Multidimensional Poverty in India: Insights from NSSO data.

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Motivation

• We compute MPI considering a series of thick rounds of NSSO data. One of our objective is to find out the discrepancy between income and multidimensional poverty. Income poverty is sensitive to changes in many variables, some of the prominent examples are household size, GDP and MPCE recall error. One of the objective is also see how these variables effect multidimensional Poverty.
Outline of the Talk

1) We first provide a brief review of AF methodology
2) Sample size for different NSSO rounds and comparability issues.
3) A brief review of different types of recall periods in collection of expenditure data by NSSO.
4) Problems with income poverty line and our choice of Poverty line.
5) Multidimensional Poverty and weights assigned to different indicators.
6) Indicator along with cut off.
7) Correlation among indicators for all the rounds.
Outline of the Talk

8) Justification for the choice of Second Stage Cut Off.
9) Raw and censored Head Count Ratio for different Rounds.
10) MPI, H and A for different rounds.
11) Composition of MPI for different Rounds.
12) Comparison of Income Poor and MPI poor for different choice of Poverty Cut off followed by different Social groups, income quintile and household size.
13) Recall error and Multidimensional Poverty.
14) GDP and multidimensional Poverty.
Methodology

- use Alkire Foster Adjusted Headcount Ratio to build a Multidimensional Poverty Index (MPI):

  Formula: \[ \text{MPI} = M_0 = H \times A \]

- \( H \) is the percent of people who are identified as poor, it shows the *incidence* of multidimensional poverty.
- \( A \) is the average proportion of weighted deprivations people suffer at the same time. It shows the *intensity* of people’s poverty – the *joint distribution* of their deprivations.
Data

Dataset: We use Rural NSSO Quinquennial (thick) Rounds for the following round.

<table>
<thead>
<tr>
<th>Rounds</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>June 1986 - July 1987</td>
</tr>
<tr>
<td>50</td>
<td>June 1993 - July 1994</td>
</tr>
<tr>
<td>55</td>
<td>June 1999 - July 2000</td>
</tr>
<tr>
<td>61</td>
<td>June 2004 - July 2005</td>
</tr>
<tr>
<td>66</td>
<td>June 2009 - July 2010</td>
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</table>
Sample Size

• Sample Size for different NSSO Rounds

<table>
<thead>
<tr>
<th>Round</th>
<th>Sample (Rural)</th>
<th>Households</th>
<th>No of Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>82,661</td>
<td></td>
<td>4,45,397</td>
</tr>
<tr>
<td>50</td>
<td>69,206</td>
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<td>3,56,289</td>
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<tr>
<td>55</td>
<td>71,385</td>
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<td>3,74,856</td>
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<tr>
<td>61</td>
<td>79,298</td>
<td></td>
<td>4,03,207</td>
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<tr>
<td>66</td>
<td>59,119</td>
<td></td>
<td>2,87,139</td>
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</tbody>
</table>
Comparability Issues

• Data is comparable in terms of survey design.

• Recall Period for MPCE changed over time. In particular for the 55th round.
Expenditure data

• NSSO does not collect data on Income. Monthly Per-Capita Expenditure (MPCE) is considered as a proxy.
• Estimation of Income Poverty rates depends on the recall Period of MPCE.
• Government estimates of Poverty rates are usually based on Mixed Recall Period.
• However MPCE_MRP is not available for all the rounds we consider Uniform recall period for 30 days for all the items, with an exception for the 55th round.
Income Poverty Line

• The poverty line is the minimum amount of money required for existence & survival of a person with physical efficiency. Any person earning less than the prescribed would be considered to be deprived in this dimension.

• Before publication of Tendulkar Committee Report, Poverty line in India was based on the recommendation of Task Force(1979).
The Poverty line as proposed by Task Force corresponds to a minimum calorie requirement of 2400 kcal and 2100 kcal for Rural and Urban India respectively.

Poverty line for the next 35 years was obtained inflating the poverty line using Consumer Price Index for Agricultural Labour for Rural India and Consumer Price Index for Industrial workers for Urban India.
Income Poverty Line Contd…

• Tendulkar Committee report (2005) : Planning Commission accepted the Poverty Line as suggested by Tendulkar Committee.

• Due to a change in methodology between Tendulkar committee and Task force, poverty would not be comparable.

• We merge this two methods by considering recent (for 61st round) Tendulkar Committee report poverty line and inflating using Consumer Price Index for Agricultural Labor.
Multidimensional Poverty: Dimensions, Indicators and Weights

8 Indicators

4 Dimensions

Highest educational attainment in household (1/4)
Education (1/4)

Mean per capita expenditure (1/4)
Income (1/4)

Protein (1/8)
Calorie (1/8)
Food (1/4)

Employment
Land
Electricity
Cooking Fuels

Standard of Living (1/4)

1/16 Each)

Mean per capita expenditure (1/4)
Income (1/4)

Protein (1/8)
Calorie (1/8)
Food (1/4)

Employment
Land
Electricity
Cooking Fuels

Standard of Living (1/4)

1/16 Each)
## Indicators and cutoffs

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Indicators</th>
<th>Cut off</th>
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<tbody>
<tr>
<td>Education</td>
<td>Highest educational attainment in household</td>
<td>Primary Schooling</td>
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<tr>
<td>Income</td>
<td>Monthly Per Capita Expenditure</td>
<td>National Poverty Line</td>
</tr>
<tr>
<td>Food Consumption</td>
<td>Calorie Consumption.</td>
<td>2400 K cal</td>
</tr>
<tr>
<td></td>
<td>Protein Consumption.</td>
<td>58.4 gms</td>
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<tr>
<td>Living Standard</td>
<td>Employment</td>
<td>Labourers</td>
</tr>
<tr>
<td></td>
<td>Land</td>
<td>1 acre agricultural Land and /or 0.5 acre irrigated Land</td>
</tr>
<tr>
<td></td>
<td>Electricity</td>
<td>No access to Electricity</td>
</tr>
<tr>
<td></td>
<td>Cooking Fuels</td>
<td>Firewood and Chips</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coke and Coal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dung Cake</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charcoal</td>
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Correlation Analysis: Round 43

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Income</th>
<th>Nutrition</th>
<th>Living Standards</th>
<th>Education</th>
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<tbody>
<tr>
<td>Expenditure</td>
<td>Expenditure</td>
<td>Calorie</td>
<td>Protein</td>
<td>Electricity</td>
</tr>
<tr>
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<td>1</td>
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<td></td>
</tr>
<tr>
<td>Calorie</td>
<td>0.47</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>0.38</td>
<td>0.66</td>
<td>1</td>
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<tr>
<td>Electricity</td>
<td>0.25</td>
<td>0.09</td>
<td>0.06</td>
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</tr>
<tr>
<td>Cooking</td>
<td>0.10</td>
<td>0.03</td>
<td>0.01</td>
<td>0.13</td>
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<td>Employment</td>
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<td>0.19</td>
<td>0.21</td>
<td>0.17</td>
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<tr>
<td>Land</td>
<td>0.12</td>
<td>0.2</td>
<td>0.22</td>
<td>0.08</td>
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<tr>
<td>Education</td>
<td>0.22</td>
<td>0.10</td>
<td>0.08</td>
<td>0.26</td>
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Correlation Analysis : Round 50

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<th>Living Standards</th>
<th>Education</th>
</tr>
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<tbody>
<tr>
<td>Expenditure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calorie</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>0.45</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>Electricity</td>
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<td>0.64</td>
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<tr>
<td>Cooking</td>
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<td>0.08</td>
<td>0.06</td>
<td>1</td>
</tr>
<tr>
<td>Employment</td>
<td>0.24</td>
<td>0.19</td>
<td>0.23</td>
<td>0.17</td>
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<tr>
<td>Land</td>
<td>0.13</td>
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<td>Education</td>
<td>0.22</td>
<td>0.10</td>
<td>0.09</td>
<td>0.27</td>
</tr>
</tbody>
</table>

**Correlation Coefficients:**
- Income: Calorie = 1
- Nutrition: Protein = 0.64
- Living Standards: Cooking = 1
- Employment: Land = 0.4615
- Education: None
### Correlation Analysis: Round 55

<table>
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<th>Living Standards</th>
<th>Education</th>
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</thead>
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<td></td>
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<tr>
<td>Calorie</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Protein</td>
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<td>0.62</td>
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<td></td>
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<td>0.04</td>
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<td>0.04</td>
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<tr>
<td>Employment</td>
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<td>0.17</td>
<td>0.20</td>
<td>0.12</td>
</tr>
<tr>
<td>Land</td>
<td>0.13</td>
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<td>0.207</td>
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<td>Education</td>
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<td>0.08</td>
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<th>Education</th>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calorie</td>
<td>0.38</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>0.39</td>
<td>0.60</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
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<td>0.04</td>
<td>0.17</td>
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<td>Employment</td>
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<td>0.20</td>
<td>0.08</td>
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<td>Land</td>
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<td>-0.07</td>
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## Correlation Analysis: Round 66

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Income</th>
<th>Nutrition</th>
<th>Living Standards</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditure</td>
<td>Expenditure</td>
<td>Calorie</td>
<td>Protein</td>
<td>Electricity</td>
</tr>
<tr>
<td>Expenditure</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calorie</td>
<td>0.29</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>0.34</td>
<td>0.62</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td>0.28</td>
<td>0.06</td>
<td>0.04</td>
<td>1</td>
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<tr>
<td>Cooking</td>
<td>0.20</td>
<td>0.06</td>
<td>0.05</td>
<td>0.19</td>
</tr>
<tr>
<td>Employment</td>
<td>0.21</td>
<td>0.11</td>
<td>0.16</td>
<td>0.07</td>
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<td>Land</td>
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<tr>
<td>Education</td>
<td>0.15</td>
<td>0.03</td>
<td>0.04</td>
<td>0.21</td>
</tr>
</tbody>
</table>
Poverty Cutoff

A person is identified as poor if the household is deprived in **50%** of all weighted indicators.

Justification: We propose two cutoffs a lower bound and an upper bound chosen in a way that government estimates lies in between the two bounds. Upper bound is 50% of all weighted indicators. Since poverty rates in India is a debatable issue particularly the number of poor’s, to remain in safe side we choose 50% as the poverty cut off.

Alternative cutoff(s) in **60%** of all weighted indicators. This is the lower bound.
## Raw and Censored Headcounts (Round 43)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Raw Headcounts</th>
<th>Censored Headcounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest educational attainment in household</td>
<td>0.43</td>
<td>0.37</td>
</tr>
<tr>
<td>Monthly Per Capita Expenditure</td>
<td>0.59</td>
<td>0.54</td>
</tr>
<tr>
<td>Calorie Consumption.</td>
<td>0.63</td>
<td>0.52</td>
</tr>
<tr>
<td>Protein Consumption.</td>
<td>0.46</td>
<td>0.40</td>
</tr>
<tr>
<td>Employment</td>
<td>0.36</td>
<td>0.30</td>
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<tr>
<td>Land</td>
<td>0.55</td>
<td>0.40</td>
</tr>
<tr>
<td>Electricity</td>
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<td>0.53</td>
</tr>
<tr>
<td>Cooking Fuels</td>
<td>0.96</td>
<td>0.60</td>
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</table>
# Raw and Censored Headcounts (Round 50)

<table>
<thead>
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<th>Indicator</th>
<th>Raw Headcounts</th>
<th>Censored Headcounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest educational attainment in household</td>
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<td>0.34</td>
</tr>
<tr>
<td>Monthly Per Capita Expenditure</td>
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<td>0.53</td>
</tr>
<tr>
<td>Calorie Consumption.</td>
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<td>Protein Consumption.</td>
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<td>0.45</td>
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<td>0.31</td>
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<tr>
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<td>0.43</td>
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## Raw and Censored Headcounts (Round 55)

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<th>Raw Headcounts</th>
<th>Censored Headcounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest educational attainment in household</td>
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</tr>
<tr>
<td>Monthly Per Capita Expenditure</td>
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<tr>
<td>Protein Consumption.</td>
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<td>0.29</td>
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<tr>
<td>------------------------------------------------</td>
<td>----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Highest educational attainment in household</td>
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<tr>
<td>Monthly Per Capita Expenditure</td>
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<td>Calorie Consumption.</td>
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<td>0.26</td>
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<tr>
<td>Land</td>
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</tr>
<tr>
<td>Electricity</td>
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<td>0.31</td>
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<tr>
<td>Cooking Fuels</td>
<td>0.87</td>
<td>0.48</td>
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# Raw and Censored Headcounts (Round 66)

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<th>Indicator</th>
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<th>Censored Headcounts</th>
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<tbody>
<tr>
<td>Highest educational attainment in household</td>
<td>0.17</td>
<td>0.15</td>
</tr>
<tr>
<td>Monthly Per Capita Expenditure</td>
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<td>0.37</td>
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<td>Calorie Consumption.</td>
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<td>0.38</td>
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<td>0.25</td>
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<tr>
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## MPI results NSSO 43

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<th>Poverty Cutoff</th>
<th>Measure</th>
<th>Value</th>
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<tbody>
<tr>
<td><strong>Union</strong></td>
<td>M₀</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>0.56</td>
</tr>
<tr>
<td><strong>Cutoff 50%</strong></td>
<td>M₀</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>0.61</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>0.75</td>
</tr>
<tr>
<td><strong>Cut off 60%</strong></td>
<td>M₀</td>
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</tr>
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</tr>
<tr>
<td></td>
<td>A</td>
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</tr>
<tr>
<td><strong>Intersection</strong></td>
<td>M₀</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>0.09</td>
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## MPI results NSSO 50

<table>
<thead>
<tr>
<th>Poverty Cutoff</th>
<th>Measure</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union</td>
<td>$M_0$</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>$H$</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>$A$</td>
<td>0.56</td>
</tr>
<tr>
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<td></td>
<td>$H$</td>
<td>0.61</td>
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<tr>
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<td>$A$</td>
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### MPI results NSSO 55

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<td>$H$</td>
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<tr>
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<td>0.51</td>
</tr>
<tr>
<td>Cutoff 50 %</td>
<td>$M_0$</td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td>$H$</td>
<td>0.53</td>
</tr>
<tr>
<td></td>
<td>$A$</td>
<td>0.73</td>
</tr>
<tr>
<td>Cut off 60 %</td>
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<td>$H$</td>
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<td>Intersection</td>
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## MPI results NSSO 61

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<tr>
<td>$M_0$</td>
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</tr>
<tr>
<td>$H$</td>
<td>0.99</td>
</tr>
<tr>
<td>$A$</td>
<td>0.49</td>
</tr>
<tr>
<td><strong>Cutoff 50 %</strong></td>
<td></td>
</tr>
<tr>
<td>$M_0$</td>
<td>0.36</td>
</tr>
<tr>
<td>$H$</td>
<td>0.51</td>
</tr>
<tr>
<td>$A$</td>
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<td>$A$</td>
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<tr>
<td><strong>Intersection</strong></td>
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<tr>
<td>$H$</td>
<td>0.04</td>
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<td>$A$</td>
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## MPI results NSSO 66

<table>
<thead>
<tr>
<th>Poverty Cutoff</th>
<th>Measure</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union</td>
<td>$M_0$</td>
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</tr>
<tr>
<td></td>
<td>$H$</td>
<td>0.99</td>
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<tr>
<td></td>
<td>$A$</td>
<td>0.47</td>
</tr>
<tr>
<td>Cutoff 50%</td>
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<td>0.31</td>
</tr>
<tr>
<td></td>
<td>$H$</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>$A$</td>
<td>0.70</td>
</tr>
<tr>
<td>Cut off 60%</td>
<td>$M_0$</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>$H$</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>$A$</td>
<td>0.74</td>
</tr>
<tr>
<td>Intersection</td>
<td>$M_0$</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>$H$</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>$A$</td>
<td>1</td>
</tr>
</tbody>
</table>
Composition of MPI: 43rd Round

- Income: 30%
- Calorie: 14%
- Protein: 11%
- Education: 20%
- Employment: 4%
- Cooking: 8%
- Electricity: 7%
- Land: 6%
- Employment: 4%

Oxford Poverty & Human Development Initiative
Composition of MPI : 50\textsuperscript{th} Round

- Income: 30%
- Calorie: 15%
- Protein: 12%
- Education: 19%
- Employment: 4%
- Cooking: 8%
- Electricity: 6%
- Land: 6%
- Proportion of MPI: 32

32

Composition of MPI : 50\textsuperscript{th} Round

- Income: 30%
- Calorie: 15%
- Protein: 12%
- Education: 19%
- Employment: 4%
- Cooking: 8%
- Electricity: 6%
- Land: 6%
- Proportion of MPI: 32
Composition of MPI: 55th Round

- Income: 28%
- Calorie: 16%
- Protein: 13%
- Education: 18%
- Cooking: 8%
- Employment: 5%
- Electricity: 6%
- Land: 6%
- Calorie: 16%
- Protein: 13%
Composition of MPI: 61st Round

- Income: 31%
- Calorie: 17%
- Protein: 14%
- Education: 13%
- Land: 7%
- Electricity: 5%
- Cooking: 8%
- Employment: 5%
- Calorie: 17%
- Protein: 14%
- Education: 13%
- Land: 7%
- Electricity: 5%
- Cooking: 8%
Composition of MPI: 66th Round

- Income: 30%
- Calorie: 17%
- Protein: 16%
- Education: 12%
- Land: 7%
- Electricity: 5%
- Cooking: 8%
- Employment: 5%

Total Composition: 100%
## Comparison of Income POOR and MPI Poor: Round 43

<table>
<thead>
<tr>
<th>Cut Off</th>
<th>MPI Poor Income non Poor</th>
<th>MPI non poor Income Poor</th>
<th>Both Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 %</td>
<td>0.35</td>
<td>0</td>
<td>0.59</td>
</tr>
<tr>
<td>20 %</td>
<td>0.23</td>
<td>0</td>
<td>0.59</td>
</tr>
<tr>
<td>30 %</td>
<td>0.20</td>
<td>0</td>
<td>0.59</td>
</tr>
<tr>
<td>40%</td>
<td>0.11</td>
<td>0.03</td>
<td>0.56</td>
</tr>
<tr>
<td>50 %</td>
<td>0.07</td>
<td>0.05</td>
<td>0.54</td>
</tr>
<tr>
<td>60 %</td>
<td>0.03</td>
<td>0.12</td>
<td>0.47</td>
</tr>
<tr>
<td>70 %</td>
<td>0.01</td>
<td>0.28</td>
<td>0.31</td>
</tr>
<tr>
<td>80 %</td>
<td>0</td>
<td>0.36</td>
<td>0.23</td>
</tr>
<tr>
<td>90 %</td>
<td>0</td>
<td>0.44</td>
<td>0.14</td>
</tr>
<tr>
<td>100 %</td>
<td>0</td>
<td>0.5</td>
<td>0.09</td>
</tr>
</tbody>
</table>
Comparison of Income POOR and MPI Poor: Round 50

<table>
<thead>
<tr>
<th>Cut Off</th>
<th>MPI Poor Income non Poor</th>
<th>MPI non poor Income Poor</th>
<th>Both Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 %</td>
<td>0.36</td>
<td>0</td>
<td>0.57</td>
</tr>
<tr>
<td>20 %</td>
<td>0.25</td>
<td>0</td>
<td>0.57</td>
</tr>
<tr>
<td>30 %</td>
<td>0.22</td>
<td>0</td>
<td>0.57</td>
</tr>
<tr>
<td>40%</td>
<td>0.12</td>
<td>0.02</td>
<td>0.55</td>
</tr>
<tr>
<td>50 %</td>
<td>0.07</td>
<td>0.04</td>
<td>0.53</td>
</tr>
<tr>
<td>60 %</td>
<td>0.03</td>
<td>0.11</td>
<td>0.46</td>
</tr>
<tr>
<td>70 %</td>
<td>0.01</td>
<td>0.27</td>
<td>0.3</td>
</tr>
<tr>
<td>80 %</td>
<td>0</td>
<td>0.34</td>
<td>0.23</td>
</tr>
<tr>
<td>90 %</td>
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<td>0.42</td>
<td>0.15</td>
</tr>
<tr>
<td>100 %</td>
<td>0</td>
<td>0.48</td>
<td>0.09</td>
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</tbody>
</table>
Comparison of Income POOR and MPI Poor: Round 55

<table>
<thead>
<tr>
<th>Cut Off</th>
<th>MPI Poor Income non Poor</th>
<th>MPI non poor Income Poor</th>
<th>Both Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 %</td>
<td>0.47</td>
<td>0</td>
<td>0.46</td>
</tr>
<tr>
<td>20 %</td>
<td>0.34</td>
<td>0</td>
<td>0.46</td>
</tr>
<tr>
<td>30 %</td>
<td>0.29</td>
<td>0</td>
<td>0.46</td>
</tr>
<tr>
<td>40%</td>
<td>0.15</td>
<td>0.01</td>
<td>0.45</td>
</tr>
<tr>
<td>50 %</td>
<td>0.09</td>
<td>0.02</td>
<td>0.44</td>
</tr>
<tr>
<td>60 %</td>
<td>0.04</td>
<td>0.09</td>
<td>0.37</td>
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<tr>
<td>70 %</td>
<td>0.01</td>
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<td>0.23</td>
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<tr>
<td>80 %</td>
<td>0</td>
<td>0.29</td>
<td>0.17</td>
</tr>
<tr>
<td>90 %</td>
<td>0</td>
<td>0.34</td>
<td>0.12</td>
</tr>
<tr>
<td>100 %</td>
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<td>0.39</td>
<td>0.07</td>
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## Comparison of Income POOR and MPI Poor: Round 61

<table>
<thead>
<tr>
<th>Cut Off</th>
<th>MPI Poor Income non Poor</th>
<th>MPI non poor Income Poor</th>
<th>Both Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 %</td>
<td>0.44</td>
<td>0</td>
<td>0.48</td>
</tr>
<tr>
<td>20 %</td>
<td>0.31</td>
<td>0</td>
<td>0.48</td>
</tr>
<tr>
<td>30 %</td>
<td>0.26</td>
<td>0</td>
<td>0.48</td>
</tr>
<tr>
<td>40%</td>
<td>0.11</td>
<td>0.01</td>
<td>0.47</td>
</tr>
<tr>
<td>50 %</td>
<td>0.06</td>
<td>0.03</td>
<td>0.45</td>
</tr>
<tr>
<td>60 %</td>
<td>0.03</td>
<td>0.11</td>
<td>0.37</td>
</tr>
<tr>
<td>70 %</td>
<td>0.01</td>
<td>0.29</td>
<td>0.19</td>
</tr>
<tr>
<td>80 %</td>
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<td>0.35</td>
<td>0.13</td>
</tr>
<tr>
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<td>0</td>
<td>0.39</td>
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<tr>
<td>100 %</td>
<td>0</td>
<td>0.44</td>
<td>0.04</td>
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## Comparison of Income POOR and MPI Poor: Round 66

<table>
<thead>
<tr>
<th>Cut Off</th>
<th>MPI Poor Income Poor</th>
<th>MPI non poor Income Poor</th>
<th>Both Poor</th>
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<tr>
<td>10 %</td>
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<tr>
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<tr>
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<td>0.14</td>
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<tr>
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<tr>
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<td>0.03</td>
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</table>
Poverty Across Social Groups: Round 43

The bar chart shows the poverty levels across social groups (ST, SC, Others) for different indicators (HCR, H, A, MPI). The values range from 0.1 to 0.9.
Poverty Across Social Groups: Round 50

![Bar chart showing poverty levels across social groups (SC, ST, Others) for different indices (HCR, H, A, MPI)].

- HCR: Dark blue
- H: Light blue
- A: Violet
- MPI: Light grey

The chart illustrates the relative poverty levels across social groups, with SC, ST, and Others categories, and different indices measured on a scale from 0.0 to 0.9.
Poverty Across Social Groups: Round 55

The bar chart illustrates poverty rates across different social groups: ST, SC, OBC, and Others, categorized by HCR, H, A, and MPI. The data shows varying levels of poverty with distinct color codes for each group.
Poverty Across Social Groups: Round 61

The chart illustrates poverty across different social groups: ST, SC, OBC, and Others. It compares poverty levels across various indicators such as HCR, H, A, and MPI. The bars represent different social categories, showing the relative poverty levels for each group.
Poverty Across Social Groups: Round 66
### MPI poor and income poverty by quintile: Round 43

<table>
<thead>
<tr>
<th>Real PC Consumption Quintile</th>
<th>MPI Poor</th>
<th>Income Poor</th>
<th>MPI Poor Income Non Poor</th>
<th>MPI non Poor Income Poor</th>
<th>Both Poor</th>
<th>Population Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Poorest)</td>
<td>0.98</td>
<td>1</td>
<td>0</td>
<td>0.02</td>
<td>0.98</td>
<td>20</td>
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<tr>
<td>Second</td>
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<td>1</td>
<td>0</td>
<td>0.07</td>
<td>0.93</td>
<td>20</td>
</tr>
<tr>
<td>Third</td>
<td>0.81</td>
<td>0.95</td>
<td>0.01</td>
<td>0.15</td>
<td>0.79</td>
<td>20</td>
</tr>
<tr>
<td>Fourth</td>
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<td>0</td>
<td>0.23</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Fifth (Richest)</td>
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<td>0.1</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>National</td>
<td>0.61</td>
<td>0.59</td>
<td>0.07</td>
<td>0.05</td>
<td>0.54</td>
<td>100</td>
</tr>
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</table>
### MPI poor and income poverty by quintile: Round 50

<table>
<thead>
<tr>
<th>Real PC Consumption Quintile</th>
<th>MPI Poor</th>
<th>Income Poor</th>
<th>MPI Poor Income Non Poor</th>
<th>MPI non Poor Income Poor</th>
<th>Both Poor</th>
<th>Population Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>First (Poorest)</td>
<td>0.99</td>
<td>1</td>
<td>0</td>
<td>0.01</td>
<td>0.99</td>
<td>20</td>
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<tr>
<td>Second</td>
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<td>1</td>
<td>0</td>
<td>0.06</td>
<td>0.94</td>
<td>20</td>
</tr>
<tr>
<td>Third</td>
<td>0.77</td>
<td>0.85</td>
<td>0.04</td>
<td>0.12</td>
<td>0.73</td>
<td>20</td>
</tr>
<tr>
<td>Fourth</td>
<td>0.22</td>
<td>0</td>
<td>0.22</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Fifth (Richest)</td>
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<td>0</td>
<td>0.11</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>National</td>
<td>0.61</td>
<td>0.57</td>
<td>0.07</td>
<td>0.04</td>
<td>0.53</td>
<td>100</td>
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</tbody>
</table>
### MPI poor and income poverty by quintile: Round 55

<table>
<thead>
<tr>
<th>Real PC Consumption Quintile</th>
<th>MPI Poor</th>
<th>Income Poor</th>
<th>MPI poor Non Poor</th>
<th>MPI non Poor Income Poor</th>
<th>Both Poor</th>
<th>Population Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>First (Poorest)</td>
<td>0.99</td>
<td>1</td>
<td>0</td>
<td>0.01</td>
<td>0.99</td>
<td>20</td>
</tr>
<tr>
<td>Second</td>
<td>0.93</td>
<td>1</td>
<td>0</td>
<td>0.07</td>
<td>0.93</td>
<td>20</td>
</tr>
<tr>
<td>Third</td>
<td>0.46</td>
<td>0.3</td>
<td>0.2</td>
<td>0.03</td>
<td>0.26</td>
<td>20</td>
</tr>
<tr>
<td>Fourth</td>
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<td>0</td>
<td>0.19</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Fifth (Richest)</td>
<td>0.06</td>
<td>0</td>
<td>0.06</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>National</td>
<td>0.53</td>
<td>0.46</td>
<td>0.09</td>
<td>0.02</td>
<td>0.44</td>
<td>100</td>
</tr>
</tbody>
</table>
## MPI poor and income poverty by quintile: Round 61

<table>
<thead>
<tr>
<th>Real PC Consumption Quintile</th>
<th>MPI Poor</th>
<th>Income Poor</th>
<th>MPI Poor Non Poor</th>
<th>MPI non Poor Income Poor</th>
<th>Both Poor</th>
<th>Population Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>First (Poorest)</td>
<td>0.98</td>
<td>1</td>
<td>0</td>
<td>0.02</td>
<td>0.984965</td>
<td>20</td>
</tr>
<tr>
<td>Second</td>
<td>0.93</td>
<td>1</td>
<td>0</td>
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<td>0.929451</td>
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<tr>
<td>Third</td>
<td>0.47</td>
<td>0.41</td>
<td>0.11</td>
<td>0.05</td>
<td>0.352748</td>
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<tr>
<td>Fourth</td>
<td>0.13</td>
<td>0</td>
<td>0.13</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Fifth (Richest)</td>
<td>0.04</td>
<td>0</td>
<td>0.04</td>
<td>0</td>
<td>0</td>
<td>20</td>
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### MPI poor and income poverty by quintile: Round 66

<table>
<thead>
<tr>
<th>Real PC Consumption Quintile</th>
<th>MPI Poor</th>
<th>Income Poor</th>
<th>MPI Poor Income Non Poor</th>
<th>MPI non Poor Income Poor</th>
<th>Both Poor</th>
<th>Population Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>First (Poorest)</td>
<td>0.97</td>
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<td>Third</td>
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<td>0.18</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Fourth</td>
<td>0.11</td>
<td>0</td>
<td>0.11</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Fifth (Richest)</td>
<td>0.04</td>
<td>0</td>
<td>0.04</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>National</td>
<td>0.44</td>
<td>0.38</td>
<td>0.07</td>
<td>0.02</td>
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</table>
### $M_0$ and income poverty by household size

**NSSO 43rd Round**

<table>
<thead>
<tr>
<th>Household Size</th>
<th>MPI Poor</th>
<th>Income Poor</th>
<th>MPI Poor Income Nonpoor</th>
<th>Income Poor MPI Nonpoor</th>
<th>Both Poor</th>
<th>Population Share</th>
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</thead>
<tbody>
<tr>
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<td>0.57</td>
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<td>0.23</td>
<td>0.01</td>
<td>0.34</td>
<td>3.55</td>
</tr>
<tr>
<td>3</td>
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</tr>
<tr>
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<td>0.02</td>
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<tr>
<td>5</td>
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<td>0.04</td>
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<td>17.21</td>
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<td>0.63</td>
<td>0.62</td>
<td>0.05</td>
<td>0.05</td>
<td>0.58</td>
<td>16.52</td>
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<td>&gt;=7</td>
<td>0.60</td>
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<td>0.07</td>
<td>0.57</td>
<td>41.56</td>
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<tr>
<td>National</td>
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<td>0.59</td>
<td>0.07</td>
<td>0.05</td>
<td>0.54</td>
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### M₀ and income poverty by household size NSSO 50th Round

<table>
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<tr>
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<th>MPI Poor</th>
<th>Income Poor</th>
<th>MPI Poor Income Nonpoor</th>
<th>Income Poor</th>
<th>Both Poor</th>
<th>Population Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>0.23</td>
<td>0.003</td>
<td>0.29</td>
<td>0.98</td>
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<td>0.23</td>
<td>0.008</td>
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<td>4.19</td>
</tr>
<tr>
<td>3</td>
<td>0.57</td>
<td>0.43</td>
<td>0.16</td>
<td>0.013</td>
<td>0.41</td>
<td>7.91</td>
</tr>
<tr>
<td>4</td>
<td>0.59</td>
<td>0.50</td>
<td>0.11</td>
<td>0.021</td>
<td>0.48</td>
<td>15.10</td>
</tr>
<tr>
<td>5</td>
<td>0.62</td>
<td>0.57</td>
<td>0.08</td>
<td>0.028</td>
<td>0.54</td>
<td>19.03</td>
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<td>6</td>
<td>0.64</td>
<td>0.62</td>
<td>0.06</td>
<td>0.035</td>
<td>0.59</td>
<td>16.96</td>
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<td>0.58</td>
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### M₀ and income poverty by household size NSSO 55th Round

<table>
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<th>MPI Poor</th>
<th>Income Poor</th>
<th>MPI Poor Nonpoor</th>
<th>Income Poor Nonpoor</th>
<th>Both Poor</th>
<th>Population Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.45</td>
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<td>0.29</td>
<td>0.001</td>
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<td>0.82</td>
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<td>0.27</td>
<td>0.002</td>
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<tr>
<td>3</td>
<td>0.46</td>
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<td>0.18</td>
<td>0.006</td>
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<td>7.19</td>
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<tr>
<td>4</td>
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<td>0.13</td>
<td>0.008</td>
<td>0.34</td>
<td>14.76</td>
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<td>0.10</td>
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<td>18.80</td>
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<tr>
<td>6</td>
<td>0.57</td>
<td>0.52</td>
<td>0.07</td>
<td>0.020</td>
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<td>16.64</td>
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<td>0.55</td>
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<td>0.039</td>
<td>0.51</td>
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<td>0.09</td>
<td>0.023</td>
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### $M_0$ and income poverty by household size NSSO 61st Round

<table>
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<th>Household Size</th>
<th>MPI Poor</th>
<th>Income Poor</th>
<th>MPI Poor Income Nonpoor</th>
<th>Income Poor MPI Nonpoor</th>
<th>Both Poor</th>
<th>Population Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.42</td>
<td>0.24</td>
<td>0.21</td>
<td>0.019</td>
<td>0.22</td>
<td>1.00</td>
</tr>
<tr>
<td>2</td>
<td>0.45</td>
<td>0.25</td>
<td>0.20</td>
<td>0.007</td>
<td>0.25</td>
<td>4.07</td>
</tr>
<tr>
<td>3</td>
<td>0.43</td>
<td>0.33</td>
<td>0.12</td>
<td>0.010</td>
<td>0.32</td>
<td>7.76</td>
</tr>
<tr>
<td>4</td>
<td>0.44</td>
<td>0.38</td>
<td>0.08</td>
<td>0.018</td>
<td>0.36</td>
<td>16.46</td>
</tr>
<tr>
<td>5</td>
<td>0.50</td>
<td>0.46</td>
<td>0.05</td>
<td>0.022</td>
<td>0.44</td>
<td>19.38</td>
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<tr>
<td>6</td>
<td>0.55</td>
<td>0.53</td>
<td>0.04</td>
<td>0.028</td>
<td>0.51</td>
<td>16.62</td>
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<tr>
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<td>0.58</td>
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<td>0.042</td>
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<td>34.71</td>
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<tr>
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<td>0.48</td>
<td>0.06</td>
<td>0.028</td>
<td>0.45</td>
<td>100</td>
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</table>
$M_0$ and income poverty by household size NSSO 66th Round

<table>
<thead>
<tr>
<th>Household Size</th>
<th>MPI Poor</th>
<th>Income Poor</th>
<th>MPI Poor Nonpoor</th>
<th>Income Poor Nonpoor</th>
<th>Both Poor</th>
<th>Population Share</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>0.17</td>
<td>0.25</td>
<td>0.018</td>
<td>0.15</td>
<td>1.00</td>
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<tr>
<td>2</td>
<td>0.41</td>
<td>0.17</td>
<td>0.25</td>
<td>0.004</td>
<td>0.17</td>
<td>4.56</td>
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<tr>
<td>3</td>
<td>0.33</td>
<td>0.20</td>
<td>0.13</td>
<td>0.008</td>
<td>0.20</td>
<td>8.67</td>
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<tr>
<td>4</td>
<td>0.36</td>
<td>0.28</td>
<td>0.09</td>
<td>0.008</td>
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<td>18.74</td>
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<tr>
<td>5</td>
<td>0.42</td>
<td>0.38</td>
<td>0.05</td>
<td>0.019</td>
<td>0.36</td>
<td>20.49</td>
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<tr>
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<td>0.47</td>
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<td>0.05</td>
<td>0.021</td>
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<td>16.53</td>
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<tr>
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<td>0.38</td>
<td>0.07</td>
<td>0.018</td>
<td>0.37</td>
<td>100</td>
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</table>
Recall error and MPI

• We would like to check the effects of recall error on Head Count Ratio (Income Poverty), H and A for 61\textsuperscript{st} and 66\textsuperscript{th} rounds.

• We consider MPCE for mixed recall period and MPCE for uniform recall period of 30 days.

<table>
<thead>
<tr>
<th>Recall Type</th>
<th>HCR Round 61</th>
<th>HCR Round 66</th>
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<tr>
<td>MRP</td>
<td>0.418</td>
<td>0.340</td>
</tr>
<tr>
<td>URP</td>
<td>0.482</td>
<td>0.384</td>
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</table>
## Recall Error and MPI: Round 61

<table>
<thead>
<tr>
<th>Cut Off</th>
<th>H_MRP</th>
<th>H_URP</th>
<th>diff_H</th>
<th>M0_MRP</th>
<th>M0_URP</th>
<th>diff_M0</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 %</td>
<td>0.99</td>
<td>0.99</td>
<td>-6E-05</td>
<td>0.47</td>
<td>0.49</td>
<td>-0.01601</td>
</tr>
<tr>
<td>11 %</td>
<td>0.92</td>
<td>0.93</td>
<td>-0.001</td>
<td>0.47</td>
<td>0.48</td>
<td>-0.01606</td>
</tr>
<tr>
<td>21 %</td>
<td>0.78</td>
<td>0.79</td>
<td>-0.009</td>
<td>0.45</td>
<td>0.46</td>
<td>-0.01741</td>
</tr>
<tr>
<td>31 %</td>
<td>0.73</td>
<td>0.74</td>
<td>-0.0165</td>
<td>0.43</td>
<td>0.45</td>
<td>-0.01927</td>
</tr>
<tr>
<td>41 %</td>
<td>0.55</td>
<td>0.59</td>
<td>-0.0355</td>
<td>0.37</td>
<td>0.4</td>
<td>-0.02571</td>
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<tr>
<td>51 %</td>
<td>0.42</td>
<td>0.46</td>
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<td>0.34</td>
<td>-0.02689</td>
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<tr>
<td>61 %</td>
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<td>-0.0286</td>
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<td>-0.02127</td>
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<tr>
<td>71 %</td>
<td>0.18</td>
<td>0.19</td>
<td>-0.0121</td>
<td>0.16</td>
<td>0.17</td>
<td>-0.01045</td>
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<tr>
<td>81 %</td>
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<td>0.13</td>
<td>-0.0089</td>
<td>0.11</td>
<td>0.12</td>
<td>-0.00808</td>
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<tr>
<td>91 %</td>
<td>0.08</td>
<td>0.09</td>
<td>-0.0046</td>
<td>0.08</td>
<td>0.08</td>
<td>-0.0044</td>
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## Recall Error and MPI : Round 66

<table>
<thead>
<tr>
<th>Cut Off</th>
<th>H_MRP</th>
<th>H_URP</th>
<th>diff_H</th>
<th>M0_MRP</th>
<th>M0_URP</th>
<th>diff_M0</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 %</td>
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<td>0.99</td>
<td>0</td>
<td>0.45</td>
<td>0.46</td>
<td>-0.01124</td>
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<tr>
<td>11 %</td>
<td>0.93</td>
<td>0.93</td>
<td>-0.0009</td>
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<td>0.46</td>
<td>-0.0113</td>
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<tr>
<td>21 %</td>
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<td>0.8</td>
<td>-0.0058</td>
<td>0.42</td>
<td>0.44</td>
<td>-0.01215</td>
</tr>
<tr>
<td>31 %</td>
<td>0.74</td>
<td>0.75</td>
<td>-0.0101</td>
<td>0.41</td>
<td>0.42</td>
<td>-0.01321</td>
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<tr>
<td>41 %</td>
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<td>0.53</td>
<td>-0.0264</td>
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<td>0.35</td>
<td>-0.01888</td>
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<tr>
<td>51 %</td>
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<td>-0.0307</td>
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<td>-0.02064</td>
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<td>61 %</td>
<td>0.32</td>
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<td>-0.0234</td>
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<td>-0.01655</td>
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<tr>
<td>71 %</td>
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<td>0.14</td>
<td>-0.0066</td>
<td>0.12</td>
<td>0.12</td>
<td>-0.00556</td>
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<tr>
<td>81 %</td>
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<td>-0.0042</td>
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<td>0.06</td>
<td>-0.0022</td>
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<td>0.06</td>
<td>-0.00207</td>
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</table>
Multidimensional Poverty And GDP

Consider the following Panel Data regression equation

\[ \log(MPI_{it}) = \alpha_{1i} + \beta_{1} \times \log(GDP_{it}) + u_{it} \quad (1) \]

\[ \log(H_{it}) = \alpha_{2i} + \beta_{2} \times \log(GDP_{it}) + u_{it} \quad (2) \]

\[ \log(A_{it}) = \alpha_{3i} + \beta_{3} \times \log(GDP_{it}) + u_{it} \quad (3) \]

\[ \log(HCR_{it}) = \alpha_{4i} + \beta_{4} \times \log(GDP_{it}) + u_{it} \quad (4) \]

where MPI, H, A follows usual notation and for \( i \)th state and for the \( t \)th round.
Poverty Elasticity w.r.t GDP

• $\beta_k$ in the above equation represents elasticity of poverty w.r.t GDP. It is expected that $\beta$ for multidimensional poverty indices would vary as a result of choice of Poverty Cut off.
Elasticity Coefficients

- **Dependent Variable is MPI**

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Cut Off=30%</th>
<th>Cut Off=40%</th>
<th>Cut Off=50%</th>
<th>Cut Off=60%</th>
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</thead>
<tbody>
<tr>
<td>β</td>
<td>-0.29</td>
<td>-0.46</td>
<td>-0.63</td>
<td>-0.65</td>
</tr>
<tr>
<td>Intercept</td>
<td>5.92</td>
<td>7.07</td>
<td>8.18</td>
<td>4.01</td>
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</table>

- **Dependent Variable is H**

<table>
<thead>
<tr>
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<th>Cut Off=40%</th>
<th>Cut Off=50%</th>
<th>Cut Off=60%</th>
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<tbody>
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<td>β</td>
<td>-0.09</td>
<td>-0.34</td>
<td>-0.56</td>
<td>-0.57</td>
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<tr>
<td>Intercept</td>
<td>4.96</td>
<td>6.51</td>
<td>8.00</td>
<td>7.8</td>
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</table>
Elasticity Coefficients Contd

• Dependent Variable is A

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Cut Off=30%</th>
<th>Cut Off=40%</th>
<th>Cut Off=50%</th>
<th>Cut Off=60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>β</td>
<td>-0.20</td>
<td>-0.13</td>
<td>-0.07</td>
<td>-0.09</td>
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<tr>
<td>Intercept</td>
<td>5.60</td>
<td>5.17</td>
<td>4.80</td>
<td>4.98</td>
</tr>
</tbody>
</table>

• NB: All coefficients are at significant 1% level. R square between and over all is also reasonable.
Conclusion

• Poverty in Rural India from different NSSO rounds has decreased over time.
• Correlation among different dimensions remained almost same for all the rounds.
• Contributions of different indicators also did not varied much.
• Poverty is highest among the SC ST groups for all the rounds. This is similar to income Poverty findings.
Conclusion Contd

• Economies of scale plays an important role in the analysis of income poverty. Income Poverty increases with the increase of household size. This phenomenon is not always observed in the case of multidimensional Poverty.

• Effects of Recall error is not so high for MPI but for H it is almost similar to HCR.
Conclusion Contd

- Multidimensional poverty and GDP are inversely related however effect of GDP on multidimensional poverty decreases with increase of Poverty cut off.