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On Setting the Poverty Line Based on Estimated Nutrient Prices With Application to the Socially Disadvantaged Groups in India During the Reforms Period*

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Abstract

The mounting evidence on the inconsistency between the official poverty estimates in India and those based on a direct specification of the calorie requirements raises serious questions on the credibility of the official poverty line as a measure of the true cost of obtaining the minimum calorie requirements today. This study provides evidence, based on estimated nutrient prices and a "balanced diet", that shows how far the official poverty lines have fallen out of line with their "true" measure. The paper provides robust evidence, with special reference to the socially disadvantaged groups, that suggests that the poverty situation in India is much worse than that revealed in official poverty statistics ("adjusted" or not). This paper makes a methodological contribution by proposing an expenditure based poverty line, using the household specific estimated nutrient prices, that serves as a compromise between the official poverty line and that specified directly in terms of calories. The proposed poverty line has the advantage of incorporating inter household variation in food preferences due to regional, class, caste and other non demographic factors that the "official poverty line" does not do. The study confirms the inferior poverty status, on both poverty measures, of the socially disadvantaged groups vis-à-vis the others. This paper, also, contains evidence that points to the usefulness of the public distribution system in the anti poverty program for the backward classes.

1. Introduction

Much of the theoretical debate on the measurement of poverty has been on the poverty measures rather than on the poverty line. While there has been considerable discussion on whether the poverty line should reflect an "absolute" or "relative" view of poverty [see, for example, Sen (1983)], the literature is relatively thin on how to update the poverty line to account for inflation and changing consumption patterns and ensuring its accuracy in terms of the original definition. The "absolute" view of poverty views the poverty line as the expenditure required to purchase a "subsistence" bundle of items by the individual. In the Indian context, the "subsistence" bundle was derived from a recommended minimum calorie or energy[1] requirement that was considered necessary for subsistence. However, as explained below, over a long time period, with inflation and changing consumer preferences, the "official poverty line" in India, that was anchored on the minimum energy requirements three decades ago, has ceased to be an accurate, or even a reasonable, indicator of the cost of acquiring the minimum energy requirement. In India, therefore, the debate on the "relative" versus "absolute" poverty line has given way to a debate on whether the poverty line should be money metric and expenditure based, as the official poverty line is, or whether it should be specified directly in terms of the minimum calorie requirements. This presents a significant methodological issue that is addressed in this paper.

This paper proposes an alternative approach to the construction of the poverty line. Though money metric and expenditure based, as is the current practice, the proposed poverty line is a compromise between the "official poverty line" and that defined in terms of minimum energy requirements. Based on the household specific estimated implicit unit values of the energy generating[2] nutrients, paid by the households, the proposed procedure has two significant new features: first, it incorporates the changes in consumer preferences,

[1] We will be using these two terms synonymously in this paper.
[2] To our knowledge, the idea of setting household specific poverty lines based on household specific estimated nutrient unit values has not been proposed, let alone empirically implemented, before.

household size, composition and other characteristics in the calculation of the household specific poverty lines and, second, it ensures that, over a long time period, the poverty line remains faithful to the original calorie based definition of the poverty line by making adjustments that reflect the price movement in the nutrients that generate the calories. In the context of large Federal countries such as India where there is considerable regional heterogeneity in consumer preferences [see Meenakshi and Ray (1999)] and in prices [see Coondoo, Majumder and Ray (2004)], these features acquire particular significance. An additional advantage of the proposed approach is that it does not require ad hoc assumptions on "equivalence scales" which can have a significant impact on the poverty estimates [see Meenakshi and Ray (2002)]. Moreover, being based on the estimated nutrient prices rather than the overall cost of living indices, the proposed poverty lines are able to incorporate changes to the calorie requirement or its composition in terms of the nutrients in a manner that the "official poverty line" does not. The information requirements of this procedure are not particularly stringent and, as this study demonstrates, they are generally available in the household budget data sets.

The procedure can be briefly described as follows. Following Coondoo, Majumder and Ray (2003), a regression analysis based procedure is used for the estimation of household level unit values of the major nutrients, namely, carbohydrate, protein and fat, using a cross sectional household budget data set on food expenditure, total consumer expenditure, quantities of nutrients consumed and related variables. The estimated nutrient prices (i.e. unit values) are, then, used to calculate the poverty line as the cost of purchasing the energy requirement by summing the expenditures on the three nutrients needed to generate the required calories. Since the estimated unit values of the nutrients, that are used to calculate the required nutrient expenditures, will vary with household and other characteristics, the poverty lines will vary across households as a consequence. Hence, while two households

which are identical in every respect, except their "permanent income", will face identical poverty lines in the current arrangements using the "official poverty line", they will face different poverty lines under the proposed procedure which will assign different unit values of the nutrients between these households. This paper provides empirical evidence on the usefulness of the proposed poverty lines by using them in calculating the head count poverty rates of the socially disadvantaged groups in India. These poverty rates are then compared with those based on the official poverty lines and the calorie based head count poverty rates during the period of economic reforms in India.

India has witnessed significant economic reforms in the 1990s.[3] This period has, therefore, attracted considerable attention from welfare analysts resulting in a large literature on poverty in India in the 1990s. Apart from the fact that most of these studies are based on the official poverty lines, a limiting feature of this literature is that relatively little attention has been focussed on how the socially disadvantaged household groups, namely, the female headed households and the backward classes have fared during the reforms period. As the evidence presented in Sen (1996), Meenakshi, Ray and Gupta (2000), Meenakshi and Ray (2002, 2003) show, both these groups face higher incidence of poverty than the rest of the population. The empirical results, presented later, throw light on the poverty experience of these groups during the reforms period.

Another feature of the present study is its comparison of the poverty estimates under the alternative definitions of the poverty lines. With the significant exception of the study by Meenakshi and Vishwanathan (2003), much of the debate on India's poverty experience in the 1990s has been conducted using "official poverty lines" based on total household expenditure that was anchored in calorie norms three decades ago. There has not been much attempt to go beyond the monetary measures of Food expenditure and analyse the pattern of

[3] Some argue [see Sengupta (2000)] that the programme of India's economic reforms started earlier with the "New Economic Policy" of Rajiv Gandhi in the mid 80's.

nutrient consumption during the reforms period and, hardly any, that is primarily aimed at the socially disadvantaged groups. The limited literature on nutrient based poverty estimates in India during the reforms period includes Mehta and Venkatraman (2000), Palmer Jones and Sen (2001), Meenakshi and Vishwanathan (2003), Radhakrishna, et.al. (2004). The emphasis on the expenditure based measures of poverty, that accepts uncritically the official poverty line, over the calorie based measures that specify the poverty line directly in terms of the energy requirements seems misplaced in view of increasing evidence of a mismatch between the two sets of estimates. As Meenakshi and Vishwanathan (2003), whose study draws attention to the sharp divergence between the two, point out, there is "need for fresh debate on the determination both of the calorie norm and the poverty line". The present study is an attempt to contribute to such a debate.

Dandekar and Rath (1971)'s study on poverty, which pioneered the literature on poverty measurement in India based on household budget data, was rooted in the concept of "nutritional adequacy" that was defined as 2250 calories per capita per day. Dandekar and Rath (1971, pgs.29-30) did not allow rural-urban differences in their definition of "nutritional adequacy". Instead, they recognised the differential Food expenditure pattern between the rural and the urban household, along with the higher urban prices, to arrive at differential rural/urban figures for the "national minimum", namely, Rs 170 per capita per annum (at 1960/61 prices) for the rural household and Rs 271 for the urban. The initial estimates of poverty, provided by the Planning Commission in India for 1973-74 using the NSS (28th round) data, were based on a differential calorie norm[4] [see Government of India (1979)] of 2400 kcals per capita for rural areas and 2100 kcals for urban areas. These yielded a per capita monthly expenditure of Rs 49.09 in rural areas and Rs 56.64 in the urban areas, so that these figures constituted the "official poverty lines" for that year. The poverty lines for the

[4] These were based on calorie norms for South Asia prescribed by the FAO (1950) – see, however, Srinivasan (1981), Sukhatme (1978) for a critique of such rigid calorie norms, and Mehta (1982) for a critical assessment of Sukhatme's position.

later years were obtained by adjusting the 1973/74 poverty lines for inflation. An 'expert group' of the Planning Commission [see Government of India (1993)] proposed major revisions in the methodology of poverty estimation which included the introduction of State specific price changes in the adjustment of the poverty line, thus, leading to State specific poverty lines.

There has been no regular attempt to re-evaluate the cost of acquiring the minimum energy requirements by adjusting the unit values of the energy producing major nutrients to take note of inflation and the changing nutrient mix of the food basket. Instead, the authorities have simply relied on cost of living indices to update the poverty lines without checking for their consistency with the movement in the implicit nutrient prices. This meant that, while in 1973/74 (NSS, 28th round), the "official poverty line" corresponded to a daily calorie norm of 2400 k cals. (rural) and 2100 k cals (urban), this was not the case in subsequent years leading to a wide divergence between the expenditure and calorie based poverty rates. A principal cause of this divergence has been the changing consumer preferences in India which have resulted in a switch from Cereal to other Food items combined with an overall switch from Food to non Food items.[5] It is not clear whether the switch away from Cereals was voluntary reflecting changing tastes in favour of high quality and less calorie intensive items or whether, as Mehta and Venkatraman (2000) argue, it was involuntary reflecting the loss in access to common property resources by the rural poor. Since Cereals has traditionally been a source of inexpensive calories, this shift has resulted in the nutrients experiencing higher inflation than is reflected in the cost of living indices. Consequently, as Mehta and Venkatraman (2000, Table 2) report, in 1993/94 the "official poverty line" was sufficient to purchase only 1968 kcal (daily) per capita in the rural areas and 1890 kcal (daily) per capita in the urban areas. The present study provides further

[5] See Mehta and Venkatraman (2000, Table 3)

evidence in support of the proposition that the official poverty lines seriously under estimate the true cost of attaining the minimum energy requirements. This study also throws light on the importance of the public distribution system (PDS) in India by quantifying its relative contribution, vis-a-vis the open market, in the calorie intake of the households.

The rest of the paper is organised as follows. The regression based procedure for the estimation of the unit values of the nutrients is briefly described in Section 2. This section also describes the alternative poverty lines that are used here, including the ones that are based on the estimated unit values of the nutrients. The data sets and their principal features are described in Section 3. The empirical results are presented and discussed in Section 4. We end on the concluding note of Section 5.

2. Methodology and the Alternative Poverty Lines

2.1 Estimation of the Nutrient Prices[6]

Suppose we have a set of household level data on total food expenditure $\left(y_h^f\right)$, total quantity of each of K major nutrients, $\left(\eta_{ih}, i=1,...,K\right)$, per capita household expenditure, PCE(y_h) and an array of household attributes (z_h) such as household size, age-gender composition, etc. for H sample households. The starting point is the identity of food expenditure of household h with the aggregate value of the nutrients consumed by that household:

$$y_h^f = \sum_{i=1}^{K} v_{ih}\eta_{ih} \quad , \quad h=1,...,H \qquad (1)$$

where v_{ih} denotes the implicit price/unit value of the i^{th} nutrient for the h^{th} household (to be estimated) and η_{ih} is the corresponding nutrient quantity. Since the nutrient unit values are not observed, let us express them as a function of observable variables as follows:

[6] See Coondoo, Majumder and Ray (2003) for more details on the estimation of the nutrient prices or unit values.

$$v_{ih} = f_i(y_h, z_h) + u_{ih} \quad , \qquad \begin{matrix} i=1,...K, \\ h=1,...H \end{matrix} \tag{2}$$

where $f_i(\cdot)$ is a positive valued function and u_{ih} is a random disturbance term. Note that (2) is a generalised form of Prais and Houthakker's (1955) quality equation that asserts that the price/unit value paid for a commodity is a function of a consumer's real income or expenditure level. It may be mentioned here that whether $f_i(\cdot)$'s are increasing or decreasing functions of real income is essentially an empirical issue. There are two different phenomena that gives rise to the quality equation. The first one is a consumer's quality sensitivity – i.e. if several qualities of the same commodity are available and the price increases with the quality, a consumer will shift from lower quality to higher quality items when her real income rises. The other phenomenon relates to price concession in bulk purchase – e.g. even when only one quality of a commodity is available, a richer consumer buying a larger quantity may get some price concession and hence pay a lower price. Thus, the nature of the slope of the quality equation with respect to real income will be determined by the relative strength of the two kinds of phenomena mentioned above.

In order to ensure that the estimated nutrient prices are positive, we specify the determinants part of equation (2), i.e. the $f_i(\cdot)$ function to be of the exponential form, so that (2) becomes:

$$v_{ih} = \exp.\left(\beta_{oi} + \beta_i \ln.y_h + \gamma_i' z_h + \delta_i' z_h^*\right) + u_{ih} \qquad i=1,...K \tag{3}$$

where z_h is the household composition vector[7] (consisting of number of adult males, adult females, male children and female children in household h) and z_h^* is the vector of interaction terms, $z_h \ln y_h$. Note that one may choose any flexible positive functional form for the fixed effect part on the r.h.s. of (3). Substituting (3) in (1), we get the following non linear estimating equation:

$$\begin{aligned} y_h^f &= \left(\exp.\left(\beta_{01} + \beta_1 \ln\ y_h + \gamma_1'\ z_h + \delta_1'\ z_h^*\right)\right)\eta_{lh} + \ .... \\ &+ \left(\exp.\left(\beta_{oK} + \beta_K \ln y_h + \gamma_K'\ z_h + \delta_K'\ z_h^*\right)\right)\eta_{Kh} + \in_h \end{aligned} \tag{4}$$

where: $\in_h = \sum_{i=1}^{K} \eta_{ih} u_{ih}$ is the composite equation random disturbance. Note that since the u_{ih}'s are unrestricted in sign, so is $\in_h$. Also, on the assumption that the random errors, u_{ih}, in (3) have zero mean, we have: $E(\in_h) = \sum_{i=1}^{K} \eta_{ih} E(u_{ih}) = 0$. Equation (4) can be estimated using any standard non linear estimation technique. Once this equation has been estimated, the household-specific nutrient prices can be estimated as:

$$\begin{aligned} \hat{v}_{ih} &= \exp.\left(\hat{\beta}_{oi} + \hat{\beta}_i \ln y_h + \hat{\gamma}_i'\ z_h + \hat{\delta}_i'\ z_h^*\right) \\ & i = 1, 2, ..., K; h = 1, 2, ...H \end{aligned} \tag{5}$$

where $\wedge$ denotes estimated value.

[7] In the empirical exercise, we have taken $z_h' = \left(\ln\left(1+n_h^{a_m}\right), \ln\left(1+n_h^{a_f}\right), \ln\left(1+n_h^{c_m}\right), \ln\left(1+n_h^{c_f}\right)\right)$, where $n_h^{a_m}, n_h^{a_f}, n_h^{c_m}, n_h^{c_f}$ denote, respectively the number of adult males, adult females, male children and female children in household h.

2.2 Specification of the Alternative Poverty Lines

Let us now briefly describe the alternative poverty lines (PL_1 – PL_4) that are used in this study. All the 4 poverty measures used here (P_1 - P_4) are head count measures of poverty but they differ with respect to the poverty line used in the calculations.

PL_1 (Official poverty line)

The technique used by the Planning Commission, Government of India, for delineating the state specific rural and urban poverty lines is as explained below [see Government of India (1979, 1993) for details]. For a given base year, the Engel curve of calorie intake (i.e. per capita calorie intake expressed as a function of PCE) is estimated separately for the all-India rural and urban population using the consumer expenditure data thrown up by the NSSO. Given the calorie requirements mentioned earlier, the PCE required to meet this norm is then worked out from the estimated Engel curve for calorie by inverse interpolation. The interpolated PCE value is taken as a measure of the all-India poverty line for the base year. Once this all-India poverty line is obtained, the corresponding state-specific poverty lines are calibrated by adjusting the all-India poverty line for inter-state price differentials. The poverty lines for other years are calculated by indexation of the base year poverty line. While the official poverty lines for NSS rounds 43 and 50, that we have used here, to calculate PL_1 are the ones reported in Dubey and Gangopadhyay (1998), those for round 55 are the ones used by the Planning Commission [see Government of India (2001)] to provide the official poverty estimates for 1999-2000.

PL_2 (Calorie norm):

As per expert opinion, the age-gender specific daily normative calorie requirements corresponding to the overall per capita calorie norm of 2400 kcal/day[8] for the average rural Indian are as reported in Table 1.[9] The corresponding figures for the Indian urban population can be obtained by scaling down these numbers by a factor 0.875 (being the ratio of 2100 and 2400). If we denote the number of household members in age gender group d in household h by n_{dh}, and if c_d denotes the daily energy requirements for a member of that group d, then the poverty line (specified in calories) of household h is given by:

$$PL_{2h} = \sum_{d=1}^{D} c_d n_{dh} \qquad (6)$$

PL_3 (Nutrient Price Based Food Expenditure Norm)

As per the recommendation of the Indian Council for Medical Research (ICMR), a balanced diet of 2738.60 kcal. energy should comprise 467.53 gms of carbohydrate, 66.6 gms of protein and 66.9 gms of fat [Gopalan, et.al. (1999)]. Given this nutrient composition of a balanced diet and the age gender specific minimum calorie requirements, reported in Table 1, the corresponding requirements in terms of the three principal nutrients, namely carbohydrate, fat and protein can be calculated. If θ_{id} denotes the minimum requirement of nutrient i by a household member of age gender group d and, as before, if n_{dh} denotes the number of members of household h in that group, then the food expenditure based poverty line PL_3, is given by

[8] These calorie norms are not sacrosanct and have attracted considerable controversy over their use as "minimum requirements". [see Sukhatme (1993), Mehta and Venkatraman (2000), Meenakshi and Vishwanathan (2003)]. For an alternative approach of determining calorie requirements based on people's behaviour pattern, see Minhas (1991).

[9] These have been obtained from the website, www.MedIndia.net. It may be mentioned that these figures 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)].

$$PL_{3h} = \sum_{i=1}^{3} \sum_{d=1}^{D} \hat{v}_{ih} \theta_{id} n_{dh} \qquad (7)$$

where $\hat{v}_{ih}$ is the estimated unit value of nutrient i consumed by household h, given its economic and household characteristics, obtained from the estimated equation (5), as described in Section 2.1. A household is, hence, considered "food poor" if its Food expenditure is less than PL_{3h}.

PL_4 (Nutrient Price Based Total expenditure norm)

This poverty line is obtained by adding an allowance for non-Food expenditure to the poverty line, PL_3, defined above. Here, we have assumed the Engel ratio for Food for a "poor household" to be 0.7,[10] so that the total expenditure base poverty line is given by

$$PL_{4h} = PL_{3h} / 0.7 \qquad (8)$$

A household h is now considered "expenditure poor" if its aggregate expenditure is less than PL_{4h}.

3. Data Description and its Principal Features

The data sets used in our analysis are from the 43rd (July, 1987 – June, 1988), 50th (July, 1993 – June 1994) and 55th (July 1999 – June 2000) rounds of the National Sample Survey in India. The 55th round data provides information, at the household level, on calorie intake. The corresponding information on the intake of the principal calorie producing nutrients, namely, carbohydrate, protein and fat, was obtained from the calorie data by a process of detailed and tedious calculations, for every state or province, using the conversion factors of Indian foods provided in Gopalan, et. al. (1999). These calculations involved using

[10] Given the shift in consumer preferences (voluntary or not) away from the Food items, an Engel ratio of 0.7 is consistent with that (0.8) used by the Indian Planning Commission when it set the poverty line three decades ago.

these conversion factors, in conjunction with the information on Food expenditure, over 30 days, disaggregated across the individual Food items, to obtain the household's monthly intake of calories, carbohydrate, protein and fat. The household intake of calorie, carbohydrate, protein and fat during NSS rounds 43, 50 was obtained by applying the conversion factors implied by the data in NSS round 55 on the disaggregated Food expenditure information in the earlier rounds. In the present study, we have overlooked the distinction between the "availability" of the energy and the nutrients to the household, that the "intake" figures represent, and their actual consumption. While factors such as the presence of guests in the affluent households and the loss of energy/nutrients during cooking may imply a significant difference between "availability" and actual intake, in the absence of available information we have overlooked such complexities. 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 earlier rounds because of the inclusion of questions on the 7-day recall figures on Food expenditure in the same questionnaire [see Sen (2000)].

The calculations and the various estimations were performed for all the households and, also, separately for the female headed households and the backward classes. Since the focus of this study is on the socially disadvantaged groups, we shall concentrate here on the estimates of these households using the overall mean figures for all households[11] as a benchmark for comparison.

The summary information on the calorie intake of all household groups is contained in Tables 2, 3 which present the per capita median monthly calorie consumption of rural and urban households, respectively, in round 55 (1999/2000) by expenditure percentiles. There is generally a positive association between household affluence and calorie intake. The issue of

[11] These will be reported in detail in a paper being prepared with Dipankor Coondoo and Amita Majumder of the Indian Statistical Institute in Kolkata.

the nature and strength of the association between energy/nutrient consumption and household income or expenditure has attracted a good deal of attention [see, for example, Behrman and Deolalikar (1987), Bouis and Haddad (1992), Ravallion (1990)]. The results of a recent study on NSS 55th round data [see Lancaster, Maitra and Ray (2004)] indicate considerable heterogeneity between the individual States in the magnitude of correlation between calorie intake and aggregate household expenditure, thus, warning against making generalisations on the basis of the figures of one State.

Tables 2, 3 show that, notwithstanding some movements among the middle ranked States, there is, in general, a reasonable degree of stability in the calorie ranking of the States between the rural and the urban areas, especially at the extremes. Himachal Pradesh and Punjab (Northern Indian States) and Kerala, Tamil Nadu (Southern Indian States) are, respectively, among the highest and lowest achievers in calorie consumption. This NSS based observation on Kerala is consistent with data from the National Nutrition Monitoring Bureau (NNMB) which confirms that the intake of calories in Kerala was quite low in relation to the other Indian States. This observation leads to the "Kerala paradox" which arises from the fact that, notwithstanding its relatively low intake of calories, Kerala does quite well on anthropometric evidence [see Swaminathan and Ramachandran (1999)]. These tables provide evidence of considerable heterogeneity in the dietary habits of the various regions. There is a general North South divide in calorie consumption with the northern States consuming more calorie rich items than their Southern counterparts.

Tables 4, 5 convey information on how the per capita calorie consumption has changed over our sample period (1987/88 to 1999/2000). They present for rural and urban areas, respectively, the median per capita calorie figures in the 3 rounds. These suggest that the median figures on calorie intake have generally registered a fall between rounds 43 and 55 which is consistent with the observation of declining calorie consumption over the 1990s

noted earlier. These tables also suggest that, at least in some States, the decline in calorie intake was halted, if not reversed, between NSS rounds 50 (1993/94) and 55 (1999/2000).

Further evidence on the calorie consumption is contained in Tables 6, 7 which present the average per capita calorie intake in the rural areas in NSS rounds 50, 55 (respectively) for all the rural households, the female headed households and the backward classes. These tables also show the breakdown of the calorie intake between the open market and the public distribution system (PDS). These tables suggest that the backward classes generally record lower calorie intake than the female headed households and the other household groups. These tables also show that the importance of the PDS in supplying 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 and Haryana, or in Bihar. Another result that is apparent from these tables is that, in the calorie poor Southern States though not everywhere, the backward classes obtain a greater share of their total calories from their PDS food rations than the rest of the population. For example, in 1999/2000 in rural Kerala, a household from the backward classes received (on average) 34.55% of its total calorie intake through the PDS, compared with 32.48% for female headed households and 30.31% for the rural population as a whole. Since, as we report later, the backward classes are more poverty prone than the rest of the population, this feature needs to be kept in mind in the ongoing debate on the future of the PDS.

4. RESULTS

4.1 Evidence on the Estimated Nutrient Prices

A significant feature of the present investigation is that it seeks to capture the regional differentials in both the quality and the quantity of energy and nutrient consumption, and

incorporate them in the setting of the poverty lines. The quality of the nutrients consumed is, partly,[12] measured by the nutrient prices or unit values, estimated for each household following the procedure outlined in Coondoo, Majumder and Ray (2003). The mean values of the estimated unit values of the nutrients consumed by the female headed and SC/ST households in round 55 are presented in Tables 8 (rural) and 9 (urban). Similar to the picture on calorie consumption presented earlier, there is considerable regional heterogeneity in the estimated nutrient prices though, unlike calories, there seems no discernible regional pattern in these differences. There is considerable heterogeneity, also, between the nutrient prices paid by the female headed and the SC/ST households. A comparison of Tables 8 and 9 shows that, notwithstanding the higher urban prices than the rural, the urban nutrient prices do not exceed their rural counterpart everywhere. The estimated nutrient prices of the earlier rounds[13] (43, 50) show a sharp rise in the nutrient prices, especially between rounds 50 and 55. This reflects the shift in consumer's Food preferences towards items which are less intensive in these calorie generating major nutrients.

4.2 The Evidence on the Household Poverty Rates

Before turning to the issue of how the estimated nutrient prices and the calorie consumption of the female headed and of the SC/ST households translate into the alternative poverty rates for these socially disadvantaged groups, let us present the picture for all the households. Tables 10, 11[14] report the poverty estimates in NSS round 55 for rural and urban areas, respectively, using the alternative poverty measures, P_1 to P_4, based on the alternative

[12] The regional differences in the nutrient unit values should not be attributed exclusively to quality differences in the nutrients since they, also, reflect large regional variation in food prices over our sample period [see Coondoo, Majumder and Ray (2004)].
[13] We have not presented them for space reasons but these are available on request.
[14] The poverty estimates reported in Tables 10, 11 are household poverty rates and are, thus, not directly comparable with the individual poverty rates reported in Government of India (2001). In our calculations of the individual poverty rates in NSS round 55, we were able to reproduce closely, though not exactly, the individual poverty rates reported in Government of India (2001, Table 2).

poverty lines, PL_1 to PL_4, respectively, described earlier. Table 10, also, reports the calorie based rural poverty estimates (P_5) if we disregard the age and gender variation in the minimum calorie requirements and set it at the daily per capita figure of 2400 kcals for the rural areas, as the Planning Commission of India did when it set the "official poverty line" three decades ago. A comparison of P_5 with the P_2 estimates confirms the sharp overstatement of the poverty rates if we disregard the age and gender variation in the minimum calorie requirements. Consistent with the results of previous studies, the expenditure based poverty measure (P_1), using the official poverty line (PL_1), understates the household poverty rate considerably in relation to the calorie based measure (P_2). As Tables 10, 11 confirm, the present study extends this finding to the nutrient price based money metric poverty measures (P_3, P_4) introduced in this paper. P_3, P_4 are more in line with P_2 than with P_1. In other words, these tables provide robust evidence that the official poverty line based poverty measure, P_1, understates significantly the extent of poverty in India. Note that P_3 (using the nutrition price based food expenditure as the poverty line) tallies reasonably closely with the calorie based poverty measure, P_2. The lower poverty estimates, recorded using P_4 in relation to P_2, probably reflect the high Food Engel ratio used in the present calculations. It is possible to argue that a combination of changing consumer preferences away from Food items, and economic circumstances implies that the Engel ratio of 0.8 used by the Planning Commission to identify the "poor" in the early 1970s is consistent with a ratio that is lower than 0.7 three decades later. This is a matter that is best left for future research. It is clear from Tables 10 and 11 that poverty measures P_3 and (with a suitable Engel Food ratio) P_4 do provide reasonable compromises between P_1 (that is currently used and understates poverty) and P_2 (the calorie based poverty measure that overstates poverty).

Tables 12 (rural), 13 (urban) present the household poverty rates of the socially disadvantaged household groups in NSS round 55 (1999/2000). A comparison with Tables 10

and 11 shows that the lower calorie consumption figures of the SC/ST households vis-à-vis the female headed households translate into higher calorie based poverty rates of the former group of households. For example, a comparison of the rural poverty rate estimates shows, that while on P_1 measure the female headed households record near identical poverty rates with the aggregate population,[15] on the calorie based P_2 measure the female headed households generally record lower poverty than the rest of the population. The latter result reflects the sharply lower calorie requirement of the female headed households that is taken into account in the present calculations (see Table 1). It is significant that, in the urban areas, the P_2 measure shows that the female headed households experience considerably lower poverty than the rest of the population reflecting the still lower calorie requirement of the urban female headed households vis-a-vis their rural counterparts. In contrast, the backward classes generally record higher poverty rates than the female headed households and the aggregate population on all the four poverty measures used in this study. Tables 12, 13 also point to the head count Food poverty measure, P_3, based on the estimated nutrient price determined poverty line, PL_3, as a reasonable compromise between the extreme poverty measures, P_1 and P_2, used in previous studies on poverty in India.

4.3 Evidence on the Public Distribution System (PDS) as an Anti Poverty Program

In the wake of the economic reforms in India in the early 1990s, there has been much discussion on the effectiveness of the PDS as an anti poverty program. The reader will recall the discussion in Section 3 and Tables 6, 7 which established that the PDS is generally more important in the Southern States than in the North, and that the backward classes obtain a greater share of their calorie intake through the PDS than the other socio economic groups. Tables 14, 15 provide further evidence on this issue by comparing, for NSS round 55 in rural

[15] Meenakshi and Ray (2002) report, however, that the situation changes dramatically if we allow economies of household size when the female headed households register substantially higher poverty than the rest of the population.

and urban areas respectively, the household (calorie based) poverty rates (P_2) in the presence and absence of PDS. While the former poverty rates are those (P_2) that were actually prevailing in Round 55, the latter are the P_2 estimates in the hypothetical case of no PDS, i.e. with the PDS calorie estimates reported in Tables 6, 7, assumed to be zero.[16] Consistent with the earlier discussion on the role of the PDS in supplying inexpensive calories, Tables 14, 15 show that the impact of the PDS in reducing poverty varies between the States and between the rural and the urban areas. These hypothetical calculations suggest that the PDS plays a significant role as an anti poverty program in the calorie poor Southern States such as Andhra Pradesh, Kerala and Tamil Nadu but are less significant in the relatively calorie affluent States such as Punjab, Rajasthan in the North and Bihar in the East. The policy message of this discussion and the results reported in Tables 14, 15 is to warn against arriving at generalised conclusions, at the all India level, on the future role of the PDS. These need to be tailored to the changing realities of the individual States. Also, the small hypothetical drop in the calorie poverty rates in some of the Northern States raises the question of whether a larger fall can be achieved by targeting the PDS at the poor with a higher Food price subsidy rather than the current practice of supplying inexpensive and subsidised calories to all, including the non poor. A satisfactory answer to this question requires a modelling strategy and simulation exercises that are outside the scope of the present investigation.

4.4 Comparison of the Official Poverty Lines (PL_1) with those based on the Estimated Nutrient Prices (PL_4)

One of the main contributions of this paper is the introduction of the poverty measure, P_4, which is a compromise between the expenditure based measure, P_1, that uses the official poverty line (PL_1) and the calorie based measure, P_2. Unlike PL_1, the poverty line, PL_4, used

[16] In the absence of a satisfactory modelling strategy, we are ignoring the increase in the non PDS calories, due to a switch from PDS to food purchases in the open market, thus, exaggerating the rise in poverty due to the abolition of the PDS. The reader needs to bear this in mind.

to calculate P_4, takes account of nutrient price inflation, regional differentials in the nutrient unit values, and the changing food habits. Hence, PL_4 seeks to capture the original calorie basis of the official poverty line when it was fixed by the Planning Commission three decades ago. Moreover, the calorie norms underlying PL_4 are derived from a "balanced diet" of nutrients recommended by nutrition experts, and allows for age-gender differences in the minimum energy requirements, unlike PL_1. A comparison of PL_1 with PL_4 is of interest since it shows the nature and extent of divergence of the official poverty line from the ones that capture the true spirit of the original calorie norm idea. Table 16 presents the comparable State specific figures for PL_1, PL_4 in the rural and urban areas. The differences are, in most cases, considerable and show how far out of line the official poverty lines (PL_1) have now fallen in relation to those (PL_4) that attempt to incorporate the inflation in the nutrients' unit values. The differences between the "official poverty line" (PL_1) and that based on estimated nutrient unit values (PL_4) are quite large in the calorie poor, Southern States of Kerala and Tamil Nadu but are much less in the Northern States of Bihar and Madhya Pradesh. In both the rural and urban areas of the latter State (MP), the official poverty line (PL_1), rather unusually, exceeds PL_4. This explains the fall in poverty rates in Madhya Pradesh (see Tables 10, 11) as we move from P_1 to P_4. While these deviations warn against making sweeping generalisations, Table 16 generally portrays the official poverty lines as understating the true inflation in the unit values of the calorie producing nutrients over our sample period, especially in the rural areas.

4.5 Quantifying the Disagreement between the poverty measures

Further evidence on the nature and extent of disagreement between the poverty measures is contained in Table 17 which is based on an identification of each household's poverty status using the 4 alternative poverty lines. This table reports for SC/ST (rural)

households in the 55th round of NSS,[17] in matrix form, the percent of households which belong to (a, b) where a (= 0, if non-poor, 1 if poor) denotes a household's poverty status on P_1, and b (= 0, 1) denotes that household's poverty status on each of the other measures. In the comparison of P_1, vs. P_2, for example, the first column [(0,0)] shows the percentage of households who are non poor using both the official poverty line (PL_1) and that based directly on calories (PL_2). At the other extreme the entries in the (1,1) column denote the percentage of households who are below both the poverty lines (PL_1, PL_2). The entries in the (1,0), (0,1) columns, hence, refer to those households on whose poverty status the measures disagree. Table 17 shows that there are very few SC/ST households who are considered "poor" on the official definition (P_1) but non poor on the others [(1,0)]. In contrast, a much larger proportion of households are "calorie poor" (based on P_2) but not recognised as "poor" on the basis of the official poverty line (P_1). Note that, in the case of most States, the disagreements reflected by the entries in the (0, 1) column come down sharply as we move from left to right in this table, i.e. from a P_1 vs. P_2 comparison to a P_1 vs. P_4 comparison. In other words, the money metric poverty line (PL_4), proposed here, does seem a reasonable compromise between the official poverty line (PL_1) and that specified in terms of calories (PL_2). Note, also, from Table 17 the large inter State variation in the percentage of households who are "calorie poor" but are not recognised as "poor" on official definition. The Southern States of Kerala, (64.8%), Karnataka (58.8%) record the top entries in the (0,1) column in the P_1 vs. P_2 comparison, with Kerala leading the way.

[17] For reasons of space, we have reported the results of only the rural areas where the bulk of the poor resides. The urban estimates of the SC/ST households and the full set of comparable figures for the female headed households are available on request.

4.6 Identifying the determinants of the differences between the Expenditure Based (P_1) and the Calorie Based Poverty (P_2) Rates

Since the P_1 vs. P_2 comparison has recently attracted much attention in the literature on poverty in India, let us present some evidence on the key attributes of households on whose poverty status these measures disagree. We do so by performing multinomial logit estimations of the 4 mutually exclusive and exhaustive states, (0, 0), (0, 1), (1, 0), (1, 1), with the first state (0, 0), i.e. when both measures agree that the household is non poor, being used as the reference point. Table 18 presents the multinomial logit estimates, on NSS 50th round data, for rural Bihar which is one of the poorest regions. From a policy viewpoint, the parameter estimates in the (1, 1) column are of particular interest, since they indicate the direction and magnitude of movement from the least preferred State (1, 1) to the most preferred one (0, 0), when the corresponding determinant increases by one unit. The significantly positive estimates in the (1, 1) column confirm the inferior poverty status of the socially disadvantaged groups vis-à-vis the rest of the population. The inferior poverty status of the female headed households is now brought out more clearly than was apparent in the earlier discussion since, unlike before, we are now controlling for other household characteristics. The rural wage earner, who generally belongs to landless families, has inferior poverty status on both expenditure and calorie grounds. However, an increase in rural wages plays a significant role in reducing rural poverty. This result is consistent with the remark of Sen (1996, p. 2459) that "the trend in rural poverty shows a very close similarity with trends in agricultural wages". An increase in household size has an adverse impact on household poverty, regardless of whether the increase is due to the addition of adults or of children. A comparison of the estimates in the (0, 1) and (1, 0) columns shows that this adverse impact tends to be more on calorie grounds than on expenditure. The significantly negative estimates of the calorie coefficients show that the public distribution system does play a significant role in the anti poverty program. The size of land holdings also plays a

strong role in reducing rural poverty on both the official expenditure and calorie definitions of the poverty line. This result possibly explains the observation of Swaminathan and Ramachandran (1999) that over the period, 1983 to 1993/94, which overlaps with our sample period, the largest absolute increase in calorie consumption was in Kerala, followed by West Bengal. These two States witnessed significant land reforms leading to a drop in the landless and a more equitable distribution of land holdings during this period.

4.7 Sensitivity of the True Expenditure Based Poverty Rates (P_4) to the Assumed Engel Ratio of Food.

It would be useful to distinguish between the alternative poverty measures, $P_2 - P_4$, introduced in this paper. P_2 refers to "calorie poverty", P_3 to "food expenditure poverty" and P_4 to "total expenditure poverty". A household which is "calorie poor" need not be "food expenditure poor" or "total expenditure poor" and vice versa. The evidence presented in Tables 10, 11 shows that the P_3 estimate is generally much closer to P_2 than to P_4. The latter often drops sharply from P_3 or P_2 but is still in most cases considerably higher than the P_1 estimate which is based on the official poverty line. The drop in P_4 from P_3 possibly reflects the use of an unrealistically high Food Engel ratio of 0.7 for the poor in round 55 in the calculations. As Mehta and Venkatraman (2000) argue, there has been a decrease in the Food Engel ratio[18] for the poor because of a sharp rise in the essential expenditure on non Food items. Tables 19, 20 provide evidence on the sensitivity of the P_4 estimate to the assumed Food Engel ratio in NSS round 55 in the rural, urban areas, respectively. These tables also report the corresponding "food expenditure poverty" rates (P_3) for comparison. The P_4 rate rises sharply with the decline in the assumed Food Engel ratio and approaches the P_3 rate at the lower Engel ratio of 0.62. The fact that the nature and extent of the remaining discrepancy

[18] This is consistent with Engel's Law which postulates an inverse relation between the budget share of Food and aggregate household expenditure – see Appendix A for supporting empirical evidence.

between P_3 and P_4 varies between States points to the need to employ State specific Engel ratios to reflect the changing realities of the various regions [see Appendix A]. It is worth noting from Tables 19, 20 that in several cases P_3 is very close to P_4. Tables 19, 20 confirm that even on conventional expenditure based poverty rates but using updated nutrient prices and realistic Engel Food ratios, the poverty situation in NSS round 55 (1999/2000) was much worse than is revealed by the poverty measure, P_1, that is based on the official poverty line. Moreover, if one uses time varying Food Engel ratios that decrease with the passage of time, as Appendix A suggests, then it is not clear at all that one can unambiguously claim that poverty in India declined in the 1990's. Appendix A shows that, in both rural and urban areas, the Engel Food share of households in the bottom 5% of the expenditure distribution declined from around 0.88 in round 43 to around 0.67 in round 55, i.e. a decline of (approx.) 23%. If we incorporate a decline in the Engel ratios of this magnitude in our calculations, then the P_4 poverty rates will register unchanging or even increasing poverty over the 1990's. In other words, several of the households who were "calorie poor" and "food expenditure poor" in round 43 had moved into poverty on all the three definitions by round 55.

5. Conclusions

Much of the recent debate on the poverty estimates in India has centred around issues such as the correct reference period that should be used in the survey questionnaires (7 days or 30 days), consistency between the national accounts and the sample survey data, etc. There has been relatively little attempt to question whether the "official poverty lines", as used today [see Government of India (2001)], retain their original definition based on minimum calorie norms when they were first set nearly three decades ago. A classic example of this uncritical attitude was provided in a recent World Bank/Planning Commission sponsored workshop in Delhi on January 11-12, 2002 [see *EPW*, January 25-31, 2003] where

researchers, using the “official poverty lines”, agreed that poverty declined during the 1990s! The disagreement mostly centred around the extent of the decline. And, yet, there is now increasing evidence that calorie intake fell during the 1980s and the 1990s, while malnourishment and hunger increased over this period.

This raises serious questions on the credibility of the “official poverty line” as a true measure of the cost of obtaining the original calorie requirements. This study provides evidence, based on estimated nutrient prices and a “balanced diet” of nutrients, that shows how far the official poverty lines have fallen out of line with the ones that reflect the true inflation in the nutrient prices. This paper provides robust evidence that shows that the poverty situation in India today is much worse than that revealed by the official poverty lines. This study goes beyond previous investigations on the discrepancy between the official poverty estimates and the calorie based ones by identifying and quantifying in every major region the households who are poor on the calorie definition but deemed non poor in official calculations. This paper also provides evidence on the determinants of the differences/agreements between these measures on the household’s poverty status. The study makes a methodological contribution by proposing an expenditure based poverty line, using the household specific estimated nutrient prices, that offers a reasonable compromise between the two measures. The study, then, employs variable Food Engel ratios, that increase with the passage of time, to deny the unqualified claim often made, that poverty in India declined in the 1990’s. The present calculations suggest the exact reverse, since several households who were “calorie poor” and “food expenditure poor”, but not “total expenditure poor” in round 43, were deemed “poor” in round 55 on all the three definitions of poverty. This last feature reflects the sharp fall in the Food budget share during the 1990s. Whether this reflects rising household affluence, as Engel’s law suggests, or whether it reflects a sharp rise in the cost of essential non Food items is a matter of debate. But it certainly calls for the poverty line to be

set at a higher level than is implied by employing a time invariant Food budget share of the poor.

The results of this study underline the importance of continuously re evaluating the cost of obtaining the minimum energy requirements to ensure that the “minimum food expenditure” used in the poverty calculations is true to its original definition. The results also point to the need to employ time varying Engel ratios, that decline with time in line with reality, to calculate the “minimum total expenditure” from “minimum food expenditure”. As long as these are not done, the “official poverty line” will remain fundamentally flawed and will yield misleading conclusions in both cross sectional and inter temporal poverty comparisons. No amount of “poverty rate adjustments” using sophisticated price indices but relying on out of date calorie costs will be of real value.

Table 1: Age-Gender Breakdown of Daily Calorie Requirement (kcal)

Gender	Per capita Calorie requirement per day (kcal) for the age group (in years)							
	<3	**3 -<6**	**6 -<9**	**9 -<12**	**12 -<15**	**15 -<18**	**18 -<60**	**≥ 60**
Male	1200	1500	1800	2100	2500	3000	2800	1950
Female	1200	1500	1800	2100	2200	2200	2200	1800

Table 2: Median Monthly Per Capita Calorie Consumption in Round 55 (1999/2000) by Expenditure Percentiles in Rural India

State	Expenditure Percentiles								
	0-1%	1-5%	5-10%	10-25%	25-50%	50-75%	75-90%	90-95%	95-99%
Karnataka	49089	56264	59823	65960	74316	83301	89178	103352	100141
Rajasthan	37322	52936	54793	61899	67419	77998	90064	108945	121343
Himachal Pradesh	49463	53565	58422	61285	70362	77147	87584	101787	106880
Haryana	36485	47519	53391	57966	67476	77237	86001	109029	110284
Uttar Pradesh	36192	47451	52035	57685	64213	74232	85611	96890	105333
Punjab	38411	49059	53802	56232	66429	77202	93694	97311	103095
Orissa	36012	43239	49849	54040	62360	70113	78224	85165	88110
West Bengal	30630	42146	46543	53595	60645	68886	77690	83566	88178
Bihar	33902	42332	46872	52355	59531	68298	79078	87940	103478
Andhra Pradesh	28756	41139	45324	52180	58811	66959	75551	84054	84626
Maharashtra	32900	40679	47235	51002	57964	67892	78413	87491	100720
Kerala	28647	42275	44804	50758	57196	64967	74998	77825	88144
Gujarat	31379	41430	48366	50461	57616	65100	76181	82383	85145
Assam	33722	38006	42048	49596	54703	61824	66916	75977	75764
Madhya Pradesh	31799	37999	42097	48154	57391	66813	76142	86508	98079
Tamil Nadu	26739	35836	40135	46101	53235	62531	69450	79308	84761
All India	34110	43641	48185	53737	60993	69923	79598	89293	96462

Table 3: Median Monthly Per Capita Calorie Consumption in Round 55 (1999/2000) by Expenditure Percentiles in Urban India

State	Expenditure Percentiles								
	0-1%	1-5%	5-10%	10-25%	25-50%	50-75%	75-90%	90-95%	95-99%
Himachal Pradesh	48433	55970	67784	65931	90515	82322	89319	92906	106395
Karnataka	50640	55128	58941	64241	70646	77045	85403	89623	92724
Orissa	36167	49738	58171	59783	68144	73923	85546	83015	94881
Rajasthan	44631	48662	51242	58603	65173	72362	82521	96914	96032
Assam	37997	50226	48141	57258	60443	71934	74539	93940	92492
Bihar	29095	41936	49405	56040	63461	73173	86580	90585	99346
Punjab	39604	47163	49603	55209	64661	75888	84784	84398	86957
West Bengal	38933	45417	51140	55129	60728	67209	71694	76754	84283
Haryana	36569	43197	50293	53452	60373	72214	69965	77477	99776
Andhra Pradesh	35885	43871	48789	53348	58601	66288	73620	79926	85238
Gujarat	37412	44637	47505	53039	58892	66071	73357	80670	77328
Maharashtra	36692	42304	49248	52619	59796	68226	77576	80017	83305
Uttar Pradesh	33786	43997	42922	52187	58721	68593	79568	87084	91895
Kerala	29997	39351	43993	50885	59483	65478	72738	83471	78596
Madhya Pradesh	24851	36456	44391	49929	57741	69101	79702	92901	92216
Tamil Nadu	1504	39063	42974	48235	54823	65045	74050	82072	86967
All India	33867	44647	49128	54531	61946	69875	78397	85578	89255

Table 4: Median Monthly Per Capita Calorie Consumption (Rural) from 1987/88 to 1999/2000

State	Round 55 1999/2000	Round 50 1993/94	Round 43 1987/88
Himachal Pradesh	72841	69854	75193
Rajasthan	71313	72290	71108
Haryana	70003	69594	71816
Punjab	68453	69878	70678
Uttar Pradesh	67712	67663	69145
Orissa	63134	65608	62000
Bihar	62639	63024	63866
West Bengal	62379	64345	62495
Andhra Pradesh	61093	61006	62777
Maharashtra	60631	56237	59326
Madhya Pradesh	60306	63359	65182
Kerala	60222	58183	55181
Gujarat	59949	58579	58891
Karnataka	59524	59947	61387
Assam	57131	59933	60220
Tamil Nadu	54648	55177	56107
All India	62917	63005	64056

Table 5: Median Monthly Per Capita Calorie Consumption (Urban) from 1987/88 to 1999/2000

State	Round 55 1999/2000	Round 50 1993/94	Round 43 1987/88
Himachal Pradesh	83449	73905	75320
Rajasthan	67466	65739	63475
Haryana	63518	63747	61468
Punjab	66247	63158	59992
Uttar Pradesh	63588	63742	60873
Orissa	69172	69026	67778
Bihar	66912	67439	64423
West Bengal	62798	64846	62372
Andhra Pradesh	61713	59214	61098
Maharashtra	62208	59739	59888
Madhya Pradesh	62292	62100	61221
Kerala	61682	57071	56151
Gujarat	62209	61366	58179
Karnataka	61972	60873	61454
Assam	64732	63446	64951
Tamil Nadu	59233	57382	56019
All India	65060	62717	62189

Table 6: Average Per Capita Monthly Calorie Consumption in Rural Households in NSS Round 50 (1993/94) [(a)]

State	All Households			Female Headed Households			SC/ST Households		
	Non PDS	PDS	Total	Non PDS	PDS	Total	Non PDS	PDS	Total
Andhra Pradesh	52233	11256	63489	49277	16479	65755	48319	12615	60934
Assam	56814	3057	59871	53226	4369	57594	57023	2546	59569
Bihar	63430	1403	64833	62570	1330	63900	59842	1373	61216
Gujarat	55695	5678	61373	57695	6994	64688	49639	7149	56788
Haryana	74784	1929	76713	77222	1744	78967	59306	1332	60638
Himachal Pradesh	63108	10517	73625	69908	10049	79957	59420	9901	69322
Karnataka	57977	5333	63310	57403	8039	65443	51834	5997	57831
Kerala	40878	17780	58658	40832	19643	60474	34247	18076	52324
Madhya Pradesh	63804	2569	66373	66284	2978	69262	60427	2573	63000
Maharashtra	55061	4125	59186	57161	5804	62965	52417	4244	56662
Orissa	65900	1380	67280	69933	1471	71404	63073	1277	64351
Punjab	72900	1331	74230	74850	1399	76249	64776	1528	66304
Rajasthan	71113	5095	76208	75279	5015	80294	64262	5132	69394
Tamil Nadu	49769	9253	59022	49009	12164	61173	44547	9155	53702
Uttar Pradesh	70130	1960	72090	70112	3432	73544	64630	2019	66649
West Bengal	64821	1842	66663	63918	2069	65987	63516	1865	65381
All India	61391	4681	66072	59787	7673	67460	58169	4196	62365

(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 7: Average Per Capita Monthly Calorie Consumption in Rural Households in NSS Round 55 (1999/2000) [(a)]

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: Estimated (Rural) Nutrient Unit Values (Rs./gm.) at Mean in NSS Round 55[(a)]

State	Female Headed Households			SC/ST Households		
	Carbohydrate	Protein	Fat	Carbohydrate	Protein	Fat
Andhra Pradesh	.0123	.0002	.1480	.0184	.0000	.0255
	(.0022)	(.0025)	(.0765)	(.0025)	(.0003)	(.0173)
Assam	.0170	0.0094	.1257	.0207	.0278	.0081
	(.0030)	(.0109)	(.0654)	(.0030)	(.0188)	(.0176)
Bihar	.0134	.0031	.0186	.0158	.0013	.0147
	(.0050)	(.0120)	(.0784)	(.0031)	(.0048)	(.0268)
Gujerat	.0014	.0666	.1340	.0145	.0053	.1034
	(.0075)	(.0274)	(.0182)	(.0044)	(.0338)	(.0118)
Haryana	.0146	.0129	.1236	.0026	.0028	.2060
	(.0028)	(.0229)	(.0516)	(.0025)	(.0100)	(.0180)
Himachal Pradesh	.0029	.1130	.0770	.0228	.0042	.0034
	(.0056)	(.0289)	(.0290)	(.0019)	(.0105)	(.0304)
Karnataka	.0158	.0362	.0167	.0099	.0486	.0773
	(.0036)	(.0275)	(.0218)	(.0055)	(.0135)	(.0320)
Kerala	.0090	.1095	.1086	.0120	.0098	.2133
	(.0078)	(.0235)	(.0313)	(.0044)	(.0161)	(.0355)
Madhya Pradesh	.0156	.0204	.0215	.0165	.0001	.0210
	(.0035)	(.0137)	(.0263)	(.0019)	(.0032)	(.0180)
Maharashtra	.0171	.0046	.0664	.0160	.0209	.0257
	(.0037)	(.0049)	(.0214)	(.0059)	(.0122)	(.0190)
Orissa	.0029	.1211	.0302	.0079	.0640	.0344
	(.0009)	(.0089)	(.0259)	(.0013)	(.0117)	(.0179)
Punjab	.0090	.1104	.0305	.0174	.0237	.0478
	(.0030)	(.0252)	(.0118)	(.0040)	(.0143)	(.0254)
Rajasthan	.0035	.0807	.0613	.0072	.0225	.1020
	(.0027)	(.0297)	(.0343)	(.0020)	(.0086)	(.0167)
Tamil Nadu	.0144	.0015	.1346	.0119	.0903	.0263
	(.0024)	(.0092)	(.0316)	(.0038)	(.0213)	(.0249)
Uttar Pradesh	.0107	.0232	.0668	.0139	.0004	.0535
	(.0023)	(.0169)	(.0226)	(.0030)	(.0087)	(.0268)
West Bengal	.0026	.0778	.1924	.0121	.0370	.1063
	(.0014)	(.0296)	(.0569)	(.0018)	(.0100)	(.0255)

(a) Standard errors in brackets.

Table 9: Estimated (Urban) Nutrient Unit Values (Rs./gm.) at Mean in NSS Round 55[(a)]

State	Female Headed Households			SC/ST Households		
	Carbohydrate	Protein	Fat	Carbohydrate	Protein	Fat
Andhra Pradesh	.0252	.0376	.0040	.0006	.1301	.1032
	(.0065)	(.0190)	(.0311)	(.0011)	(.0338)	(.0368)
Assam	.0365	.0020	.0284	.0211	.0421	.0908
	(.0098)	(.0132)	(.0393)	(.0074)	(.0449)	(.0914)
Bihar	.0143	.0028	.1706	.0190	.0041	.0790
	(.0028)	(.0180)	(.0513)	(.0040)	(.0105)	(.0239)
Gujerat	.0083	.1406	.0870	.0008	.2093	.0120
	(.0224)	(.0395)	(.0165)	(.0032)	(.0359)	(.0102)
Haryana	.0047	.0111	.2265	.0024	.1072	.0541
	(.0034)	(.0295)	(.0225)	(.0047)	(.0442)	(.0511)
Himachal Pradesh	.0175	.0007	.1699	.0102	.1033	.0931
	(.0094)	(.0054)	(.0283)	(.0098)	(.0169)	(.0325)
Karnataka	.0294	.0030	.0546	.0001	.1379	.0974
	(.0123)	(.0116)	(.0298)	(.0014)	(.0249)	(.0248)
Kerala	.0336	.0121	.0485	.0133	.0976	.1229
	(.0066)	(.0141)	(.0316)	(.0047)	(.0371)	(.0349)
Madhya Pradesh	.0013	.0427	.1832	.0015	.0015	.2034
	(.0023)	(.0345)	(.0384)	(.0022)	(.0132)	(.0405)
Maharashtra	.0059	.0758	.1501	.0104	.0785	.0936
	(.0053)	(.0379)	(.0236)	(.0093)	(.0217)	(.0293)
Orissa	.0047	.0569	.2224	.0092	.0467	.1583
	(.0029)	(.0337)	(.0400)	(.0018)	(.0278)	(.0404)
Punjab	.0316	.0003	.0460	.0197	.0040	.0926
	(.0123)	(.0019)	(.0340)	(.0049)	(.0084)	(.0446)
Rajasthan	.0003	.1801	.0227	.0223	.0078	.0257
	(.0021)	(.0475)	(.0175)	(.0052)	(.0108)	(.0241)
Tamil Nadu	.0003	.1615	.1117	.0006	.1735	.0888
	(.0018)	(.0523)	(.0853)	(.0041)	(.0279)	(.0333)
Uttar Pradesh	.0019	.1452	.0336	.0133	.0542	.0268
	(.0023)	(.0436)	(.0274)	(.0065)	(.0315)	(.0336)
West Bengal	.0012	.2318	.0402	.0001	.1695	.0913
	(.0030)	(.0835)	(.0362)	(.0005)	(.0437)	(.0486)

(a) Standard errors in brackets.

Table 10: Rural Household (headcount) Poverty Rates (% age) in NSS Round 55 (1999/2000) Using Alternative Poverty Lines: All Households

State	P_1[(a)]	P_2[(b)]	P_3[(c)]	P_4[(d)]	P_5[(e)]
Andhra Pradesh	8.4	64.3	61.6	47.2	74.2
Assam	35.2	75.5	53.3	49.6	84.9
Bihar	38.6	56.5	28.1	19.9	70.4
Gujarat	9.8	66.1	64.3	41.7	74.2
Haryana	6.8	42.2	40.4	19.9	53.6
Himachal Pradesh	5.7	35.3	26.3	10.7	47.8
Karnataka	13.8	66.5	50.4	31.5	73.6
Kerala	7.2	66.6	65.4	45.2	74.5
Madhya Pradesh	33.2	62.5	41.9	24.1	72.6
Maharashtra	19.5	65.4	54.6	27.3	76.6
Orissa	44.8	58.9	50.8	41.3	69.9
Punjab	4.7	43.5	41.5	12.7	57.3
Rajasthan	11.1	35.2	25.3	9.9	51.3
Tamil Nadu	16.8	75.9	72.9	60.0	81.3
Uttar Pradesh	26.9	41.8	26.3	9.8	58.5
West Bengal	27.5	60.4	58.1	50.9	71.7
All India	23.0	57.7	45.7	30.6	69.2

(a) P_1 uses the official poverty line, PL_1 (see Sec 2.2)
(b) P_2 uses the calorie norm based poverty line, PL_2 (see Sec 2.2)
(c) P_3 uses the poverty line, PL_3, that is the food expenditure implied by the nutrient prices and the calorie norm (see Sec 2.2)
(d) P_4 uses the poverty line, PL_4, that is the total expenditure implied by P_3 (see Sec 2.2)
(e) P_5 denotes the calorie based poverty rates, P_2, when we disregard the age/gender variation of the calorie requirements

Table 11: Urban Household (headcount) Poverty Rates (% age) in NSS Round 55 (1999/2000) UsingAlternative Poverty Lines: All Households

State	P_1[(a)]	P_2[(b)]	P_3[(c)]	P_4[(d)]
Andhra Pradesh	23.2	44.4	27.3	9.5
Assam	4.8	44.3	20.2	8.0
Bihar	25.4	32.3	34.9	21.9
Gujarat	11.0	44.3	31.1	6.9
Haryana	8.0	38.6	12.1	0.6
Himachal Pradesh	2.1	13.6	6.8	0.4
Karnataka	18.8	45.8	44.1	17.4
Kerala	13.6	45.0	45.2	21.8
Madhya Pradesh	32.2	42.0	25.3	7.8
Maharashtra	19.7	44.9	22.6	4.5
Orissa	36.7	29.2	67.1	53.6
Punjab	3.5	36.2	34.5	4.2
Rajasthan	15.2	27.1	11.4	3.1
Tamil Nadu	19.1	50.9	32.5	16.1
Uttar Pradesh	23.7	39.0	15.0	2.5
West Bengal	10.7	45.7	24.9	10.0
All India	17.8	40.3	26.4	9.9

(a) P_1 uses the official poverty line, PL_1 (see Sec 2.2)
(b) P_2 uses the calorie norm based poverty line, PL_2 (see Sec 2.2)
(c) P_3 uses the poverty line, PL_3, that is the food expenditure implied by the nutrient prices and the calorie norm (see Sec 2.2)
(d) P_4 uses the poverty line, PL_4, that is the total expenditure implied by P_3 (see Sec 2.2)

Table 12: Rural Poverty Rates (% age) in NSS Round 55 of Socially Disadvantaged Groups Using Alternative Poverty Lines

State	Female Headed Households				SC/ST Households			
	P_1	P_2	P_3	P_4	P_1	P_2	P_3	P_4
Andhra Pradesh	10.7	50.1	69.9	62.8	14.9	68.9	51.4	39.3
Assam	33.3	71.0	83.3	78.9	36.5	75.0	50.5	52.6
Bihar	36.5	46.5	12.4	10.1	50.9	65.6	31.9	25.8
Gujarat	7.2	51.7	40.1	31.8	17.8	74.8	77.8	65.1
Haryana	5.1	33.5	34.7	13.7	15.3	61.3	70.6	47.4
Himachal Pradesh	5.2	19.7	20.3	10.7	8.9	42.1	19.8	9.0
Karnataka	15.2	54.3	31.0	20.4	21.1	78.0	80.7	64.3
Kerala	11.1	63.8	62.4	46.1	13.2	77.7	90.4	73.8
Madhya Pradesh	30.2	50.5	38.4	24.6	44.9	68.7	57.9	37.3
Maharashtra	12.5	43.0	45.1	23.0	32.6	71.9	62.4	32.3
Orissa	39.1	40.3	61.0	44.3	58.4	64.2	76.1	72.6
Punjab	5.1	30.0	20.0	4.5	9.3	56.1	46.5	13.5
Rajasthan	15.5	29.3	16.7	10.0	18.6	42.1	48.1	24.4
Tamil Nadu	17.8	62.3	71.9	61.5	27.5	82.9	79.4	66.6
Uttar Pradesh	27.5	33.8	41.8	24.8	37.2	51.4	54.7	31.4
West Bengal	26.6	54.0	85.9	79.2	33.7	61.1	88.3	83.1
All India	20.5	47.5	48.1	36.6	33.8	64.4	59.6	44.7

Table 13: Urban Poverty Rates (% age) in NSS Round 55 of Socially Disadvantaged Groups Using Alternative Poverty Lines

State	Female Headed Households				SC/ST Households			
	P_1	P_2	P_3	P_4	P_1	P_2	P_3	P_4
Andhra Pradesh	29.7	37.2	23.9	7.2	39.6	44.1	54.5	37.4
Assam	2.1	29.4	13.4	4.5	9.9	43.5	45.4	35.8
Bihar	27.1	28.2	47.4	39.5	40.1	41.2	55.3	42.6
Gujarat	14.1	27.1	16.8	5.6	23.3	53.1	29.2	8.7
Haryana	4.5	32.2	28.9	4.7	24.9	46.9	28.6	7.9
Himachal Pradesh	2.8	7.2	8.9	3.6	3.5	20.2	18.8	1.6
Karnataka	23.4	35.3	26.6	11.5	43.0	56.6	58.1	30.9
Kerala	15.9	38.8	34.1	15.3	20.1	52.0	58.4	33.4
Madhya Pradesh	31.1	33.2	50.1	27.7	49.3	44.8	63.8	40.0
Maharashtra	19.4	39.1	30.7	11.5	34.2	53.6	46.9	19.8
Orissa	50.7	35.5	71.1	63.4	63.2	37.9	85.8	75.4
Punjab	1.0	33.5	36.7	9.9	7.2	39.8	39.9	7.0
Rajasthan	18.6	13.9	2.1	0.0	32.6	33.2	18.4	3.9
Tamil Nadu	24.4	40.0	40.3	29.1	40.0	63.1	70.2	48.7
Uttar Pradesh	20.1	29.5	20.0	7.4	32.3	36.5	18.1	5.8
West Bengal	9.4	41.6	32.3	14.5	23.6	52.9	59.4	41.6
All India	19.7	34.3	30.6	15.7	32.6	46.1	47.4	27.5

Table 14: Rural Calorie Based Poverty Rates ($P_{2,}$ %) in NSS Round 55 in the Presence and Absence of Public Distribution System (PDS)

State	All Households		Female Headed Households		SC/ST Households	
	With PDS	No PDS	With PDS	No PDS	With PDS	No PDS
Andhra Pradesh	64.3	80.3	50.1	72.7	68.9	87.4
Assam	75.5	80.9	71.0	78.1	75.0	80.9
Bihar	56.5	59.3	46.5	49.5	65.6	68.4
Gujerat	66.1	74.5	51.7	60.9	74.8	82.6
Haryana	42.2	44.9	33.5	34.7	61.3	63.3
Himachal Pradesh	35.3	55.0	19.7	37.9	42.1	66.2
Karnataka	66.5	77.6	54.3	73.4	78.0	87.7
Kerala	66.6	83.0	63.8	81.9	77.7	93.3
Madhya Pradesh	62.5	67.2	50.5	55.9	68.7	73.1
Maharashtra	65.4	74.6	43.0	62.2	71.9	78.7
Orissa	58.9	72.7	40.3	63.1	64.2	77.7
Punjab	43.5	45.7	30.0	31.8	56.1	58.5
Rajasthan	35.2	38.9	29.3	36.4	42.1	45.6
Tamil Nadu	75.9	89.0	62.3	81.8	82.9	93.0
Uttar Pradesh	41.8	45.6	33.8	40.7	51.4	55.3
West Bengal	60.4	65.2	54.0	57.9	61.1	66.7
All India	57.7	65.5	47.5	60.3	64.4	71.8

Table 15: Urban Calorie Based Poverty Rates (P_2,%) in NSS Round 55 in the Presence and Absence of Public Distribution System (PDS)

State	All Households		Female Headed Households		SC/ST Households	
	With PDS	No PDS	With PDS	No PDS	With PDS	No PDS
Andhra Pradesh	44.4	58.6	37.2	55.1	44.1	61.2
Assam	44.3	50.3	29.4	38.1	43.5	59.0
Bihar	32.3	34.8	28.2	31.2	41.2	43.6
Gujarat	44.3	51.2	27.1	36.5	53.1	64.3
Haryana	38.6	41.0	32.2	33.9	46.9	53.1
Himachal Pradesh	13.6	22.8	7.2	12.3	20.2	40.7
Karnataka	45.8	60.0	35.3	51.1	56.6	68.7
Kerala	45.0	64.7	38.8	59.0	52.0	69.4
Madhya Pradesh	42.0	45.5	33.2	37.0	44.8	48.2
Maharashtra	44.9	51.8	39.1	46.5	53.6	61.9
Orissa	29.2	44.0	35.5	57.8	37.9	52.3
Punjab	36.2	38.0	33.5	33.8	39.8	41.2
Rajasthan	27.1	30.2	13.9	21.0	33.2	38.3
Tamil Nadu	50.9	68.4	40.0	61.1	63.1	79.7
Uttar Pradesh	39.0	45.1	29.5	37.4	36.5	47.2
West Bengal	45.7	52.1	41.6	46.7	52.9	59.8
All India	40.3	48.8	34.3	46.3	46.1	55.7

Table 16: Comparison of Official Poverty Line [(a)] (PL_1) in NSS Round 55 (1999/2000) with that based on Estimated Nutrient Prices (PL_4) [(b)]

State	Rural		Urban	
	PL_1	PL_4	PL_1	PL_4
Andhra Pradesh	262.9	394.2	457.4	414.8
Assam	365.4	401.7	344.0	482.2
Bihar	333.1	298.4	379.8	384.9
Gujarat	318.9	482.8	474.4	520.9
Haryana	362.8	478.8	420.2	389.6
Himachal Pradesh	367.5	445.0	420.2	474.0
Karnataka	309.6	396.3	511.4	536.4
Kerala	374.8	656.9	477.1	581.6
Madhya Pradesh	311.3	292.3	481.7	350.3
Maharashtra	318.6	380.5	539.7	453.8
Orissa	323.9	312.3	473.1	602.9
Punjab	362.7	468.2	388.2	470.3
Rajasthan	344.0	361.1	465.9	374.1
Tamil Nadu	307.6	541.8	475.6	531.8
Uttar Pradesh	336.9	288.5	416.3	326.6
West Bengal	350.2	446.1	409.2	470.7
All India	329.1	385.5	455.2	447.7

(a) The poverty lines are monthly expenditure (Rs) per capita
(b) The PL_4 figures are the means of estimated household specific PL_{4h}s in that state. The PL_1 figures are as reported in Government of India (2001, Table 1)

Table 17: Identification of Poverty Status of Households in Alternative Combinations of Poverty Line Definitions (SC/ST households in NSS Round 55 (Rural))[(a)]

State	(P_1, P_2)				(P_1, P_3)				(P_1, P_4)			
	(0,0)	(0,1)	(1,0)	(1,1)	(0,0)	(0,1)	(1,0)	(1,1)	(0,0)	(0,1)	(1,0)	(1,1)
Andhra Pradesh	30.4	54.7	0.6	14.3	47.5	37.6	1.1	13.8	59.6	25.5	1.1	13.8
Assam	23.3	40.1	1.7	34.9	45.1	18.4	4.4	32.1	44.1	19.3	3.3	33.2
Bihar	26.7	22.4	7.7	43.2	42.1	7.0	26.0	24.9	46.6	2.5	27.6	23.3
Gujarat	24.8	57.5	0.4	17.3	22.2	60.0	0.0	17.8	34.9	47.3	0.0	17.8
Haryana	38.7	46.0	0.1	15.3	29.4	55.3	0.0	15.3	52.6	32.0	0.0	15.3
Himachal Pradesh	57.0	34.1	0.9	8.0	77.3	13.8	2.8	6.0	88.4	2.7	2.6	6.3
Karnataka	20.1	58.8	1.8	19.3	19.0	59.9	0.3	20.8	35.6	43.3	0.1	21.0
Kerala	22.1	64.8	0.3	12.9	9.6	77.3	0.0	13.2	26.2	60.6	0.0	13.2
Madhya Pradesh	26.0	29.2	5.3	39.5	35.2	19.9	6.9	37.9	50.8	4.4	12.0	32.9
Maharashtra	26.2	41.2	1.9	30.7	33.8	33.6	3.8	28.8	58.8	8.6	8.9	23.7
Orissa	26.2	15.3	9.6	48.8	19.2	22.4	4.7	53.8	24.2	17.3	3.2	55.2
Punjab	42.7	48.0	1.3	8.1	53.2	37.5	0.3	9.1	84.1	6.6	2.4	6.9
Rajasthan	54.0	27.5	3.9	14.7	51.0	30.5	0.9	17.7	72.9	8.5	2.7	15.9
Tamil Nadu	16.7	55.8	0.5	27.0	20.4	52.1	0.2	27.3	33.4	39.1	0.0	27.5
Uttar Pradesh	39.6	23.2	9.1	28.1	41.3	21.5	4.0	33.2	59.1	3.8	9.6	27.6
West Bengal	33.7	32.6	5.1	28.6	11.7	54.6	0.0	33.7	16.9	49.4	0.0	33.7

(a) The figures denote the percentage of households who belong to (a, b) under the alternative poverty measure combinations, where a=0, if the household is above the relevant poverty line and a=1, otherwise (similarly for b) – see text for more explanations

Table 18: Multi Nomial Logit Estimates for Rural Bihar in Round 50 (1993/1994)[a]

Household Characteristics	Estimate[b],[c]		
	(0, 1)	**(1, 0)**	**(1, 1)**
Log of number of male adults	2.55 [e] (10.8)	10.50[e] (29.1)	12.39[e] (35.9)
Log of number of female adults	2.23[e] (11.3)	5.65[e] (22.1)	7.98[e] (31.7)
Log of number of male children	2.29[e] (18.8)	4.25[e] (25.1)	5.98[e] (37.2)
Log of number of female children	2.00[e] (17.0)	3.51[e] (21.3)	5.44[e] (35.3)
Amount of PDS calories consumed	-2.1E-5[e] (-6.0)	-4.1E-[e] (-11.7)	-6.3E-5[e] (-16.6)
Amount of non PDS calories consumed	-9.9E-6[e] (-14.3)	-3.9E-5[e] (-31.1)	-4.8E-5[e] (-40.4)
Age of Household Head	0.002 (0.6)	-0.002 (-0.5)	-0.002 (-0.6)
Female Household head Dummy	0.86[e] (4.5)	2.97[e] (11.6)	3.75[e] (16.6)
Hindu Dummy	-0.16 (-0.5)	-0.12 (-0.3)	-0.35 (-1.0)
Islam Dummy	0.08 (0.2)	0.19 (0.5)	-0.17 (-0.5)
SC/ST Dummy	0.37[e] (3.4)	-0.02 (-0.2)	0.44[e] (3.9)
Self Employed Dummy	-0.44[e] (-2.9)	-0.05 (-0.3)	-0.26 (-1.7)
Wage Worker Dummy	1.16[e] (9.8)	-0.07 (-0.5)	1.21[e] (9.7)
Wage Level	-1.1E-5[e] (-4.5)	3.1E-6 (1.2)	-1.3E-5[e] (-4.5)
Home Owner Dummy	0.10 (0.9)	0.09 (0.6)	0.21 (1.7)
Size of Land Holding	-0.002[e] (-5.2)	0.0002 (0.9)	-0.002[e] (-4.5)
Constant	-4.37[e] (-9.2)	-9.02[e] (-15.4)	-11.52[e] (-21.2)

(a) Figures in brackets denote t-ratios
(b) (0,0), i.e. when a household is above both the poverty lines PL_1, PL_2, is the reference state
(c) Pseudo $R^2 = 0.3997$.
(d) statistically significant at 5%
(e) statistically significant at 1%

Table 19: Sensitivity of the P_4 (Rural) Estimate in Round 55 (1999/2000) to Alternative Engel Food Ratios

State	Engel Ratio					P_3
	0.8	**0.7**	**0.68**	**0.65**	**0.62**	
Andhra Pradesh	26.1	47.2	51.6	58.6	65.3	61.6
Assam	28.2	49.6	54.7	62.2	69.2	53.3
Bihar	6.9	19.9	24.2	31.5	40.1	28.1
Gujarat	23.1	41.7	46.6	53.5	60.1	64.3
Haryana	11.2	19.9	23.6	27.7	31.7	40.4
Himachal Pradesh	4.4	10.7	13.6	17.3	21.9	26.3
Karnataka	16.9	31.5	34.8	40.7	47.8	50.4
Kerala	31.4	45.2	48.1	52.6	57.5	65.4
Madhya Pradesh	12.7	24.1	26.9	32.4	38.6	41.9
Maharashtra	13.6	27.3	30.7	36.5	43.4	54.6
Orissa	21.0	41.3	46.3	54.2	61.3	50.8
Punjab	4.9	12.7	14.9	19.3	23.7	41.5
Rajasthan	4.0	9.9	11.8	15.0	19.2	25.3
Tamil Nadu	47.0	60.0	62.9	66.6	70.5	72.9
Uttar Pradesh	3.4	9.8	11.9	15.2	19.8	26.3
West Bengal	34.5	50.9	55.5	61.3	67.2	58.1

Table 20: Sensitivity of the P_4 (Urban) Estimate in Round 55 (1999/2000) to Alternative Engel Food Ratios

State	Engel Ratios					P_3
	0.8	**0.7**	**0.68**	**0.65**	**0.62**	
Andhra Pradesh	3.5	9.5	10.9	14.0	17.0	27.3
Assam	2.9	8.0	9.7	12.3	16.2	20.2
Bihar	11.6	21.9	25.1	29.3	34.2	34.9
Gujarat	2.4	6.9	8.3	11.9	16.4	31.1
Haryana	0.3	0.6	1.3	1.8	2.0	12.1
Himachal Pradesh	0.3	0.4	0.4	0.8	1.0	6.8
Karnataka	8.9	17.4	19.2	22.6	25.5	44.1
Kerala	11.8	21.8	24.1	28.3	32.4	45.2
Madhya Pradesh	4.0	7.8	9.4	11.4	14.8	25.3
Maharashtra	1.6	4.5	5.2	6.7	9.0	22.6
Orissa	42.3	53.6	55.9	57.9	61.8	67.1
Punjab	1.2	4.2	5.5	7.7	10.8	34.5
Rajasthan	1.3	3.1	4.0	4.6	6.1	11.4
Tamil Nadu	9.6	16.1	17.6	21.1	24.1	32.5
Uttar Pradesh	1.0	2.5	3.2	5.5	7.3	15.0
West Bengal	3.9	10.0	11.9	14.7	18.6	24.9

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Appendix A

Table A1: Variation of Food Share (i.e. Engel Food Ratio) in Household Budget Across the Expenditure Distribution (Rural)

State	Expenditure Distribution															
	Round 43 (1987/88)								Round 55 (1999/2000)							
	5%	10%	25%	50%	75%	90%	95%	99%	5%	10%	25%	50%	75%	90%	95%	99%
Andhra Pradesh	.88	.88	.87	.83	.76	.67	.60	.51	.67	.67	.66	.65	.63	.57	.52	.47
Assam	.91	.91	.91	.89	.86	.79	.74	.67	.70	.70	.71	.70	.69	.65	.62	.58
Bihar	.92	.91	.90	.88	.85	.80	.73	.66	.71	.71	.70	.68	.67	.64	.62	.59
Gujarat	.87	.88	.88	.86	.84	.79	.71	.68	.66	.68	.65	.64	.62	.59	.56	.50
Haryana	.87	.81	.81	.79	.76	.67	.58	.58	.62	.61	.60	.59	.57	.54	.54	.51
Himachal Pradesh	.86	.84	.85	.81	.77	.70	.61	.57	.65	.65	.63	.61	.56	.53	.50	.47
Karnataka	.89	.89	.88	.85	.82	.75	.67	.63	.64	.63	.63	.63	.60	.57	.52	.48
Kerala	.86	.86	.83	.80	.76	.69	.64	.55	.63	.63	.62	.60	.57	.50	.45	.37
Madhya Pradesh	.90	.89	.88	.85	.81	.73	.67	.59	.65	.65	.64	.62	.59	.56	.52	.48
Maharashtra	.87	.87	.85	.82	.77	.71	.65	.57	.63	.64	.62	.60	.57	.53	.47	.41
Orissa	.95	.93	.92	.90	.85	.77	.70	.68	.71	.73	.70	.69	.65	.60	.57	.52
Punjab	.84	.83	.81	.78	.73	.66	.59	.50	.61	.61	.57	.56	.53	.50	.46	.41
Rajasthan	.88	.88	.86	.82	.79	.71	.66	.62	.61	.63	.63	.61	.60	.57	.56	.51
Tamil Nadu	.89	.88	.93	##	.82	.79	.73	.63	.64	.65	.65	.64	.61	.56	.51	.45
Uttar Pradesh	.87	.85	.82	.88	.76	.76	.69	.65	.63	.63	.62	.61	.59	.56	.53	.47
West Bengal	.91	.92	.91	.89	.84	.79	.72	.68	.72	.72	.70	.68	.66	.63	.58	.53

Table A2: Variation of Food Share (i.e. Engel Food Ratio) in Household Budget Across the Expenditure Distribution (Urban)

State	Expenditure Distribution															
	Round 43 (1987/88)								Round 55 (1999/2000)							
	5%	10%	25%	50%	75%	90%	95%	99%	5%	10%	25%	50%	75%	90%	95%	99%
Andhra Pradesh	.85	.84	.81	.76	.69	.60	.52	.41	.66	.66	.60	.56	.49	.42	.37	.32
Assam	.90	.86	.86	.81	.76	.68	.60	.55	.70	.68	.66	.61	.58	.51	.46	.46
Bihar	.92	.88	.87	.83	.77	.68	.59	.51	.70	.69	.67	.64	.59	.52	.48	.44
Gujarat	.86	.84	.84	.80	.76	.69	.61	.55	.64	.63	.60	.57	.53	.47	.42	.37
Haryana	.83	.82	.78	.75	.84	.64	.59	.55	.55	.54	.53	.51	.49	.43	.39	.37
Himachal Pradesh	.80	.81	.82	.73	.65	.55	.57	.51	.59	.59	.56	.52	.49	.43	.43	.37
Karnataka	.86	.85	.83	.79	.70	.65	.55	.46	.62	.61	.59	.56	.50	.44	.42	.35
Kerala	.84	.84	.89	.79	.73	.63	.56	.48	.62	.64	.62	.57	.52	.46	.42	.33
Madhya Pradesh	.88	.85	.83	.78	.70	.60	.52	.49	.60	.60	.58	.55	.50	.45	.40	.37
Maharashtra	.85	.83	.80	.74	.69	.63	.56	.51	.61	.60	.57	.53	.50	.45	.40	.33
Orissa	.93	.90	.86	.81	.75	.68	.63	.57	.70	.70	.66	.61	.58	.52	.45	.42
Punjab	.82	.80	.77	.73	.67	.60	.56	.48	.59	.58	.55	.51	.49	.45	.41	.38
Rajasthan	.86	.84	.81	.76	.70	.62	.55	.49	.61	.61	.58	.56	.52	.46	.43	.40
Tamil Nadu	.86	.83	.82	.78	.71	.63	.52	.44	.63	.59	.60	.56	.53	.46	.42	.37
Uttar Pradesh	.86	.84	.83	.78	.72	.66	.59	.51	.64	.62	.60	.58	.54	.49	.46	.40
West Bengal	.87	.87	.82	.79	.75	.68	.56	.49	.68	.66	.64	.60	.55	.49	.44	.43

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