members clear the ethical aspects with following suggestion.
1.Review and produce evidences regarding the impact of fortified rice kernel. **2.** Necessary aporoval should be taken from the Research & Ethics Committee of Department of Health and Family Welfare, Govt. of Odisha, before initiating the study as this involves collection of blood samples from school students. **3.** Prior permission should be taken from department of school and mass education to facilitate the data collection process. **4.** Ensure consent of parents and students before taking blood sample from students. Report of the blood test may be shared with the respective parents. **5.** Clinical assessment or physical test is mandatory before conducting the shuttle test. Precautionary measure should be taken care of.

9. The official signing below certifies that the information provided above is correct and that, as required, future reviews will be performed until study closure and certification will be provided.	10. Name and Address of Institution: Institution Ethics Committee Indian Institute of Public Health, Bhubaneswar 2nd & 3rd Floor, JSS Software Technology Park, E1/1, Infocity Road, Patia, Bhubaneswar-751024
11. Phone No. : +91-0674-6655601 12. Fax No. : +91-06746655614 13. Email : sarit.kumar@phfi.org	
14. Name of Official: **Dr. Sarit Kumar Rout**	15. Title: **Member Secretary**
16. Signature: 30/9/2016	17. Date: **30th September 2016**

INSTITUTIONAL ETHICS COMMITTEE APPROVED CHAIRMAN/MEMBER SECRETARY IIPH- BHUBANESWAR

Government letter

Government of Odisha

Shri Gangadhar Sahoo, OAS
State Nodal Officer (MDM) &
Additional Secretary to Govt.
School & Mass Education Department, Odisha

Mid Day Meal Scheme

No. 497 /SPMU., Dt. 17-04-2019
S&ME (MDM)-745/2016

To

The Country Director,
World Food Programme, India

Sub: Minutes of the sharing meeting of the findings of end-line evaluation for fortification of MDM in Dhenkanal.

Sir,

In inviting a reference to the above cited subject, I am directed to enclose herewith the minutes of the sharing meeting of the findings of end-line evaluation for fortification of MDM in Dhenkanal held on 10.04.2019 at 11.00 a.m under the Chairmanship of Principal Secretary S&ME Deptt..

I request you to take necessary steps and follow up action in the above matter accordingly

Yours faithfully

17/4/19

State Nodal Officer (MDM) &
Additional Secretary to Govt.

Encl: As above

Memo. No. 498 / SPMU. Dt 17-04-2019
Copy with copy of enclosure forwarded to the Dr. G.Bulleya, Deputy Director-cum-Scientist-E, RMRC (ICMR), Bhubaneswar/ Nutrition Specialist, UNICEF, Bhubaneswar /Indian Institute of Public Health (IIPH), Bhubaneswar and All India Institute of Medical Sciences (AIIMS), Bhubaneswar for kind information and necessary action.

17/4/19

State Nodal Officer (MDM) &
Additional Secretary to Govt.

Memo. No. 499 / SPMU. Dt 17-04-2019
Copy with copy of the enclosure forwarded to the State Project Coordinator, World Food Programme for kind information

17/4/19

State Nodal Officer (MDM) &
Additional Secretary to Govt.

List of Acronyms

AIIMS	All India Institute of Medical Sciences
AIRA	Arun Institute of Rural Affairs
CCH	Cook-cum-Helper
CO	Country Office
DAC	Development Assistance Criteria
DID	Difference-in-Difference
DSME	Department of School and Mass Education
FCI	Food Corporation of India
FRK	Fortified Rice Kernel
FSSAI	Food Safety and Standard's Authority of India
GoO	Government of Odisha
HR	Human Resources
IDI	In-depth Interview
IEC	Information Education Communication
IEC	Institutional Ethics Committee
IFA	Iron and Folic Acid
IIPHB	Indian Institute of Public Health, Bhubaneswar
HDPE	High-density polyethylene
MDM	Mid_Day Meal
MND	Micro-nutrient deficiencies
MNP	Micro-nutrient powder
NABL	National Accreditation Testing and Calibration Laboratories
NGO	Non-government organization
NNMB	National Nutrition Monitoring Bureau
OBC	Other Backward Caste
RDA	Recommended Dietary Allowance
SOVA	Social Organization for Voluntary Action

ToR	Terms of Reference
UNICEF	United Nations Children's Fund
WFP	World Food Programme