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Economic status of households & Protein and calorie intake among children from supplementary nutrition programme in Odisha

Jagannath Behera^{1*}

Abstract

This paper attempts to find out “whether the supplementary nutrition scheme is effective to reduce protein and energy deficiency among children belonging to different economic groups”. The level of child under-nourishment is larger in India and mostly poor states constitute large part of it, despite the fact that these states are “self-sufficient” in food production. Even if Odisha is self sufficient in staple food production, the prevalence of ‘protein and energy deficiency’ among children remains a challenge. To assess the effectiveness of supplementary food towards protein and energy deficiency, a cross-sectional primary study was carried out in the states of Odisha. Both bivariate and multivariate analyses have been carried out for this paper. The result reveals that, the more proportion of poor children access supplementary food as compared to children of better-off families in rural areas of Odisha. The unmet need for protein is fulfilled from the supplementary food. However, the supplementary food is not able to fulfil the total unmet need for calorie among poor children. Further, the result also shows, though the poor children are going regularly to Anganwadi centers, but their access to calorie is less than 50% of the norm as mentioned in the supplementary nutrition guideline. Thus a regular monitoring and evaluation system need to be carried out at the local level to check the programme functioning and its efficiency.

Keywords

Children, Economic status, Nutrition, Protein energy deficiency, Supplementary food

* Corresponding Author

¹ Assistant Professor, Department of Population Studies, Fakir Mohan University, Balasore, Odisha, India. Email: jagannathjnu08@gmail.com. Phone No- 9868641836, ORCID Id: [0000-0002-9054-2449](https://orcid.org/0000-0002-9054-2449)

Background

Ministry of Women and Child Development is implementing Supplementary Nutrition Programme (SNP) through Integrated Child Development Services (ICDS) to eradicate child malnutrition focusing on daily protein and energy intake. It is believed that, if children belonging to poor households will take supplementary food provided by ICDS centres along with home food, then the nutritional requirement as per the Recommended Dietary Allowance (RDA) norm will be full filled. Therefore, this study tried to explore the effect of supplementary food to eradicate protein and calorie deficiency among children belonging to different economic groups. Here we use calorie intake as measure for the nutritional level of children, as most of the children in developing countries depend of staple food particularly consumption of cereals. So, the growth of the children is mainly depending on calorie intake along with other nutrients (Alur et al., 2020). World Health organization confirms that there is a requirement of supplementary nutrition for management of moderate and acute malnutrition through improving calorie and protein intake (WHO, 2012).

Protein Energy Malnutrition (PEM) is a common nutritional problem worldwide and can be seen in both developed and developing countries. The number of cases of children with PEM is declining globally but also varies by region; for example, it continues to decline in Asia but is increasing in Africa. PEM poses a threat to public health, especially in children by impairing the immune response, which can lead to death (Crichton et al., 2019). PEM still has a relatively serious disease burden in the world, especially in lower income countries. Consequently, more attention should be

paid to developing early prevention and treatment measures for PEM in developing countries, such as safeguarding the food supply, eliminating hunger, and improving overall nutritional status (Xu Zhang et al., 2022). Further, improving mother's calorie intake during pregnancy is required for lowering the risk of child malnutrition. Mother's calorie intake has also direct relation with weight of the child and malnutrition (Khammarnia et al., 2024). Child patients generally lack the amino acids which will affect the normal growth of cells and collectives. For example, the lack of amino acids will cause the main growth regulation of cells, Mechanical, to synthesize and inhibit the growth of cells and the body, which leads to slow development and immune function defects (Nova et al., 2002). PEM causes 56% of children's deaths in developing countries (Walker, 1990).

Protein Energy Malnutrition (PEM) is mainly affects children under 5 mostly belonging to the poor underprivileged communities. Childhood malnutrition is associated with growth retardation and wasting are accompanied with higher susceptibility to different diseases, increased risk of infections, and increased mortality (Azimi et al., 2000). To address the food gap particularly calorie and protein deficiency, the supplementary food schemes is being implemented by MoWCD, Govt. of India. So, the study is assessing the effect of supplementary food towards protein and calorie intake among children belonging to different economic groups.

Methodology

Data Source

This study has been based on both primary and secondary source of data. The study has been given more focus on primary source of

data. The net effect of different socio-economic factors and service of ICDS has been assessed from this secondary as well as primary source. For collecting primary data, a field survey has been conducted. The survey has been based on following themes.

1. Household survey
2. FGDs with targeted or eligible pregnant women and lactating mother and mother having children below six years

Besides interview, observation method has been used for collecting information pertaining to delivery of services at Anganwadi level. The available reports, records, guidelines and other documents at local level formed additional source of information.

As part of secondary data National Family Health Surveys data has been used for this research paper.

Geographic coverage of field survey

The study was carried out in the state of Odisha based on the high child under-nutrition and under-five mortality rates. Two backward districts 'Mayurbhanj from north Odisha with highest concentration of population in plain area and Koraput from south Odisha with highest concentration of population in hilly area' have been selected for this study.

Study design and data management

The cross-sectional study design has been adopted for this study. The data collected through primary survey (unit level data) was entered and analysed in the statistical package for social science (SPSS) software. Qualitative data was analysed through content analysis. The Unit level data in National Family Health Surveys (NFHS) was also analysed for this study purpose.

Sample Selection of primary/field survey data

Cluster sampling method was carried out for this study. Two blocks were selected from Mayurbhanj and Koraput districts. Koraput district was selected based on highest proportion of population living in hilly area. From each district, six villages were selected from each block. Out of six villages four large/medium villages were selected from villages having more than 300 population and rest two villages were selected from small villages having population within 100 to 300. For this study approximately 280 mothers (mothers having children three to six years) were surveyed.

In the survey, questions were asked to the mothers about consumption of food items (cereals, pulses, vegetables, milk, and other items) per day/ week/ month by their children. Mothers generally reported consumption of cereals and vegetables per day; pulses, milk, egg per week; and consumption of other items like fruits, fish and meat per month. Further, the consumption of different food items in the last day were asked. Measuring cups were used for the field survey. Mean daily food intake of cereals, pulses, green leafy vegetables, other vegetables, roots and tubers, milk products, fats and oils, sugar and fruits were assessed. Then protein and calorie value of different items are calculated on the basis of nutritive value of Indian foods as provided in the standard text 'Nutritive Value of Indian Foods' which was published by National Institute of Nutrition (NIN, 2017 & NIN, 2024). To calculate the protein and calorie value, SPSS software is being used. The calorie value of each food item (per 100g) is multiplied with the food quantity a child has consumed in a day. Then, all values

of different items were added to get total calorie intake in a day. Similarly, the protein value is also calculated.

Methods for Analysis

Bivariate Analysis

Association between dependent and independent variables are examined with the help of Cross-Tabulation.

Multiple Classification Analysis

The relationship between several predictor variables and a dependent variable within the context of an additive model can be examined through multiple classification analysis (MCA) technique. Symbolically,

$$Y_{ijk} = \mu + a_i + b_j + \dots + e_{ijk}$$

This analysis is used to show the differentials in mean quantity of protein and calorie intake by different social and economic groups of beneficiaries of ICDS after controlling for other predictor factors.

Results

The survey result reveals that, children belonging to different economic status are accessing supplementary food provided by the Anganwadi Centres. Along with the Anganwadi food, children are taking food at the home. Here the nutritive value of total food consume in a day is calculated. Field data shows energy intake is not adequate among children. Overall, average intake of energy/ calorie is 1083Kcal (Table-1). Average daily calorie intake among children is lower than the Recommended Dietary Allowance (RDA) norm of 1350kcal. On an average, a child is getting 217Kcal of energy from the supplementary food and 866Kcal of energy from the home food. This clearly indicates that children are not getting the ICDS norm of 500Kcal of energy per day from the supplementary food. If the supplementary food is provided adequately as per the ICDS norm, then the calorie intake will improve among the children.

Table1 Average calorie intake among children belonging to different economic groups

Economic Groups	Total energy (Kcal/d) intake	Energy (Kcal/d) from home food	Energy (Kcal/d) from supplementary food	Energy deficiency (Kcal/d) as per RDA norm	% of supplementary energy (Kcal/d) intake to total energy intake
Low SLI	1022	783	219	318	21
Medium SLI	1149	784	224	373	19
High SLI	1416	926	170	203	12
Total	1083	866	217	267	20

Note: RDA norm (1350 Kcal energy/day); SLI: Standard of Living Index

However, protein intake among children is showing better picture as compared to calorie intake. Total intake of protein is 31.5g per day (Table-2). The average daily protein intake is adequate among children belonging to different economic groups.

Out of total protein intake, a child is getting 7.8g of protein from supplementary food and 23.7g of protein from home food. Across all economic groups, protein intake is higher than the RDA norm.

Thus, the result reveals that, there is no protein shortage among children. However, there is a shortage of average daily energy

intake among children and it is estimated at around 267Kcal. Children belonging to high standard of living are getting adequate

calorie. However, children belonging to low and medium standard of living are not getting adequate calorie/ energy.

Table 2 Average protein intake among children belonging to different economic groups

Economic Groups	Total Protein (gm/d) intake	Protein (gm/d) from home food	Protein (gm/d) from supplementary food	Protein deficiency (g/d) as per RDA norm	% of supplementary protein intake to total protein intake
Low SLI	29.7	21.9	7.8	0	26
Medium SLI	33.8	25.7	8.1	0	24
High SLI	39.2	32.8	6.4	0	16
Total	31.5	23.7	7.8	0	25

Note: RDA norm (20.1g protein/day)

A multivariate analysis has been carried out to see the difference in energy intake among children belonging to different socio-economic groups after controlling other background factors. The result shows, the children belonging to land less households are taking fewer calories as compared those having some land. Those children belonging to landless households they are taking 110Kcal of less energy as compared to those are having land (Table-3). Even, after controlling the effect of other factors, there is difference in calorie intake, but it is minimal. Further, those children who are belonging to households having sufficient food production are getting 1229Kcal of energy, whereas children belonging to households without sufficient food production are getting 1049Kcal of energy. However, the difference is narrowed down when we control the effect of other background factors.

There is also social group disparity in nutrition intake. Children belonging to scheduled tribe are getting 959Kcal of energy per day while it is 1068Kcal among children belonging to scheduled caste, 1135Kcal

among children belonging to other backward class and 1273Kcal among children belonging to other caste groups. Thus, it is concluded that there is differences in calorie intake among children belonging to different socio-economic groups. It indicates the exclusion in multiple sphere and the hidden factors need to be addressed to bring equality in consumption of calorie from childhood.

Qualitative data findings

This study is also tried to find out the qualitative data from the beneficiaries about 'Why supplementary food is not effective in reducing the under-nutrition among children in rural and tribal areas. The findings show, there is absence of home visits by the AWW for nutrition education. As per the ICDS norms, all Anganwadi workers should visit households for the outreach service of nutrition education and other information. Further, observation method highlights 'children are taking food at the Anganwadi centre at the time of lunch and they skip their lunch at home. So, supplementary food becomes complementary.'

Table 3 Multiple Classification Analysis of calorie (Kcal) intake among children by background variables

Background Variables	N	Eta	Beta	Unadjusted Mean	Adjusted Mean
Land holding		0.167	0.023		
Having land	138			1139	1090
No Land	147			1029	1075
Household members		0.013	0.011		
Less than 4 members	127			1077	1078
5 or more members	158			1086	1085
Mother's education		0.229	0.096		
No education	101			1013	1046
Elementary	98			1054	1082
Secondary and above	86			1195	1125
Food Production		0.210	0.089		
Yes	52			1229	1144
No	233			1049	1068
Caste		0.357	0.336		
SC	88			1032	1068
ST	94			973	959
OBC	50			1147	1135
Others	53			1296	1273
Religion		0.090	0.231		
Hindu	256			1072	1057
Non-Hindu	29			1170	1309
R= 0.428		R ² = 0.183		N=285	

Note: Household income is used as covariate

Technically, the Anganwadi food should be additional/ supplementary to home food, so that children will get adequate nutrition particularly protein and energy according to Recommended Dietary Allowance (RDA) norm.

The qualitative survey data from the field reflects that children belonging to poor households are going to Anganwadi centres

at morning and they are not getting morning snacks. Further the take home ration is distributed among family members. Moreover, there are malpractices in distribution of food at the Anganwadi centres. It is observed that, as per the current provision, one egg needs to be provided for a child, but in actual practice half egg is provided in many Anganwadi Centres. The

Anganwadi worker highlights the sanction amount is less than the actual price of the egg. They demand that each year the sanction amount of money need to be increased as there is inflation in food items. There should be a policy for supplementary food, which need to be increased as per the inflation rate of the food items being consumed at the Anganwadi centres.

Acceptance of supplementary food

The modified supplementary nutrition for take home ration is not accepted by the targeted beneficiaries. There is huge loss of money due to non-user of the supplementary food. This money can be saved if there will be pilot testing of the newly designed food for the targeted beneficiaries. Pilot testing of the new food model in few villages will help the administrator to know whether the proposed new food model will be accepted by the community. Further, there is opinion that the food should be packed in the sealed cover (preferably plastic jar). The local people complain about indigestion/ acidity due to consumption of some supplementary food items. Most of the beneficiaries don't know about the quantity of food government provide. There should be proper awareness programme among all beneficiaries about the quantity of supplementary food items. The management of food supply and distribution need involvement of all beneficiaries in the village, which will help better functioning of the supplementary nutrition programme.

The findings of this research support the findings of Sukhatme in 1960s to 70s (1969, 1977, 1978). He finds Indians are getting adequate protein from the diet but there is huge shortage of calorie. But some other researchers and organizations finds Indian diet does not have adequate protein and

calorie, so they try to high light protein rich food is required for them. However, the study findings support the finding of Sukhatme, which strongly believes Indian children have high energy deficiency with very minimal protein deficiency across all economic groups. Therefore, the supplementary food policy should focus on calorie requirement of the children (Faizan & Rouster, 2023).

Conclusion

The overall result reflects that, around one fifth of the calorie intake par day is received from the supplementary food among the children. However, there is huge shortage of calorie as per the recommended norm among many children even after receiving supplementary food across all economic groups. The average quantity of protein is 8g per day and energy is 217 kcal per day received by the children from the supplementary food. Thus, presence of ICDS programme contributing half of the protein and energy intake among children as compared to the actual norm mentioned in the supplementary nutrition guidelines.

Children belonging to poor households have low unmet need of protein from home food according to their requirement and it met from the supplementary nutrition. But huge shortage of calorie cannot be filled from the supplementary nutrition. Children should take adequate calorie, so that the proteins in the diet are most economically used for the formation of body proteins to fulfil other functions essential to life.

The result shows that, children belonging to low and medium standard of living households access supplementary food and there is a partial positive impact of SNP in children's nutritional intake. However, there is a need for further monitoring to enhance

the impact for calorie intake as per RDA norm among children belonging to all economic groups with special emphasis on deprived poor. There are some limitations of this study. Here, only protein and calorie intake are being taken for the measurement of nutritional intake among children. However, future research needs to be carried out to understand 'how protein and energy intake play a vital role for the height and weight of the children'.

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