

**Mid Day School Meals as Social Safety Nets: An evaluation of the Impact of Iron Fortification of Mid Day Meals on the prevalence of Anemia among Children in Odisha, India**

**Introduction:**

Mid Day Meal (MDM) scheme implemented by the Government of India is the largest school-feeding programme in the world designed to boost the enrolment in schools, and simultaneously address the problem of malnutrition among children. The programme provides cooked meal with a minimum of 450 and 700 calories, to all primary and upper primary stage children respectively in government and government-aided schools, and alternative education centers. Serving 120,000,000 children in over 1,265,000 schools, it is the largest such programme in the world. While the strongest impact of the MDM scheme is in increasing the enrollment, use of the scheme for nutritional impact, which is a great potential, is rarely attempted. Since India accounts for the largest number of anemic children in the world and level of anaemia among children increased from 74 percent in NFHS-2 (1998-99) to 79 percent in NFHS-3 (2005-06), therefore there is an urgent need to develop pathways for combating the nutritional deficiencies among children.

Available literature suggests that fortification of school meals is the most efficient and effective route to alleviating micronutrient deficiencies among school-aged children. The state of Odisha, being one of the most nutritionally vulnerable state of India, has substantially high levels of both under-nutrition and anemia among the children. Odisha's poor nutritional status has captured the attention of policy makers. Under MDM the Government of Odisha (GoO) is providing a rice-based hot cooked meal to the children in the age group of 6 to 14 years, attending the schools and fortification of rice provides a great opportunity to reduce micro-nutrient malnutrition. UNWFP in collaboration with GoO is implementing the pilot project of rice fortification in the Gajapati district of the Odisha. Objectives of the project are (a) to reduce the prevalence of anemia among children, (b) increase the awareness regarding the micro-nutrient malnutrition, its consequences and strategies to address the same; (c) build the capacity of state government for procurement of appropriately fortified rice and its quality assurance protocols; and (d) to develop a replicable model for state government based on monitoring and evaluation of the supply chain management of fortified rice provided in the MDM programmes. Under this project 4602 Metric Tonnes of fortified rice would be distributed to 97,790 school children in the age-group of 6-14 years of age.

UNWFP has identified a series of Stakeholders to support the process of rice fortification with iron, its distribution and consumption at the school. Rice kernels fortified with iron, are been blended into the Food Corporation of India (FCI) rice in a ratio of 1 part of fortified rice kernels into 100 parts of rice and then this fortified rice is being used for on-site cooking of supplementary nutrition provided under the MDM programme. This rice ration size provides 62.5 percent Recommended Daily Allowance (RDA) of iron for children of 7-9 years of age. To ensure that fortification of rice is at an adequate level, National Accreditation Board Laboratories (NABL) tests the samples for the purpose of maintaining the quality of fortification. The appropriately fortified rice from the processing unit

is transported by the GoO, on a monthly basis to the schools where it is been used for the preparation of hot-cooked meals served to school children under the MDM programme.

**Objective:**

The main objective of this study is to conduct an evaluation of the UNWFP's rice fortification project on the prevalence of anemia among the school-aged (6-14 years) children in the state of Odisha.

**Methodology:**

For the purpose of the evaluation of this study, a case-control approach has been adopted where programme district (where rice-fortification project has been implemented) is Gajapati and control district is Raygada. Baseline and midline-longitudinal evaluation has been conducted for the purpose of evaluation of the study.

At the beginning of the project, in December 2012 the baseline evaluation was conducted to provide in-depth analyses of the situation in the operational area to support benchmarking of key performance indicators, facilitate operational planning and establish basis for assessment of impact on completion of the project along with insights of lessons learnt to facilitate the replication by the government and other stakeholders. In the baseline, mixed methods were used including quantitative survey, anthropometric and biochemical assessment of school children, facility survey of schools and qualitative survey of school teachers, community leaders and other stake holders. Quantitative survey and bio-medical assessment was conducted of a total sample of 1899 school-aged (6-14 years) children and 1920 children in Gajapati and Rayagada district respectively.

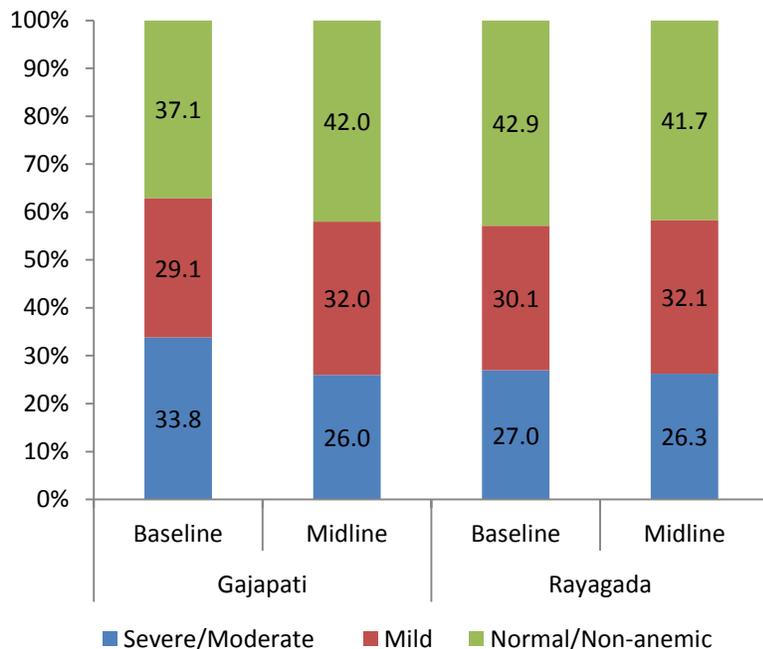
During April, 2014 mid-term assessment has been conducted. For mid-term evaluation a longitudinal survey approach has been adopted, in which a sub-sample of baseline survey has been assessed. During baseline, 32 sample school-children were selected from the 60 sample schools from both the districts, whereas during midline, assuming that some of the baseline samples (school children) would have migrated or dropped-out from the school, a smaller sub-sample of around 10 students were selected from each of the 44 sample schools in Gajapati and 36 schools in Rayagada. A total of 526 children and 419 children were interviewed and bio-medically assessed in Gajapati and Rayagada district respectively.

**Results:**

Mid-term assessment, which has been conducted after an exposure of 1 year of project shows 5 percent decline in the prevalence of anemia in the intervention district contrary to 1.2 percent increase in the control district ( $p < 0.000$ ). Prevalence of severe/moderate anemia declined in both the districts, but magnitude of decline was more in programme than the control district ( $p < 0.000$ ). In programme district incidence of severe/moderate anemia declined by 7.8 percentage points compared with 1.3 percentage points decline in control district. School

holidays, low attendance rate among children and duration of the exposure of children to the fortified MDM acted as limiting factor in the regular consumption of fortified MDM.

**Figure 1: A Pre-Post Intervention Comparative Analysis between Gajapati (Programme) and Rayagada (Control).**



Mean hemoglobin increased in both the groups, but the magnitude of change is much more in programme than the control district ( $p < 0.000$ ).

District	Study	Mean	Paired Difference			t	Sig. (2-tailed)
			Mean	95% CI of the Difference			
				Lower	Upper		
Gajapati (Programme)	Baseline	11.61	0.27	0.24917	0.29026	25.812	0.000
	Midline	11.88					
Rayagada (Control)	Baseline	11.88	.04281	0.04003	0.0456	30.224	0.000
	Midline	11.92					

Around 9 in every ten students have reported that the taste of rice served in MDM is same/improved since the inception of the project in programme district, showing high level acceptability among the children.

Multivariate regression analysis has been conducted to analyze the net-effect of consumption of iron-fortified mid-day meal, iron supplementation, de-worming and morbidity profile on the anemia status of the school children. Multivariate results show that consumption of iron-fortified rice meal has a significant positive impact in reducing

the prevalence of anemia. Administration of iron supplementation, de-worming and morbidity profile of children do not have significant impact on the prevalence of anemia.

**Conclusions:**

In summary, iron fortification of mid-day meal was effective in significantly reducing the prevalence of anemia among school children. The results also shows high level of acceptability among children as more than 85% of students reported taste of the MDM as same/improved. Fortification of school feeding programme can therefore sever as a suitable vehicle for addressing micronutrient malnutrition among children.

**Recommendations:**

Keeping in mind that the 'iron fortification of mid-day meal' pilot-project has significantly improved the nutritional status of children and shown high level of acceptability among various stakeholders, results of this model can be generalized to children living under similar socio-economic conditions in Odisha and other states of India. Iron fortification of mid-day meal has advantages of being acceptable by various stakeholders especially children, sustainable, and lower implementation cost, because it uses the infrastructure of an already existing scheme of government of India. Therefore, based on the findings of this study it is being recommended that the model should be scaled-up in the remaining districts of the state of Odisha and other states of India.