



SCHOOL OF ECONOMICS AND FINANCE

Discussion Paper 2007-01

**Dietary Changes, Calorie Intake and Undernourishment:  
A Comparative Study of India and Vietnam**

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ISSN 1443-8593

ISBN 978-1-86295-410-6

# **Dietary Changes, Calorie Intake and Undernourishment: A Comparative Study of India and Vietnam\*.**

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July 2007

\*Paper prepared for International Seminar on “Revisiting the Poverty Issue: Measurement, Identification and Eradication” in Patna, India, July 20-22, 2007. I am grateful to the seminar participants, especially the discussants, for their comments. I also acknowledge support provided by ARC Discovery Grant and the research assistance of Vinod Mishra.

## **Abstract**

This paper examines the changes in the nature and quantity of Food consumption in India during the reforms decade of the 1990s, and analyses their implications for calorie intake and undernourishment. The study documents the decline in cereal consumption, especially in the urban areas, and provides evidence that suggests an increase in the prevalence of undernourishment over the period, 1987/88 – 2001/2002. The results also point to a significant number of households, even in the top expenditure decile, suffering from under nourishment. This calls for a reassessment of the current strategy of directing the Targetted Public Distribution System (TPDS) exclusively at households “below the poverty line” (BPL). This study shows that, both as a source of subsidised calories and as a poverty reducing instrument, the PDS is of much greater importance to the female headed households than it is to the rest of the population. Another important result is that, notwithstanding the sharp decline in their expenditure share during the 1990s, Rice and Wheat continue to provide the dominant share of calories, especially for the rural poor. The Indian experience is in sharp contrast to that in Vietnam which witnessed a large increase in calorie intake and, consequently, a decrease in the prevalence of undernourishment in the late 1990s. The Vietnamese diet displayed increased diversification during the 1990s with a greater role for protein rich animal products and a more balanced diet of nutrients than in India.

**Keywords:** Calorie Intake, Prevalence of Undernourishment, Calorie Price Inflation, Public Distribution System, Backward Classes, Female headed Households.

**JEL Classification:** D12, I12, O18, O53.

## **1. Introduction**

There are few topics that are of greater importance to individual survival and human development than that of nutritional adequacy and food security. With the availability of improved and disaggregated survey information on food consumption, attention has shifted from an almost exclusive focus on monetary indicators such as poverty measures and per capita income to a range of measures that include non monetary indicators such as energy intake, dietary diversity and the prevalence of undernourishment. Strong empirical support for such a shift in emphasis to a more encompassing approach has been provided by the Vietnamese evidence presented in Baulch and Masset (2003) which shows that monetary and non monetary indicators do not always tell the same story.

The present exercise looks at the comparative experiences of India and Vietnam in the related areas of food security, dietary changes, calorie intake and the prevalence of undernourishment during the 1990s and the early part of the new millennium. While the focus of this study is on India, the comparison with Vietnam is instructive in view of several contrasts in their experiences. Both these countries have been pursuing economic reforms, with the Vietnamese initiating the “Doi Moi” reforms in the mid 1980s, while the Indian economic reforms started later in the early 1990s. The Vietnamese experience of a sharp fall in the prevalence of undernourishment and a rise in calorie intake contrasts with the Indian evidence presented here and in Sen (2005, Table 5) and Ray (2007, Table 12).

The 1990s witnessed widespread economic reforms and liberalisation in India. Much of the discussion on the effects of economic reforms in India has centred around the temporal movement in the poverty and inequality magnitudes [see, for example, Dubey and Gangopadhyay (1998), Meenakshi and Ray (2002), Bhalla (2003), Sen and Himanshu (2004), Ray and Lancaster (2005)]. Relatively little attention has been paid, until recently, to changes in the magnitude and pattern of Food consumption over the reforms period, even though such

changes ought to be linked to poverty movements via the calorie basis of the original definition of the poverty line in India [see Dandekar and Rath (1971)]. However, as Ray and Lancaster (2005) have shown, the link has weakened to the extent that the official poverty line in India today is quite out of step with that based on the household's minimum calorie requirements.<sup>1</sup> This is reflected in a dissonance, even contradiction, between the expenditure based poverty magnitudes and the calorie based measures of hunger or under nourishment.<sup>2</sup>

This points to the need to analyse the magnitude and trend in Food, especially Cereals, consumption over the reforms period in India in view of their strong implications for Food and nutrition security. Such an analysis, which is the main motivation for this study, is necessitated by the failure of expenditure and income based poverty magnitudes to depict the true picture on Food and nutrition security in a period of significant changes in the nature of Food consumption with strong implications for the household's calorie intake. This study provides evidence, at both state and All India levels, on the magnitude and trends in Food consumption. It, then, uses calorie conversion factors to calculate calorie intake and, from them, estimates of under nourishment in both urban areas and the rural countryside. The prevalence of under nourishment (POU) is measured by the percentage of households who are unable to meet their daily calorie requirement.<sup>3</sup>

This paper is a contribution to the recent literature on Food security and calorie intake in India during the reforms period [for example, Meenakshi and Vishwanathan (2003), Radhakrishna (2005), Rao, N. (2005), Rao, C.H.H. (2005), Chand (2005), Ray and Lancaster (2005), Sen (2005), Suryanarayana and Silva (2007),].<sup>4</sup> Apart from extending the recent evidence to the new millennium by considering the 57<sup>th</sup> round (2001/2) of the National

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<sup>1</sup> See, also, Subramanian (2005) for an analytical critique of the methodology generally adopted in India for calculating poverty.

<sup>2</sup> See Coondoo, Lancaster, Majumder and Ray (2005).

<sup>3</sup> See Sen (2005) for a comprehensive critique of the calorie norm concept and its relevance in the context of poverty calculations and the poverty debate in India.

<sup>4</sup> See Shah (1983) for earlier evidence (1967/68) on food consumption and undernourishment in the state of Kerala in South India.

Sample Survey, this study has the following features. It presents the magnitude and trend in the quantities and expenditure shares of the principal items of Food consumption, works out the corresponding calorie intake and calorie shares of the Food items, and then calculates the magnitude of under nourishment during the reforms period. The study pays special attention to the calorie intake of two minority groups, namely, female headed households and the backward classes. Evidence is presented on the role of the public distribution system (PDS) in providing cheap calories to the household, especially those belonging to these minority groups. This is a topic of some policy importance in the Indian context in view of recent discussions on the effectiveness of the PDS as an anti hunger strategy, and the efforts to target the PDS exclusively at households “below the poverty line” (BPL). The results of this study suggest that such a strategy may be counter productive since a lot of households that are “above the poverty line” (APL), especially in the rural areas, suffer from under nourishment. Such APL households are missing out on the provision of subsidised Rice and Wheat, via the PDS, because they are now outside the purview of this system.

The rest of this paper is organised as follows. While Section 2-5 relate to India, Section 6 relates to Vietnam. Section 2 describes the Indian data sets and reports the State wise changes in the per capita consumption of the principal Food grain items and of the composition of Food expenditure between 1987/88 and 2001/2. Section 3 analyses the nutritional implications of the changes in the Food expenditure pattern, presents the calorie share of each Food item in the household’s total intake of calories and reports the movement in these calorie shares in India over the sample period. The importance of the PDS in providing subsidised calories in India and its effectiveness as an anti poverty strategy is examined in Section 4 with special reference to the female headed households and the backward classes. Section 5 presents and discusses the State wise changes in the magnitude of under nourishment in India between 1987/88 and 2001/2. Section 6 reports the comparable

Vietnamese experience on calorie intake and under nourishment. Section 7 concludes the paper.

## **2. Changes in Indian Food Consumption**

The Indian data sets used in our analysis are from the 43<sup>rd</sup> (July, 1987 – June 1988), 50<sup>th</sup> (July, 1993 – June, 1994), 55<sup>th</sup> (July, 1999 – June, 2000) and 57<sup>th</sup> (July, 2001 – June, 2002) rounds of the National Sample Survey (NSS). The 55<sup>th</sup> round data provides information, at the household level, on calorie intake. These, in conjunction with the conversion factors of Indian foods provided in Gopalan, et.al. (1999), were used to calculate calorie consumption figures in the other rounds. In the present study, we have overlooked the distinction between the “availability” and the actual “intake” of calories, in the absence of necessary information. Another potential complication that we have overlooked is the possible non comparability between the 30 day food expenditure figures in NSS round 55 with those in the other rounds because of the inclusion of questions on the seven-day recall figures on food expenditure in the same questionnaire [Sen (2000)]. It is difficult to speculate on the nature and magnitude of the bias, if any, in the 30 day consumption figures in round 55 since, as Sen (2000) found, “because the RSEs ... do not differ very substantially for these item groups (food, pen, tobacco and intoxicants), the RSE criterion does not really clinch the issue...” (pgs. 4507/4508)<sup>5</sup>. Also, as Sen and Himanshu (2004) point out, “on proper comparison 55<sup>th</sup> round results agree reasonably with trends from other NSS rounds during the 1990s, testifying to the integrity of NSS field operations....”, (p. 4249).

Tables 1, 2 report the State wise changes in the monthly per capita consumption (kgs.) of the principal Food items between 1987/88 (Round 43) and 2001/2 (Round 57) in the rural, urban areas respectively. The following features are worth noting. First, Cereals consumption

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<sup>5</sup> Note, however, that the present study is mostly based on a comparison between NSS rounds 43 and 57 for which this is not an issue. Moreover, the bias is more likely to be felt in case of the non Food items which are not considered here.

is generally much higher in the rural areas than in the urban, mainly due to the higher consumption of Rice by the rural household. The reverse is the case for Meat/Fish/Eggs and Fruits/Vegetables. Second, there has been a marked decline in the consumption of all the Cereal items over the period, 1987/88 – 2001/2 in nearly all the States and in both rural and urban areas, with the reduction being particularly sharp in case of the smaller Cereal items, namely, barley, maize and cereal substitutes such as tapioca. Third, there has been a switch in preferences towards non Cereal items such as Meat/Fish and Fruits/Vegetables and, once again, this picture holds generally.

These features are confirmed in Table 3 which presents the All India average values of both the (monthly) Food consumption quantities and the Food expenditure shares at the beginning (1987/88) and end (2001/2) of our sample period. The Engel Food share in total expenditure, also, registered a sharp decline over this period, especially in the urban areas. While some, such as Rao, C.H. (2005), have interpreted these movements as evidence of urbanisation and increased household affluence, others such as Mehta and Venkatraman (2000), have argued that such changes have been involuntary reflecting the loss in access to common property resources by the rural poor. Whatever the underlying factors causing these changes, these have led to significant declines in calorie consumption, as we report later, due to the switch from calorie intensive cereal items to non Cereals which are more expensive sources of calories.

### **3. Calorie Share of Items in India**

The switch in Food spending throughout the 1990s from Cereals, which are a source of cheap calories, to more expensive calorie sources such as Meat, Fish and Eggs and Fruits/Vegetables, resulted in a decline in calorie intake as documented in, for example, Ray and Lancaster (2005), Rao, C.H. (2005). While the previous section reported the decline in



Cereal consumption in both absolute quantities and in terms of expenditure share over the period, 1987/88 – 2001/2, this raises the question: how did the composition of the household's total calorie intake from the various items change during this period? The answer is provided by Table 4 which reports, at the All India level, the temporal movement in the calorie shares during this period. The sharp decline in Cereals consumption, evident in the earlier discussion, did not translate into declines of similar magnitude in case of the calorie shares of Rice and Wheat. In fact, in the rural areas, while the calorie shares of Rice registered an increase, that of Wheat fell over the period, 1987/88 – 2001/2. The calorie share of the composite item, called "Other Cereals", consisting of the smaller cereal items such as barley, maize and tapioca, recorded larger declines in both rural and urban areas over this period. Another feature worth noting is that, notwithstanding the sharp rise in the consumption of Meat, Fish & Eggs during the 1990s, the calorie share of this composite item remained virtually unchanged around an insignificant 1%. There has been a modest increase in the calorie share of Fruits and Vegetables which, from the nutritional viewpoint, strongly dominated Meat, Fish & Eggs in importance. A comparison of the calorie shares in Table 4 with the expenditure shares in Table 3, shows that Cereals, as a whole, is far more calorie important in the Indian diet than is revealed by the expenditure share figures. The calorie importance of Cereals (as a whole) fell only marginally during the reforms period and that too due to the marked decline in the calorie share of the smaller cereal items. In both rural and urban areas, the PDS items, Rice and Wheat, together, continued to supply well over 50% of the household's total calorie intake.

Further insight into the nutritional importance of the various Food items is provided in Table 5 which reports their calorie shares by the three expenditure percentile groups, namely, the bottom 30%, middle 40% and the top 30% of households in the per capita expenditure distribution. The calorie share of Rice goes down with increasing affluence in both rural and

urban areas but, in the case of Wheat, this is so only in the urban areas, not in the rural. Consistent with the expenditure shares presented earlier, Rice contributes a greater share of calories in the rural areas than in the urban, but the reverse is the case for Wheat. Note, incidentally, that the calorie content of the Indian food diet is spread more evenly between Rice and Wheat in the urban areas than in the rural, suggesting a greater diversification in the dietary pattern of the urban household, both within and beyond Cereals. Note, also, that the relative insignificance of Meat, Fish and Eggs in the calorie content, that was noted earlier, holds for all the three expenditure percentiles and that, in comparison, Fruits and Vegetables are of much greater importance in the Indian diet.

#### **4. Role of the Public Distribution System (PDS) in Providing Cheap Calories in India**

The Public Distribution System (PDS) in India is quite unique in terms of the extent and intensity of its coverage.<sup>6</sup> With a network of about 4.75 lakh Fair Price Shops (FPS) in 2004, the PDS is possibly the largest distribution network of its type in the world. It is a major instrument in the government's anti poverty programme and serves as a safety net for the poor. Responding to criticisms that the PDS has an urban bias and fails to serve the poor, the government introduced in June, 1997 the targeted PDS (TPDS) which distinguished between "below the poverty line" (BPL) and "above the poverty line" (APL) families in setting the quantity and issue price of the subsidised food grain items. In a further tightening of the public distribution system, the government introduced on December 25, 2000, the "Antyodaya Anna Yojana" (AAY) scheme that makes the TPDS more focussed by targeting the very poor, i.e. the destitute, who formed a population of one crore families out of a total of 6.52 crore BPL families covered under TPDS.

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<sup>6</sup> See, however, Thorat and Lee (2005) for a recent account of the patterns of exclusion and caste discrimination that afflict the PDS in several parts of India.

The role of the PDS has figured prominently in discussions on the economic reforms undertaken in India in the 1990s. Table 6 provides some evidence on this issue by reporting the share of the household's intake of calories that is contributed by the PDS.<sup>7</sup> The calculations were performed not only State wise and for all households but, also, separately for the female headed households and the backward classes. Table 6 shows that the importance of the PDS in supplying inexpensive calories to the household varies sharply between the constituent states of the Indian Union. For example, a much larger share of the total calorie intake is supplied through the PDS in the southern States, especially Kerala and Tamil Nadu, than in the northern States such as Punjab, Rajasthan, Haryana and Bihar.<sup>8</sup> This is partly due to the caste based discrimination and exclusion prevailing in the northern states that allow the backward classes very limited access to the PDS. Another feature that is apparent from Table 6, is that, in the calorie poor states though not everywhere, the female headed households and the backward classes obtain a greater share of their total calories from their PDS food rations than the rest of the population. Since these minority groups are more poverty prone than the others [see, for example, Meenakshi and Ray (2002), Ray and Lancaster (2005)], this feature needs to be kept in mind in the ongoing debate on the future of the PDS. A comparison of the calorie shares of the PDS items between NSS rounds 50 (1993/94) and 55 (1999/2000) reported in Table 6 shows that, notwithstanding the market driven agenda of economic reforms and the sharp rise in the issue prices of Rice and Wheat [see Rao, C.H. (2005, p. 190)], there is not much evidence of any significant decline in the importance of PDS in supplying calories to the household especially at the All India level.

Further evidence on the role of PDS in calorie consumption is contained in Table 7 which presents the average per capita calorie intake in the rural areas in NSS round 55 (1999/2000), and its breakdown between the open market and the PDS. This table suggests

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<sup>7</sup> The evidence relates to the sub period, 1993/94 – 1000/2000, because the question of whether to keep the PDS in its present form was a live issue in the second half of the 1990s, not in the earlier or the later period.

<sup>8</sup> See Dreze and Sen (1995, Appendix Table A3) for similar evidence for the earlier, pre reform year 1986/87.

that the backward classes generally record lower calorie intake than the female headed households and the other household groups. This table shows the calorie consumption by female headed households in a more favourable light, vis-à-vis that by the male headed households, than is actually the case. This is because the use of uncorrected household size as the calorie deflator tends to bias downward the per capita calorie intake of the male headed households which have more children and enjoy more size economies than the female headed households. As Meenakshi and Ray (2002) found on NSS expenditure data, the apparent relative affluence of the female headed household, vis-à-vis the others, is quickly reversed once we allow adult child relativities and household size economies via the use of adult equivalence scales as the expenditure deflator. Other notable features include the fact that the Southern states generally consume less calories than the Northern states [see, also, Ray and Lancaster (2005), Sen (2005)]. Also, in most regions, especially in the Southern states, the female headed households get more calories from the PDS than do the rest of the population. In other words, the PDS enjoys double importance in the female headed households since it supplies not only a greater share of the total calorie intake in such households, compared to the rest of the population (Table 6), but, also, supplies them more calories than it does to other households.

##### **5. Changes in Prevalence of Under Nutrition in India Between 1987/88 and 2001/2**

The Indian poverty lines for rural and urban population are based on calorie norms of 2400 and 2100 k cal per capita per day, respectively. The age-sex specific daily calorie requirements, corresponding to the overall rural calorie norm, are available from the website [www.Medindia.net](http://www.Medindia.net). These estimates are close to, though not exactly the same as, the energy allowances recommended by an Expert Group of the Indian Council of Medical Research [see ICMR (2002)]. The corresponding urban figures can be obtained by scaling down these

numbers by a factor, 0.875 (being the ratio of 2100 and 2400). A household is classified as (calorie) poor (non poor) if its observed calorie intake turns out to be less (more) than the required amount. The prevalence of under nutrition (POU) is, then, measured as the percentage of households who are unable to meet their daily calorie requirement.

The estimates of POU in rural and urban India in NSS rounds 43 (1987/88) and 57 (2001/2) are presented in Tables 8, 9 respectively. These estimates are much higher than the expenditure based poverty magnitudes using the official poverty line [see Ray and Lancaster (2005)]. Many argue that the POU and the expenditure based poverty estimates are not directly comparable, since while the former measures “hunger”, the latter measures the failure to buy a minimum bundle of items, both Food and non Food, necessary for survival. The POU measure has been used extensively by the FAO in world wide calculations of hunger [FAO (1992)]<sup>9</sup> and in the case of individual countries and regions [Harriss (1990)].<sup>10</sup>

Tables 8, 9 suggest that in India over the period, 1987/880 – 2001/2, there has been rising hunger, i.e. increasing failure to meet the calorie requirement at the household level. This upward trend is a continuation of that observed between NSS rounds 43 (1987/88) and round 55 (1999/2000), reported in Coondoo, Lancaster, Majumder and Ray (2005). For example, at the All India level, the rural POU rate increased from 48.16% in 1987/88 to 66.90% in 2001/2. The rise in hunger or undernourishment stands in sharp contrast to much of the evidence from the expenditure based poverty literature, and used routinely in poverty debates on India, suggesting a decline in poverty over this period. Moreover, as the NSS based calculations reported in Coondoo, et.al. (2005, Table 7) show, the POU rates, which measure calorie deprivation, exceed the official poverty line based poverty rates by a large margin in each of the last three large survey rounds of the NSS, namely, Round 43 (1987/88), 50 (1993/94), and 55 (1999/2000). This is confirmed by Tables 8, 9 which present (for

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<sup>9</sup> See Svedberg (2000) for a critique of the FAO method of measuring under nutrition.

<sup>10</sup> See, also, the articles in the volume edited by Osmani (1992).

comparison) the head count poverty rates in NSS Round 43 as calculated and reported in Sen and Himanshu (2004). This raises serious questions about the continued usefulness of the official poverty line today as a measure of the true cost of purchasing the minimal calorie requirement, an issue that has been discussed extensively in Ray and Lancaster (2005) and Sen (2005)<sup>11</sup>. Tables 8, 9, also reveal sharp differences between states on changes to the POU with states such as (rural) Assam and (rural) Bihar improving their state of under nourishment, while Orissa and Andhra Pradesh have fared badly in both rural and urban areas. Consistent with previous evidence, the rural POU exceeds its urban counterpart, largely reflecting the higher calorie requirements in the countryside due to the nature of work done in the rural areas.

There has been, principally, three criticisms made of the use of the calorie based POU measures. The first is based on the belief that the calorie requirements have come down over the years due to lower requirements of physical labour in various occupations. The second criticism made by, for example, Svedberg (2000), is that the POU estimates used in these FAO type exercises are wildly sensitive to the a-priori specified minimum calorie requirements. The third criticism, made by Coondoo, et.al. (2005) and Sen (2005), is that the exclusive reliance on the calorie norm as a unidimensional requirement overlooks the considerations of a “balanced diet” and the possibility of substitution between the micronutrients such as fat, carbohydrates and protein in the production of the calories. The first type of criticism does not have much operational significance since, to my knowledge, no serious physiological study exists, at least in the Indian context, that seeks to scientifically quantify and revise the calorie requirements over time. Moreover, as Sen (2005, p.4612) argues, “although it is true that both the population structure and the intensity of labour effort have changed for the population as a whole, there is no evidence to show that such is the case

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<sup>11</sup> See, also, Ray (2007) for evidence on the divergence between calorie price inflation and consumer price inflation during the 1990s.

for the population around the poverty line”. To examine the second criticism, we perform a sensitivity exercise by repeating the calculations at 80% of the original calorie requirements. This was done for all the major States in each of ten decile groups of households arranged in increasing order of affluence in the expenditure distribution. Tables 10, 11 present the POU estimates for households in the rural and urban areas, respectively, at the bottom (0-10%) and top (90-100%) deciles of the expenditure distribution, using two different vectors of age and gender specific calorie requirements. There is some support to Svedberg (2000)’s point about the high sensitivity of the POU estimates though such variation, also, reflects differences between the magnitude of mild and severe under nutrition. The rural POU exceeds the urban POU almost everywhere. Another feature worth noting is the significant number of households, even in the top expenditure decile, who are unable to meet their daily calorie requirement. For example, in the rural areas, West Bengal, Orissa and Andhra Pradesh stand out for their high POU in the top expenditure decile group, even when the calorie requirement is reduced to 80% of the original values. The obvious policy significance of this result is that, in restricting access to it to only the households that are “below the poverty line” (BPL), the PDS may be missing out several undernourished households that are above the poverty line (APL). Give the positive role that PDS can play in enhancing calorie intake, by providing subsidised Rice and Wheat through the “fair price” shops, there is clearly room for designing a more effective targeting strategy for the PDS than simply restricting it to BPL households, and missing out on APL households altogether. A similar comment applies to the mid day meal scheme for school children that is operational in several parts of India and is a useful tool for enhancing the nutrient intake of children in under nourished households.

## **6. The Comparable Vietnamese Experience on Dietary Diversity and the Prevalence of Undernourishment**

The Vietnamese evidence, which will be reported and discussed in more detail in Mishra and Ray (2007), is based on the three Vietnamese Living Standard Surveys (VLSS) that were carried out in 1992/93, 1997/98 and 2004. These results add to the growing literature on food security and calorie consumption in Vietnam [see, for example, Hop (2003), Dien, Thang and Bentley (2004), Thang and Popkin (2004), Molini (2006)]. There have been several private and public initiatives to enhance food security in Vietnam in the 1990s. For example, the Dutch foundation, WOTRO, under its programme, Nutrition and Health, 1995-99, undertook a project entitled, “Nutritional Status and health of Women in relation to Household Food Security in Urban and Rural Vietnam”. The Government of Vietnam, formulated in 1990/91, a new Socio Economic strategy for the period up to 2000 designed to improve the nutritional levels for the whole community. As Hop (2003) notes, and the present results confirm, “the population’s dietary intakes have clearly improved in terms of both quality and quantity”.

The median figures for per capita daily calorie intakes in the various regions and for Vietnam as a whole have been presented in the top half of Table 12, with the corresponding figures for households below the food expenditure poverty line reported in the lower half of this table. After recording a small decline in calorie intake in most regions during the first half of the 1990s., there was a sharp increase in the period from the late 1990s to the middle of the present decade. The increase has occurred in all regions and for both poor and non poor households, though much more spectacularly in the urban than in the rural areas. A quick comparison with the monthly calorie consumption levels in rural India presented in Table 7 suggests that the Vietnamese enjoyed higher calorie consumption levels. Figures 1, 2 which



provide the kernel density plots, confirm that there has been an all round improvement in calorie consumption in Vietnam between 1992/93 and 2004.

It has been argued, however, by nutritionists and others [see Sen (2005), Coondoo, et.al. (2005)] that a simple comparison of calorie levels can be misleading since the calorie quality, underpinned by dietary diversity or the lack of it, may differ. To provide some evidence on this issue, Table 13 reports the movements in the calorie shares of the various Food items. These show that, after a period of sluggish movement in the early 1990s, there was a sharp diversification in the calorie sources of the Vietnamese diet in the late 1990s and the early part of the new millennium. The fact that this parallels the movements in calorie intake reported in Table 12, confirm the finding in Hoddinott and Yohannes (2002) that an increase in dietary diversity is associated with an increase in calorie intake. Note, in particular, that while the calorie share of Rice declined sharply in the late 1990s, Meat, which is rich in protein and other micronutrients, was providing a significant share of the total calorie intake by 2004, a much greater share than in the Indian diet [see Table 4]. This confirms the observation of Hop (2003), noted above, on the qualitative and quantitative improvements in the Vietnamese dietary habits in the late 1990s. In contrast, Table 4 does not reveal much movement in the calorie composition of the Indian diet over the longer period, 1987/88 – 2001/2.

The contrasts between the Indian and Vietnamese experiences is further highlighted by Tables 14, 15 which provide the POU rates in the various regions (Table 14) and across the various expenditure percentiles in Vietnam (Table 15). Mirroring the upward movement in calorie intake levels, reported in Table 12, the POU rates fell sharply in the late 1990s after recording small movements in the first half. Table 15 confirms the sharp downward movement in the POU rate as we move up the expenditure distribution. This suggests a much greater consistency between under nutrition and expenditure based poverty than in the Indian

case. Note, however, that even in 2004, a significant minority of urban households in Vietnam (approximately 20%) in the top half of the expenditure distribution were unable to meet their daily calorie requirement.

## **7. Concluding Remarks**

This study examines the changes in the nature of household spending on Food in India over a time period that stretches from the late 1980s to the early part of the new millennium. Special attention was paid to the minority groups (typically, widows) and the backward classes. The paper analyses the implications of the consumption of the various Food items for calorie intake and the prevalence of undernourishment. The Indian experience is compared with that of Vietnam over a similar period. Both these countries undertook significant economic reforms, with the Vietnamese initiating the “Doi Moi” reforms in the mid 1980s, while the Indian reforms started later in the early 1990s.

The contrasts between the Indian and Vietnamese experiences are striking. While the Indian budget surveys show a decline in calorie intake and rise in undernourishment levels throughout the 1990s, the Vietnamese data shows the exact reverse with a sharp increase in calorie intake in the late 1990s. In addition, the Vietnamese diet showed much greater changes in favour of increased diversity with an increased share of protein rich animal products than happened in case of India. Moreover, while undernourishment is almost exclusively restricted to households in the lower expenditure percentiles in the Vietnamese context, this is not the case in India. Our results show that, on the basis of age and gender specific calorie requirements set out by the Indian Council of Medical Research, a significant number of affluent Indian households, i.e. in the top 10% of the expenditure distribution, are unable to meet their calorie requirements. This raises a serious policy issue in the Indian context since, with the sets of calorie deprived and expenditure poor households non

overlapping to such a large extent, one needs a comprehensive set of measures to reach both types of households.

The Indian results underline the important role that the public distribution system (PDS) plays in enhancing calorie intake and reducing hunger. The results of this study call for a better targeting strategy than simply restricting it to BPL households and, thereby, missing out on all undernourished APL households. The fact that female headed households, and the backward classes rely more on the PDS than the others provides further ground for the belief that, by simply restricting it to BPL households, the PDS may be losing its effectiveness in providing Food and nutrient security.

**Table 1: Per Capita Food Consumption<sup>(a)</sup> (kg./30 days) in Rural Areas in India**

State	Food Items																							
	Rice		Wheat		Other Cereals <sup>(b)</sup>		Pulses		Dairy		Edible Oils		Meat/Fish/Eggs		Vegetables/Fruits		Sugar/Spices		Processed Food		Beverages		Total Cereals	
	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002
Andhra Pradesh	11.8	11.2	0.1	0.2	2.3	0.9	0.8	0.7	2.5	3.7	0.4	0.5	1.7	2.3	6.2	9.0	1.4	1.3	1.1	2.1	2.3	8.0	14.3	12.3
Assam	13.7	12.7	0.9	0.7	0.0	0.0	0.8	0.7	1.5	1.7	0.3	0.5	1.9	2.8	10.0	13.0	1.2	1.1	0.7	1.1	2.8	3.2	14.5	13.3
Bihar	9.1	7.9	5.6	6.1	1.1	0.5	1.1	0.7	1.7	2.4	0.3	0.4	0.5	0.7	6.7	9.7	1.0	0.9	0.3	0.8	0.9	3.2	15.8	14.5
Gujarat	2.0	2.1	4.8	4.1	5.6	3.5	1.0	0.9	4.7	6.1	0.7	1.0	0.3	0.4	6.2	9.4	1.9	1.8	0.3	1.3	1.4	2.5	12.4	9.7
Haryana	0.8	0.7	13.5	8.8	0.5	0.3	0.9	0.6	12.6	12.8	0.3	0.4	0.3	0.1	7.0	10.7	2.5	1.9	0.3	3.0	2.9	4.2	14.8	9.8
Himachal Pradesh	4.3	4.8	7.3	5.9	4.5	1.9	1.6	1.4	8.5	8.9	0.6	0.7	0.6	0.8	6.1	8.8	1.9	1.8	0.2	1.7	2.5	4.6	16.1	12.5
Karnataka	5.3	5.7	0.8	1.1	7.9	4.5	1.0	0.9	2.9	3.3	0.3	0.5	0.9	1.8	7.3	10.1	1.8	1.5	0.8	1.2	4.1	7.7	14.0	11.2
Kerala	9.9	8.6	0.6	0.9	2.0	1.0	0.5	0.5	2.4	3.2	0.3	0.5	3.4	4.8	11.5	15.5	1.6	1.6	0.3	2.7	9.7	7.9	12.5	10.5
Madhya Pradesh	6.9	2.9	5.9	6.8	2.9	1.7	1.3	0.9	2.4	3.6	0.3	0.5	0.3	0.3	5.6	7.1	1.5	1.3	0.3	1.1	1.2	2.5	15.7	11.3
Maharashtra	3.0	3.6	2.4	3.0	7.7	4.5	1.2	1.1	2.5	2.8	0.5	0.7	1.0	1.5	6.2	9.9	1.7	1.7	0.3	4.6	2.4	3.2	13.2	11.1
Orissa	14.7	13.3	0.6	0.4	0.9	0.5	0.5	0.5	0.8	0.6	0.2	0.3	0.5	0.8	6.8	7.8	1.1	0.9	0.3	2.7	0.5	1.6	16.1	14.3
Punjab	0.8	0.9	11.2	9.2	0.4	0.3	1.1	0.8	13.6	11.8	0.5	0.7	0.8	0.6	8.4	9.3	3.0	2.3	0.2	0.8	3.9	2.7	12.4	10.3
Rajasthan	0.2	0.2	12.5	8.2	4.4	4.4	0.7	0.6	7.2	10.7	0.4	0.5	0.2	0.5	4.0	6.8	2.2	1.8	0.2	1.0	2.1	2.1	17.0	12.8
Tamil Nadu	10.1	10.0	0.2	0.3	2.5	0.4	0.8	0.8	1.6	2.1	0.3	0.5	1.1	2.3	6.7	9.7	1.5	1.3	0.9	1.8	4.4	11.7	12.9	10.7
Uttar Pradesh	3.9	3.8	10.7	8.4	1.0	0.4	1.3	0.9	4.5	4.4	0.4	0.5	0.4	0.6	7.7	8.6	1.7	1.3	0.2	1.6	0.9	2.3	15.6	12.7
West Bengal	13.6	12.0	1.5	1.1	0.0	0.0	0.5	0.5	1.4	1.8	0.3	0.5	1.9	3.9	8.5	11.3	1.1	1.1	0.3	2.6	1.7	4.7	15.1	13.1

(a) Source: Own Calculations Based on NSS Rounds 43,57.

(b) Other Cereals consists of smaller cereal items such as barley, maize and cereal substitutes (e.g. tapioca).

**Table 2: Per Capita Food Consumption<sup>(a)</sup> (kg./30 days) in Urban Areas in India**

State	Food Items																							
	Rice		Wheat		Other Cereals <sup>(b)</sup>		Pulses		Dairy		Edible Oils		Meat/Fish/Eggs		Vegetables/Fruits		Sugar/Spices		Processed Food		Beverages		Total Cereals	
	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002	1988	2002
Andhra Pradesh	10.3	9.2	0.7	0.8	0.5	0.3	0.9	0.8	3.9	4.1	0.5	0.6	2.5	2.9	10.0	12.8	1.5	1.3	2.0	3.3	5.9	12.6	11.5	10.2
Assam	10.5	9.4	1.3	1.4	0.0	0.0	1.1	0.8	2.1	1.8	0.5	0.7	3.0	3.7	12.3	13.8	1.3	1.1	0.4	6.8	6.4	16.0	11.9	10.8
Bihar	7.7	5.8	5.8	6.0	0.2	0.0	1.2	0.9	2.5	3.9	0.4	0.6	1.1	1.6	10.0	14.3	1.2	1.1	0.2	3.4	2.7	10.4	13.7	11.8
Gujarat	2.3	1.8	5.7	4.9	1.6	1.2	1.2	0.9	6.2	7.5	1.0	1.1	0.7	0.8	8.9	11.3	1.8	1.6	0.2	3.0	3.5	7.9	5.2	7.9
Haryana	6.8	1.0	10.1	7.9	0.1	0.0	1.1	0.7	8.7	9.3	0.6	0.7	1.4	2.9	12.6	15.3	1.9	1.9	0.3	1.8	8.5	6.2	17.0	8.9
Himachal Pradesh	3.8	3.5	6.2	5.7	0.4	0.2	1.6	1.2	7.7	8.8	0.6	0.7	2.3	1.9	13.6	11.7	1.8	1.5	0.3	9.2	6.3	13.8	10.3	9.4
Karnataka	5.6	5.1	1.4	1.8	3.1	2.2	1.0	1.0	3.9	5.1	0.4	0.6	1.7	2.2	9.7	14.1	1.6	1.5	2.3	4.4	6.2	11.5	10.1	9.0
Kerala	7.9	7.2	0.9	1.0	0.6	0.4	0.6	0.6	3.5	4.2	0.4	0.5	4.9	5.3	14.1	16.5	1.6	1.6	0.2	9.5	9.7	13.4	9.4	8.6
Madhya Pradesh	3.9	2.3	7.3	7.5	0.5	0.2	1.4	0.9	4.5	4.8	0.6	0.7	1.3	1.0	10.6	10.5	1.8	1.6	0.3	1.8	5.9	6.9	11.7	10.0
Maharashtra	2.9	3.2	4.3	4.0	2.4	1.2	1.2	1.0	4.8	5.3	0.7	0.9	2.4	2.4	13.4	14.2	1.7	1.5	0.7	5.1	6.6	12.9	9.6	8.4
Orissa	10.6	10.2	2.3	2.1	0.1	0.0	0.8	0.8	2.3	2.7	0.4	0.5	1.8	2.2	11.5	15.3	1.5	1.2	0.4	4.1	3.4	8.0	13.0	12.4
Punjab	1.2	1.3	8.7	7.8	0.1	0.0	1.2	0.9	10.1	10.6	0.7	0.7	1.3	2.2	12.5	13.0	2.3	2.0	0.3	4.9	8.6	13.0	10.0	9.1
Rajasthan	0.6	0.6	11.4	9.2	0.8	0.9	0.9	0.7	7.3	7.7	0.6	0.7	0.7	1.0	9.9	11.3	2.1	1.6	0.2	2.0	6.4	6.5	12.7	10.7
Tamil Nadu	8.9	8.1	0.7	0.6	0.2	0.1	0.9	0.9	3.3	4.0	0.4	0.5	2.9	3.7	11.2	12.5	1.6	1.4	1.7	5.5	6.6	12.5	9.8	8.8
Uttar Pradesh	2.5	2.5	8.9	7.3	0.1	0.1	1.2	0.9	5.3	5.9	0.5	0.6	1.0	1.5	13.0	13.4	1.7	1.4	0.4	2.2	4.4	7.0	11.5	9.9
West Bengal	8.3	7.3	2.9	2.4	0.0	0.0	0.7	0.6	2.8	2.9	0.5	0.7	3.3	5.0	11.9	16.6	1.2	1.1	0.7	8.0	5.5	15.3	11.3	9.7

(a) Source: Own Calculations Based on NSS Rounds 43,57.

(b) Other Cereals consists of smaller cereal items such as barley, maize and cereal substitutes (e.g. tapioca).

**Table 3: All-India Mean Consumption and Expenditure Shares**

Food Items	Urban			Rural		
	1988	2002	Change (%)	1988	2002	Change (%)
	(Round 43)	(Round 57)		(Round 43)	(Round 57)	
<i>Consumption/Capita (kg/30 days)</i>						
Rice	5.65	4.85	-14.2	7.35	6.79	-7.7
Wheat	4.57	4.03	-11.70	4.80	4.05	-15.7
Other Cereals	0.83	0.56	-32.5	2.59	1.38	-46.8
Total Cereals	11.05	9.44	-14.5	14.74	12.22	-17.2
Pulses	1.06	0.86	-18.8	0.97	0.77	-20.9
Dairy	4.52	5.25	16.2	3.34	3.94	17.9
Edible Oils	0.56	0.69	23.6	0.35	0.51	45.4
Meat/Fish/Eggs	2.01	2.49	23.8	0.91	1.50	65.6
Veg/Fruit	11.46	13.44	17.3	6.99	9.48	35.6
Sugar/Spices	1.63	1.46	-10.4	1.53	1.34	-12.7
<i>Share of Total Food Expenditure (%)</i>						
Rice	16.33	14.06	-13.9	24.97	21.32	-14.6
Wheat	9.07	8.70	-4.1	10.99	9.58	-12.8
Other Cereals	1.80	1.18	-34.4	5.87	2.83	-51.7
<b>Total Cereals</b>	27.20	23.94	-12.0	41.83	33.73	-19.3
Pulses	6.16	5.66	-8.1	6.48	6.31	-2.6
Dairy	13.23	15.71	18.7	9.87	12.02	21.8
Edible Oils	8.65	6.55	-24.4	7.41	6.53	-11.9
Meat/Fish/Eggs	5.37	5.58	4.0	4.27	5.34	25.1
Veg/Fruit	12.29	15.03	22.3	10.32	14.56	41.1
Sugar/Spices	8.12	7.44	-8.4	8.73	8.36	-4.2
Processed Food	13.59	13.49	-0.7	8.28	9.31	12.5
Beverages	5.38	6.61	22.8	2.83	3.83	35.5
<i>Share of Total Expenditure (%)</i>						
All Food	66.1	50.0	-24.4	72	60.9	-16.1

Source: Own calculations based on NSS Rounds 43, 57.

**Table 4: Changes in the Calorie Share (%) of Various Food Items in India between 1987/88 and 2001/2002**

<b>NSS Round</b>	<b>Rural Shares</b>											
	<i>Rice</i>	<i>Wheat</i>	<i>Other Cereals</i>	<i>Pulses</i>	<i>Dairy</i>	<i>Edible Oils</i>	<i>Meat/Fish/ Eggs</i>	<i>Veg/Fruit</i>	<i>Sugar/Spices</i>	<i>Processed Food</i>	<i>Beverages</i>	<i>Total Cereals</i>
Round 43 (1987/88)	38.0	22.40	12.90	4.6	5.0	4.4	0.7	4.0	5.8	2.0	0.1	<b>73.32</b>
Round 57 (2001/02)	42.98	18.04	7.07	4.03	6.48	7.27	1.02	5.73	5.87	1.31	0.20	<b>68.09</b>
	<b>Urban Shares</b>											
Round 43 (1987/88)	31.4	24.0	4.6	5.4	7.5	7.6	1.0	5.7	7.2	5.2	0.3	<b>60.08</b>
Round 57 (2001/02)	29.42	25.59	2.59	4.80	9.37	9.92	1.13	6.94	6.87	3.03	0.36	<b>57.60</b>

**Table 5: Calorie Share (%) of Various Food Items in India by Expenditure Class in 2001/2002**

<b>Rural</b>											
<i>Expenditure Class</i>	<i>Rice</i>	<i>Wheat</i>	<i>Other Cereals</i>	<i>Pulses</i>	<i>Dairy</i>	<i>Edible Oils</i>	<i>Meat/Fish/Eggs</i>	<i>Veg/Fruit</i>	<i>Sugar/Spices</i>	<i>Processed Food</i>	<i>Beverages</i>
Bottom 30%	46.28	17.10	9.82	3.69	3.52	6.75	0.78	5.42	5.36	0.94	0.32
Middle 40%	43.22	18.14	6.18	4.07	6.21	7.48	1.04	5.90	5.97	1.54	0.25
Top 30%	35.84	18.03	3.97	4.53	9.83	8.42	1.31	6.85	6.80	4.11	0.31
<b>Urban</b>											
<i>Expenditure Class</i>	<i>Rice</i>	<i>Wheat</i>	<i>Other Cereal</i>	<i>Pulses</i>	<i>Dairy</i>	<i>Edible Oils</i>	<i>Meat/Fish/Eggs</i>	<i>Veg/Fruit</i>	<i>Sugar/Spices</i>	<i>Processed Food</i>	<i>Beverages</i>
Bottom 30%	33.03	27.48	4.19	4.17	5.41	8.77	0.91	6.89	6.29	1.95	0.91
Middle 40%	28.69	24.50	1.75	4.83	9.07	10.39	1.16	7.18	6.95	4.99	0.50
Top 30%	20.76	20.13	0.65	5.11	12.78	10.47	1.27	7.96	6.92	13.17	0.79



**Table 6: Calorie Share of PDS Items in Rural Indian Households**

State	All Households		Female Headed Households		SC/ST Households	
	NSS Round 50 (1993/94)	NSS Round 55 (1999/00)	NSS Round 50 (1993/94)	NSS Round 55 (1999/00)	NSS Round 50 (1993/94)	NSS Round 55 (1999/00)
Andhra Pradesh	0.177	0.153	0.251	0.191	0.207	0.184
Assam	0.051	0.058	0.076	0.089	0.037	0.058
Bihar	0.022	0.022	0.021	0.027	0.022	0.026
Gujarat	0.093	0.076	0.108	0.094	0.126	0.105
Haryana	0.025	0.019	0.022	0.018	0.022	0.027
Himachal Pradesh	0.143	0.140	0.126	0.118	0.143	0.165
Karnataka	0.084	0.111	0.123	0.158	0.104	0.141
Kerala	0.303	0.280	0.325	0.313	0.345	0.392
Madhya Pradesh	0.038	0.042	0.043	0.052	0.041	0.050
Maharashtra	0.070	0.085	0.092	0.125	0.075	0.094
Orissa	0.021	0.112	0.021	0.150	0.020	0.123
Punjab	0.018	0.014	0.018	0.012	0.023	0.017
Rajasthan	0.067	0.024	0.062	0.049	0.074	0.027
Tamil Nadu	0.157	0.242	0.199	0.292	0.170	0.280
Uttar Pradesh	0.027	0.026	0.047	0.052	0.030	0.030
West Bengal	0.028	0.035	0.031	0.037	0.028	0.038
<b>All India</b>	<b>0.071</b>	<b>0.078</b>	<b>0.114</b>	<b>0.126</b>	<b>0.067</b>	<b>0.083</b>

**Table 7: Average Per Capita Monthly Calorie Consumption in Rural Indian Households in NSS Round 55 (1999/2000) <sup>(a)</sup>**

State	All Households			Female Headed Households			SC/ST Households		
	Non PDS	PDS	Total	Non PDS	PDS	Total	Non PDS	PDS	Total
Andhra Pradesh	53735	9679	63414	52874	12480	65355	49486	11155	60641
Assam	54623	4008	58632	53956	5248	59204	56274	3986	60260
Bihar	64948	1467	66415	73348	2061	75409	63141	1670	64811
Gujarat	57909	4783	62691	62071	6474	68545	52613	6142	58755
Haryana	74229	1413	75642	77430	1424	78853	66333	1822	68155
Himachal Pradesh	67572	11017	78589	73168	9786	82954	66136	13047	79183
Karnataka	56937	7082	64019	59404	11111	70515	48944	8007	56951
Kerala	45426	17696	63123	42742	19447	62189	36560	23536	60096
Madhya Pradesh	61866	2732	64598	66857	3636	70493	57845	3019	60864
Maharashtra	58121	5414	63536	61308	8763	70071	53359	5564	58923
Orissa	58381	7369	65750	57797	10203	68000	55181	7737	62918
Punjab	73298	1077	74375	76508	922	77430	66276	1135	67411
Rajasthan	74860	1862	76722	73257	3774	77032	72287	1986	74273
Tamil Nadu	44034	14058	58092	45116	18642	63758	38471	14957	53428
Uttar Pradesh	71567	1939	73506	70118	3825	73942	66240	2067	68307
West Bengal	62687	2244	64931	65908	2533	68441	60913	2381	63294
All India	61424	5241	66665	61051	8804	69855	58130	5273	63403

(a) The Non PDS/PDS breakdown refers to the split of the total calorie intake between that which is obtained from the open market and that obtained from the public distribution system, respectively.

**Table 8: Percentage of Rural Indian Households Undernourished (POU)<sup>(a)</sup>**

State	Head Count Poverty Rates (%) in NSS Round 43 (1987/88) <sup>(b)</sup>	POU Rates (%) in NSS Round 43 (1987/1988)	POU Rates (%) in NSS Round 57 (2001/2002)
Andhra Pradesh	40.0	52.34	73.50
Assam	27.7	60.57	73.06
Bihar	48.7	49.14	50.91
Gujarat	28.4	56.56	77.31
Haryana	13.9	24.80	63.23
Himachal Pradesh	NA	22.46	40.83
Karnataka	41.2	54.52	77.39
Kerala	19.7	65.85	71.04
Madhya Pradesh	49.6	45.78	77.61
Maharashtra	40.6	56.35	67.10
Orissa	53.0	56.22	68.60
Punjab	9.6	31.45	54.53
Rajasthan	31.8	31.74	53.85
Tamil Nadu	44.3	67.31	84.03
Uttar Pradesh	42.9	36.30	56.94
West Bengal	36.6	53.58	68.90
<b>All India</b>	<b>39.0</b>	<b>48.16</b>	<b>66.90</b>

(a) POU measures the prevalence of undernutrition.

(b) These poverty rates were calculated using National Poverty Line and reported in Sen and Himanshu (2004, Table 1a).

**Table 9: Percentage of Urban Indian Households Undernourished (POU)<sup>(a)</sup>**

State	Head Count Poverty Rates (%) in NSS Round 55 (1987/88) <sup>(b)</sup>	POU Rates (%) in NSS Round 43 (1987/1988)	POU Rates (%) in NSS Round 57 (2001/2002)
Andhra Pradesh	45.7	37.35	57.70
Assam	28.7	34.65	47.84
Bihar	57.9	30.46	43.58
Gujarat	32.1	43.04	57.58
Haryana	36.9	29.03	56.31
Himachal Pradesh	NA	12.08	26.05
Karnataka	45.1	37.71	50.63
Kerala	38.2	48.00	49.02
Madhya Pradesh	40.9	34.28	58.63
Maharashtra	30.6	38.66	51.47
Orissa	39.2	29.39	39.94
Punjab	21.0	31.97	41.35
Rajasthan	36.9	30.37	41.55
Tamil Nadu	38.9	51.19	63.84
Uttar Pradesh	48.6	32.80	52.30
West Bengal	39.7	41.17	50.68
<b>All India</b>	<b>38.7</b>	<b>36.97</b>	<b>51.00</b>

(a) POU measures the prevalence of undernutrition.

(b) These poverty rates were calculated using National Poverty Line and reported in Sen and Himanshu (2004, Table 1b).

**Table 10: Percentage of Rural Indian Households Undernourished in Bottom and Top Deciles in NSS Round 57 (2001/02)**

State	Bottom 10%		Top 10%	
	Original (100%) Calorie Requirements	80%	Original (100%) Calorie Requirements	80%
Andhra Pradesh	94.04	56.49	16.75	8.25
Assam	98.89	87.22	24.37	2.29
Bihar	87.30	29.97	3.57	0.45
Gujarat	99.47	86.34	15.84	2.14
Haryana	100.00	92.39	14.30	5.66
Himachal Pradesh	100.00	73.16	18.50	2.73
Karnataka	99.14	97.97	49.03	3.32
Kerala	84.04	66.76	6.97	0.34
Madhya Pradesh	99.11	84.99	34.64	6.17
Maharashtra	99.41	80.06	15.17	0.00
Orissa	100.00	83.92	24.45	17.83
Punjab	93.29	49.00	12.96	0.22
Rajasthan	96.69	86.55	13.05	2.71
Tamil Nadu	94.23	72.18	23.53	5.15
Uttar Pradesh	76.84	28.67	11.73	2.54
West Bengal	98.75	90.09	22.60	8.79
<b>All India</b>	<b>95.63</b>	<b>75.58</b>	<b>23.06</b>	<b>4.49</b>

**Table 11: Percentage of Urban Indian Households Undernourished in Bottom and Top Deciles in NSS Round 57 (2001/02)**

State	Bottom 10%		Top 10%	
	Original (100%) Calorie Requirements	80%	Original (100%) Calorie Requirements	80%
Andhra Pradesh	75.27	20.36	18.75	3.09
Assam	94.22	57.77	5.33	0.33
Bihar	77.03	36.42	3.66	0.23
Gujarat	71.64	32.33	10.22	2.83
Haryana	90.69	44.53	35.66	0.10
Himachal Pradesh	82.41	27.36	11.49	2.10
Karnataka	93.08	72.71	12.34	5.44
Kerala	85.44	52.21	13.74	6.73
Madhya Pradesh	92.44	51.92	21.51	4.26
Maharashtra	84.14	43.41	3.89	0.11
Orissa	95.96	53.40	14.08	7.51
Punjab	83.43	45.00	9.29	0.71
Rajasthan	97.90	80.76	4.73	0.00
Tamil Nadu	79.33	39.82	20.70	2.27
Uttar Pradesh	68.07	16.93	1.38	1.28
West Bengal	100.00	73.18	1.19	0.21
<b>All India</b>	<b>87.57</b>	<b>50.04</b>	<b>14.65</b>	<b>3.35</b>

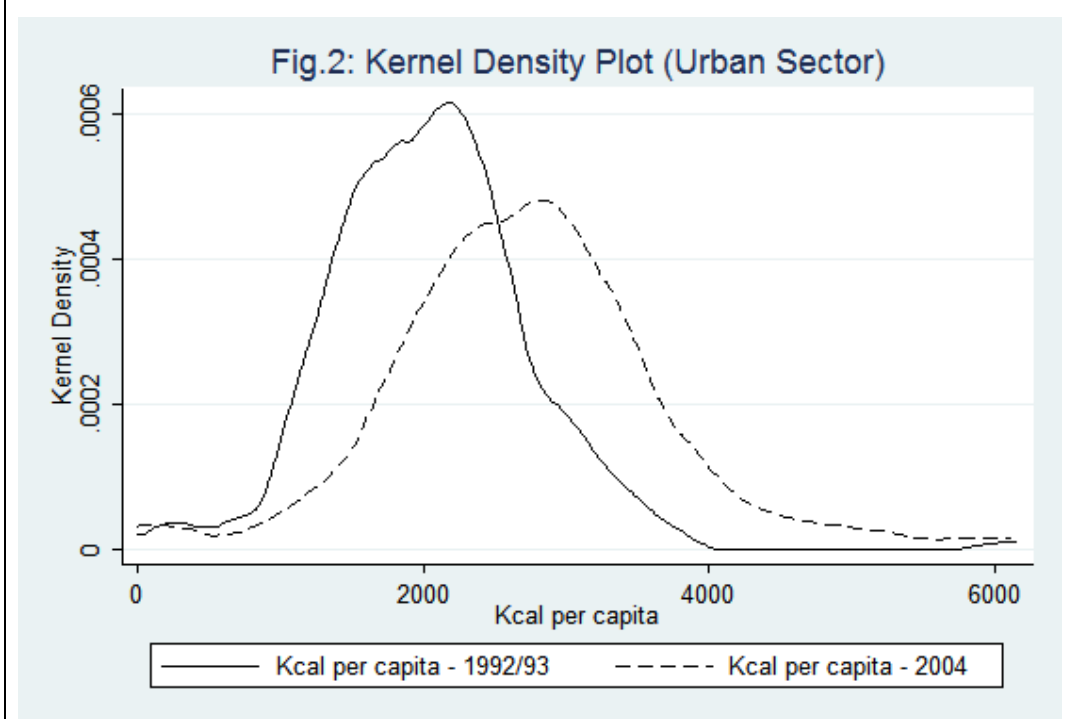
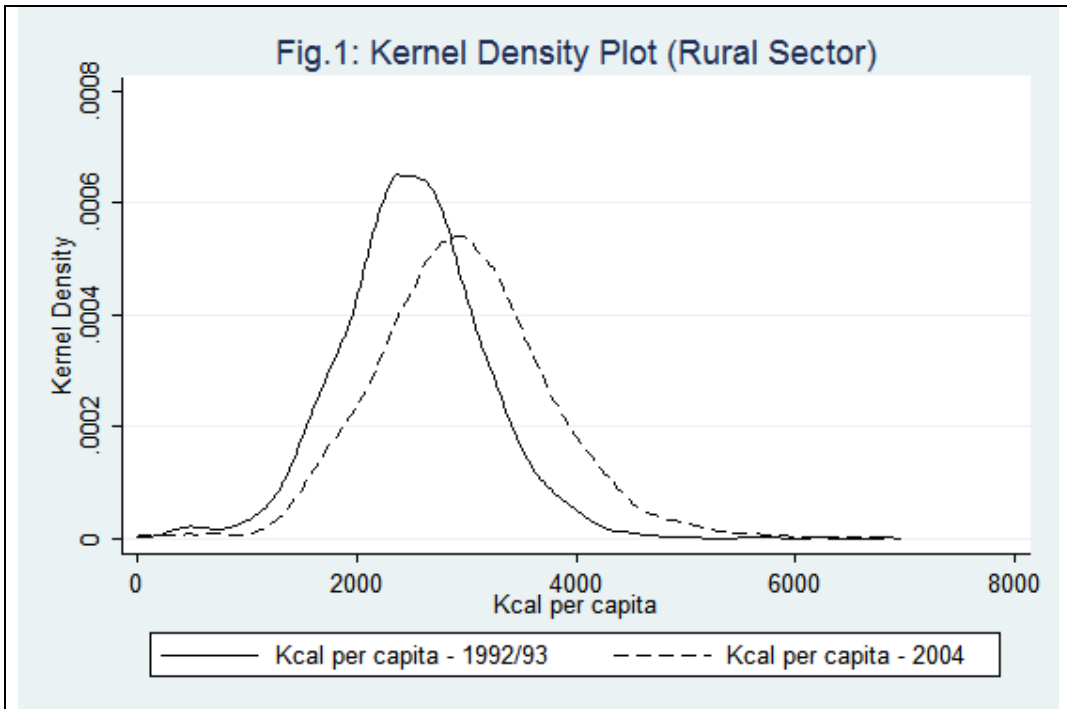
**Table 12: Median Kilo Calories Consumed (per capita per day) by Various Population Groups in Vietnam**

Whole Population						
Region	Rural			Urban		
	1992/93	1997/98	2004	1992/93	1997/98	2004
Red River Delta	2622.67	2670.70	3238.82	2178.76	2183.79	2888.87
North East	2761.59	2839.11	3478.96	2461.38	2513.59	2956.74
North West	2910.22	2639.34	3380.56	2584.01	2458.74	2847.54
North Central Coast	2337.41	2549.33	3047.84	2481.12	2337.77	2831.94
South Central Coast	2316.50	2363.24	2978.69	2120.81	2054.02	2738.13
Central Highlands	2666.17	2549.94	3386.35	-	-	2846.55
South East	2532.40	2499.61	3078.76	1856.22	1779.07	2591.45
Mekong River Delta	2586.80	2402.60	3135.70	2178.93	2079.25	2925.76
Overall	2571.39	2553.00	3205.61	2164.62	2038.94	2823.92
Food Poor Households <sup>(a)</sup>						
Region	Rural			Urban		
	1992/93	1997/98	2004	1992/93	1997/98	2004
Red River Delta	2451.02	2389.82	2509.16	-	1961.45	2624.89
North East	2360.88	2485.44	2724.80	-	2737.46	2713.25
North West	2512.68	2251.09	2936.97	-	-	2393.93
North Central Coast	2235.78	2354.54	2444.81	2377.88	2244.38	2666.10
South Central Coast	2058.36	2208.59	2249.37	1655.73	1541.32	2287.45
Central Highlands	2361.64	2367.47	2724.28	-	-	2702.66
South East	1944.47	2087.07	2212.30	1284.49	1117.20	1889.71
Mekong River Delta	2194.10	2183.23	2234.81	1620.34	1717.67	2358.30
Overall	2318.86	2287.37	2505.03	1660.70	1691.56	2455.18

Notes:

(a). Source: Authors' calculations.

(b) Food poor household as defined by GSO Food Poverty line and using effective household size.





**Table 13: Share (%) of Calories from Various Food Items in Vietnam**

<b>Region</b>	<b>Rural</b>			<b>Urban</b>		
	<b>1992/93</b>	<b>1997/98</b>	<b>2004</b>	<b>1992/93</b>	<b>1997/98</b>	<b>2004</b>
Rice	81.93	80.63	65.91	75.65	71.35	55.19
Wheat	0.64	0.99	0.41	3.60	3.05	1.12
Other Cereals	4.37	4.08	4.26	3.77	4.81	4.76
Vegetables	4.68	2.51	1.60	2.27	2.17	1.26
Fruits	0.84	1.04	0.67	2.03	1.88	0.91
Meats	2.60	3.92	4.24	5.50	6.96	6.32
Fish	0.81	0.97	0.91	1.29	1.25	1.04
Dairy	0.01	0.03	0.06	0.08	0.20	0.28
Alcoholic Beverages	1.60	2.27	2.61	2.17	2.81	3.33
Other Items <sup>2</sup>	2.52	3.48	13.96	3.63	5.16	13.99
Eating Out	0.00	0.07	5.37	0.001	0.37	11.80

**Table 14: The Percentage of Vietnamese Households that are Undernourished:  
POU Rates**

<b>Based on (Actual Calories &lt; Required Calories) Criterion</b>						
<b>Region</b>	<b>Rural</b>			<b>Urban</b>		
	<b>1992/93</b>	<b>1997/98</b>	<b>2004</b>	<b>1992/93</b>	<b>1997/98</b>	<b>2004</b>
Red River Delta	15.83	14.69	4.66	43.23	44.39	11.90
North East	14.24	7.99	1.17	21.88	21.29	7.99
North West	3.13	14.58	3.58	9.38	12.50	15.15
North Central Coast	29.74	19.00	8.60	26.56	35.19	10.91
South Central Coast	40.00	29.66	13.47	49.22	52.73	16.67
Central Highlands	19.79	22.83	5.41	.	.	12.18
South East	27.40	26.29	12.01	64.84	76.89	24.52
Mekong River Delta	23.00	30.60	8.20	45.83	52.13	11.47
Overall	22.22	21.34	6.83	45.94	53.64	14.84
<b>Based on (Actual Calories &lt; 0.8* Required Calories) Criterion</b>						
Red River Delta	4.69	4.09	1.05	9.90	16.33	1.19
North East	5.21	1.39	0.00	4.17	7.10	2.08
North West	0.00	2.08	0.83	0.00	3.13	6.06
North Central Coast	9.74	4.67	2.83	4.69	17.59	2.42
South Central Coast	16.88	8.09	3.87	25.00	19.55	5.81
Central Highlands	8.33	5.43	0.94	.	.	0.64
South East	9.86	9.14	4.65	38.28	39.93	8.81
Mekong River Delta	10.38	9.88	1.81	25.00	25.53	4.80
Overall	8.25	6.18	1.84	21.25	24.62	4.4

**Table 15: Percentage of Undernourished Vietnamese households in various expenditure percentiles**

<b>Expenditure Class</b>	<b>Rural</b>			<b>Urban</b>		
	<b>1992/93</b>	<b>1997/98</b>	<b>2004</b>	<b>1992/93</b>	<b>1997/98</b>	<b>2004</b>
Bottom 10%	58.45	54.22	28.71	60.45	49.13	30.22
Middle 40%	15.10	11.76	6.66	60.93	68.06	15.33
Upper Middle 40%	23.63	24.53	2.81	36.45	48.12	11.66
Top 10%	8.85	14.05	1.72	8.33	22.54	9.33

## REFERENCES

- Baulch, B. and E. Masset (2003), “Do Monetary and Non-Monetary Indicators tell the same story about chronic poverty? A study of Vietnam in the 1990s”, *World Development*, 31(3), 441-453.
- Bhalla, S.S. (2003), “Recounting the Poor: Poverty in India, 1983-99”, *Economic and Political Weekly*, 38(4), 338-349.
- Chand, R. (2005), “Whither India’s Food Policy? From Food Security to Food Deprivation”, *Economic and Political Weekly*, 40(11), 1055-1062.
- Coondoo, D., A. Majumder, G. Lancaster and R. Ray (2005), “Alternative Approaches to Measuring Temporal Changes in Poverty with Application to India”, mimeographed, University of Tasmania, Hobart, (available at [www.utas.edu.au/economics/](http://www.utas.edu.au/economics/)).
- Dandekar, V.M. and N. Rath (1971), “Poverty in India – I”, *Economic and Political Weekly* 6(1), 25-48.
- Dien, L.N., M.T. Nguyen and M.E. Bentley (2004), “Food consumption patterns in the economic transition in Vietnam”, *Asia Pacific Journal of Clinical Nutrition*, 13(1), 40-47.
- Dreze, J. and A. Sen (1995), *India Economic Development and Social Opportunity*, Clarendon Press, Oxford.
- Dubey, A. and S. Gangopadhyay (1998) “Counting the Poor: Where are the Poor in India?”, *Sarvekshana*, Analytical Report No. 1, Department of Statistics, Government of India.
- FAO (1992), “*World Food Supplies and Prevalence of Chronic Undernutrition in Developing Regions as Assessed in 1992*”, mimeographed, FAO, Rome.
- Gopalan, C., Sastri B.V., Rama and S.C. Balasubramanian (1999), “Nutritive Value of Indian Foods”, *National Institute of Nutrition, ICMR*, Hyderabad.
- Harriss, B. (1990), “The Intra-Family Distribution of Hunger in South Asia”, in Dreze, J. and A. Sen (eds.), *The Political Economy of Hunger*, Vol. 1: Entitlements and Well-being, Clarendon Press, Oxford.
- Hoddinott, J. and Y. Yohannes (2002), “Dietary Diversity as a Food Security Indicator”, Discussion Paper No. 136, Food Consumption and Nutrition Division, International Food Policy Research Institute, Washington, DC, June.
- Hop, L.T. (2003), “Programs to Improve Production and Consumption of Animal Source Foods and Malnutrition in Vietnam”, *Journal of Nutrition*, 133, 4006S-4009S.
- ICMR (2002): “*Nutrient Requirements and Recommended Dietary Allowances for Indians: A Report of the Expert Group of the Indian Council of Medical Research*”, ICMR, New Delhi.
- Meenakshi, J.V. and R. Ray (2002), “Impact of household size and family composition on poverty in rural India”, *Journal of Policy Modelling*, 24, 539-559.
- Meenakshi, J.V. and B. Vishwanathan (2003), “Calorie Deprivation in Rural India”, *Economic and Political Weekly*, 38(4), 369-375.
- Mehta, J. and S. Venkatraman (2000), “Poverty Statistics: Bismillah’s Feast”, *Economic and Political Weekly*, 35, (27), 2377-2381.

- Mishra, V. and R. Ray (2007), "Dietary Diversity, Food Security and Undernourishment: The Vietnamese Evidence", mimeographed, University of Tasmania, Australia.
- Molini, V. (2006), "Food Security in Vietnam during the 1990s: the Empirical Evidence", UNU-WIDER Research Paper No. 2006/67, Helsinki.
- Osmani, S.R. (1992), *Nutrition and Poverty*, OUP, Delhi.
- Radhakrishna, R. (2005), "Food and Nutrition Security of the Poor: Emerging Perspectives and Policy Issues", *Economic and Political Weekly*, 40(18), 1817-1823.
- Rao, C.H.H. (2005), *Agriculture, Food Security, Poverty and Environment: Essays on post-reform India*, OUP, Delhi.
- Rao, N. (2005), "Gender Equality, Land Rights and Household Food Security: Discussion of Rice Farming Systems", *Economic and Political Weekly*, 40(25), 2513-2521.
- Ray, R. (2007), "Changes in Food Consumption and the Implications for Food Security and Undernourishment: India in the the 1990s", *Development and Change*, 38(2), 321-343.
- Ray, R. and G. Lancaster (2005), "On Setting the Poverty Line Based on Estimated Nutrient Prices: condition of socially disadvantaged groups during the reform period", *Economic and Political Weekly*, 40(1), 46-56.
- Sen, A. (2000), "Estimates of Consumer Expenditure and its Distribution: Statistical Priorities after NSS 50<sup>th</sup> Round", *Economic and Political Weekly*, 35(51), 4499-4518.
- Sen, A. and Himanshu (2004), "Poverty and Inequality in India – I", *Economic and Political Weekly*, 39(38), 4247-4263.
- Sen, P. (2005), "Of Calories and Things: Reflection on Nutritional Norms, Poverty Lines and Consumption Behaviour in India", *Economic and Political Weekly*, 30 (43), 4611-4618.
- Shah, C.H. (1983), "Food Preference, Poverty and the Nutrition Gap", *Economic Development and Cultural Change*, 32, 121-148.
- Subramanian, S. (2005), "Unravelling a Conceptual Muddle", *Economic and Political Weekly*, 40(1), 57-66.
- Suryanarayana, M.H. and D. Silva (2007), "Is Targeting the Poor a Penalty on the Food Insecure? Poverty and Food Insecurity in India", *Journal of Human Development*, 8(1), 89-107.
- Svedberg, P. (2000), *Poverty and Undernutrition: Theory, Measurement and Policy*, OUP (Indian Edition), Delhi.
- Thang, N.M. and B.M. Popkin (2004), "Patterns of food consumption in Vietnam: effects on socio economic groups during an era of economic growth", *European Journal of Clinical Nutrition*, 58, 145-153.
- Thorat, S. and J. Lee, (2005), "Caste Discrimination and Food Security Programmes", *Economic and Political Weekly*, 30(39), 4198-4200.

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