

India's Middle-Expenditure Groups: Size and Inequality

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Abstract

India's middle expenditure group (MEG) is large and plays a critical role in determining overall inequality in per capita expenditures. This study focusses on measuring inequality within the MEG separately for rural and urban areas in India. The study utilizes per capita expenditure data for different expenditure groups provided by the NSSO 2011-12, 2022-23 and 2023-24 surveys. For this purpose, we use a framework in which absolute and relative aspects of inequality are captured together. We find that urban inequality is higher than rural inequality in all the three reference years and both have fallen over time. A decomposition of the Gini coefficient of MEG inequality highlights the relatively larger role of between group inequality as compared to within group inequality.

Keywords: Income inequality, Middle-expenditure group, India, Censored distributions, Gini coefficient

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1. Introduction

Concern with inequality in per capita expenditures is an important policy issue. Elimination of poverty and reduction in inequality are major policy questions, wherein considerable attention has been given with respect to the distributional aspects of incomes or expenditures. Both these issues have been studied in India primarily using thick rounds¹ of NSS estimates. Recently, results of two such surveys for 2022-23 and 2023-24 were published after a long gap – the last survey was in 2011-12. These show that poverty, defined through a number of alternative approaches, has been reduced considerably (Das et. al. 2025, Srivastava et. al. 2025). While the incidence of poverty has been reduced, inequality has fallen at a much lower pace (Srivastava 2026). The present paper has a focus on the measurement of inequality. Further, there is an emphasis on measuring inequality in per capita expenditures of middle expenditure group in India, which is a large and expanding group, as noted in a number of studies (Meyer et al. 2012, Vakulabharanam 2024).

We utilize the Gini coefficient of measuring inequality which provides a popular and well-known index of inequality. In measuring inequality of the middle expenditure group, we could measure it only with respect to individuals who are placed in this group. However, in such an approach, relative aspects of inequality in a society are not fully captured. Individuals place their expenditure levels in relation not only to the expenditure levels of individuals within their groups, but also individuals within lower and higher expenditure groups.

In order to capture this relative aspect fully, we have measured inequality of the middle expenditure group within the context of the overall population in the society by using the concept of ‘censored distributions’², which has been used in the literature in similar contexts such as Takayama 1979, Thon 1979 and Srivastava 1987, 1988. We have focussed on rural and urban populations in India. In this exercise, we have undertaken a comparison of the thick rounds of the survey pertaining to 2011-12, 2022-23 and 2023-24.

Our main findings highlight that the measurement of inequality of the middle expenditure group is considerably higher when we consider this inequality within the whole population rather than only within the subset of individuals placed within the middle expenditure group. Further, the urban MEG poverty is tangibly higher than rural MEG poverty. Using a scheme of decomposition of the Gini coefficient, we highlight that the contribution of the Gini coefficient of between group means of LEG, MEG and HEG is substantially higher than the within group inequality of the MEG. This implies that inequality is higher across groups as compared to inequality within the middle expenditure group. Each group is represented by its average per capita expenditure.

The paper is divided into five sections. Apart from this introductory section, section 2 provides a brief literature review highlighting the gap that we aim to fill in this paper. Section 3 relates to Data and Descriptive statistics, which give details of the three NSS surveys pertaining to 2011-12, 2022-23 and 2023-24. We also highlight the key features of the middle expenditure group as identified in this paper. Section 4 provides the details of the methodology used including interpretations of the Gini

coefficient as a weighted sum of deviations of per capita expenditures of individuals from the mean income and the concept of censored distributions. We also give details of a suggested scheme of decomposition of the Gini coefficient. Section 5 gives results and related observations.

2. Literature Review

Several contributions in the literature have utilized NSS data pertaining to different survey rounds to highlight the expanding size of the middle expenditure group (MEG) in India. They have used diverse definitions of 'MEG'. Broadly, the existing studies can be categorized into two groups: those focused on identifying the MEG and examining its size, and those that explore inequality within the MEG.

In the first group of studies, we may include Ramanathan and Paul 2017, which analyses NSS consumption data from 1993 to 2012 to highlight the problem of defining the MEG. Their concern is primarily with the possibility of alternative ways of identifying the MEG. Maitra 2021 also uses NSS data for identifying socioeconomic clusters. This study identifies three groups which includes a growing middle cluster especially in urban India. The focus of the study is on ownership of durables, which correlates well with the expansion of the middle expenditure cluster.

Meyer et al. 2012 use multiple rounds of the NSS Household Consumer Expenditure Survey to generate internationally comparable estimates of the size of India's middle class, by converting domestic consumption aggregates into World Bank PPP-based income bands. Their concern is only with the size of the MEG, not inequality within it. Vakulabharanam 2024 shows that expansion in India's middle strata has taken place, but this expansion has been uneven across segments due to occupational structure, sectoral shifts, and access to state resources. In these studies, the broad finding is that India's MEG has expanded significantly from the 1990s.

In the second group of studies, we may consider studies that provide estimates of inequality in the middle expenditure segment. Ghosh, Gangopadhyay, and Basu 2011 use NSS data (1983 to 2007) to fit lognormal-Pareto models to consumption distributions. They identify rising inequality within the middle segment, which increases at higher expenditure levels within the group. Krishnan and Hatekar 2020 also draw on NSS expenditure surveys of 1999-00, 2004-05, and 2011-12, to study various features of the MEG. Their focus is on household assets and durable goods. They highlight expansion in the size of MEG. They also study one aspect of inequality within the MEG, namely spatial inequality.

World Inequality Lab 2024 uses tax records, national accounts, and NSS surveys to construct Distributional National Accounts for India from 1922 to 2023. Their findings indicate sharp concentration at the top. By 2022-23, the top 1% held around 22.6% of national income and 40% of national wealth. Meanwhile, the middle 40% saw its income share fall from over 45% in the early 1980s to about 27% in 2022. This 'squeezed middle' reflects both the rising dominance of top groups and widening inequality within the middle class.

Ahalya and Paul 2024 undertake econometric estimations using state level NSS data and the national accounts data, and find positive association between size of the middle class and per capita income and health outcomes.

In these studies, a major gap in the measurement of inequality of the MEG has remained. In particular, their focus is on inequality within the MEG. However, inequality in the MEG is not viewed in the context of the overall population. In such an approach, the relative aspects of inequality can not be captured. In the present paper, the relative aspects of inequality have been captured by utilizing information on the per capita expenditure levels of the entire population, including low, middle and high expenditure groups, by using the concept of censored distributions. Further, our study captures information from the latest NSS survey of 2023-24, thereby highlighting the changes that have taken place between 2011-12 and 2023-24 in rural and urban areas in India.

3. Data and Descriptive Statistics

3.1 Features of recent consumption expenditure surveys

Household Consumption Expenditure Surveys (HCES) have been carried out regularly in most NSS rounds, typically every five years, known as 'quinquennial rounds'. The 50th round was conducted in 1993-94 and the 68th round was conducted in 2011-12. There was a gap in conducting the quinquennial rounds of household consumption expenditure surveys until recently when in 2022-23 this round was conducted. It was subsequently followed by the 2023-24 HCES. These quinquennial surveys form the main data source for poverty estimation, inequality analysis, and national accounts benchmarks in India. It may, however, be recognised that the 2022-23 and 2023-24 surveys incorporated certain design changes³ that may affect the strict comparability of findings based on these two years as compared to 2011-12.

The 2022-23 round covered 2.6 lakh households across states. Using these data, Das et. al. 2025 provides insights into inequality in consumption expenditures for rural and urban areas, and finds evidence for beta-convergence in state-level monthly per capita expenditure between 2011-12 and 2022-23. This implies that states with lower initial monthly per capita expenditure (MPCE) levels experienced higher growth in consumption expenditure, while richer states grew more slowly. They also provide poverty estimates for 19 states and the UT of Delhi based on updated poverty lines using the Rangarajan Committee 2014 norms. The study finds evidence of declining consumption inequality and rising convergence in per capita consumption expenditures across states. Average monthly per capita expenditure nearly doubled in both rural and urban India, accompanied by a reduction in the rural-urban gap and a fall in the share of food in household budgets, reflecting improvements in living standards. Inequality declined significantly, with the Gini coefficient falling in both rural and urban areas in 2022-23 as compared to 2011-12, and the distribution of consumption shifting towards greater balance across deciles.

There are a number of approaches proposed in the literature to define the middle income/expenditure classes. For a good review see Ahalya and Paul 2024. Ravallion 2009 defines middle class as all those individuals whose per capita consumption expenditure is between PPP\$2 and PPP\$13 per day in developing countries. Banerjee and Duflo 2008, classified all those with a per capita income between PPP\$2 and PPP\$10 per day as middle class.

Taking guidance from the existing literature and accounting for the time difference, we have defined the lower and upper thresholds for determining the middle-expenditure group for the years 2011-12, 2022-23 and 2023-24. As detailed in Table 1, these give us the 10-20% fractile at the lower end and the 70-80% fractile at the upper end. Accordingly, we have considered the low expenditure group (LEG) as consisting of the first two fractiles of 0-5% and 5-10%, the MEG as consisting of fractiles from 10% to 80% and high expenditure group (HEG) as consisting of fractiles of 80-90% and 90-100%.

Table 1: Determining lower and upper thresholds of middle expenditure group in terms of per capita expenditure per day

Year	Lower limit	Upper limit	Lower limit	Upper limit	Exchange rate
	10% fractile (10-20%) (mean)	80% fractile (70-80%) (mean)	10% fractile (10-20%) (mean)	80% fractile (70-80%) (mean)	
	INR		PPP\$		INR/PPP\$
FY12	112	240	6.5	14.0	17.2
FY23	344	720	16.8	35.2	20.5
FY24	412	795	20.3	39.2	20.3

Source: NSSO Household Consumption Expenditure Surveys, 2011-12, 2022-23, 2023-24

Note: All limits are on a per day basis

The INR/PPP\$ rate has been estimated using IMF data on GDP at current prices measured in domestic currency and PPP terms (International dollar, ICP benchmarks 2017-2021)

Some notable features of the expenditure patterns according to the expenditure fractiles (covering 10% of population in the lowest expenditure bracket and 20% in the highest bracket, with the balance of 70% defined as middle expenditure group) are highlighted in Table 2.

- As shown in column (9), share of rural expenditure of LEG in total expenditure of the LEG is high but falling over time.
- Comparing columns (3) and (4), it is seen that mean expenditures for all fractile groups are lower for rural areas as compared to urban areas in all the three years of the sample surveys.
- As shown in columns (6), (7) and (8), the share of expenditure of the middle expenditure group has increased over time for rural, urban and combined (rural and urban) sectors. Considering total expenditure of rural and urban areas (column (8)), this share was 55.2% in 2011-12, rising to 57.7% in 2022-23 and further to 59.5% in 2023-24. Thus, 70% of total

population comprising the MEG accounted for nearly 60% of share in expenditure in 2023-24.

- On the other hand, in 2023-24, 20% of total population of the HEG accounted for 36.1% of total expenditure. This shows a fall from 41.1% in 2011-12 and 38.4% in 2022-23, indicating reduction in expenditure inequality. Thus, the expenditure shares of LEG and MEG have been rising at the cost of the share of HEG.

Table 2: Key averages of differential expenditure groups: 2011-12, 2022-23 and 2023-24

Expenditure group	Population shares (%)	Monthly mean per capita expenditure (INR)			% share of aggregate group expenditure in total expenditure			% share of rural expenditure in total expenditure
		Rural	Urban	Combined	Rural	Urban	Combined	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
FY12								
LEG	10	594	805	654	4.2	3.1	3.7	64.9
MEG	70	1,169	1,969	1,397	57.2	52.4	55.2	59.7
HEG	20	2,763	5,853	3,646	38.6	44.5	41.1	54.1
Totals/Average	100	1,430	2,630	1,773	100.0	100.0	100.0	57.6
FY23								
LEG	10	1,577	2,304	1,783	4.2	3.6	3.9	63.4
MEG	70	3,175	5,156	3,737	58.9	55.9	57.7	60.9
HEG	20	6,963	13,097	8,701	36.9	40.6	38.4	57.3
Totals/Average	100	3,773	6,459	4,534	100.0	100.0	100.0	59.6
FY24								
LEG	10	1,901	2,734	2,150	4.6	3.9	4.3	62.1
MEG	70	3,574	5,790	4,235	60.7	57.9	59.5	59.3
HEG	20	7,148	13,351	8,997	34.7	38.2	36.1	55.8
Totals/Average	100	4,122	6,996	4,978	100.0	100.0	100.0	58.1

Source: NSSO Household consumption expenditure surveys 2011-12, 2022-23 and 2023-24

Table 3 shows the relative share of per capita mean expenditure levels of different expenditure groups, with respect to the total per capita mean expenditure (including all expenditure groups). Here also, it is seen that the mean expenditure for the HEG of the combined sector relative to the overall mean expenditure has fallen over time, from 2.057 in 2011-12 to 1.919 in 2022-23 and 1.807 in 2023-24. This pattern prevails both in rural and urban comparisons.

For the low expenditure fractiles, the movement is in the opposite direction, namely the relative overall mean expenditure for this group has increased over time from 0.369 in 2011-12 to 0.393 in 2022-23 and 0.432 in 2023-24. This pattern is also noted for the middle expenditure fractiles and for both the rural and urban areas.

Table 3: Ratio of group average to overall average per capita expenditure in 2022-23 and

2023-24	Rural	Urban	Combined
2011-12			
LEG	0.415	0.306	0.369
MEG	0.817	0.749	0.788
HEG	1.932	2.226	2.057
2022-23			
LEG	0.418	0.357	0.393
MEG	0.842	0.798	0.824
HEG	1.845	2.028	1.919
2023-24			
LEG	0.461	0.391	0.432
MEG	0.867	0.828	0.851
HEG	1.734	1.908	1.807

Source: NSSO Household consumption expenditure surveys 2011-12, 2022-23 and 2023-24

Thus, the share of the low and middle expenditure groups as well as their relative share of mean expenditures has increased over time, and those of the HEGs has fallen over time, indicating a fall in expenditure inequality. However, for more directly measuring the pattern of change in per capita expenditure inequality, we utilise the Gini coefficient of expenditure inequality. Further, we focus on inequality with respect to the MEG, which comprises the largest share of population and expenditures.

4. Methodology

4.1 Measuring inequality: Gini index and Sen's axiomatic framework

Let per capita expenditures of 'n' individuals be arranged in non-descending order as follows:

$$y_1 \leq y_2 \leq \dots \leq y_m < Z \leq \dots \leq y_n$$

Here, Z is the exogenously given poverty line and 'm' is the number of poor.

The mean per capita expenditure is given by

$$\mu = \frac{\sum_{i=1}^n y_i}{n}$$

The Gini coefficient of inequality of per capita expenditure can be written as a weighted sum of deviations of per capita expenditures from the mean expenditure (equation (2)) as proposed by Sen 1974, 1976.

$$I = \frac{2}{\mu \cdot n^2} \cdot \sum_{i=1}^n (n+1-i) \cdot (\mu - y_i) \quad (1)$$

Here $n + 1 - i$ gives the ordinal rank weight of the deviation of the per capita expenditure of the i^{th} individual in the population consisting of 'n' individuals. The lower the y_i , the higher is the associated ordinal rank weight. Thus, the expenditure deviations of the poorer individuals from the mean expenditure are given relatively higher weights.

In this form, the Gini coefficient is seen as the normalised weighted sum of differences of individual expenditures from the mean expenditure. The norms ensure that the coefficient varies between 0 and 1.

Subsequently, in the context of measuring poverty, Takayama 1979 had utilized the framework of estimation of Gini coefficient to measure poverty by using the concept of censored income distributions. He defined an index of poverty as below.

$$P (\text{Takayama}) = \frac{2}{\mu^* \cdot n^2} \cdot \sum_{i=1}^n (n + 1 - i) \cdot (\mu^* - y_i^*) \quad (2)$$

Here y_i^* is defined as:

$y_i^* = y_i$, for $i=1,2,\dots,m$ where m is the number of poor in Takayama's analysis, and
 $y_i^* = Z$ for all $i=m+1,\dots,n$ where Z is the exogenously defined poverty line

The mean income of this censored distribution is given by:

$$\mu^* = \frac{\sum_{i=1}^m y_i \cdot N_i + Z \cdot \sum_{i=m+1}^n N_i}{\sum_{i=1}^n N_i} \quad (3)$$

It may be noted that while Sen 1976 had defined poverty using per capita expenditures only of 'm' individuals who are below the poverty line Z , Takayama had utilized information on per capita expenditure of all the 'n' individuals for defining the poverty index. This was done by using the concept of a censored distribution.

In this paper, we have utilized the concept of censored distributions in order to measure the role of middle expenditure inequality in the overall inequality in per capita expenditures. To delineate the MEG, we require two markers defining the thresholds of individuals in lower and higher expenditure groups. These markers are given by ' l ' and ' q '. The per capita expenditures for the entire population can now be arranged in non-descending order as follows

$$y_1 \leq y_2 \leq \dots < y_l \leq y_{l+1} \leq \dots < y_q \leq y_{q+1} \leq \dots \leq y_n \quad (4)$$

Thus, we divide the entire population into three groups namely 1) LEG covering individuals from 1 to l , 2) MEG covering individuals from $l+1$ to q and 3) HEG covering individuals from $q+1$ to n .

Total population (N) is thus divided into three groups as indicated below.

In the LEG: $\sum N_i = L$ where i varies from 1 to l , that is, $L = l$

MEG: $\sum N_i = Q$ where i varies from $l+1$ to q , that is $Q = q - l$

HEG: $\sum N_i = H$ where i varies from $q+1$ to n , that is, $H = n - q$

Total population for all groups can be written as $\sum_{i=1}^n N_i = N = L + Q + H$

When we consider the MEG by itself, y_i may be considered such that i varies from 1 to Q where total population of the MEG is Q . In the context of the total population,

$$Q = n - (n - q) - l = q - l = N - H - L$$

Exclusively for the MEG, we can write the per capita expenditures of the individuals in this group as below.

$$y_1 \leq y_2 \leq \dots < y_Q$$

4.2 Estimating inequality for middle expenditure group

We first consider estimation of inequality in the MEG (covering population shares in the fractiles of 10-80%) by considering it as a group. The available data for this group covers seven deciles. The population covered by this group amounts to 70% of the total population of all groups. When we consider the MEG by itself for the estimation of inequality, the ordinal ranks will be generated using 70% population pertaining to the MEG. The Gini coefficient formula for this estimation is given below.

$$I_q^q = \frac{2}{\mu_q \cdot Q^2} \cdot \sum_{i=1}^Q (n + 1 - i) \cdot (\mu_q - y_i) \quad (5)$$

where, n is the population of the MEG, that is, Q and μ_q is the mean per capita consumption expenditure of the MEG, that is,

$$\mu_q = \frac{\sum_{i=1}^Q \frac{N_i \cdot y_i}{N_i}}{\sum_{i=1}^Q \frac{N_i \cdot y_i}{N_i}}$$

The inequality for the MEG covering 70% of the population has been done in two ways. First, we look only at the middle expenditure population and expenditure patterns ignoring both low expenditure and high expenditure fractiles. Here, the Gini coefficient will utilize information only with respect to the middle expenditure fractiles and the ordinal rank weights of individuals within these fractiles are generated using the total population of these fractiles, which is a fraction of the overall population. The sum of these ordinal rank weights is therefore lower than in the case for measuring inequality when ordinal rank weights are generated using the entire population.

As shown in Appendix 1, it is possible to identify the role of MEG inequality in the overall inequality.

$$I_q^c = \frac{2}{\mu \cdot n^2} \cdot \sum_{i=1}^n (n + 1 - i) \cdot (\mu - y_i^*) \quad (6)$$

Thus, I_q^c can be considered as the inequality of the entire population with fractile-wise details of MEG and censored distributions of HEG and LEG. We refer to this as Gini coefficient of MEG along with censored distributions of HEG and LEG. Also, censored MEG inequality can be related to inequality exclusively within the MEG as shown by equation (A9) in Appendix 1.

This equation has two components. The first component within the square brackets indicates the contribution of deviation of means of each of the three expenditure groups from the overall mean to the inequality of the MEG in the presence of censored per capita expenditures for LEG and HEG. This term can be called the 'Gini coefficient between group means'. This deviation considers the weighted sum of the deviations of group means from the overall mean. The second term indicates the weighted contribution of the inequality within the MEG (I_q^q).

5. Results and Discussion

The results are discussed in two parts. First, we consider the inequality in per capita expenditures for rural and urban areas for the MEG within the population of the middle expenditure group only. The results of such an estimation are given in Table 4.

Table 4: Inequality in middle expenditure groups in rural and urban areas

Year	Gini coefficient	Gini coefficient	Ratio of urban
	(only MEG) Rural	(only MEG) Urban	Gini to rural Gini
2011-12	0.135	0.182	1.34
2022-23	0.136	0.161	1.19
2023-24	0.124	0.148	1.19

Source: NSSO Household consumption expenditure surveys 2011-12, 2022-23 and 2023-24

The main findings are as follows:

1. Urban inequality is higher than rural inequality during the three year period under consideration.
2. Urban inequality fell in 2022-23 as compared to 2011-12 and further in 2023-24 as compared to 2022-23. Rural inequality, however, marginally increased between 2011-12 and 2022-23 before falling sharply between 2022-23 and 2023-24.
3. The ratio of urban inequality to rural inequality also fell between 2011-12 and 2022-23 but remained stable between 2022-23 and 2023-24.

These results, however, understate the extent of inequality. Inequality of one individual in the MEG has an important aspect of relativity not only with respect to other individuals within the same group, but also with respect to individuals that are placed within the LEG and HEG. In order to capture these relative aspects of inequality, in this paper we have utilised the concepts of censored distributions. The results of this exercise are given in Table 5.

Table 5: Inequality at all-India level: Gini coefficient of MEG with censored distributions for LEG and HEG

Year	Rural Gini	Urban Gini	Ratio of urban Gini to rural Gini
FY12	0.269	0.343	1.28
FY23	0.255	0.300	1.18
FY24	0.228	0.272	1.19

Source: NSSO Household consumption expenditure surveys 2011-12, 2022-23 and 2023-24

The main findings are:

1. Rural and urban inequality coefficients fall over the three year period under reference covering the years from 2011-12 to 2023-24.
2. Urban inequality is higher than rural inequality in all three years.
3. The ratio of urban Gini to rural Gini fell in 2022-23 as compared to 2011-12 but marginally increased again in 2023-24.

The advantage of using the entire expenditure distribution through the concept of censored distribution is to look at the size and inequality of the MEG in relation to the low and high-expenditure groups of the society. The lower is the share of the LEG, the relatively larger is the role of the MEG. The higher is the share of the HEG, the higher is the scope for redistribution in favour of the LEG so that they can also move into the MEG.

Further, we have decomposed the Gini coefficient for MEG with censored distribution in terms of identifying contributions of 1) Gini coefficients of between group means, and 2) weighted Gini of the middle expenditure group only. Table 6 summarizes the results.

Table 6: Decomposition of Gini coefficient for MIG with censored distributions for LIG and HIG

(1)	Gini coefficient between group means $\frac{2}{\mu \cdot n^2} [(z_l) \cdot C + (z_h) \cdot B - (z_h) \cdot A]$		Contribution of weighted Gini of MEG only $(\frac{\mu_q}{\mu} \cdot (\frac{Q}{n})^2 \cdot I_q^q)$		Gini coefficient of MEG with censored distributions for LEG and HEG (I_q^c)	
	Rural (2)	Urban (3)	Rural (4)	Urban (5)	Rural (6)=(2)+(4)	Urban (7)=(3)+(5)
2011-12	0.215	0.276	0.054	0.067	0.269	0.343
2022-23	0.199	0.236	0.056	0.063	0.255	0.300
2023-24	0.175	0.212	0.053	0.060	0.228	0.272

Source: Authors' estimates

Table 6 shows that the main component of the Gini coefficient of the MEG using censored distributions for HEG and LEG is the Gini coefficient between group means. The contribution of within MEG inequality is a small fraction as shown in columns (4) and (5). It may be noted that the inequality between group means has also consistently fallen for both rural and urban groups from 2011-12 to 2022-23 and from 2022-23 to 2023-24. The contribution of the weighted Gini of the MEG increased between 2011-12 and 2022-23 for rural areas. It fell marginally for urban areas in this period. Between 2022-23 and 2023-24, the contribution of MEG fell in both cases.

Using NSSO's latest consumption expenditure surveys for 2022-23 and 2023-24 in comparison with 2011-12, we estimate the size and components of inequality of the middle expenditure group, separately for rural and urban areas. The suggested methodological framework utilizes the distribution of the per capita expenditures of the entire population. The study highlights the relatively larger role of between group inequalities as compared to the within group inequality for the MEG. We also note that for the MEG, urban inequality is higher than rural inequality in all the three reference years while both have fallen over time.

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Appendix 1:

Role of MEG inequality in overall inequality

Next, we have used the all-India fractile-wise data to also estimate the Gini coefficient of expenditure inequality for all fractiles considered together. In this case, per capita expenditures are arranged as in equation (4). In order to bring out the role of the inequality of the MEG, we need to generate ordinal rank weights in 100% of population but still suppress the impact of inequality within the LEG and HEG. For this purpose, we have utilized the concept of censored distributions. This is shown as below.

The sequence of per capita expenditures earlier written in equation (4) can be replaced by the following.

$$\mu_l = \mu_l = \dots = \mu_l \leq y_{l+1} \leq \dots \leq y_q \leq \mu_h = \dots = \mu_h$$

Here we have censored the LEG at $y_i^* = \mu_l$, for $i=1,2,\dots,l$ and HEG at $y_i^* = \mu_h$ for all $i=q+1,\dots,n$.

For MEG, we will use $y_i^* = y_i$.

For the three expenditure groups, lower, middle and high, we can write the mean expenditures as,

$$\mu_l = \sum_{i=1}^l \frac{N_i \cdot y_i}{N_i} \quad ; \quad \mu_q = \sum_{i=l+1}^q \frac{N_i \cdot y_i}{N_i}; \text{ and } \mu_h = \sum_{i=q+1}^n \frac{N_i \cdot y_i}{N_i}$$

μ can be seen as the weighted sum of μ_l , μ_q and μ_h .

$$\mu = \frac{L \cdot \mu_l + Q \cdot \mu_q + H \cdot \mu_h}{N} \text{ where } N = L + Q + H$$

This mean expenditure can also be written as:

$$\mu = \frac{\mu_l \cdot L + \sum_{i=l+1}^q y_i \cdot N_i + \mu_h \cdot H}{N}$$

Compared to the equation for Gini coefficient of expenditure inequality given by equation (1), the difference is only arising by replacing y_i by y_i^* . Thus, we have equation (6) of the text as shown below:

$$I_q^c = \frac{2}{\mu \cdot n^2} \cdot \sum_{i=1}^n (n+1-i) \cdot (\mu - y_i^*)$$

Thus, I_q^c can be considered as the inequality of the entire population with fractile-wise details of MEG and censored distributions of HEG and LEG. We refer to this as Gini coefficient of MEG along with censored distributions of HEG and LEG.

Relating censored MEG inequality to exclusive MEG inequality

The inequality index for MEG can be seen as the inequality index within the MEG plus a constant. This can be derived by using equations (5) and (6) of the text.

We define the differences between the overall mean and the group means as follows:

$$\mu - \mu_l = z_l, \mu - \mu_q = z_q, \text{ and } \mu_h - \mu = z_h$$

Expanding equation (6) of the text for the three groups separately, we can write

$$I_q^c = \frac{2}{\mu \cdot n^2} \cdot \left[\sum_{i=1}^l (n+1-i) \cdot (z_l) + \sum_{i=l+1}^q (n+1-i) \cdot (\mu - y_i) - \sum_{i=q+1}^n (n+1-i) \cdot (z_h) \right] \quad (7)$$

This decomposition reduces the term pertaining to the lower and higher expenditure groups to two constants. This can be understood in two steps. First, the deviation of the censored per capita expenditures of these two groups from their mean incomes are constants. Second, as shown in Appendix 2, the sum of the ranks of the lower and higher expenditure groups also add to respective constants indicated by C and A in equation (A2) below.

We can rewrite equation (A1) as follows:

$$I_q^c = \frac{2}{\mu \cdot n^2} \left[(z_l) \cdot C + \sum_{i=l+1}^q (n+1-i) \cdot (\mu - y_i) - (z_h) \cdot A \right] \quad (A2)$$

where

$$A = \frac{(n-q) \cdot (n-q+1)}{2}$$

and

$$C = \frac{\{n \cdot (n+1) - (n-1) \cdot (n-1+1)\}}{2}$$

$$I_q^c = \frac{2}{\mu \cdot n^2} \left[(z_l) \cdot C + \sum_{i=l+1}^q (n+1-i) \cdot \{(\mu - \mu_q) + (\mu_q - y_i)\} - (z_h) \cdot A \right]$$

$$I_q^c = \frac{2}{\mu \cdot n^2} \left[(z_l) \cdot C + (\mu - \mu_q) \sum_{i=l+1}^q (n+1-i) + \sum_{i=l+1}^q (n+1-i) \cdot (\mu_q - y_i) - (z_h) \cdot A \right]$$

$$I_q^c = \frac{2}{\mu \cdot n^2} \left[\{(z_l) \cdot C + (z_q) \cdot B - (z_h) \cdot A\} + \sum_{i=l+1}^q (n+1-i) \cdot (\mu_q - y_i) \right] \quad (A3)$$

where,

$$B = \frac{\{(n-1) \cdot (n-1+1) - (n-q) \cdot (n-q+1)\}}{2}$$

It can be shown that the third term on the RHS within the brackets

$$\sum_{i=l+1}^q (n+1-i) \cdot (\mu_q - y_i) = \sum_{i=1}^Q (Q+1-i) \cdot (\mu_q - y_i)$$

(A4)

Solving the LHS, and adding and subtracting $q - n$

$$\sum_{i=l+1}^q [(n+q-n+1-i) + q-n] \cdot (\mu_q - y_i)$$

$$\sum_{i=l+1}^q [(n + q - n + 1 - i). (\mu_q - y_i) + (q - n). (\mu_q - y_i)]$$

$$\sum_{i=l+1}^q (n + q - n + 1 - i). (\mu_q - y_i) + (q - n). \sum_{i=l+1}^q (\mu_q - y_i)]$$

Since $(q - n). \sum_{i=l+1}^q (\mu_q - y_i) = 0$, LHS can be written as

$$\sum_{i=l+1}^q (n + 1 - i). (\mu_q - y_i) = \sum_{i=1}^Q (Q + 1 - i). (\mu_q - y_i) \tag{A5}$$

The LHS in equation (A5) can be written as

$$\sum_{i=l+1}^q (n + q - n + 1 - i). (\mu_q - y_i) + (q - n). \sum_{i=l+1}^q (\mu_q - y_i)] \tag{A6}$$

Solving the second term in the above equation

$$(q - n). [\mu_q. \sum_{i=l+1}^q i - \sum_{i=l+1}^q y_i]$$

$$(q - n). [\mu_q. (q - l) - \sum_{i=l+1}^q y_i] = 0 \text{ since}$$

$\sum_{i=l+1}^q y_i$ is the average income of the middle-expenditure group multiplied by the number of individuals in this group which is equal to $\mu_q. (q - l)$.

Hence, equation (A6) solves to

$$\sum_{i=l+1}^q (n + q - n + 1 - i). (\mu_q - y_i) = \sum_{i=l+1}^q (q + 1 - i). (\mu_q - y_i) \tag{A7}$$

Replacing LHS of equation (A5) with RHS of equation (A7), we have

$$\sum_{i=l+1}^q (n + q - n + 1 - i). (\mu_q - y_i) = \sum_{i=1}^Q (Q + 1 - i). (\mu_q - y_i)$$

$$\sum_{i=l+1}^q (q + 1 - i). (\mu_q - y_i) = \sum_{i=1}^Q (Q + 1 - i). (\mu_q - y_i)$$

Further, using equation (5) from the text we have,

$$\sum_{i=l+1}^q (q + 1 - i). (\mu_q - y_i) = \sum_{i=1}^Q (Q + 1 - i). (\mu_q - y_i) = I_q^q. \left(\frac{\mu_q \cdot Q^2}{2}\right) \tag{A8}$$

This relates to inequality exclusively within the middle expenditure group. Replacing equation (A8) in equation (A3), we have:

$$I_q^c = \frac{2}{\mu \cdot n^2} [\{(z_l) \cdot C + (z_q) \cdot B - (z_h) \cdot A\}] + \frac{\mu_q}{\mu} \cdot \left(\frac{Q}{n}\right)^2 \cdot I_q^q \quad (A9)$$

Appendix 2: Group-wise decomposition of ordinal rank weights

Income group	Ordering of individuals	Identifier of individuals in each group	Number of individuals in each group	Rank weights	Sum of weights	Share of group-wise sum of ranks
High expenditure	Highest expenditure individual	n		1		
	Lowest expenditure individual	q+1	H	n-q	$A = \frac{1}{2} \cdot \{(n - q) \cdot (n - q + 1)\}$	$\alpha = \frac{2A}{n(n+1)}$
Middle expenditure	Highest expenditure individual	q		n-q+1		
	Lowest expenditure individual	l+1	Q	n-l	$B = \frac{1}{2} \cdot \{(n - l) \cdot (n - l + 1) - (n - q) \cdot (n - q + 1)\}$	$\beta = \frac{2B}{n(n+1)}$
Low expenditure	Highest expenditure individual	1		n-l+1		
	Lowest expenditure individual	1	L	n	$C = \frac{1}{2} \cdot \{n \cdot (n + 1) - (n - l) \cdot (n - l + 1)\}$	$\gamma = \frac{2C}{n(n+1)}$
All groups			N=H+Q+L		$\frac{1}{2} \cdot \{(n) \cdot (n + 1)\}$	1

Source: NSSO Household consumption expenditure surveys 2011-12, 2022-23 and 2023-24

Notes

¹ A thick NSSO round uses large, stratified samples, extensive fieldwork, and detailed schedules to produce robust, state-level estimates with wide coverage. The frequency of the thick round of the Household consumption expenditure survey was generally at five year intervals prior to 2011-12. A thin round employs smaller samples, simplified instruments, and limited spread, prioritizing quicker, indicative trend estimates over depth, precision, and granular representativeness. The thin survey have been typically conducted at annual intervals.

² A censored distribution assigns a specific value to a range of observations in a given distribution. The specific values may be exogenous or derived from the distribution itself such as the mean per capita expenditure in a distribution of per capita expenditures (see, for example, Takayama (1979)).

³ Some notable distinctions between the latest NSSO rounds and the 2011-12 round may be noted as follows. The latest two rounds (2022-23 and 2023-24) provided for a multi-visit canvassing approach, whereby each sampled household was visited three times over the reference period as compared to a single visit approach implemented in the 2011-12 survey. This change was intended to minimise recall errors and better account for seasonality in consumption behaviour. Also, instead of a single questionnaire, four distinct questionnaires were utilized pertaining to: 1) the Household Characteristics Questionnaire, 2) the Food Diary Questionnaire, 3) the Consumables and Services Questionnaire, and 4) the Durables Questionnaire.