

A Study of The Role of Income, Consumption Patterns, and Time in Shaping Food Expenditure in India

ABSTRACT

Aims: we sought to determine the key factors affecting per capita monthly expenditure on food across Indian states over time.

Study design: This is a quantitative, cross-sectional study that uses existing data from National Sample Survey (NSS), 61st, 66th and 68th rounds.

Methodology: We compiled datasets on 10 independent variables believed to influence monthly per capita expenditure (MPCE) across 17 Indian states over three distinct time periods (2004-05, 2009-10, 2011-12). These variables include household size, dependency ratio, milk availability, Gross State Domestic Product (GSDP), literacy rate, a time dummy variable, poverty rate, and consumption patterns of cereals, pulses, and non-vegetarian food.

Results: The analysis of 51 observations identified key factors influencing household food consumption expenditure. milk consumption showed a positive correlation with expenditure, yielding a coefficient of 1.668 ($p = 0.001$). Similarly, expenditure on non-vegetarian food demonstrated a significant positive relationship, with a coefficient of 3.644 ($p = 0.001$). In contrast, poverty levels exhibited a near-significant negative association, indicated by a coefficient of -15.03 ($p = 0.058$), reflecting lower spending among poorer households. The dummy variable for time factor, showed a significant coefficient of 871.32 ($p = 2.26E-06$), indicating that changes over time are associated with increased food expenditure Overall, the model accounted for 90.9% of the variance in food consumption expenditure

Conclusion: Higher per capita milk availability leads to increased overall food spending, while the time factor indicates a trend of rising expenditures, likely linked to changing consumption patterns and incomes. A negative correlation between poverty and food expenditure highlights how limited

purchasing power restricts access to diverse food options. The analysis also shows that spending on protein-rich foods, such as eggs and meat, positively affects overall food expenditure.

Keywords: food expenditure, socio economic factors, temporal factors, India,

1. INTRODUCTION

India's diverse population and rapid economic growth have led to meaningful changes in the consumption patterns of its citizens across different socioeconomic strata [1]. These patterns have been shaped by various forces, including the rising affluence of the middle class, rapid urbanization, and the increasing integration of the Indian economy with global markets [2]. Numerous surveys have highlighted distinctions among various income groups in the country and how their food habits and preferences have evolved over time. Furthermore, the influence of globalization has introduced new food products and dietary trends, leading to a blending of traditional cuisines with international flavors.

Regardless of the apparent social divide, food remains an essential part of every household's budget. Statistics reveal that the lowest income group spends approximately 53.27% of its budget on food and beverages, while the highest income group allocates only 11.88%. Lower-income households exhibit higher elasticity in food expenditure, in line with Engel's law [3]. The widening gap in consumption patterns between upper and lower classes indicates that as income increases, the proportion of expenditure on food decreases, with a shift towards non-food items [4]. Geographic and occupational factors also contribute to food expenditure inequality, as poorer households spend more on cereals, while wealthier households invest in a more diverse array of food items [5].

Studies indicate that urban households tend to have higher real food expenditures compared to rural households; however, the share of food expenditure has decreased in urban areas due to rising nonfood expenditures [6]. In contrast, rural areas have seen a decline in real food expenditures, particularly in staples like sugar and oil, while spending on fruits and vegetables has increased. Several studies corroborate the observation that individuals with higher incomes generally have healthier diets, consuming more fruits, vegetables, oils, and meats compared to those in lower income classes [7]. The reason for this can be attributed to the fact that higher income levels often lead to better socioeconomic status, which in turn results in greater knowledge and awareness about health and nutritious foods.

Given the changes in expenditure, it becomes crucial to analyze how different socio-economic factors influence food consumption patterns. Higher-income households, for instance, may prioritize quality and variety, while lower-income groups might still focus on quantity and basic staples. Understanding food consumption pattern also helps in studying nutritional status and welfare of households.

The share of Indians who are classified as being in the lower class is smaller than it used to be, indicating a gradual improvement in economic conditions. In 1990, 51% [8] of Indians lived below the poverty line, struggling to meet basic needs. By 2023, this share had fallen to 14.96% [9], reflecting

significant progress in poverty alleviation efforts. However, despite this positive trend, it is concerning that, according to the Global Hunger Index, approximately 18.7% of the population in India was reported to be food insecure in 2021. This statistic highlights the ongoing challenges related to access to adequate nutrition. A household's socioeconomic status (SES) is a key factor influencing food insecurity in India, as it determines the resources available for food purchasing and preparation. Low SES, particularly in low-income households, results in the consumption of inadequate and nutrient-poor diets due to a lack of dietary diversity, which ultimately affects overall health and well-being.

Explaining consumer behavior, especially regarding food consumption, is complex and multifaceted. Traditional theories have emphasized income as the primary determinant of food choices; however, factors such as social groups, cultural norms, and demographic characteristics have been found to play significant roles in shaping these consumption patterns. These elements interact dynamically, influencing not only what people buy but also how they perceive food and nutrition. Previous studies have found that the consumption patterns of Indian consumers are undergoing a significant transformation, with a greater emphasis on high-value products such as fruits and vegetables, rather than traditional staples like cereals and pulses [10]. This shift can be attributed to several interrelated factors, including increasing health awareness among consumers, which has led to a more conscious approach to diet, the influence of globalization that exposes individuals to diverse food options, and rising disposable incomes, particularly within the growing middle class, enabling greater access to these higher-value foods.

2. MATERIALS AND METHODS

The data used for the study was on food consumption and consumer expenditure collected by the National Sample Survey Organization (NSSO) of the Government of India. The analysis draws from the 61st, 66th, and 68th rounds of surveys, encompassing the years 2004-05, 2009-10, and 2011-12. The data includes per-capita consumption figures for both food and non-food commodities across sample households. Specifically, the NSS surveys covered 79,297 rural households in the 61st round, 59,119 in the 66th, and 59,695 in the 68th round, along with 45,346, 41,736, and 41,967 urban households, respectively. For the study the data pertaining to 17 important states were selected during the three rounds thus making the total number of observations to 51.

2.1 A consumption model

Multiple linear regression analysis has been used study per capita monthly expenditure on food items. By incorporating multiple predictors, this method allows for a more comprehensive understanding of how each factor, such as household size, poverty rates or literacy rate, contributes to overall food spending. This regression analysis uses a mathematical model in the form of a straight-line equation that can define the relationship between variables according to the research objectives.

In this study, we analyze data across **17 states** (Andhra Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan,

Tamil Nadu, Uttar Pradesh and West Bengal), over three time periods (2004-05 and 2009-10, 2011-12)

The dependent variable, Y , represents the per capita monthly expenditure on food items in Indian Rupees (₹) for the i^{th} state and the independent variables are X_1 (household size), X_2 (dependency ratio), X_3 (milk availability per gram for the i^{th} state), X_4 (the per capita GSDP in ₹ for the i^{th} state at constant prices, (base year 2005), X_5 (literacy rate for the i^{th} state), X_6 (dummy variable for the period ('0' for 61st round, '1' for 66th round and '2' for 68th round), X_7 (poverty rate of the i^{th} state), X_8 (per capita monthly consumption of cereals for the i^{th} state in kg), X_9 (per capita monthly consumption of pulses for the i^{th} state in kg), X_{10} (per capita monthly consumption expenditure on meat, fish and egg for the i^{th} state in ₹) β_0 is the intercept, U_i is the stochastic disturbance term. Hence, the multiple linear regression model used is [11]

$$Y = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \beta_8 X_{8it} + \beta_9 X_{9it} + \beta_{10} X_{10it} + U_{it} \text{ for}$$

$i = 1$ to n states ($n=17$) and $t = 2004-05, 2009-10, 2011-12$ (three-point period)

where,

Y is per capita monthly expenditure of food items in ₹ for the i^{th} state

X_{1i} - household size for the i^{th} state in numbers

X_{2i} - dependency ratio for the i^{th} state in percentage

X_{3i} - per capita milk availability for the i^{th} state in grams per day

X_{4i} - per capita GSDP in ₹ for the i^{th} state at constant prices (base year: 2005)

X_{5i} - literacy rate for the i^{th} state in percentage

X_{6i} - dummy variable for time period ('0' for 61st round and '1' for 66th round and '2' 68th round)

X_{7i} - poverty rate of i^{th} state in percentage

X_{8i} - per capita monthly consumption of cereals for the i^{th} state in kg

X_{9i} - per capita monthly consumption of pulses for the i^{th} state in kg

X_{10i} - per capita monthly consumption expenditure on meat, fish and egg for the i^{th} state in ₹ β_0

is the intercept

U_i is the stochastic disturbance term

3. RESULTS AND DISCUSSION

The results indicate that selected variables significantly influence food consumption patterns across Indian states during the analyzed period. Among these variables, milk availability, the time period (dummy variable), and expenditure on eggs and meat exhibit the strongest effects on food expenditure. Notably, India is the largest producer and consumer of milk globally, making it a critical

factor in shaping food consumption expenditure. The dairy sector contributes approximately 5.3% to India's agricultural GDP, with milk production experiencing substantial growth from 146.3 million tonnes in 2014-15 to 198.4 million tonnes in 2019-20. Over 75% of households consume milk, establishing it as a vital source of nutrition and income for rural families [12]. Our analysis reveals that an increase in milk availability correlates with a rise in per capita food expenditure, with each additional unit of milk available leading to an increase of ₹1.67 in spending. This underscores the significance of milk in household budgets, particularly in rural areas where dairy farming is integral to local livelihoods. Moreover, the cultural importance of milk as a staple further enhances its role in household expenditure decisions, reinforcing the need for policies that support dairy production and accessibility.

Food expenditure in India has undergone notable transformations from 2004-05 to 2011-12, mirroring broader economic trends and shifts in consumer behavior. In 2004-05, food expenditure constituted 35.4% of total consumption, reflecting a decline from prior years as households increasingly allocated resources to non-food items such as transport and communication [13]. By 2011-12, per capita calorie consumption exhibited a slight increase, reversing a long-term downward trend attributed to enhanced agricultural productivity and evolving dietary patterns [14]. The coefficient of 871.32 captures this upward trajectory in per capita spending, reinforcing the notion that household expenditure on food items has risen, potentially driven by factors such as inflation, evolving consumer preferences, or increased dietary diversification.

The dynamics of nutrient consumption reveal that rising food prices disproportionately affect poorer households, leading to reduced calorie intake despite adequate food production [15]. Chronic food insecurity remains a pressing concern, closely linked to purchasing power and poverty levels. Our findings suggest that poverty is a critical determinant of food expenditure, with a 1% increase in poverty resulting in a ₹15.03 decline in food spending. This highlights the financial challenges faced by poorer households, restricting their access to adequate nutrition and emphasizing the need for targeted policies that address food affordability and accessibility.

Interestingly, we observe that an increase in cereal consumption, a traditional staple in Indian diets, is associated with a reduction in overall food expenditure. Specifically, for each unit increase in cereal consumption, expenditure declines by ₹3.45, likely due to the low cost and widespread availability of cereals compared to other food groups. This supports the Engel curve principle of wealthier households allocating a smaller share of their budgets to staple foods as rising incomes correlate with decreased spending on cereals [16]. Households are increasingly favoring high-value food items, such as fruits, vegetables, and animal-source foods, which specifically, spending on protein-rich foods such as eggs and meat has a positive impact on overall food expenditures; each additional rupee allocated to these items results in a ₹3.64 rise in food spending. This trend highlights the escalating importance of animal-based proteins in Indian diets, aligning with global patterns of rising meat consumption. The results related to the literacy rate and Gross State

Domestic Product (GSDP) show different outcomes compared to popular studies on their impact on food expenditure.

Table 1. Determinants of food consumption expenditure in India

Sl. No.	Particulars	Coefficient	Standard error	T stat	P value
1	Intercept	1670.9045	905.4168	1.8454	0.0723
2	Milk availability (gm/ day)	1.6679***	0.4576	3.644626794	0.0007
3	Dummy variable	871.3218***	157.9830	5.515286944	2.2659E-06
4	Poverty (%)	-15.0293*	7.7065	-1.95022	0.0581
5	Cereal consumption (kg/month)	-3.4508**	1.5731	-2.1936	0.0341
6	Expenditure on eggs and meat (Rs/month) per capita	3.6442***	1.0601	3.4373	0.0013
7	GSDP	0.00035	0.0042	0.8314	0.4107
8	Literacy rate (%)	2.4040	7.5230	0.3196	0.7510

Note: ***, ** and * indicate the significance at 1, 5, 10

4. CONCLUSION

In this paper, the impact of various socioeconomic factors on food expenditure has been investigated. It is clear that milk availability, the time period (represented by a dummy variable), and expenditures on eggs and meat have the most pronounced effects on food expenditure. Higher per capita milk availability significantly boosts food expenditure, as people with more access to milk are willing to spend more on food overall. This trend is particularly noteworthy in regions where milk is a dietary staple, reflecting both cultural preferences and nutritional needs. The dummy variable reflecting time shows the increase in spending across the years, which may be attributed to changing consumption patterns or perhaps rising incomes. Over time, households have shifted their spending habits towards more diverse and higher-quality food items, which are often more

expensive. Poverty and food expenditure have a negative relationship because purchasing power can limit the ability of households to invest in a variety of food options. When financial constraints are in place, families often prioritize basic needs over diverse nutritional options. The Indian diet is majorly cereal-centric, and so increased cereal consumption correlates with lower spending due to its lower cost. Furthermore, it was estimated that the level of food expenditures is positively affected by expenditure on eggs and meat. In many households, these protein-rich foods are considered essential for a balanced diet and often take precedence in food budgets. Therefore, it's clear that spending on these protein-rich foods positively correlates with overall food expenditure. Consequently, it's imperative that food policies not only aim to increase availability and access to these nutritional staples but also consider the affordability of such foods. As the analysis indicates, rising food prices and poverty may lead consumers to opt for cheaper, low-quality food options, which could negatively affect their health and well-being. This shift toward less nutritious options can result in long-term health issues, underscoring the need for comprehensive food policies that address both access and quality.

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