

FOOD CONSUMPTION PATTERN IN RURAL INDIA: A REGIONAL PERSPECTIVE

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Since the economic transformation in early 1990s, India experienced a massive change in food consumption pattern. There has been a decline in cereal especially coarse cereal intake whereas consumption of other food items (fruits, vegetables, meat products) has slightly increased particularly in rural India. These changes vary across socio-economic groups, which has implications for inter-group inequalities. This paper attempts to show food consumption pattern across selected social and economic groups and identifies food consumption regions in India. An attempt has also been done to show determinants of food item wise consumption pattern in rural India. The paper argues that such a disaggregated analysis brings out the diversity in food consumption patterns and helps identifying the socio-economic groups suffering from deprivations in food consumption.

Key Words : Food Intake, Diversity in Food Consumption, Socio-economic groups, Agro Climatic Regions.

INTRODUCTION

The relatively faster growth of India's economy since 1990s has often been subjected to critical scrutiny, particularly in relation to the inclusiveness of this growth process. In the post-economic reforms period, India not only experienced rapid economic transformation but also substantial changes in many other dimensions of well-being, including in its diet pattern (Ali 2007; Atibudhi 2006; Giri 2006; Golait and Pradhan 2006; Nasurudeen et al. 2006; Radhakrishna 2006; Singh et al. 2006; Viswanathan 2001; Shariff and Mallick 1999; Radhakrishna and Reddy 2004). There is a trend of declining cereal intake particularly coarse cereals and very low increase of consumption of other food items in the rural diet, which has often been explained as an expected outcome of economic growth. These changes in diet pattern, however, are not uniform rather they vary across various socio economic groups (Gupta and Mishra 2013). Such differential access to food has resulted in widening inequalities among these groups in terms of nutrition intake, which in turn may lead to inequalities in health outcomes.

While with increase in per capita income decline cereal consumption is expected to some extent, it is important to note that cereals are considered to be among the best source of energy and they also provide important nutrients to the body but they lack some micronutrients such as Vitamins and minerals (Gopalan et al. 2009). The insufficiency of these micronutrients in the body may result in increasing health risks. The incidence of cardiovascular diseases, cerebrovascular diseases, obesity, metabolic syndrome, diabetes and cancer has risen significantly and most of these are related to dietary and lifestyle patterns (Deshmukh-Taskar 2007; Ruel et al. 2004; Groth et al. 2001; Yang 1998; Neumark-Sztainer et al. 1996). Increase in consumption of fruits and vegetables are important to protect against the cardiovascular and other chronic diseases (Prattala 2006; Giskes et al. 2002; Johansson et al. 1999). Since consumption of these food items vary

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among various socio-economic groups so the risk of several diseases also vary among these groups. Generally lower socio-economic class people experience greatest morbidity and mortality from chronic diseases. Differences in dietary intake contribute to some extent in these inequalities (Giskes et al. 2002).

Food security continues to be one of the critical policy objectives in India. While food availability has substantially increased in India over the past decades, mainly due to the productivity gains from 'green revolution', the challenge of providing adequate food and nutrition to each and every citizen of the country is far from being resolved (Swaminathan 2006). Often the literature on food security is focused on macro trends and the links between income or economic well-being and food consumption is assumed to be uniform across socio-economic groups. This paper contributes to the literature by (a) presenting the regional patterns of food consumption in India; and (b) examining the role of different socio-economic factors on food consumption pattern in rural India. The paper is organised as follows: after a discussion on data base and methodology in the next section, the differences in food consumption pattern across social groups and regions have been presented in the next section. Results of the regression analysis showing the socio-economic determinants of food consumption have been presented in the following section. Discussion of the results and concluding observations are placed in the final sections.

DATA AND METHODS

This paper has drawn data from National Sample Survey (NSS), 66th round (2009-10) which provides unit level data on consumer expenditure. NSS covers 59119 rural sample households in this round. This survey gives information on quantity and value of more than 142 food items with a reference period of last 30 days for each state/UT, all India and separately for rural and urban areas (NSS 2009-10). For the paper, all the food items have been grouped into 12 categories¹. Household monthly consumption of food items has been converted into per capita monthly (PCPM) consumption, dividing household consumption by household size. In order to show affect of socio-economic and regional variables on consumption of different food items, a multiple regression analysis has been attempted. Besides, Herfindahl Index¹ has been calculated to estimate diversity in food expenditure.

The following socio-economic and regional variables have been selected and recoded from the NSS 66th round (2009-10) unit level data.

Household Size has been grouped into three categories: 1-4 members (small households), 5-7 members (middle size households) and > 7 members (big households).

Religious Groups have been categorized into four: Hindus, Muslims, Christian and other religious groups, which include Sikhism, Jainism, Buddhism, Zoroastrianism and others. In multiple regression, Hindu is the reference category.

Social Group (Caste) includes Scheduled Tribe (ST), Scheduled Caste (SC), Other Backward class (OBC) and 'Others', where 'others' is the reference category.

Monthly per capita expenditure (MPCE) is taken as proxy of income.

Occupation Type (Household Type): Since this study is based on rural areas so rural occupation categories have been used. There are five type of rural occupation selected self-employed in non-agriculture, agricultural labour, other labour, self-employed in agriculture, other occupation. In multiple linear regressions, self-employed in non-agriculture is the reference category.

Agro Climatic Regions (ACR): 15 agro climatic regions have been made out of 87 NSS regions to show the agriculture and climate's affect on food consumption pattern. However only 14 major ACR have been selected for analysis and island region has been dropped. Upper Gangetic Plain is the reference category in the regression analysis.

DIFFERENCES IN FOOD CONSUMPTION PATTERN

Food is not just a necessity; its production, distribution and consumption are deeply embedded in the local political economy. It is well known that control over the production and distribution of food has been among the most fundamental aspects of exercising control over populations. Food is also a marker of social status and hierarchy. In the presence of social diversity and inequality, food often becomes an important aspect of the boundaries between groups. Even after significant changes in food consumption patterns over past decades, diversity in food consumption patterns remains a significant, albeit neglected, aspect of the political economy of food in India.

It is hardly surprising that food consumption pattern shows significant variations across economic classes. As we move up in the consumption expenditure class, consumption of all food items increases. The bottom MPCE class, which covers 20 percent of rural population, has cereal consumption less than national average (11.73 kg PCPM). Even coarse cereal consumption is low among bottom MPCE class. Rich people tend to enjoy consumption of all food items including cereals, which are believed to decline with income in diet. Consumption of pulses, milk, fruits and vegetables increases with higher income classes (Table 1).

Table 1: Average Monthly Per Capita Consumption of Commodities (Kg)* Across Economic Groups During 2009-10 in Rural India

| Economic groups | Cereal | Wheat | Rice | Coarse Cereal | Pulses and Nuts | Milk (Lit) | Roots and Tubers | Veg- etables | Fruits | Meat | Egg (no.) | Edible Oil |
|----------------------------------|--------|-------|-------|---------------|-----------------|------------|------------------|--------------|--------|-------|-----------|------------|
| <i>Occupation Type</i> | | | | | | | | | | | | |
| Self employed in non agriculture | 11.634 | 4.671 | 7.187 | 2.514 | 0.725 | 4.920 | 2.335 | 2.896 | 0.512 | 0.657 | 0.003 | 0.611 |
| Agriculture Labour | 11.546 | 3.868 | 7.687 | 3.067 | 0.693 | 3.570 | 1.943 | 2.859 | 0.478 | 0.470 | 0.003 | 0.573 |
| Other Labour | 11.280 | 4.783 | 6.790 | 3.044 | 0.695 | 4.402 | 2.071 | 2.625 | 0.478 | 0.659 | 0.003 | 0.592 |
| Self employed in agriculture | 12.223 | 5.664 | 6.414 | 3.653 | 0.831 | 7.162 | 2.242 | 2.930 | 0.540 | 0.562 | 0.003 | 0.644 |
| Others | 11.477 | 4.811 | 6.882 | 2.667 | 0.905 | 6.634 | 2.437 | 3.408 | 0.611 | 0.909 | 0.004 | 0.740 |
| <i>MPCE Quartile groups (%)</i> | | | | | | | | | | | | |
| Bottom 20 | 10.837 | 4.309 | 6.818 | 2.963 | 0.543 | 2.522 | 1.807 | 2.216 | 0.360 | 0.311 | 0.002 | 0.430 |
| 20-40 | 11.573 | 4.673 | 7.004 | 3.397 | 0.676 | 3.947 | 2.112 | 2.724 | 0.431 | 0.454 | 0.003 | 0.563 |
| 40-60 | 11.927 | 4.780 | 7.148 | 3.203 | 0.793 | 5.267 | 2.223 | 3.065 | 0.457 | 0.600 | 0.003 | 0.661 |
| 60-80 | 12.394 | 5.244 | 7.057 | 3.331 | 0.911 | 7.117 | 2.372 | 3.345 | 0.551 | 0.754 | 0.004 | 0.750 |
| Top 20 | 12.879 | 5.664 | 7.050 | 3.046 | 1.179 | 10.540 | 2.749 | 4.001 | 0.827 | 1.299 | 0.005 | 0.933 |

Source: Authors' calculation from NSS 66th (2009-10) Consumer Expenditure Schedule, Type 1

The shift to meat and meat products and oil also increases with higher income groups. This analysis clearly shows that bottom MPCE classes are worst sufferers in getting a quality of food as dietary diversity tend to increase with higher income classes (Table 2). Cereal consumption across all occupation categories in rural areas is highest among self-employed in agriculture (12.22 kg PCPM). Even this group also enjoys higher intake of milk (7.16 litres PCPM) much more than the national average. Agricultural labourers are deprived of getting standard amount of milk, roots and tubers compared with the national average. Even their diet is concentrated with cereals lacking the consumption of healthy food items. Differences in consumption of other food items (Vegetables, fruits, meat and meat products, edible oil) are quite low across all occupation groups, but more so for the labour households.

Table 2: Food Expenditure Diversity at Disaggregated Level in Rural India, 2009-10

| Categories | Index | Categories | Index |
|----------------------------------|-------|---------------------------------|-------|
| <i>Household Size</i> | | <i>MPCE Quartile groups (%)</i> | |
| 1-4 | 0.174 | Bottom 20 | 0.214 |
| 5-7 | 0.193 | 20-40 | 0.193 |
| Above 7 | 0.201 | 40-60 | 0.183 |
| <i>Social Group</i> | | 60-80 | 0.178 |
| Scheduled Tribe | 0.189 | Top 20 | 0.172 |
| Scheduled Caste | 0.186 | <i>Agro Climatic Regions</i> | |
| Other Backward Caste | 0.180 | West Himalayan | 0.186 |
| Others | 0.180 | East Himalayan | 0.231 |
| <i>Religious Group</i> | | Lower Gangetic Plain | 0.219 |
| Hindu | 0.183 | Middle Gangetic Plain | 0.210 |
| Muslim | 0.193 | Upper Gangetic Plain | 0.189 |
| Christian | 0.180 | Trans Gangetic | 0.240 |
| Others | 0.196 | Eastern Plateau and Hill | 0.208 |
| <i>Occupation Type</i> | | Central Plateau and Hill | 0.207 |
| Self employed in non agriculture | 0.186 | Western Plateau and Hill | 0.163 |
| Agriculture Labour | 0.185 | Southern Plateau and Hill | 0.187 |
| Other Labour | 0.179 | East Coast Plain and Hill | 0.182 |
| Self employed in agriculture | 0.187 | Western Plain and Ghat | 0.164 |
| Others | 0.172 | Gujarat Plain and Hill | 0.176 |
| | | Western Dry | 0.230 |

Source: Authors' calculation from NSS 66th (2009-10) Consumer Expenditure Schedule, Type 1

Family size is significantly related with consumption of all food items. Bigger families show poor intake of all food items compared with smaller families. Average per capita per month intake of cereals is 10.86 kg in large households (above 7 members) whereas small families exhibit 12.26 kg average per capita monthly cereal intake. Consumption of all other food items including fruits, vegetables, meat, oil decreases as household size rises (Table 3). These differences could be the results of differences in income as bigger families belong to lower MPCE classes.

Consumption of food items especially cereals among religious groups is interesting to study. Christian households get major share of their cereals from rice whereas 'other religious groups' including Jains, Buddhists and Sikhs consume a much larger portion of wheat in their cereal diet.

Hindu families prefer to include all type of cereals in their diet. Milk consumption is much higher in 'other religious groups' (PCPM 10.62 lit) while others have a very low level of consumption. Differences in consumption of all other food items are relatively insignificant among religious groups. However, expenditure on different food groups is highly concentrated in Muslims families than any other religious groups. These inter-religious differences, to some extent, are reflections of the regional concentration of religious groups. Even among the lowest MPC Equartiles, we notice inter-religious differences in food consumption: meat consumption is higher among Muslims than Hindus and these differences remain same with rise in MPCE classes. Lowest MPCE quartile exhibits no difference in milk intake between both religious groups but as MPCE level shifts to higher quartile, differences in milk intake rises. However, in the case of caste groups, food consumption patterns within MPCE quartiles differ in a less striking manner.

Table 3: Average Monthly Per Capita Consumption of Commodities (Kg)* across Social groups during 2009-10 in rural India

| Social Variables | Cereal | Wheat | Rice | Coarse Cereal | Pulses and Nuts | Milk (Lit) | Roots and Tubers | Vegetables | Fruits | Meat | Egg (no.) | Edible Oil |
|------------------------|--------|-------|-------|---------------|-----------------|------------|------------------|------------|--------|-------|-----------|------------|
| <i>Household Size</i> | | | | | | | | | | | | |
| 1-4 | 12.264 | 4.593 | 7.976 | 3.171 | 0.865 | 6.136 | 2.390 | 3.487 | 0.645 | 0.716 | 0.004 | 0.706 |
| 5-7 | 11.263 | 4.921 | 6.228 | 3.202 | 0.667 | 4.950 | 1.948 | 2.394 | 0.438 | 0.489 | 0.003 | 0.546 |
| Above7 | 10.867 | 5.545 | 4.920 | 3.220 | 0.639 | 4.635 | 1.929 | 2.000 | 0.352 | 0.397 | 0.002 | 0.485 |
| <i>Social Group</i> | | | | | | | | | | | | |
| Scheduled Tribe | 11.996 | 4.093 | 7.942 | 4.182 | 0.658 | 4.288 | 1.742 | 2.925 | 0.496 | 0.485 | 0.003 | 0.550 |
| Scheduled Caste | 11.657 | 5.315 | 6.790 | 2.980 | 0.713 | 4.541 | 2.212 | 2.784 | 0.484 | 0.481 | 0.003 | 0.585 |
| Other Backward Caste | 11.731 | 4.877 | 6.869 | 2.941 | 0.789 | 5.506 | 2.104 | 2.844 | 0.496 | 0.603 | 0.003 | 0.619 |
| Others | 11.683 | 4.562 | 6.988 | 3.173 | 0.814 | 6.627 | 2.432 | 3.131 | 0.599 | 0.763 | 0.003 | 0.690 |
| <i>Religious Group</i> | | | | | | | | | | | | |
| Hindu | 11.827 | 4.936 | 6.917 | 3.246 | 0.780 | 5.528 | 2.150 | 2.923 | 0.522 | 0.533 | 0.003 | 0.628 |
| Muslim | 11.316 | 3.836 | 7.737 | 2.862 | 0.622 | 3.906 | 2.329 | 2.778 | 0.517 | 0.763 | 0.003 | 0.561 |
| Christian | 11.438 | 1.574 | 9.841 | 1.170 | 0.680 | 4.596 | 1.931 | 2.812 | 0.636 | 1.319 | 0.004 | 0.527 |
| Others | 10.580 | 7.562 | 3.154 | 2.607 | 0.908 | 10.625 | 2.349 | 3.036 | 0.535 | 0.486 | 0.004 | 0.751 |

Source: Authors' calculation from NSS 66th (2009-10) Consumer Expenditure Schedule, Type 1

Food Consumption Regions

Consumption of various food items depends to some extent on the agricultural and climatic conditions. Planning commission on the basis of these conditions divided India into 15 major Agro-Climatic Regions. These regions are essential not only from production perspective but they also show distinct food cultures and dietary habits in terms of eating, preparation and conservation of

different food items. Agro-Climatic Regions also differ in terms of livelihoods patterns, which in turn govern levels of income, which ultimately affects food consumption pattern. Our results clearly show a sharp distinction in food consumption across agro-climatic regions (Table 4).

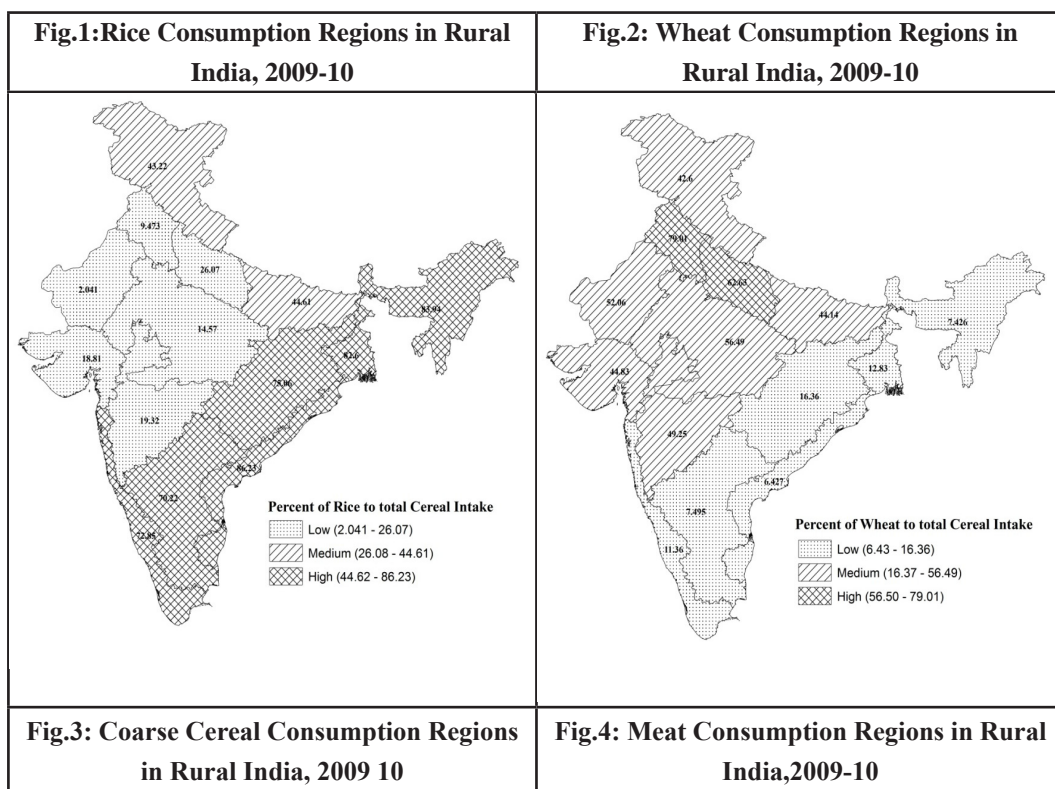
Table 4: Average Monthly Per Capita Consumption of Commodities (Kg)* across Agro Climatic Regions during 2009-10 in rural India

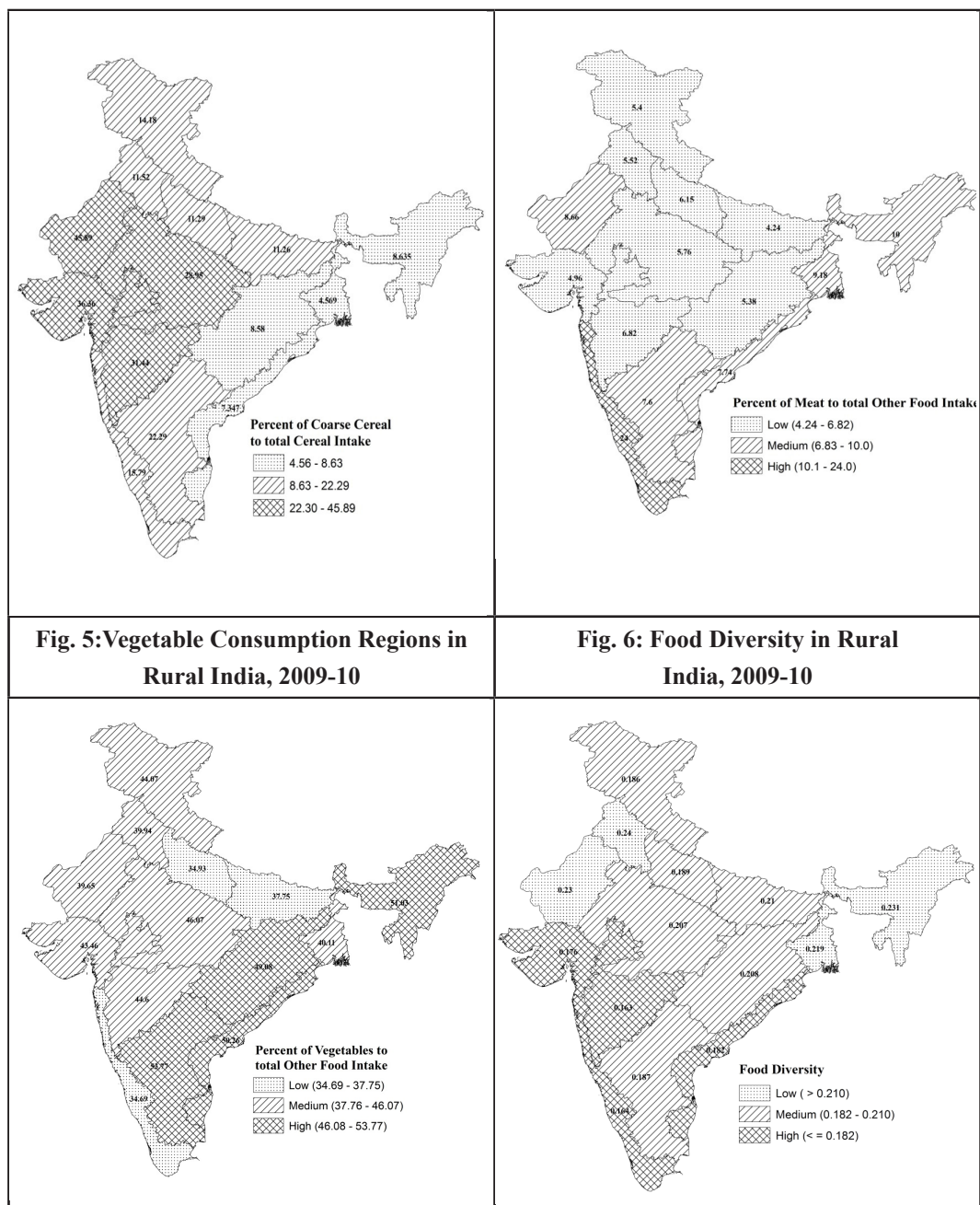
| Regions | Cereal | Wheat | Rice | Coarse Cereal | Pulses and Nuts | Milk (Lit) | Roots and Tubers | Veg- etables | Fruits | Meat | Egg (no.) | Edible Oil |
|------------------------------|--------|-------|--------|---------------|-----------------|------------|------------------|--------------|--------|-------|-----------|------------|
| <i>Agro Climatic Regions</i> | | | | | | | | | | | | |
| West Himalayan | 11.892 | 5.680 | 5.763 | 1.891 | 1.078 | 9.421 | 2.078 | 3.005 | 0.542 | 0.368 | 0.003 | 0.825 |
| East Himalayan | 12.915 | 1.076 | 12.157 | 1.251 | 0.527 | 2.726 | 1.912 | 3.812 | 0.522 | 0.749 | 0.003 | 0.475 |
| Lower Gangetic Plain | 11.447 | 1.594 | 10.261 | 0.568 | 0.418 | 2.761 | 3.432 | 3.592 | 0.548 | 0.822 | 0.003 | 0.561 |
| Middle Gangetic Plain | 12.678 | 6.230 | 6.297 | 1.589 | 0.797 | 4.368 | 3.396 | 2.901 | 0.553 | 0.326 | 0.003 | 0.510 |
| Upper Gangetic Plain | 11.674 | 8.193 | 3.410 | 1.477 | 0.780 | 6.136 | 2.945 | 2.420 | 0.529 | 0.426 | 0.003 | 0.609 |
| Trans Gangetic | 9.909 | 8.881 | 1.065 | 1.295 | 0.813 | 12.948 | 2.514 | 2.888 | 0.712 | 0.399 | 0.004 | 0.719 |
| Eastern Plateau and Hill | 13.012 | 2.451 | 11.244 | 1.285 | 0.648 | 3.023 | 2.095 | 3.433 | 0.571 | 0.376 | 0.003 | 0.520 |
| Central Plateau and Hill | 11.914 | 9.054 | 2.335 | 4.640 | 0.627 | 6.968 | 1.476 | 2.445 | 0.515 | 0.306 | 0.003 | 0.565 |
| Western Plateau and Hill | 11.136 | 5.929 | 2.325 | 3.784 | 1.222 | 4.078 | 1.242 | 2.310 | 0.443 | 0.353 | 0.003 | 0.831 |
| Southern Plateau and Hill | 11.412 | 0.969 | 9.074 | 2.880 | 0.820 | 3.904 | 1.132 | 2.940 | 0.363 | 0.416 | 0.003 | 0.618 |
| East Coast Plain and Hill | 11.923 | 0.834 | 11.191 | 0.954 | 0.864 | 4.400 | 1.771 | 3.398 | 0.397 | 0.523 | 0.003 | 0.672 |
| Western Plain and Ghat | 10.422 | 1.343 | 8.610 | 1.866 | 0.787 | 4.363 | 1.587 | 2.249 | 0.512 | 1.557 | 0.004 | 0.579 |
| Gujarat Plain and Hill | 9.790 | 4.723 | 1.982 | 3.831 | 0.764 | 6.816 | 1.921 | 3.086 | 0.721 | 0.352 | 0.002 | 1.021 |
| Western Dry | 11.738 | 8.233 | 0.323 | 7.257 | 0.502 | 12.366 | 1.464 | 2.028 | 0.460 | 0.443 | 0.003 | 0.720 |
| Total | 11.730 | 4.826 | 6.992 | 3.189 | 0.764 | 5.490 | 2.169 | 2.908 | 0.523 | 0.598 | 0.003 | 0.621 |

Source: Authors' calculation from NSS 66th (2009-10) Consumer Expenditure Schedule, Type 1

Mapping food consumption patterns across space clearly brings out the regional food cultures in India. The level of aggregation does not allow a detailed identification of food cultures in specific

regional contexts, but even this exercise indicates: (a) the diversity that exists in India in terms of food preferences and (b) the significance of regions as a key aspect of food consumption patterns in India. Rice consumption regions¹ are mainly seen in eastern, southern and coastal parts of India whereas wheat consumption regions fall in northern and central parts (Fig. 1 and Fig. 2). Western India prefers to consume coarse cereals and wheat (Fig. 3). As far as meat consumption regions are concerned, meat is mainly consumed in southern, north-eastern and north-western parts (Fig. 4). Among the meat products, fish, which is an important non-vegetarian diet is preferred in western plain and Ghat, western dry and lower-Gangetic plain regions. Vegetable consumption is low throughout the country, yet its greater dominance is seen in southern, eastern and north-eastern parts of the country (Fig. 5). Food expenditure diversity across regions brings out interesting results showing greater diversity across sea-coast in the east, south and the west. In contrast, north-western and eastern regions exhibit higher concentration of particular food in their diet (Fig. 6). This analysis shows that there are food regions in India, which may have been made by distinct food cultures and systems of agricultural production, a factor that has significant implications for nutrition security, but has hardly been factored into food policy discourse in India.





FACTORS AFFECTING FOOD CONSUMPTION PATTERN

The effects of Socio-economic and regional variables on consumption of different food items have been estimated using multiple regression analysis (Table 5).

Table 5: Multiple Linear Regression Analysis for showing effect of Socio-Economic and Regional Variables on Consumption of Food Items

| Explanatory Variables | | Un-standardized Coefficients*/Dependent Variables | | | | | | | |
|--------------------------|--------------------------------|---|-----------------|-------|----------------|------------|--------|-------|------------|
| | | Cereal | Pulses and Nuts | Milk | Roots & Tubers | Vegetables | Fruits | Meat | Edible Oil |
| | Constant | 13.19 | 1.01 | 8.40 | 3.81 | 3.91 | 0.89 | 0.58 | 0.83 |
| Household Size | Household size | -0.35 | -0.05 | -0.42 | -0.15 | -0.28 | -0.06 | -0.04 | -0.04 |
| Social Class | Scheduled Tribe | 0.03 | -0.10 | -1.85 | -0.25 | -0.23 | -0.10 | -0.06 | -0.12 |
| | Scheduled Caste | -0.06 | -0.08 | -1.81 | -0.19 | -0.25 | -0.09 | -0.05 | -0.07 |
| | Other Backward Class | -0.09 | -0.04 | -0.69 | -0.13 | -0.11 | -0.08 | -0.03 | -0.04 |
| Religion | Muslim | -0.31 | -0.08 | -1.13 | -0.27 | -0.24 | 0.00 | 0.15 | -0.04 |
| | Christian | -0.44 | -0.09 | -0.27 | 0.10 | -0.33 | 0.10 | 0.34 | -0.07 |
| | Other Religion | -0.40 | 0.09 | 0.41 | 0.22 | 0.20 | -0.12 | 0.05 | 0.07 |
| MPCE | Monthly Per Capita Expenditure | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Occupation Type | Agriculture Labour | -0.08 | -0.06 | -0.79 | -0.21 | -0.12 | -0.03 | -0.14 | -0.05 |
| | Other Labour | -0.24 | -0.04 | -0.92 | -0.01 | -0.17 | -0.03 | -0.03 | -0.02 |
| | Self Employed in Agriculture | 0.65 | 0.08 | 1.96 | 0.06 | 0.16 | 0.03 | -0.01 | 0.02 |
| | Other Occupation | -0.41 | 0.08 | 0.72 | 0.07 | 0.24 | 0.02 | 0.12 | 0.05 |
| Agro Climatic Regions | West Himalayan | -0.05 | 0.20 | 2.54 | -1.09 | 0.26 | -0.11 | -0.16 | 0.14 |
| | East Himalayan | 1.13 | -0.27 | -3.69 | -1.10 | 1.28 | -0.06 | 0.26 | -0.14 |
| | Lower Gangetic | -0.44 | -0.39 | -3.37 | 0.38 | 0.90 | -0.08 | 0.36 | -0.09 |
| | Middle Gangetic | 1.13 | 0.04 | -1.62 | 0.51 | 0.54 | 0.04 | -0.05 | -0.08 |
| | Trans Gangetic | -1.85 | -0.08 | 6.37 | -0.71 | 0.13 | 0.16 | -0.12 | 0.02 |
| | Eastern Plateau | 1.15 | -0.13 | -3.22 | -0.91 | 0.85 | 0.02 | -0.02 | -0.08 |
| | Central Plateau | 0.08 | -0.16 | 0.85 | -1.51 | -0.08 | -0.02 | -0.07 | -0.04 |
| | Western Plateau | -0.81 | 0.40 | -2.38 | -1.82 | -0.34 | -0.13 | -0.06 | 0.19 |
| | Southern Plateau | -0.58 | 0.01 | -2.29 | -1.95 | 0.22 | -0.23 | 0.00 | -0.02 |
| | East Coast Plain | -0.15 | 0.02 | -2.01 | -1.40 | 0.56 | -0.24 | 0.08 | 0.01 |
| | West Coast Plain | -1.60 | -0.07 | -2.24 | -1.63 | -0.56 | -0.14 | 1.00 | -0.10 |
| | Gujarat Plain | -2.05 | -0.03 | 0.64 | -1.06 | 0.55 | 0.17 | -0.02 | 0.41 |
| | Western Dry | -0.04 | -0.31 | 6.03 | -1.56 | -0.49 | -0.07 | -0.05 | 0.09 |
| Adjusted R Square | | 0.13 | 0.26 | 0.33 | 0.34 | 0.20 | 0.05 | 0.28 | 0.23 |

*Note**: all variables are significant at 1 percent level

Source: Computed from 66th consumer expenditure schedule, Type 1.

Our results show that selected variables to some extent influence food consumption pattern in rural India. Among all food items, milk and Roots & Tuber are much influenced by these variables. As the size of family rises, consumption of all food items especially cereals and milk declines in the diet. Bigger families are at a greater risk of nutrition as they are unable to consume cereals, which

are considered as staple, less costly and easily accessible food items. Analysis of results across social groups shows significant caste differentials in food consumption pattern. The likelihood of consuming all food items is lower among Scheduled tribes and scheduled caste households compared with 'other social group' category. With a percent increase in scheduled tribe households, there is a decline of 1.85 litre milk consumption per capita per month. Similarly with a rise in scheduled caste households, vegetable consumption falls at 0.25 kg per capita per month. Although, other backward class households consume all food items lesser than 'other social group' yet its probability is not much high. This is analysis at the level of broad caste group is not enough to bring out the nuances of caste as an important determinant of food consumption pattern, but it does point to the significance of caste in shaping food consumption. Religion is another significant variable affecting food consumption pattern. Muslims have lower probability of consuming all food items except meat compared with the Hindu households. The likelihood of consuming cereals is 0.44 kg and 0.40 kg lower among Christians and other religious groups respectively compared with Hindu households. However both the religious groups have higher probability of consuming meat and fruit products than the Hindu households. Occupation wise analysis clearly points out poor plight of agricultural labourers and other labourers in terms of food consumption. Both the groups have very low probability of consuming all food items than the self-employed in non-agriculture category households. Other occupation group, that included the regular salaried, enjoy higher consumption of all food items.

Agro-climatic regions, another significant variable affecting food item consumption in rural India show a mixed regional picture. The probability of consuming roots and tuber is lower in all regions except lower and middle Gangetic plains compared with the upper Gangetic plain region. Southern regions have lesser probability of getting proper milk intake than upper Gangetic plain which lies in the north. Out of 13 regions, only 4 have comparatively more chances of eating cereals than the reference upper Gangetic region category.

DISCUSSION

Most of the studies in India analyse prices and expenditure as one of the important factors affecting food consumption pattern and less attention has been paid to socio-economic and regional variables, which may incur differences in food consumption pattern. In this paper an attempt has been made to address this research gap. Examining differentials in food consumption pattern across social sections and regions is important for understanding the nutritional situation and dietary preferences of people in this large and diverse country. A close analysis of reasons of this variation may help in better planning and management of food policies.

Several studies in various parts of the world report the significant influence of social and demographic factors on food consumption pattern (Harriss-White and Hoffenberg, 1994). Some studies have found age affecting food consumption pattern (Kossioni and Bellou 2011; Dynesen et al. 2003; Tucker et al. 1995). While, gender differences in food intake also prevail, however the differences are not much in case of India (Subramanian and Deaton 1990). Women in general tend to eat more healthy food than men in many western countries (Deshmukh-Taskar 2007; Prattala et al. 2006; Kiefer et al. 2005; Sobal 2005; Fraser et al. 2000; Louk et al. 1999; Roos et al. 1998). In contrast, it is true that women also suffer from under-nutrition, anaemia, lower Body Mass Index and unhealthy conditions. Poverty, discrimination and favourable behaviour towards boys are some of the reasons for their worse nutritional conditions (Gittelsohn et al. 1997; Harriss-White 1991; Behrman 1988; Choudhary and Parthasarathy 2008). Studies also show marital status as another significant variable affecting food consumption pattern (Eng et al. 2005).

This paper has taken into account selected social, economic and regional variables in determining food consumption pattern. Our results show household size is one of the important determinants of food consumption, a result similar to those of Meenakshi and Ray (1999). Household size and its composition especially the number of children determine the allocation of household expenditure on different food items. Some studies found education as one of the most important factors affecting nutritional status of population. Well-educated persons choose their food in a more informal way (Ruel 2004; Dynesen et al. 2003; Groth et al. 2001; Roos et al. 2001; Yang et al. 1998). They receive more nutritional messages and are more aware of their diets. Sometimes more educated persons over report their food intake in order to maintain their social status (Roos et al. 2001; Irala-Estevez et al. 2000).

To the extent that income closely proxies other variables such as education and occupation, it is expected to capture the divergences across economic classes. On an average people belonging to higher income class are associated with healthier dietary pattern, which includes fruits, vegetables, oil and meat consumption. The higher income class people consume more these food items than their lower class counterparts probably because with higher income, socio-economic status increases which results into more knowledge and awareness of health and healthy food items (Deshmukh-Taskar et al. 2007; Prattala et al. 2003; Sanchez-Villegas A et al. 2003; Giskes et al. 2002; Bhandari and Smith 2000; Roos 1998; Yang 1998). In many other studies (Roos et al. 1998; Dittus et al. 1995; Hupkens et al. 2000), it is found that unemployed have less money to spend on food and thus low income becomes a barrier in the purchase of fruit and vegetable consumption. In our study type of occupation is significantly associated with all food items. A study based on food consumption pattern among different occupation categories shows that men from highest occupation level spend more money to eat fruits and vegetables whereas this is negatively related to occupation among women (Estaquio et al. 2008). Public policy and the management of public distribution of food is also another significant factor affecting food consumption (Harriss-White, 2004).

Religion is another important variable affecting consumption pattern. Our study confirms that Muslims have lower probability of consumption of all food items except meat than the Hindu families, even within the same expenditure classes. Generally, various religions forbid the consumption of certain types of food. The division between *haram* (forbidden) and *halal* (permitted) food among the Muslims, preference for vegetarianism among certain Hindu and Jain groups, and prescriptions against the consumption of pork among Muslims (Waibel 2011) and beef among Hindus are all examples of influence of religious beliefs on food consumption patterns. Khare (1986 cited in Gittelson et al. 1997) describes Hindu food system as having both materialistic and emic-cultural components. It is based on certain set of beliefs and rules 'including ways that food (and individuals) can become polluted, food classification systems, local explanatory models of illness (where food is perceived either as a causal agent or as a treatment) and normative patterns of favouring/disfavouring household members based on their age and gender.' Among different religions, food consumption pattern is quite different for man and woman. Women at the time of fasting do not prefer meat consumption. Intra-household food distribution favours man over women in Hindu societies (Thomson 1985). In Hindu societies women are viewed as polluting (particularly during menstruation) and are regarded as threat to patrifocal system.

Our results show that type of caste also affects food consumption pattern in rural India. Consumption of all food items is lower among Scheduled caste and Schedule tribe households than the others that include the so-called higher caste groups. However, it is important to note that caste is interwoven with wealth, earnings and opportunities. In India, people at the bottom of social ladder are at a higher risk of suffering pre-mature death, poor health and lack of treatment and care

as compared to their better off (Borooah 2010). An empirical study based on 5 major states covering 531 villages show '*Dalit*' children are completely bared of accessing government run mid day meal programme. Similarly, the accessibility of public distribution services to socially deprived sections depends on the location and owner of ration shops. Higher proportion of PDS dealers and PDS shop held in '*Dalit*' colonies show lesser rate of discrimination and 'untouchability' (Thorat and Lee 2010).

In determining food consumption and nutrition intake, many of Indian studies focus on food prices, expenditure level, income and very few of them incorporate regional factor, which not only reflect distinct production and prices pattern but also show sharp cultural differences. So far as the role of regional factor in shaping food consumption is concerned, our results show distinct food consumption regions in rural India, which are made by distinguished food culture and system of agriculture. Cultural differences do matter in shaping food regions. For example in Punjab, meat consumption is low both among rich and poor whereas, West Bengal shows higher intake of meat consumption to all income levels because this state has been traditionally meat-eating region (Meenakshi and Ray 1999). Likewise, regional differences are also carved out by distinct local food production pattern. Reduction in total cereal consumption is occurred in states which are predominantly coarse cereal growing and consuming such as Andhra Pradesh, Karnataka, and Maharashtra (Suryanarayana 2009). Inter-regional differences occur due to different level of income governed by employment and prices of cereals, which in turn determine level of production and composition of cereal basket (Panikar 1980). Development heterogeneity resulted by state run policies and programme also contributes in regional differences. For instance, food for work and public distribution system programmes improve food security level in developed states compared with backward states (Mahadevan and Suardi 2012). Sometimes regional factor determines level of food security across caste and religion groups. Muslims relative to Hindus are calorie deficient but in south India, Hindus are relatively worse off in terms of calorie consumption. Similar conditions of scheduled caste and scheduled tribes vary with regions (Mahadevan and Suardi 2013).

CONCLUSION

Consumption of different food items varies among socio-economic groups and regions. Persons with better incomes, belonging to 'higher' social class, having small families and working as self employed show higher intake of almost all food items and also exhibit diet diversity which make them nutritionally more secure and healthy whereas other socio-economic groups such as those with lower MPCE, large households, belong to Scheduled Tribe, Scheduled Caste, Muslims, agricultural labour and other labourers have a poorer diet in comparison to the national average and even to the other groups. In an 'optimistic' interpretation, the trends of declining cereal or food grain consumption, even among the lower consumption expenditure classes, are often interpreted as the outcome of changes in tastes and preferences and increasing incomes. However, our analysis shows that consumption of other food items is much less among the socially deprived groups. These variations caused by different factors may lead to inequality in nutrition and resultant health behaviour across different groups. From our analysis, it is also found that milk and root & tuber consumption is much affected by selected socio-economic variables. Our analysis also identifies distinct food regions in India. It is well known that wheat is much preferred in northern and central region, and rice in the southern and eastern region. Western region displays higher relative consumption of coarse cereals. In rural India, meat consumption is quite low however its higher consumption is mainly seen in western coastal region. There are number of factors which make and shape food regions such as food culture, taste and preferences, local availability, market, income etc. Hence, it is clear from our results that socio-economic and regional factors though interwoven make it necessary to devise

food policies with a focus on increasing access of marginalised sections and regions of society. These diverse determinants of food consumption patterns and the social and regional context of food production and consumption ought to be taken into consideration in food policy, particularly in the context of large countries like India.

Foornotes

1. *These categories are 1) Cereals include Rice, Wheat, Jowar, Bajra, Maize, Barley, Small Millet, Ragi and their products, and other cereals; 2) Wheat includes wheat and its products; 3) Rice includes rice and its products; 4) Coarse Cereals include Jowar, Bajra, Maize, Barley, Small Millet, Ragi& their products; 5) Pulses and nut include all type of pulses and nut covered by the NSS; 6) Milk is in liquid and its consumption is in litres; 7) Roots and Tuber: includes root and tuber products such as potato, arum, onion, carrot etc. 8) Vegetables include all vegetables covered by NSS excluding lemon; 9) Fruits: this category includes those fruits whose unit is in kg mentioned by NSS and other fruits such as banana, pineapple, coconut and orange have not been taken in the study 10) Meat includes all type of meat excluding egg; 11) Egg: includes egg in no; 12) Edible oil includes all oil products (NSS, 2009-10).*
2. *The Herfindahl Index is defined as $H = \sum S_i^2$, Where, S_i is the share of food groups to total diet and N is the number of food groups.*
3. *Although there are obvious limitations in capturing diversity in food intake through food expenditure under major food groups, still this exercise is expected to capture the diversity in intake to some extent.*
4. *The natural break method in Arc-GIS software that divides data into classes based on natural groups in the data distribution has been used to identify the regions.*

References

- Ali J (2007) Structural Changes in Food Consumption and Nutritional Intake from Livestock Products in India, South Asia Research, Vol. 27, issue 2, pp. 137-151.
- Atibudhi H N (2006) A Comparative Analysis of Food Consumption and Monthly Per Capita Expenditure of Orissa vis-a-vis All India Level, Indian Journal Of Agricultural Economics, Vol. 61, issue 3, July-September.
- Bhandari R, Smith F J (2000) Education and Food Consumption Pattern in China: Household analysis and Policy implication, Journal of Nutrition Education, Vol. 32, pp. 214-224.
- Behrman J R (1988) Intra-household Allocation of Nutrients in Rural India: Are boys favoured? Do parents exhibit inequality aversion?, Oxford Economic Papers, Vol. 40, issue 1; pp. 32-54.
- Borooh V K (2010) Inequality in health outcomes in India: the role of caste and religion' In: Thorat, S. and Newman, K. S., ed. Blocked by caste: Economic discrimination in modern India, Oxford University Press, New Delhi.
- Choudhary N, Parthasarathy D (2008) Intra-household inequalities and gendered outcomes of Malnutrition: some theoretical and empirical reflections from Mumbai Metro, [Online] Available at: <http://www.capabilityapproach.com/pubs/Neetu%20Choudhary%20ans%20D.%20Parthasarathy.pdf>, (accessed on May 3, 2013).
- Deshmukh-Taskar P, Nicklas T A, Yang S J, Berenson G S (2007) Does Food Group Consumption Vary by Differences in Socioeconomic, Demographic, and Lifestyle Factors in Young Adults? The Bogalusa Heart Study, Journal of American Diet Association, Vol. 107, issue 2; pp. 223-234.
- Dittus K L, Hillers V N, Beerman K A (1995) Benefits and barriers to fruit and vegetable intake: relationship between attitudes and consumption, Journal of Nutritional Education, Vol. 27, issue 3; pp. 120-126.
- Dynesen AW, Haraldsdottir J, Holm H, Astrup A (2003) Socio-demographic differences in dietary habits

- described by food frequency questions—results from Denmark, *European Journal of Clinical Nutrition*, Vol. 57, issue 12; pp. 1586-1597.
- Eng P M, Kawachi I, Fitzmaurice G, Rimm E B (2005) Effects of marital transitions on changes in dietary and other health behaviors in US male health professionals, *Journal of Epidemiology and Community Health*, Vol. 59, issue 1; pp. 56–62.
- Estaquio C, Druetne-Pecollo N, Latino-Martel P, Dauchet L, Hercberg S et al. (2008) Socio-economic differences in fruit and vegetable consumption among middle aged French adults: Adherence to the 5 A day recommendation, *Journal of American Dietary Association*, Vol. 108, issue 12; pp. 2021-2030.
- Fraser G E, Welch A, Luben R, Bingham S A, Day N E (2000) The Effect of Age, Sex, and Education on Food Consumption of a Middle-Aged English Cohort—EPIC in East Anglia, *Preventive Medicine*, Vol. 30, issue 1; pp. 26–34.
- Giri A K (2006) Cereal Consumption over Time in the Country and across the States, *Indian Journal of Agricultural Economics*, Vol. 61, issue 3.
- Gittelsohn J, Thapa M, Landman L T (1997) Cultural factors, calorie intake and micronutrient sufficiency in rural Nepali households, *Social Science Medicine*, Vol. 44, issue 11; pp. 1739-1749.
- Giskes K, Turrell G, Patterson C, Newman B (2002) Socio-economic differences in fruit and vegetable consumption among Australian adolescents and adults, *Public Health Nutrition*, Vol. 5, issue 5; pp. 663–669.
- Golait R, Pradhan N C (2006) Changing Food Consumption Pattern in Rural India: Implication on food and Nutrition security, *Indian Journal of Agricultural Economics*, Vol. 61, issue 3; July-September.
- Gopalan C, Shastri B V R, Balasubramanian S C (2009) Nutritive value of Indian foods, *National Institute of Nutrition, ICMR, Hyderabad*.
- Groth M V, Fajt S, Brøndsted L (2001) Social determinants of dietary habits in Denmark, *European Journal of Clinical Nutrition*, Vol. 55, issue 11; pp. 959–966.
- Gupta A, Mishra D K (2013) Poverty and calorie deprivation across socio-economic groups in rural India: a disaggregated analysis, *Journal of Regional Development and Planning*, Vol. 2, issue 1; pp. 15-33.
- Harriss-White B (1991) The intra-family distribution of hunger in South Asia In: Dreze J and Sen A, ed. *The Political Economy of Hunger, Volume 1, Entitlement and Well-Being*, Clarendon Press, Oxford.
- Harriss-White B (2004) Nutrition and Its Politics in Tamil Nadu, *South Asia Research*, Vol. 24, issue 1; pp. 51–71.
- Harriss-White B, Raymond Hoffenberg (1994) eds. *Food: Multidisciplinary Perspectives*, Blackwell, Oxford.
- Hupkens C L H, Knibbe R A, Drop M J (2000) Social class differences in food consumption: The explanatory value of permissiveness and health and cost considerations, *European Journal of Public Health*, Vol. 10, issue 2; pp. 108-113.
- Irala-Estevez J De, Groth M, Johansson L, Oltersdorf U, Prättälä R et al. (2000) A Systematic review of socio-economic differences in food habits in Europe: consumption of fruit and vegetables, *European Journal of Clinical Nutrition*, Vol. 54, issue 9; pp. 706-714.
- Johansson L, Thelle D S, Solvoll K, Bjørneboe G A, Drevon C A (1999) Healthy dietary habits in relation to social determinants and life style factors, *British Journal of Nutrition*, Vol. 81, issue 3; pp. 211–220.
- Kiefer I, Rathmanner T, Kunze M (2005) Eating and dieting differences in men and women, *Journal of Men's Health and Gender*, Vol. 2, issue 2; pp. 194–201.
- Khare, R S (1986) The Indian meal: aspects of cultural economy and food use, In *Food, Society and Culture*, eds R. S. Khare and M. S. A. Rao, Carolina Academic Press, Durham, NC.

- Kossioni A, Bellou O (2011) Eating habits in older people in Greece: The role of age, dental status and chewing difficulties, *Archives of Gerontology and Geriatrics*, Vol. 52, issue 2; pp. 197–201.
- Louk K R, Schafer E, Schafer R B, Keith P (1999) Comparison of Dietary Intakes of Husbands and Wives, *Journal of Nutrition Education*, Vol. 31, issue 3; pp. 145–152.
- Mahadevan R, Suardi S (2012) Regional Differences Pose Challenges for Food Security Policy: A Case Study of India, *Regional Studies*, DOI: 10.1080/00343404.2012.726709.
- Mahadevan R, Suardi S (2013) Is there a role for caste and religion in food security policy? A look at rural India, *Economic Modelling*, Vol. 31; pp. 58–69.
- Meenakshi J V, Ray R (1999) Regional differences in India's food expenditure pattern: a complete demand systems approach, *Journal of International Development*, Vol. 11; pp. 47–74.
- National Sample Survey Organisation (2009–10) Nutritional Intake in India-2009–2010, Report No. 540(66/1.0/2.), Ministry of Statistics and Programme Implementation, Government of India.
- Nasurudeen P, Kuruvila A, Sendhil R, Chandrasekar V (2006) The Dynamics and Inequality of Nutrient Consumption in India, *Indian Journal of Agriculture Economics*, Vol. 61, issue 3; pp. 362–373.
- Neumark-Sztainer D N, Story M, Resnick M D, Blum R W (1996) Correlates of Inadequate Fruit and Vegetable Consumption among Adolescents, *Preventive Medicine*, Vol. 25, issue 5; pp. 497–505.
- Panikar P G K (1980) Inter-regional variation in calorie intake, *Economic and Political Weekly*, Vol. 13, issue 41/43; pp. 1803–14.
- Prättälä R, Groth M V, Oltersdorf U S, Roos G M, Sekula W et al. (2003) Use of butter and cheese in 10 European Countries, a case of contrasting educational differences, *European Journal of Public Health*, Vol. 13, issue 2; pp. 124–132.
- Prättälä R, Paalanen L, Grinberga D, Helasoja V, Kasmel A et al. (2006) Gender differences in the consumption of meat, fruit and vegetables are similar in Finland and the Baltic countries, *European Journal of Public Health*, Vol. 17, issue 5; pp. 520–525.
- Radhakrishna R, Reddy V (2004) Food Security and Nutrition: Vision 2020, [Online] Available at: planningcommission.nic.in/reports/.../bkpap2020/16_Bg2020.pdf (accessed on 9 August 2010).
- Radhakrishna R (2006) Food Consumption and Nutritional Status in India: Emerging Trends and Perspectives, Working Paper, November, Indira Gandhi Institute of Development Research, Mumbai.
- Roos E, Lahelma E, Virtanen M, Prättälä R, Pietinen P (1998) Gender Socio economic status and family status as determinants of food behaviour, *Social Science Medicine*, Vol. 46, issue 12; pp. 1519–1529.
- Roos G, Johansson L, Kasmel A, Klumbiene J, Prättälä R (2001) Disparities in vegetable and fruit consumption: European cases from the north to the south, *Public Health Nutrition*, Vol. 4, issue 1; pp. 35–43.
- Ruel M T, Minot N, Smith L (2004) Patterns and determinants of fruits and vegetable consumption in Sub Saharan Africa: a multi-country comparison, Background paper for the joint FAO/WHO workshop on fruit and vegetables for health, 1–3 September, Kobe, Japan.
- Sanchez-Villegas A, Martinez J A, Prättälä R, Toledo E, Roos G et al. (2003), 'A systematic review of socioeconomic differences in food habits in Europe: consumption of cheese and milk', *European Journal of Clinical Nutrition*, Vol. 57, issue, 8; pp. 917–929.
- Shariff A, Mallick A C (1999) Dynamics of Food Intake and Nutrition by Expenditure Class in India, *Economic and Political Weekly*, Vol. 34, issue 27; pp. 1790–1800.
- Singh R K, Vishwakarma A, Singh P K (2006) Food Security and Policy Perspective in India, *Indian Journal of Agricultural Economics*, Vol. 61, issue 3.

- Sobal J (2005) Men, Meat and Marriage: Models of masculinity, Food and Food-ways, Vol. 13, issue 1; pp. 135-158.
- Subramanian S, Deaton A (1990) Gender effects in Indian food consumption patterns, Research Programme in Development studies, Discussion Paper 147, Princeton University.
- Suryanarayana M H (2009) Nutritional norms for poverty: issues and implication, Concept paper prepared for the Expert Group to Review the Methodology for Estimation of Poverty, Indira Gandhi Institute of Development Research: Mumbai.
- Swaminathan M S (2006) National Commission on farmers, fifth and final report, 4 Oct, Vol. I, Government of India.
- Thomson C (1985) The power to pollute and the power to preserve: perceptions of females in a Hindu village, Social Science and Medicine, Vol. 21, issue 6; pp. 701-711.
- Thorat S, Lee J (2010) Food Security Schemes and Caste Discrimination In Thorat S and Newman K S, ed. Blocked by caste: Economic discrimination in modern India, Oxford University Press, New Delhi.
- Tucker K, Spiro A III, Weiss S T (1995) Variation in Food and Nutrient Intakes among Older men: Age, and other socio-demographic factors, Nutrition Research, Vol. 15, issue 2; pp. 161-176.
- Viswanathan B (2001) Structural breaks in consumption patterns: India 1952-1991, Applied Economics, Vol. 33, issue 9; pp. 1187-1200.
- Waibel Ruth A (2011) Religion and Dietary Practices, [Online] Available at: <http://www.faqs.org/nutrition/Pre-Sma/Religion-and-Dietary-Practices.html> (accessed 4 June 2011).
- Yang X, Hsu-Hage B H-H, Tian H, Hu G, Dong Q et al. (1998) The role of income and education in food consumption and nutrient intake in a Chinese population, Asia Pacific Journal of Clinical Nutrition, Vol. 7, issue 3/4; pp. 217-223.