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Assumptions Matter: Revisiting India’s Multidimensional Poverty Index

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Even small methodological changes can impact poverty estimates, as illustrated by the results of the Niti Aayog’s tweaking of the Multidimensional Poverty Index. Methodologies should not be chosen to show a decline in poverty; they should be chosen to get a better understanding of reality.

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The NITI Aayog (2023) in its report on the National Multidimensional Poverty Index (MPI) estimates that 13.5 crore people in India moved out of poverty between 2015-16 and 2019-21. In addition to the indicators used by the United Nations Development Programme (UNDP, 2023) in constructing the Global MPI, the NITI Aayog “Indianised” its MPI by adding two more indicators on bank accounts and maternal health.

While the MPI has its advantages, it is designed in such a way that the choice of indicators, their weights, and the cut-off for defining multidimensional poverty are all left to subjective judgement. These subjective decisions need to be considered carefully while interpreting results from the MPI.

Recent reports have pointed to how the Indian government may have rigged the MPI to show itself in a positive light. While acknowledging the politics associated with the construction of the MPI, this article aims to empirically demonstrate that minor changes in definitions and computation methods can have a sizable impact on the contribution of different indicators to poverty and the number of poor.

We change the definition of two indicators that constitute the MPI—maternal health and housing—and the method of computing the headcount ratio. We find that while a change in the definition of housing makes only a marginal difference to the index, redefining maternal health and modifying the method of determining the headcount ratio change the share of the population deprived under some of the indicators and the contribution of different indicators to overall poverty. It also increases the headcount ratio of multidimensional poverty.

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We demonstrate that attempts at estimating poverty should consider its implicit assumptions and computational methods and not simply be taken at face value. Changing some of the assumptions and definitions can change the estimates and shift the policy focus.

1. NITI Aayog’s MPI

The construction and computation of the MPI involves two broad stages. In the identification stage, various indicators of multidimensional poverty are identified, and a criterion is set for each indicator to identify a household as poor or non-poor. In the second stage of aggregation, each indicator is assigned a weight and a weighted score for each household is computed. Households whose weighted score exceeds a threshold value are considered multidimensionally poor.

The UNDP as well as the NITI Aayog use the value of 0.33 as the cutoff for classifying households as multidimensionally poor. This cutoff value corresponds to households that are deprived on more than one-third of all the indicators. It should be noted that the value of 0.33 is subjective.

The ratio of multidimensionally poor individuals to the total population is referred to as the headcount ratio. The intensity ratio tells us the average number of indicators the multidimensionally poor are deprived of. This is akin to the depth of poverty measure, whereas the former reflects the incidence of poverty. The MPI is a product of the headcount and intensity ratios, a joint measure of the incidence and depth of poverty.

We argue for the modification of measurement of at least two indicators—maternal health and housing. Moreover, the methodology used for computing the headcount ratio is also problematic.

India’s MPI has 12 indicators across three dimensions of health, education, and standard of living. The indicators are nutrition, child/adolescent mortality, maternal health, years of schooling, school attendance, cooking fuel, sanitation, drinking water, electricity, housing, assets, and bank accounts (see NITI Aayog (2023) for the specific definition of and weight assigned to each indicator).

2. Modifying the MPI

Although the indicators constituting the MPI are seemingly a comprehensive measure of poverty, certain implicit assumptions made while measuring some of them make them questionable. We argue for the modification of measurement of at least two indicators—maternal health and housing. Moreover, the methodology used for computing the headcount ratio is also problematic. Below, we explain why, and suggest modifications to re-calculate the MPI.

Housing

The current construction of the MPI considers a household as deprived in terms of housing if the floor of the house is made of natural materials such as mud, clay, sand, or dung; or if the walls or roof are made of rudimentary materials like thatch. The problem with this definition is twofold.

First, it is not clear whether rudimentary materials are restricted to thatch, or also include plywood, cardboard, metal, asbestos, plastic, and the like. These materials also being temporary, the census classifies such houses as semi-pucca or kuccha. The current MPI construction does not clearly say whether these materials are considered while defining housing deprivation. Second, the definition does not consider housing congestion. Evidence shows that an unacceptably large number of Indians live in houses that are too congested (Kishore, 2016; Ministry of Housing and Urban Poverty Alleviation, 2012).

We expand the definition of housing deprivation to include walls made of thatch and other temporary materials such as plywood, cardboard, metal, or asbestos, or if the house does not have any walls. Similarly, families living in houses with plastic/polythene and asbestos roofs or in houses with no roofs are also categorised as deprived. Alongside this, we also consider the availability of physical space.

We categorise a household as deprived of housing if the house is made of rudimentary materials, and/or the household has at most one sleeping room for at least six adults.

Maternal Health

The MPI currently defines a household as deprived in terms of maternal health if any woman in that household who has given birth in the five years preceding the survey has not received at least four antenatal care visits for the most recent birth, or has not received assistance from trained medical personnel during the most recent childbirth.

Although antenatal care is an important indicator of maternal health and is closely associated with fewer newborn and maternal deaths, there are issues with how this indicator captures maternal health deprivation.

In considering households that have had maternal care in the last five years, households without a birth in the last five years are automatically considered non-deprived. Because of a fertility transition in India, many households have not had a birth in the last five years. The National Family Health Survey (NFHS) data for 2019-21 shows that 75% households in India have not had any births in the last five years and are therefore considered “non-deprived” in the existing MPI framework. Moreover, since fertility patterns differ systematically across social groups and geographies, this can create a bias in the comparability of the estimates across these groups.

We believe an alternative question to ask, which can capture many more of the surveyed households, is whether these households would have been at significant risk of maternal mortality if there had been a birth/pregnancy in the household. One way to capture this is to look at the incidence of anemia among women of reproductive age. Several studies point towards the association of moderate and severe anemia with maternal deaths (Daru 2022; Shi et. al. 2022).

Consequently, we replace the NITI Aayog’s definition of maternal health with two alternative indicators. One, whether any woman in the household in the reproductive age group is either severely or moderately anemic. Two, whether any woman in the household in the reproductive age group is severely anemic.

The two slightly different versions of maternal health will indicate how overall poverty changes with minor changes in the definition of indicators.

Headcount Ratio

Our final difference with the NITI Aayog methodology is counting the number of poor individuals. Though its definition is at the household level, the NITI Aayog reports that the counting is happening at the level of individuals. An individual is identified as being poor or non-poor depending on whether the household within which the individual resides is identified as “poor” or “non-poor”. The percentage of such individuals relative to the total population gives the headcount ratio. Though on the face of it this method looks fine, there is a potential problem.

While counting individuals as poor or non-poor, the NITI Aayog only considers individuals on whom data for all indicators is available (except the maternal mortality indicator, which is used asymmetrically in this respect). Those for whom data on all indicators are not available are dropped from the analysis. This can be a serious problem if poorer households are also more likely to lack data on all indicators when compared to better-off households.

We modify this method by classifying households as “poor” or “non-poor”, instead of counting individuals, depending on whether a specific household satisfies the definition for being “poor”. We then count all the individuals living in multidimensionally poor households as being “poor”, regardless of whether the data on all indicators is available for all the individuals counted as “poor”. Our headcount ratio is thus the ratio of individuals who live in multidimensionally poor households to the total population.

3. Comparing Estimates

Uncensored Headcount Ratios

Figures 1 and 2 present the uncensored headcount ratios; that is, the proportion of population deprived under each indicator, irrespective of whether they are multidimensionally deprived or not.

Figure 1: Uncensored Headcount Ratio, 2015-16

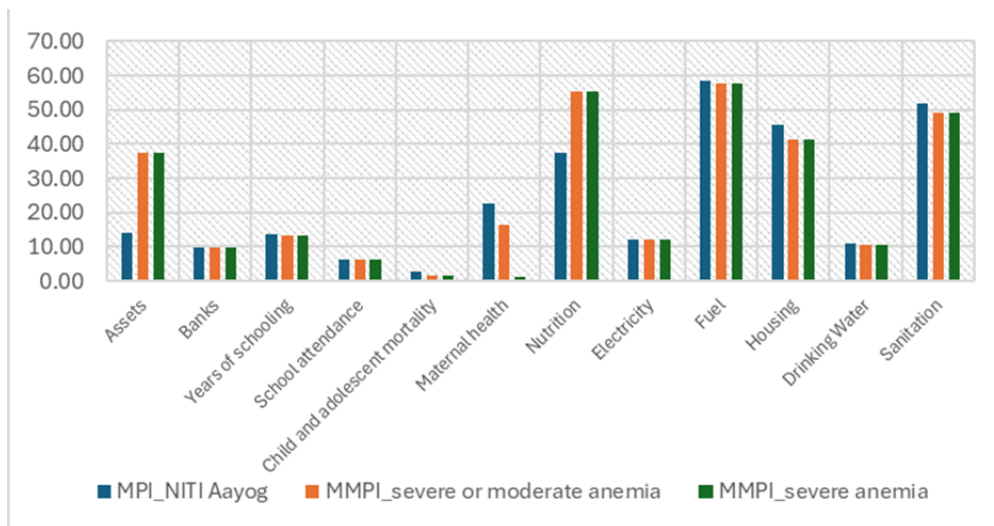
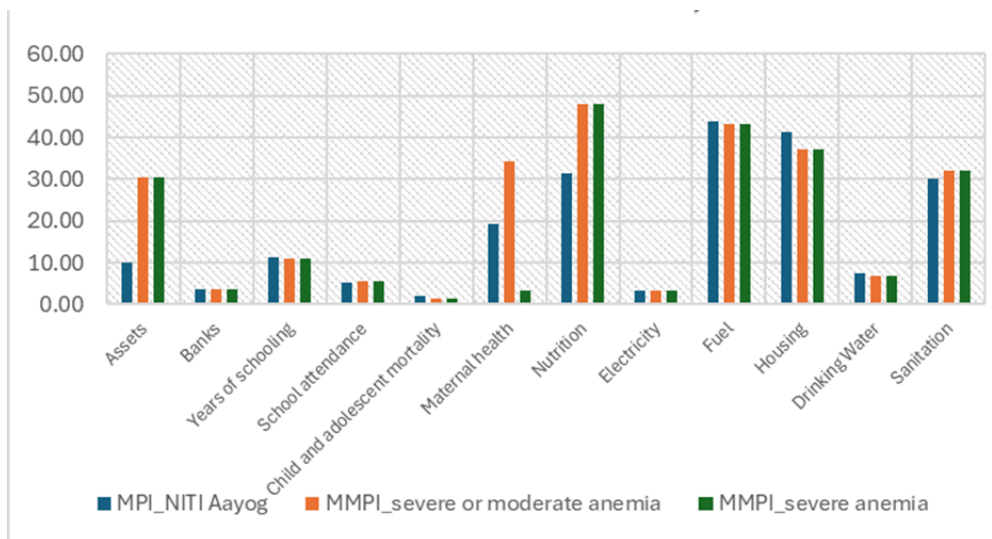


Figure 2: Uncensored Headcount Ratio, 2019–2021



First, we compare indicators across both methods. The difference in numbers between the NITI Aayog’s method and our method for all indicators, except maternal health and housing, are due to differences in counting the population headcount. Compared to the NITI Aayog’s estimates, we find a larger proportion of the population to be deprived of assets and nutrition. If the measurement of the headcount ratio is changed to include more individuals in the sample, a larger proportion of the population turns out to be deprived of nutrition and assets.

In the case of housing and maternal health, differences in the uncensored headcount ratios arise because of differences in the definitions of the indicators between the two methods.

Despite broadening the definition, we do not see any substantial difference in the population share deprived under housing.

For maternal health, for 2015-16, we find a smaller share of the population deprived under both our definitions as compared to the NITI Aayog’s. However, in 2019-21, the population share deprived under maternal health defined as women with severe or moderate anemia is far higher than the NITI Aayog’s estimate. The uncensored headcount ratio of women with severe anemia alone is meagre, reflecting that minor modifications in definitions can have a significant impact on the results.

However, assets, nutrition, and maternal health cannot be improved via large-scale government schemes. They need concentrated efforts that can pull deprived households out of poverty.

Over time, we see that while the uncensored headcount ratio for all indicators has declined with time, the proportion of the population deprived under maternal health defined as women with severe or moderate anemia has increased from less than 20% in 2015-16 to more than 30% in 2019-21. This indicates an increase in the proportion of women with moderate or severe anemia.

Of the indicators that constitute the MPI, deprivation in banks, drinking water, sanitation, electricity, and cooking fuel are determined primarily via government programmes and schemes that cover entire regions. However, assets, nutrition, and maternal health cannot be improved via large-scale government schemes. They need concentrated efforts that can pull deprived households out of poverty. Thus, the high deprivation in these indicators shows that we have been unable to improve the lives of the poor in areas that cannot be covered by large-scale government schemes.

Headcount Ratio, Intensity Ratio, and MPI

Next, we compute our Modified Multidimensional Poverty Indices (MMPI) under the two different definitions of maternal health. We use our modified definition of housing in both methods while the definition of other indicators is same as the NITI Aayog’s. Figure 3 gives a comparison of the headcount ratio, intensity ratio, and the MPI for the different methodologies.

Irrespective of the method used, multidimensional poverty in India has come down between 2015-16 and 2019-21. However, the reduction is much smaller under the modified method. Based on the NITI Aayog’s methodology, the headcount ratio of multidimensional poverty decreased from 25% to 15% of the population between 2015-16 and 2019-21. While these figures remain

almost the same if we define maternal health solely on severe anemia, the numbers differ significantly if we consider cases of moderate or severe anemia. Here, the headcount ratio declines from 28.3% to 21.6% in the period under consideration.

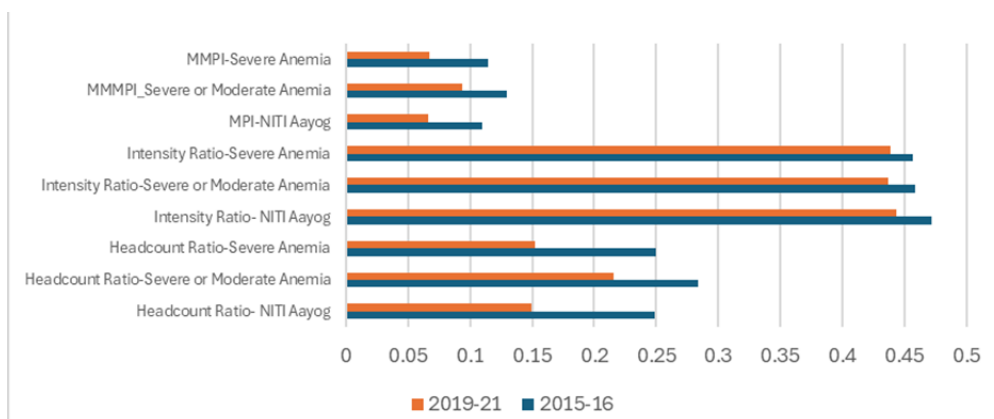
The difference is stark in absolute population sizes. According to the NITI Aayog’s calculation, 13.55 crore people escaped multidimensional poverty in India between 2015-16 and 2019-21 (calculated as the difference in the population size of the multidimensionally poor). Based on our modified method (moderate or severe anemia), this number is only 7.2 crore. Thus, there has been a decline in poverty that is significant, but nowhere as large as that claimed by the NITI Aayog.

If we look at the percentage change in headcount ratio during this period, we find that Goa has had the largest reduction in poverty headcount, followed by states such as Telangana, Jammu and Kashmir, and Tamil Nadu.

Further, if we look at state-level poverty levels, we find that by the moderate or severe anemia measure, poverty has increased in states such as Delhi and Punjab, which contradicts the NITI Aayog’s claim of a fall in poverty across all states. It is also worth noting that the NITI Aayog report claims that Bihar has witnessed the largest reduction in poverty, when calculated as the percentage point change in headcount ratio between 2015-16 and 2019-21.

However, if we look at the percentage change in headcount ratio during this period, we find that Goa has had the largest reduction in poverty headcount, followed by states such as Telangana, Jammu and Kashmir, and Tamil Nadu. Bihar ranks somewhere in the middle (see Appendix for the state-wise figures on changes in headcount ratio).

Figure 3: Headcount Ratio, Intensity Ratio, and MPI under Different Measures, 2015-16 and 2019-21



Contribution of Indicators to Poverty

Figures 4 and 5 show the comparison of the contribution of various indicators to the MMPI and the corresponding figures of the NITI Aayog.

Figure 4: Percentage Contribution of Various Indicators to Multidimensional Poverty, 2015-16

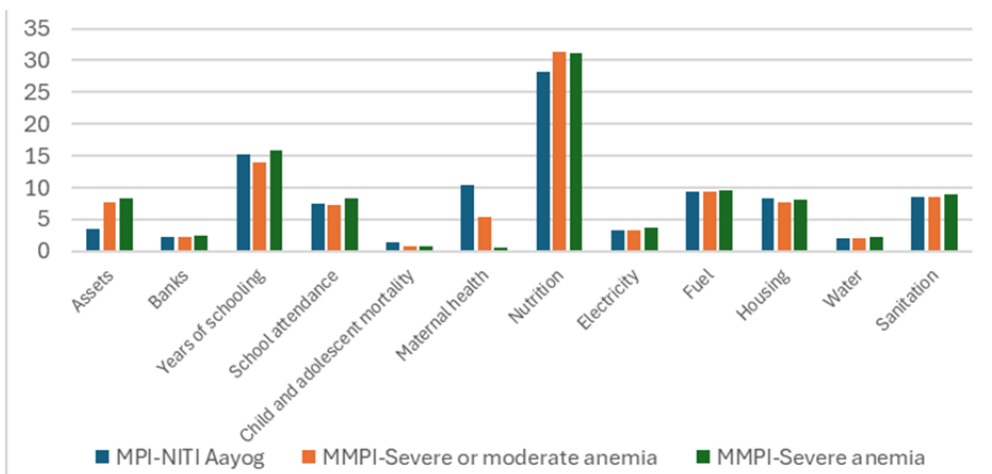
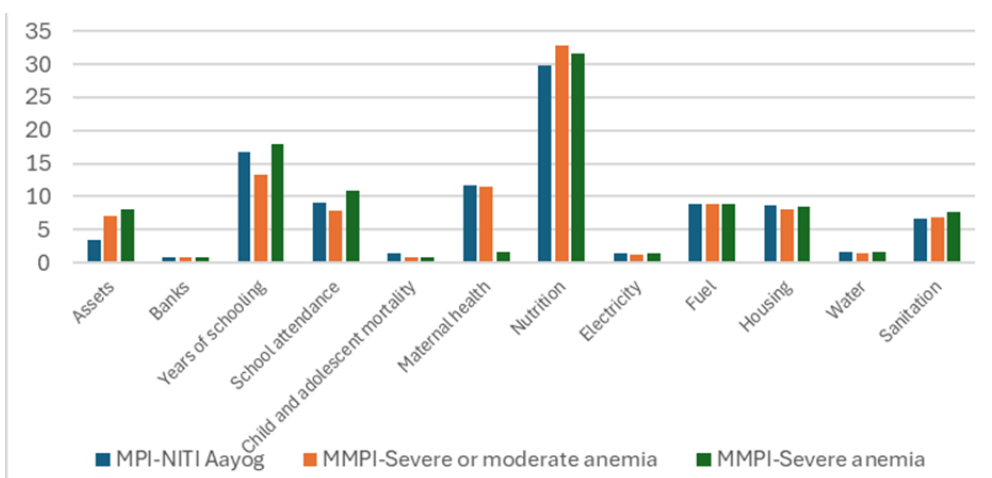


Figure 5: Percentage Contribution of Various Indicators to Multidimensional Poverty, 2019-21



The major contributors to multidimensional poverty are years of schooling and nutrition, whichever way we measure it. While the contribution of maternal health has increased based on all methods, it has almost doubled under the MMPI, reflecting significant expansion in the incidence of anemia between 2015-16 and 2019-21. The contribution of housing has marginally increased under the NITI Aayog method, whereas declined slightly under the MMPI. The contributions of bank accounts, sanitation, cooking fuel, and electricity have declined significantly, reflecting governmental efforts at improving these outcomes.

One of the advantages of the MPI is that it helps identify the contribution of each indicator to overall poverty, thus enabling policy focus on indicators that need the most attention. Our results show that depending on how we define an indicator, its contribution changes substantially, thus shifting the policy focus.

4. Conclusions

Modifying the definition of two indicators used in computing the MPI and changing the counting method for the headcount ratio, we find that the decline in poverty in India is much smaller than that claimed by the NITI Aayog. Further, the contribution of different indicators to overall poverty also changes with a change in definitions.

Deprivations on indicators such as maternal health, which have been redefined by us, have worsened over time, reflecting an increase in anemia among women in the country. A deep dive into the construction of the MPI reveals that the actual decline in poverty has neither been as large as that projected by the NITI Aayog, nor have all indicators shown a decline in deprivation levels.

The NITI Aayog has told us one story, that of a significant reduction in poverty. However, the key lies in the assumptions and counting methods that are not stated upfront.

Our results highlight some interesting trends in poverty. Reduction in multidimensional poverty in India can be attributed primarily to indicators such as bank accounts, electricity, drinking water, and the like, which are public goods that do not truly reflect the economic plight of individual households. Important indicators—such as maternal health and assets, which can improve only when households are able to uplift themselves and have a better standard of living—have deteriorated with time.

Despite being a data-driven analysis, multiple narratives of the Indian story of multidimensional poverty emerge. The NITI Aayog has told us one story, that of a significant reduction in poverty. However, the key lies in the assumptions and counting methods that are not stated upfront. Modifying these assumptions and changing the counting method to reflect reality more closely substantially changes the story.

The moral of the story is that claims about reductions in poverty cannot be taken at face value. They often hide other potential stories, like, in this case, the extent of reduction in the number of poor in the country and the contribution of different indicators to overall poverty levels. To understand poverty and its multiple dimensions better, one must look at it from different angles and be mindful that estimates are a function of the underlying assumptions. If the assumptions change, the level of poverty and its source also change.

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Appendices:

Figure 1A: State-wise percentage change in Headcount Ratio of Poverty (NITI Aayog) between 2015-16 and 2019-21

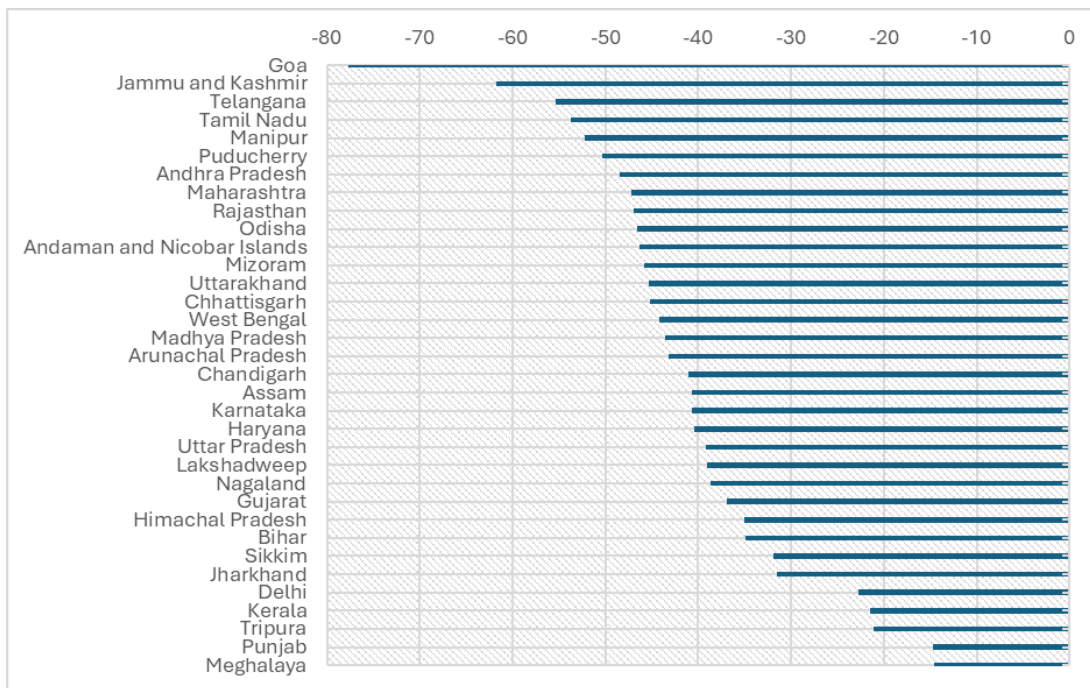


Figure 2A: State-wise percentage change in Headcount Ratio of Poverty (Severe or Moderate Anemia) between 2015-16 and 2019-21

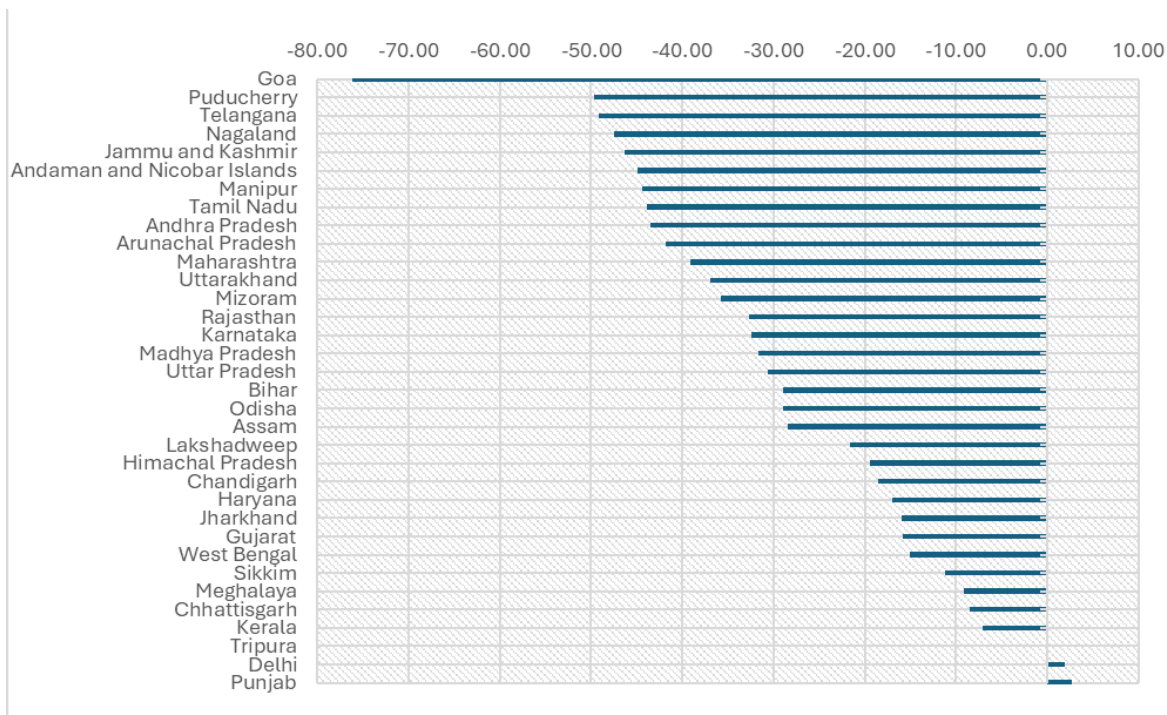


Figure 3A: State-wise percentage change in Headcount Ratio of Poverty (Severe Anemia) between 2015-16 and 2019-21

