

## Food Quality of Rural Poor in India: A Case Study of Orissa and Bihar

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**ABSTRACT:** India is home to 22 per cent of the world's poor, but the majority is in rural area. Such a high incidence of poverty is a matter of concern in view of the fact that food security and its quality has been one of the major concerns for rural poor. Agricultural wage earners, small and marginal farmers and casual workers engaged in non-agricultural activities, constitute the bulk of the rural poor. Small land holdings and their low productivity are the cause of poverty among households dependent on land-based activities for their livelihood. Even after six decades of independence and two decades of economic liberalization, it remains the bitter truth. This study assumes greater significance, because, majority of the rural poor still depend on low quality of food grain leading to poor health and malnutrition. An effective public distribution system with quality of food grain would help in reducing the government spending on public health problems. This study could be useful not only to India, but to many other economies that are on the threshold of transition; where majority of the population, still lives in the rural areas, and are predominantly dependent on agriculture for their livelihood. This study was undertaken with the objective of analyzing the socio-economic conditions of rural poor of India with respect to their quality of food grain consumption. The study conducts a questionnaire based survey on demographic, economic, and perceptible parameters on quality of food; using ordinal logit model to identify variables useful for the study. The respondents with larger income have more chances of consuming good quality of food. Interestingly, it is also found that most of the poorest of the poor respondents spend high share of their income on food consumption.

**KEYWORDS:** Ordinal Regression Model; Food Quality; Rural Poor, Below Poverty Line; Bihar; Orissa; India.

### 1 INTRODUCTION

The word 'food' refers to the chemical substances taken into the body in order to keep the body in a healthy and active condition. The body requires food for growth, repair and replacement of its worn-out tissues. Hence, food has to provide the required raw material, energy and other regulating substances, like vitamins and minerals, for the smooth functioning of the body, besides meeting the calorific requirements like carbohydrates, proteins, fats, etc [1]. Therefore, food is a basic human need and the major source of nutrients needed for human existence. The problem of adequate nutrition is regarded as a major strategic issue that attracts intensive attention at all levels. Its importance stems from important political and socio-economic dimensions [2].

Food insecurity includes problems with the quantity and quality of available food, uncertainty of food supply and food insecurity experiences, which include running out of food and purchasing power to buy food, skipping meals and hunger due to financial constraints. Food availability and access is restricted due to high food prices and limited resources, which result in inadequate quantity and poor quality of diet in households [3]. The rise in food prices not only has an adverse impact on the quantity and quality of food consumption, but it also forces the poor to reduce their expenditure on basic needs and investments in human assets, such as education and health and to sell productive assets with negative effects on their current and future livelihoods [4]. Poor dietary quality or diversity is a significant contributing factor of under nutrition, specifically micronutrient deficiencies.

In the past few decades, the food grain situation in India has undergone substantial change. From a position of growing shortages in the mid 1960s, India became able in the 1980's to produce enough to meet its current demand and at the same time generate a small surplus. At present India is the world's second largest producer of food next to China [5]. However, the concern is about several underlying features of production and consumption that may make the present position difficult to sustain over the years, but India does have the capacity to double the food grains produce in the next ten years. One of the major features of production and consumption is the growth in population and decrease in agricultural land. Another concern is the distribution of food grains among the rich and poor population especially among rural area [6].

India is the second most populous country in the world, with over 1.01 billion people out of which more than seventy percent live in rural areas [7]. The number of poor people in India, according to the country's Eleventh National Development Plan, amounts to more than 300 million. The country has been successful in reducing the proportion of poor people from about 55 per cent in 1973 to about 27 per cent in 2004 [8]. But almost one third of the country's population of more than 1.1 billion continues to live below the poverty line, and a large proportion of poor people live in rural areas. Poverty remains a chronic condition for almost 30 per cent of India's rural population [9]. The incidence of rural poverty has declined somewhat over the past three decades as a result of rural to urban migration and poverty alleviation program by the government [10].

In India, poverty is defined on the basis of a minimum per capita daily nutritional requirement of 2,100 calories in urban areas and 2,400 calories in rural areas [11]. These figures are based on the recommendations submitted in 1979 by the Government of India Task Force on Minimum Needs and Effective Consumption Demand. According to the report of the Task Force, the poverty line was defined as per capita monthly expenditure of Rs 49.09 in rural areas and Rs 56.64 in urban areas at 1973/74 prices, corresponding to per capita daily calorie requirements in rural and urban areas. The definition covers expenditures on food and non-food items (such as fuel, clothing, housing, health, education and social services) and ensures adequacy of calorie consumption. On the map of poverty in India, the poorest areas are in parts of Rajasthan, Madhya Pradesh, Uttar Pradesh, Bihar, Jharkhand, Orissa, Chhattisgarh and West Bengal [12].

Therefore the objective of this paper is to discuss the factors guiding rural poor household choices of food quality [13]. This is crucial for policies to combat under nutrition, specifically micronutrient deficiencies among rural poor. As there is economic progression in a country, there is likely to be shift towards better quality of food. Understanding this "transition in food quality", as it has come to be called, is therefore of prime importance for designing policy interventions. It is also important for food security planners who must anticipate future demand for better quality of food, as well as for those concerned with the longer-term health consequences of food intake. Here we undertake the first analysis of a nationally representative survey of rural poor households in India particularly Orissa and Bihar to describe patterns of rural food consumption, in the context of the conceptual framework of the quality of food transition. In the next section we describe the dataset. Following that, we present a descriptive analysis, focusing on types of rural poor and their quality of food intake; by income and expenditure, as well as a multi ordinal analysis of the determinants of food intake. Finally, we provide a discussion and summarize conclusions.

## **2 METHODOLOGY FOR SAMPLE SELECTION AND DATA COLLECTION**

The data used in this paper was collected from primary sources based on fieldwork conducted during 2001-2002. The study covered two states of India. In the first stage of the multi-stage sampling used, two districts of each state were chosen. The districts were selected through purposive sampling to ensure that these districts were adequately representative of the state with respect to geographical distribution and special conditions of the state, if any. A total of four districts were chosen at the end of the first stage. Four blocks were identified in district in the second stage through circular systematic sampling using Directory of Blocks as the frame of reference. From each of the selected block ten gram panchayats was chosen using convenience sampling. A gram panchayat is the lowest administrative unit in India. In some cases a gram panchayat may consist of only one village, while in other, it may have a number of villages, hamlets or padas. The selection of villages/gram panchayats was done carefully so that these would properly represent the blocks. Individual respondents were the final sampling units. From each of the selected village or gram panchayat, eighteen respondents were selected randomly. Special care was taken to ensure that out of eighteen fifteen respondents were covered under officially declared Below Poverty Line (BPL) category. Rest three non official BPL respondents constituted the control group. Finally, the schedule for respondents filled up for each of them. A total of 2640 were covered in the entire study.

## **3 FOOD INTAKE BY RURAL POOR OF ORISSA AND BIHAR IN INDIA**

Poverty in India is widespread, with the nation estimated to have a one third of the world's poor. Out of 1.01 billion populations, 300 million are still below the poverty line, according to the country's Eleventh National Development Plan, a

large proportion of India's poor live in rural areas. Within rural areas, poverty is concentrated in five out of the 17 major (undivided) states, which account for nearly two thirds of poor people in the country. These states are: Bihar, Orissa, Uttar Pradesh, Madhya Pradesh, and Maharashtra. Among the poor states, Bihar and Orissa are at the bottom level amounts to 20.47 million and 8.4 million poor people respectively [14].

In India, cereals formed the largest component of the diet [15]. Consumption of pulses was very low; this may be due to increasing prices of pulses. Consumption of milk, fruits and vegetables and animal food continue to be quite low. Consumption of all foodstuffs increases with increasing income [16]. This is especially true for sugar, oil, and animal products. With the availability of wheat and rice through public distribution system the poorer segment of the population have changed over to rice and wheat as staple cereals [17], [18]. Coarse cereals such as bajra, ragi, maize and jawar, which are rich in micronutrients and minerals, are no longer being consumed in substantial quantity by the rural poor in rural Orissa and Bihar with higher poverty rates and low per capita income, as cereals formed the major food item. Since cereal consumption and intake of energy is high but under nutrition rates are also high. This is perhaps due to high-energy expenditure among poor in these states among manual labour [19].

Total number of households residing in rural India was 138.3 million, out of which, the share of Orissa was five percent i.e. 6.8 million and that of Bihar nine percent i.e. 12.7 million [7]. A total number of 2880 respondents, with 1440 respondents each from states of Orissa and Bihar, spread across 160 Gram Panchayat of four districts were studied. Out of 2880 respondents, 2400 respondents have Below Poverty Line (BPL) card and the rest 480 did not have the BPL card due to various reasons such as lack of own house, awareness level, etc. An analysis of table 1 reveals that the quality of food intake of rural poor in Orissa and Bihar. The quality of food is categorised into three parts i.e. poor, medium and good according to the nutrients in the food taken by the rural poor. The households consumed only cereals come under the first category. However, along with cereals, pulses consumption belongs to second category. Instead of cereals and pulses, the consumption of milk, fruits and vegetables or animal food continue to be considered as good quality of food.

Twenty five percent of the BPL listed respondents consumed good quality of food in each state. However, the respondents do not have BPL card consumed good quality of food is found to be 5 and 10 percent in Bihar and Orissa respectively. The medium quality of food is taken by majority of BPL listed respondents and the poor quality is claimed by 30 percent only in Orissa. But in case of Bihar, majority of BPL listed respondents consumed poor quality of food followed by medium quality. On the other hand, the poor quality of food is taken by the respondents do not have BPL card is 74 percent in Bihar and 48 percent in Orissa. From the above discussions it is observed that the BPL respondent households have taken better quality of food than the respondent households do not BPL cards. This may be due to the assistance provided by the government to BPL households in India. Finally, the quality of food taken by the respondents as a whole is found to be better in Orissa than Bihar.

TABLE 1. Quality of Food Intake by Rural Respondent Households

Quality of Food	Orissa <sup>a</sup>		Bihar <sup>b</sup>	
	BPL Listed	BPL not Listed	BPL Listed	BPL not Listed
Good	306	27	292	10
Medium	543	98	445	53
Poor	350	115	462	177

Source: Field survey conducted in <sup>a</sup>2001 and <sup>b</sup>2002

The importance of income and expenditure as a factor affecting quality of food taken is however, apparent even in the case where the switch to good quality of food is not complete [20]. Table 2 reveals that the average income and expenditure per annum among the BPL household respondents in Orissa and Bihar is a little over Rs, 20,000; with Bihar scoring marginally over Orissa. The difference in income levels could also be due to higher average earning member of family in Bihar or due to the time lag. The income and expenditure of the respondents do not have BPL card is just 60 percent of that of the respondents having BPL card in both the states. The higher income and expenditure of respondents having BPL card, could be the main reason of assistance provided by the government through various developmental scheme. On the other hand, the per capita income and expenditure of the respondents in Orissa is found to be higher than Bihar.

TABLE 2. Socioeconomic Characteristics of Orissa and Bihar

Socioeconomic Parameters	Orissa <sup>a</sup>		Bihar <sup>b</sup>	
	BPL Listed	BPL not Listed	BPL Listed	BPL not Listed
Average Annual Income (Rupees)	22324	11857	23181	12396
No. of Respondents Annual Income ≤ Rs. 20000	765	219	570	216
No. of Respondents Annual Income > Rs. 20000	434	21	630	25
Average Annual Expenditure (Rupees)	22953	13009	23720	13370
Average Annual Expenditure on Food (Rs.)	19958	11657	19706	11899
Average Household Size (No)	6	5	7	5
Average Earning Household Members (No)	1.7	1.2	1.6	1.1

Source: Field survey conducted in <sup>a</sup>2001 and <sup>b</sup>2002

#### 4 DEVELOPMENT OF MODEL

The formulation of ordinal regression models are the special cases of the general linear model [21]. The binary logistic regression model estimates a set of regression coefficients that predict the probability of the outcome of interest. The logistic model can be written as a function of the probabilities, which results in a linear combination of parameters that is

$$\ln\left(\frac{\text{prob}(\text{event})}{1 - \text{prob}(\text{event})}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_i X_i$$

It is the log of an odd that an event occurs. By incorporating the ordinal nature of a dependent variable in the binary model, the ordinal logistic regression model has been developed. Instead of considering the probability of an individual event, consideration of the probability of that specific event and all events that are ordered before it has been taken. In ordinal logistic regression, the event of interest is observing the particular quality of food or less.

All of the odds are of the form:  $\theta_j = \text{prob}(\text{score} \leq j) / \text{prob}(\text{score} > j)$

The function can be written as  $\theta_j = \text{prob}(\text{score} \leq j) / (1 - \text{prob}(\text{score} \leq j))$ ,

Since the probability of a score greater than  $j$  is  $1 - \text{probability of score less than or equal to } j$ .

The quality of food taken by rural people are poor, medium and good assigned by a particular score i.e. 1, 2 and 3 respectively. Therefore modelling the following odds are

$$\theta_1 = \text{prob}(\text{poor}) / \text{prob}(\text{greater than poor})$$

$$\theta_2 = \text{prob}(\text{poor or medium}) / \text{prob}(\text{greater than medium})$$

The last category i.e. good does not have an odds associated with it since the probability of scoring upto and including the last score is 1.

Therefore the ordinal logistic model for a single independent variables is then

$$\ln(\theta_j) = \alpha_j - \beta X, \text{ where } j \text{ goes from } 1 \text{ to the number of categories minus } 1.$$

Each logit has its own  $\alpha_j$  term but the same  $\beta$ s coefficient. That means that the effect of the independent variable is the same for different logit functions. The effect of a unit change in  $X$  on the log odds ratio of the event occurring is given by the corresponding  $\beta$  coefficient. Taking the log odds ratio into consideration is very useful since the interpretation of the coefficient is immediate. The independent variable in the model is income. Using this variable, this paper tries to find the probability of quality of food intake by rural poor, at a given significance level. The switch to good quality of food has been made, in part, a function of income; because of the fact that we are dealing with spending on good food which increases the household cost; and that the capacity to spend has direct relationship with income [22]. Further, it is hypothesized that persons with larger income will spend more, *ceteris paribus*. As logit model is not linear in parameters, they are estimated by using maximum likelihood techniques. The maximum likelihood estimator is consistent and normally distributed in large samples, so that  $t$ -statistics and confidence intervals for the coefficients can be constructed in the usual way.

## 5 ANALYSIS OF MODEL OUTPUT

Table 3 presents the parameter estimates of the logit regression of the ordinal dependent variable (Food Quality) for a selection of an independent variable (Income) is coded as 1, if the respondent's income is less than or equal to Rs. 20,000, otherwise 2. The estimation, using the SPSS software package, was performed on the dataset consisting of 2879 observations (respondents). From case processing summary, it is found that, 38, 40 and 22 percent of respondents are consuming poor, medium and good quality of food respectively. On the other hand 61.5 percent of the respondents having yearly income below Rs. 20,000 but only 38.5 percent of the respondents have income more than Rs. 20,000. Since there is no missing data, almost all observations were considered for the purpose of analysis.

The coefficient for respondent having income less than or equal to Rs. 20,000 is found to be -3.821, however the respondent having income more than Rs. 20,000 is the reference category and has a coefficient of 0. The coefficient for those whose household having less than Rs. 20,000 yearly income is negative, this implies it is associated with poorer food quality. The ratio of the odds for lower to higher food quality for those having less than Rs. 20,000 yearly income and those more than Rs. 20,000 yearly income is found to be 45.65 stays the same for over all quality of food. Based on the small observed significance level, the null hypothesis that it is zero is rejected, hence there appears to be a relationship between household income and quality of food consumed by the respondent. The quality of food is increased with increasing the income level.

**TABLE 3. Parameter Estimates**

		Estimate	Std. Error	Wald	df	Sig.
Threshold	[Food = 1]	-3.382	0.12	769.1	1	0
	[Food = 2]	-0.114	0.06	3.638	1	0.05
Location	[Income=1]	-3.821	0.13	894.9	1	0
	[Income=2]	0 <sup>a</sup>	.	.	0	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

The chance of consuming good quality of food is highest i.e. 0.53 by the respondent having yearly income more than Rs.20,000, followed by medium quality (0.44) then poor quality (0.03). On the other hand, the chance of consuming poor quality of food is highest i.e. 0.61 by the respondent having yearly income less than or equal to Rs.20,000, followed by medium quality (0.37) then good quality (0.02).

**TABLE 4. Test of Parallel Lines<sup>a</sup>**

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	38.936			
General	26.033	12.903	1	0

Null hypothesis states that location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit

The relationships between the income and the logits are the same for all the logits. The result of the test of parallelism in Table 4 which indicates that the null hypothesis is rejected i.e. the link function selected is correct for the data or that the relationships between the income and logits are the same for all logits. From the analysis of all the logits given above, it can be observed that rise in income level has positive impact in determining the likelihood of switching over to good quality of food. However, non-availability of good quality food grain seems to be the major detrimental factor, in the switchover decision in few cases. Hence, the families having relatively higher income have a very high probability of consuming medium and good quality of food grain.

## 6 CONCLUSION

Hike in the food prices has impacted the pockets of rich and poor equally. The cost of food grain of the middle income group is pinching the pockets; and the increase in household budget is threatening even the mere existence of the poor person [23]. According to some of the existing studies, the food security is the major concern in the world today. In the prevailing circumstances, it becomes essential to look for quality of food consumed by the poor rural household.

This study is undertaken with the objective of analyzing the socio-economic conditions of rural poor in India with respect to their quality of food consumption. The study conducts a questionnaire based survey on demographic, economic, and perceptible parameters on quality of food; using ordinal logit model to identify variables useful for the study. This study assumes greater significance, because, majority of the rural poor are still dependent on poor quality of food. To make this happen, the government should have an efficient distribution system for food grain. This study could be useful not only to India, but to many other economies that are on the threshold of transition; where majority of its population is still living in the rural areas, and are predominantly dependent on agriculture for their livelihood.

Data collected through the field study and subsequent data analysis, revealed that nearly 40 percent of rural poor in India are consuming poor and medium quality of food, but only 20 percent are taking good quality of food. About sixty one percent of the poor household respondents that took the survey have annual income less than Rs. 20,000; rest thirty nine percent having annual income more than Rs. 20, 000. This implies some of the respondents whose annual income is less than Rs. 20,000 is also consuming medium quality food. The factors emerging out of the analysis is that the income of the respondent has great influence in the switchover to good quality of food.

Providing the good quality of food could also act as a great boost to an emerging economy such as India because, at every world forum, food security concerns form part of core discussions. Immense pressure is mounted on India and other emerging economies to have control over malnutrition. Making good quality of food easily available will be beneficial, not only for the development, but will also help in malnutrition. Government of India should actively consider providing incentives, duty cuts, etc., and encourage supplying improved quality of food grain to the rural poor. By providing good quality of food, government will be in a position to reduce the rural health hazards, which would ultimately help in reducing the government spending on public health; as also improving the living conditions of the rural poor. This would result in a win-win situation, both at the micro as well as macro levels.

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