Benefit Incidence Analysis for Government Health Services in India*

* This work was done as part of the Resource Tracking and Management (RTM) Project at Harvard Chan. The study team includes (in alphabetical order) Peter Berman, Manjiri Bhawalkar, Diana Bowser, Denizhen Duran, Rajesh Jha, and Bryan Patenaude.
Outline

● Introduction
● Background
● Data
● Methodology
● Sample Summary Statistics
● Results
● Conclusions
● Annexes
Introduction

• This study analyzes the distribution of government and out-of-pocket spending on government health care in India using a benefit incidence analysis (BIA) methodology.

• BIA examines who benefits in financial terms from expenditure on health care, examining how effectively governments are able to target their limited resources towards meeting the needs of the poor.

• Past BIA analyses conducted in India examined how public spending was distributed using data for 1995–96 (Mahal et al., 2000). This analysis uses the most recent data (2014) from the 71st Round of the National Sample Survey (NSS) and combines it with recent Resource Tracking and Management Project (RTM) analysis of state-level government health spending allocations.

• This report presents the first stage of analysis results, highlights some key findings, and lays out plans for further in-depth analysis and reporting.
Introduction

Key questions the study addresses:

1. Who benefits from public expenditure on health?

2. What level of inequality is there in terms of health service use and the financial value of benefits received across household income levels?

3. What are the relative shares of government health care use (outpatient at primary level, outpatient in hospital, inpatient at primary level, inpatient in hospital, delivery at primary level, delivery in hospital) captured by different income groups, both nationally, across different states within India, and urban/rural?

4. What shares of “gross” and “net” government health expenditure (“net” deducts OOP spending related to government service use) -- are received by different income groups across different levels of care (outpatient at primary level, outpatient in hospital, inpatient at primary level, inpatient in hospital, delivery at primary level, delivery in hospital)? How is OOP spending distributed?

5. How do different states rank in terms of targeting of services for the poor in terms of these 3 measures? Which states are more pro-poor? How do Bihar, Odisha and Uttar Pradesh compare to other states?
Overview of health financing in India (NHA 2013-2014):

• Total Health Expenditure: US$ 73 billion (exchange rate)
• Total Health Expenditure per capita: US$ 58 (exchange rate)
• Total Health Expenditure (% GDP): 4.02%
• Out of Pocket Expenditure (%THE): 67.7%
• General Government Expenditure on Health (%THE): 28%
• 2/3 of Government Health Expenditure is financed by the States
• 80% of TGHE is curative and 20% of TGHE is preventive
• Recent government policy developments:
  - 14th Finance Commission increased state responsibility to allocate for health, with less direct health sector support from central government
  - Greater focus on determinants of health and tertiary care
  - Less growth of spending on primary care
Data and Variables

- **Data Sources and Variables:**

  - 10 datasets were combined from the Indian National Sample Survey (NSS) 71st Round (information on datasets and variables are located in the annex slides) to capture:
    - Utilization of Outpatient Care at primary care level facilities and hospitals
    - Admissions for Inpatient Care at primary care level facilities and hospitals
    - Deliveries at primary care level facilities and hospitals

  - Total Health Expenditure and Government Health Spending for 16 Indian States were combined with estimated total volumes of health care from NSS to calculate unit costs for:
    - Health care in primary level facilities (overall illness care and deliveries)
    - Hospital-based Care (inpatient and outpatient illness care and deliveries)

- **Definition of levels of care:** Primary care facilities combines reports from two levels of service (level 1: HSW/ANM/ASHA/AWW; level 2: PHC/dispensary/CHC/mobile medical unit); Hospital includes District Hospitals and above.
Methodology: BIA

NSS data on utilization and state-level estimates of service unit costs are used to create concentration curves for both utilization and for benefit incidence analysis; all results were weighted using the NSS weighting scheme.

The BIA was conducted by:

1. **Ranking individuals** from poorest to richest based on per capita annual expenditure (derived from NSS household expenditure data)
2. **Estimating the utilization** of different type of health service (delivery, outpatient, inpatient), level of service (primary, hospital) by individuals
3. **Estimating unit costs with separate figures for government costs and out-of-pocket costs** for each type and level of health service
4. **Estimating benefit value from government spending in financial terms by multiplying government unit costs by utilization rates** for each type and level of health service for each individual
5. **Estimated the “net” public subsidies by deducting direct user fee or out-of-pocket payments** for each type and level of health service for each individual
6. **Compiling utilization, government spending, out-of-pocket spending, and net public subsidies into** concentration curves and calculated concentration indices for different types of health services (delivery, outpatient, inpatient) and level of service (primary, hospital)
Concentration Index:  

\[ C = \frac{2}{\mu} \text{cov}(h, r) = \frac{2}{N\mu} \sum_{i=1}^{n} h_i r_i - 1 - \frac{1}{N} \]

- *Concentration Index* \( C \) is computed as the weighted covariance between an individual’s \( i \) health sector variable \( h \), which is utilization or benefits in our analysis and the individual’s rank in the income distribution \( r \).

- This weighted sum of all individuals is standardized to be between -1 and 1 by multiplying it by a fraction of the mean of health sector variable \( \mu \).

- The ranking goes from 1 to \( N \) with 1 being the poorest and \( N \) being the richest.

- This index is represented visually as the area between a curve comparing the cumulative % of utilization (or benefits) over the cumulative income distribution and the line of perfect equality (45 degree line); where a negative coefficient is pro-poor and positive coefficient is pro-rich.
Methodology: Unit Cost Analysis

We used expenditure estimates for primary care and hospital care for 16 Indian States developed by RTM and combined this with utilization data from the NSS to estimate unit costs for primary care and hospital care. (This report uses average unit costs for the 16 states to impute unit costs for all other states. All analyses are done for all states, with imputed values, and just the 16 states.)

NB: For primary care unit costs we summed all outpatient, inpatient, and delivery outputs in government primary level facilities and divided by government primary health care expenditure to estimate a single per output cost for outpatient, inpatient and deliveries.

NB: For hospital care, we could estimate separate unit costs for outpatient and inpatient. Deliveries at the hospital level were costed as equal to an average inpatient episode.

We separated total hospital expenditure into outpatient and inpatient expenditure based on literature showing ~60%/40% split between inpatient and outpatient.

The equations for the unit cost calculations are included in the annex.
Sample Summary Statistics: All Visits—Public and Private (Unweighted)

<table>
<thead>
<tr>
<th>Type of Care</th>
<th>Total Sample (Individuals)</th>
<th>Sector</th>
<th>Number of Visits (Annualized)</th>
<th>Number of Individuals with Visits</th>
<th>% Visited (of Total Sample)</th>
<th>Number of Visits Per Person per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outpatient</strong></td>
<td>333,105</td>
<td>Total</td>
<td>851,994</td>
<td>29,662</td>
<td>8.9%</td>
<td>2.56</td>
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<tr>
<td></td>
<td></td>
<td>Public</td>
<td>237,146</td>
<td>8,274</td>
<td>2.5%</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Private</td>
<td>614,848</td>
<td>21,388</td>
<td>6.4%</td>
<td>1.85</td>
</tr>
<tr>
<td><strong>Inpatient</strong></td>
<td>333,105</td>
<td>Total</td>
<td>57,456</td>
<td>49,824</td>
<td>15.0%</td>
<td>0.17</td>
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<tr>
<td></td>
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<td>Public</td>
<td>27,439</td>
<td>24,230</td>
<td>7.3%</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Private</td>
<td>30,017</td>
<td>25,594</td>
<td>7.7%</td>
<td>0.09</td>
</tr>
<tr>
<td><strong>Delivery</strong></td>
<td>333,105</td>
<td>Total</td>
<td>19,484</td>
<td>19,420</td>
<td>5.8%</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Public</td>
<td>9,721</td>
<td>9,699</td>
<td>2.9%</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Private</td>
<td>6,180</td>
<td>6,160</td>
<td>1.8%</td>
<td>0.02</td>
</tr>
</tbody>
</table>
### Population Summary Statistics: All Visits—Public and Private (Weighted*)

<table>
<thead>
<tr>
<th>Type of Care</th>
<th>Total Population (Individuals)</th>
<th>Sector</th>
<th>Number of Visits (Annualized)</th>
<th>Number of Individuals with Visits</th>
<th>% Visited (of Total Population)</th>
<th>Number of Visits Per Person per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outpatient</strong></td>
<td>1,120,000,000</td>
<td>Total</td>
<td>2,635,840,896</td>
<td>92,700,000</td>
<td>8.3%</td>
<td>2.35</td>
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<tr>
<td></td>
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<td>Public</td>
<td>673,296,260</td>
<td>23,900,000</td>
<td>2.1%</td>
<td>0.60</td>
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<tr>
<td></td>
<td></td>
<td>Private</td>
<td>1,962,544,610</td>
<td>68,900,000</td>
<td>6.2%</td>
<td>1.75</td>
</tr>
<tr>
<td><strong>Inpatient</strong></td>
<td>1,120,000,000</td>
<td>Total</td>
<td>54,775,721</td>
<td>49,400,000</td>
<td>4.4%</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Public</td>
<td>24,859,418</td>
<td>22,900,000</td>
<td>2.0%</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Private</td>
<td>29,916,303</td>
<td>26,500,000</td>
<td>2.4%</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Delivery</strong></td>
<td>1,120,000,000</td>
<td>Total</td>
<td>25,848,260</td>
<td>25,900,000</td>
<td>2.3%</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Public</td>
<td>10,921,231</td>
<td>10,900,000</td>
<td>1.0%</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Private</td>
<td>6,229,212</td>
<td>6,219,729</td>
<td>0.6%</td>
<td>0.01</td>
</tr>
</tbody>
</table>

*Sample results are scaled up to the population level by applying NSS survey weights*
<table>
<thead>
<tr>
<th>Type of Care</th>
<th>Total Public Sample (Individuals)</th>
<th>Level</th>
<th>Number of Visits (Annualized)</th>
<th>Number of Individuals with Visits</th>
<th>% Visited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatient</td>
<td>8,274</td>
<td>Primary</td>
<td>72,280</td>
<td>2,555</td>
<td>30.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital</td>
<td>164,866</td>
<td>5,719</td>
<td>69.1%</td>
</tr>
<tr>
<td>Inpatient</td>
<td>24,230</td>
<td>Primary</td>
<td>3,690</td>
<td>3,447</td>
<td>14.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital</td>
<td>23,749</td>
<td>20,783</td>
<td>85.8%</td>
</tr>
<tr>
<td>Delivery</td>
<td>9,699</td>
<td>Primary</td>
<td>1,887</td>
<td>1,883</td>
<td>19.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital</td>
<td>7,834</td>
<td>7,816</td>
<td>80.6%</td>
</tr>
</tbody>
</table>
## Sample Summary Statistics: Public Visits (Weighted*)

<table>
<thead>
<tr>
<th>Type of Care</th>
<th>Total Public Population (Individuals)</th>
<th>Level</th>
<th>Number of Visits (Annualized)</th>
<th>Number of Individuals with Visits</th>
<th>% Visited</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outpatient</strong></td>
<td>23,900,000</td>
<td>Primary</td>
<td>224,716,544</td>
<td>8,165,617</td>
<td>34.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital</td>
<td>449,800,000</td>
<td>15,700,000</td>
<td>65.7%</td>
</tr>
<tr>
<td><strong>Inpatient</strong></td>
<td>22,900,000</td>
<td>Primary</td>
<td>3,627,720</td>
<td>3,427,535</td>
<td>15.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital</td>
<td>21,200,000</td>
<td>19,400,000</td>
<td>84.7%</td>
</tr>
<tr>
<td><strong>Delivery</strong></td>
<td>10,900,000</td>
<td>Primary</td>
<td>2,415,177</td>
<td>2,414,700</td>
<td>22.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital</td>
<td>8,506,053</td>
<td>8,496,870</td>
<td>78.0%</td>
</tr>
</tbody>
</table>

*Sample results are scaled up to the population level by applying NSS survey weights*
Analysis of Health Care Utilization
The following four slides use NSS utilization data and examine the income-related distribution of health care utilization.

Concentration curves and concentration indices are presented. Concentration curves above the 45-degree line are “pro-poor” and have negative concentration indices; those below the 45-degree line are “pro-rich” and have positive concentration indices.

Unit costs and financial value of benefits received are not considered in the following four slides.

Concentration curves and concentration indices are presented for the following levels and types of services:

- All public outpatient visits, primary outpatient and hospital level outpatient visits
- All public inpatient admissions, primary inpatient and hospital level inpatient visits
- All public deliveries, primary care deliveries and hospital level deliveries
- All of the above categories are also analyzed for Urban and Rural areas
The following slides show that, overall:

- Utilization of government providers is slightly pro-rich for outpatient visits, somewhat pro-poor for inpatient visits, and more pro-poor deliveries.

- Public outpatient utilization is the most pro-rich for rural, hospital outpatient visits.

- For inpatient utilization, public primary inpatient visits are the most pro-poor.

- For deliveries, public primary deliveries and urban deliveries are the most pro-poor.
Results: Outpatient Utilization

- Public hospital outpatient visits are more pro-rich than primary care outpatient visits.
- Urban public outpatient visits are more equal (less pro-rich) than rural public outpatient visits for both primary and hospital care.
Results: Inpatient Utilization

- Primary inpatient visits are more pro-poor than hospital inpatient visits
- Urban inpatient visits are more pro-poor than rural inpatient visits, at both primary and hospital level
Results: Delivery Utilization

- Delivery visits are more pro-poor than outpatient and inpatient visits, at primary level

- Urban delivery visits are more pro-poor than rural delivery visits
Utilization Distribution Analysis for Indian States

- The following three slides use NSS utilization data and examine income-related differences in health care utilization for all Indian States.

- Concentration indices are arrayed from negative (pro-poor) to positive (pro-rich) across the states.

- Unit costs and financial value of benefits are not considered in the following three slides.

- The utilization distribution analysis is done for the following levels and types of services:
  - All public outpatient visits, primary outpatient and hospital level outpatient visits.
  - All public inpatient visits, primary inpatient and hospital level inpatient visits.
  - All public deliveries, primary care deliveries and hospital level deliveries.

- The national average is highlighted in green. Bihar, Uttar Pradesh and Orissa are highlighted in red.
The following slides show that

- Despite pro-poor utilization trends shown at the national level, especially for inpatient and deliveries, there is a considerable amount of difference across Indian states.
- More apparently equal national averages disguise large differentials across states in India for inpatient, outpatient, and deliveries.
- Hospital outpatient utilization has the highest number of states that are pro-rich.
- Inpatient visits are pro-poor for almost all states, but there is still disparity across the level of pro-poor.
- Bihar and Uttar Pradesh are pro-rich for outpatient visits.
- Odisha is pro-rich for inpatient hospitalizations and hospital deliveries.
Results: Outpatient Utilization by State

For Outpatient utilization, Odisha is slightly pro-poor for all outpatient visits and outpatient primary care visits.
Results: Inpatient Utilization by State

Inpatient Public Utilization Concentration Indices

Negative: pro poor; positive: pro rich
Inpatient utilization is pro-poor for most states
Odisha is pro-rich for inpatient hospital visits

Inpatient Primary Care Utilization Concentration Indices

Inpatient Hospital Utilization Concentration Indices

Red: Bihar, Odisha, and Uttar Pradesh
Green: National Level
Results: Delivery Utilization by State

Negative: pro poor; positive: pro rich
Delivery Utilization is pro-poor for many states
Odisha is pro-rich for hospital deliveries
Benefit Incidence Analysis: distribution of value of government spending only – "gross benefits"
Benefit Incidence Analysis – Gross Benefits

- The following three slides use NSS utilization data and unit cost data to examine the distribution by income level of **the value of gross benefits received**

- Gross benefits include the unit cost for each type of service (primary care, outpatient hospital level, inpatient hospital level), but do not net out the out of pocket payment or any other reimbursements

- Concentration curves and concentration indices are presented, interpreted as before

- The BIA is done for the following levels and types of services:
  - All public outpatient visits, primary outpatient and hospital level outpatient visits
  - All public inpatient visits, primary inpatient and hospital level inpatient visits
  - All public deliveries, primary care deliveries and hospital level deliveries
  - All of the above categories are also analyzed for urban and rural areas
The following slides show that:

‣ Concentration curves for all services (inpatient, outpatient and delivery) are close to equality (45 degree line), taking into consideration utilization and unit costs. **NB: government services are intended to differentially benefit the poor, which is not showing in these aggregate results.**

‣ Greater equality in the gross benefits being different from the utilization patterns suggests that inter-state differences in service use and costs are resulting in reduced inequalities in this measure.
  
  ▪ For example, the utilization results above showed a pro-rich outpatient utilization trend. Greater equality in gross benefits suggests that differences in utilization rates and costs across the states reduce this inequality in gross benefit terms. Further investigation is needed on this.
  
  ▪ For example, the utilization results above showed pro-poor inpatient and delivery patterns nationally. Greater equality in gross benefits may result from wealthier individuals in larger, richer states benefiting from higher cost inpatient and delivery services. Further investigation is needed on this.

‣ National outpatient gross benefits are the most pro-poor service

‣ The only pro-poor gross benefit for deliveries is for urban primary deliveries
Results: Public Outpatient Gross Benefits

- Concentration indices < -0.02 or >0.02 are statistically significantly different from equality at the 95% level of significance

- National outpatient gross benefit are the most pro-poor
Results: Public Inpatient Gross Benefits

- Concentration indices < -0.02 or >0.02 are statistically significantly different from equality at the 95% level of significance

- National inpatient and hospital inpatient gross benefit are the pro-rich
Results: Public Delivery Gross Benefits

- Concentration indices < -0.02 or >0.02 are statistically significantly different from equality at the 95% level of significance

- The only pro-poor gross benefit for deliveries is for urban primary deliveries
The following three slides use NSS utilization data and unit cost data to examine the distribution of the value of gross benefits received by income level for all Indian States.

Gross benefits include the unit cost for each type of service (primary care, outpatient hospital level, inpatient hospital level), but do not net out the out of pocket payment or any other reimbursements.

Concentration indices are presented, interpreted as before.

The BIA for gross benefits is done for the following levels and types of services for each Indian State:

- All public outpatient visits
- All public inpatient visits
- All public deliveries
- Bihar, Uttar Pradesh and Orissa are highlighted in Red
The following slides show that:

- Despite the equality that is shown for gross benefits at the national level, there are large differentials across Indian states.
- Relative national level equality disguises these large differentials across states for inpatient, outpatient and deliveries.
- Outpatient gross benefits have the highest number of states that are pro-poor.
- Very few states show pro-poor benefits for inpatient and delivery services.
- Odisha is pro-poor for outpatient visits.
- Bihar is pro-poor for inpatient visits.
Results: Gross Benefits by State (Outpatient, Inpatient, Delivery)

- Negative: pro poor; positive: pro rich
- More states (66%) are pro poor for outpatient care. Delivery care and Inpatient care are less pro-poor (37%)

Red: Bihar, Odisha, and Uttar Pradesh
Green: National Level
Out of Pocket Expenditure: State-Level Analysis
Analysis of Out-of-Pocket (OOP) Spending

The following four slides provide some additional data on utilization and out of pocket expenditures for those using public sector services, based on the NSS results:

- The first slide shows the percentage of those individuals reporting any health care use who used government services of different types across India states.
- The second slide shows the percentage of users of government services who reported any OOP spending associated with use of government services.
- The third slide shows the average OOP expenditure per service use for government services.
- The fourth slide shows the average OOP spending per unit of use for all services, government services and private services as well as the estimated unit cost for government services. NB: Adding the average government unit cost and the OOP cost shows the total cost of government service use which can be compared with the private sector OOP cost.

Data are provided for all Indian States with Bihar, Uttar Pradesh and Orissa highlighted in Red and national average is highlighted in Green.
Out of Pocket Analysis: Key Takeaways

» The following slides show that

» The percent of individuals in each state using the government providers for different services (inpatient, outpatient and deliveries) varies a lot across states. In general, service users in smaller, more remote states depend more on government services, while those larger states depend less.

» Almost all of those that use the public sector, for all services, report OOP spending when using those services across almost all states.

» Average OOP amounts vary by Indian State with the highest OOP spending for government services in Manipur for outpatient, Himachal Pradesh for inpatient, and Kerala for deliveries.

» On average, adding the average government unit cost and the public OOP cost (total cost of government service use) is 2,106 rupees higher than the private sector for outpatient visits and 2,058 rupees higher than the private sector for deliveries. This may reflect relatively low volumes of services provided in government facilities relative to spending. More research is needed on this finding.
Results: % of all health care users of each type of care using public sector by state

<table>
<thead>
<tr>
<th>Public Sector Outpatient Care Utilization</th>
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<tbody>
<tr>
<td>Tripura</td>
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<tr>
<td>Sikkim</td>
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<tr>
<td>Andaman Nicobar Islands</td>
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<td>Manipur</td>
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<td>National</td>
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<td>Uttar Pradesh</td>
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<td>West Bengal</td>
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<td>Andhra Pradesh</td>
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<td>Madhya Pradesh</td>
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<tr>
<td>Rajasthan</td>
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<td>Chandigarh</td>
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<td>Daman &amp; Diu</td>
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<td>Arunachal Pradesh</td>
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<td>Andaman Nicobar Islands</td>
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<td>Manipur</td>
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<td>Daman &amp; Diu</td>
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<td>Odisha</td>
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<td>Tripura</td>
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<td>Andaman Nicobar Islands</td>
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<td>Rajasthan</td>
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<td>Chandigarh</td>
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<tr>
<td>Daman &amp; Diu</td>
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<tr>
<td>Arunachal Pradesh</td>
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<td>Odisha</td>
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<table>
<thead>
<tr>
<th>Public Sector Delivery Care Utilization</th>
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<tr>
<td>Tripura</td>
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<tr>
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</tr>
<tr>
<td>Daman &amp; Diu</td>
</tr>
<tr>
<td>Arunachal Pradesh</td>
</tr>
<tr>
<td>Odisha</td>
</tr>
</tbody>
</table>
Results: % of users of government services reporting any out-of-pocket expenditure by state
Results: mean out-of-pocket expenditure (in Rs.) for government services by state

**Mean Public Outpatient Out-of-Pocket Expenditures**

- Chhattisgarh
- Arunachal Pradesh
- Jammu & Kashmir
- Punjab
- Rajasthan
- Himachal Pradesh
- Mizoram
- Uttarakhand
- Assam
- Haryana
- Tamil Nadu
- Chhattisgarh
- Nagaland
- Odisha
- Madhya Pradesh
- Urban
- Rural
- National
- Tripura
- Maharashtra
- Delhi
- Dadra & Nagar Haveli
- West Bengal
- Karnataka
- Meghalaya
- Kerala
- Andhra Pradesh
- Goa
- Jharkhand
- Uttarakhand
- Gujarat
- Puducherry
- Rajasthan
- Telangana
- Tripura
- Mizoram
- Madhya Pradesh
- Kerala
- Uttar Pradesh
- Chhattisgarh
- Nagaland
- Andhra Pradesh
- Meghalaya
- Jharkhand
- Tamil Nadu
- Puducherry
- Andaman & Nicobar Islands
- Dadra & Nagar Haveli
- Lakshadweep
- Andaman & Nicobar Islands
- Odisha

**Mean Public Inpatient Out-of-Pocket Expenditures**

- Chhattisgarh
- Haryana
- Punjab
- Sikkim
- Assam
- Manipur
- Bihar
- Jammu & Kashmir
- Uttar Pradesh
- Goa
- Odisha
- Urban
- National
- Sikkim
- West Bengal
- Rural
- Jammu & Kashmir
- Himachal Pradesh
- Assam
- Manipur
- Punjab
- Andhra Pradesh
- Bihar
- Jharkhand
- Odisha
- Tamil Nadu
- Rajasthan
- Delhi
- Gujrat
- Patiala
- Chhattisgarh
- Uttar Pradesh
- Uttarakhand
- Himachal Pradesh
- Andhra Pradesh
- Dakshina Pradesh
- Delhi
- Bihar
- Rural
- Sikkim
- Rajasthan
- Odisha
- Arunachal Pradesh
- Delhi
- Uttar Pradesh
- National
- Goa
- Urban
- National
- Goa
- National
- Delhi

**Mean Public Delivery Out-of-Pocket Expenditures**

- Chhattisgarh
- Haryana
- Punjab
- Sikkim
- Jharkhand
- Assam
- Manipur
- Bihar
- Jammu & Kashmir
- Himachal Pradesh
- Delhi
- Haryana
- Rajasthan
- Tamil Nadu
- Jharkhand
- Telangana
- Chhattisgarh
- Uttar Pradesh
- Uttarakhand
- Haryana
- Meghalaya
- Mizoram
- Arunachal Pradesh
- Tripura
- Gujarat
- Patiala
- Chhattisgarh
- Telangana
- Bihar
- Andhra Pradesh
- Madhya Pradesh
- Kerala
- Maharashtra
- Dakshina Pradesh
- Tripura
- Mizoram
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- Kerala
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- Meghalaya
- Jharkhand
- Tamil Nadu
- Puducherry
- Andaman & Nicobar Islands
- Dadra & Nagar Haveli
- Lakshadweep
- Andaman & Nicobar Islands
- Odisha
- Urban
- National
- Goa
- Urban
- National
- Goa
- National
- Delhi
## Results: Comparing government costs and out-of-pocket expenditures for government services with private services

<table>
<thead>
<tr>
<th>Care</th>
<th>Sector</th>
<th>Mean Out-of-Pocket Expenditure (per visit) and Public Unit Cost</th>
<th>Percent of Individuals with Out-of-Pocket Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total OOP</td>
<td>869.40</td>
<td>93%</td>
</tr>
<tr>
<td>Outpatient</td>
<td>Public OOP</td>
<td>605.33</td>
<td>84%</td>
</tr>
<tr>
<td></td>
<td>Private OOP</td>
<td>971.25</td>
<td>97%</td>
</tr>
<tr>
<td></td>
<td>Unit Cost</td>
<td>2,472.92</td>
<td>---</td>
</tr>
<tr>
<td>Inpatient</td>
<td>Total OOP</td>
<td>17,081.91</td>
<td>99%</td>
</tr>
<tr>
<td></td>
<td>Public OOP</td>
<td>6,922.64</td>
<td>99%</td>
</tr>
<tr>
<td></td>
<td>Private OOP</td>
<td>26,368.66</td>
<td>99%</td>
</tr>
<tr>
<td></td>
<td>Unit Cost</td>
<td>7,362.41</td>
<td>---</td>
</tr>
<tr>
<td>Delivery</td>
<td>Total OOP</td>
<td>5128.66</td>
<td>89%</td>
</tr>
<tr>
<td></td>
<td>Public OOP</td>
<td>3067.05</td>
<td>87%</td>
</tr>
<tr>
<td></td>
<td>Private OOP</td>
<td>8371.54</td>
<td>98%</td>
</tr>
<tr>
<td></td>
<td>Unit Cost</td>
<td>7362.41</td>
<td>---</td>
</tr>
</tbody>
</table>

Total cost of using govt OP services is 3x higher than private OOP service cost.

Total costs of using govt IP services is 50% less than private OOP service cost.

Total costs of using govt delivery services is about 20% greater than private OOP service cost.
Benefit Incidence Analysis: distribution of the benefits of government spending deducting OOP spending on government services – “Net Benefits”
BIA Analysis:

- The following three slides use NSS utilization data, unit cost data, and OOP spending data to examine the distribution by income level of the value of net benefits received.

- Concentration curves and concentration indices are presented, interpreted as before.

- The value of net benefits received is defined as the unit cost for each type of service (primary care, outpatient hospital level, inpatient hospital level) minus the associated out of pocket expenses incurred by each individual for the respective level of service. NB: when the value is negative (OOP > unit cost), a value of zero is used.

- The BIA is done for the following levels and types of services:
  - All public outpatient visits, primary outpatient and hospital level outpatient visits
  - All public inpatient visits, primary inpatient and hospital level inpatient visits
  - All public deliveries, primary care deliveries and hospital level deliveries
  - All of the above categories are also analyzed for Urban and Rural areas.
BIA– Net Benefits: Key Takeaways

The following slides show:

• Similar patterns overall to the “gross benefits” results in terms of overall pro-poor or pro-rich distributions.

• Some differences in the size and direction of CI’s

• Further analysis/investigation is needed to assess the meaning of any differences

NB: the concept behind “net benefits” implies that the value of government spending is in part offset by OOP spending on government services. Where this OOP spending consists of ”user fees”, essentially additional revenue to government facilities, this makes sense. However, if this OOP spending is largely going to purchase inputs not available at government facilities, it is supplementary to government spending. This needs to be reviewed more carefully in the Indian context.
Results: Public Outpatient Net Benefits

- Outpatient public benefits are mildly pro-poor
- Hospital outpatient benefits are more pro-poor than primary care outpatient benefits
- Rural public hospital outpatient benefits are more pro-poor than urban public hospital outpatient benefits
Results: Public Inpatient Net Benefits

- Primary inpatient benefits are pro-poor; hospital inpatient benefits are pro-rich
- Urban inpatient benefits are more pro-poor than rural inpatient benefits
Results: National Inpatient vs. Outpatient Net Benefits

- Outpatient benefits are more pro-poor than inpatient benefits
Results: Public Delivery Net Benefits

Primary delivery benefits are more pro-poor than hospital delivery benefits.

Urban primary care delivery benefits are more pro-poor than rural primary care delivery benefits.
Benefit Incidence Analysis of “Net benefits” for Indian States

**BIA Analysis:**

- The following three slides use NSS utilization data, unit cost data, and OOP spending data to examine the distribution of the value of net benefits received by income level for all Indian States.
- Concentration indices are presented, interpreted as before.
- The value of net benefits received is defined as the unit cost for each type of service (primary care, outpatient hospital level, inpatient hospital level) minus the associated out of pocket expenses incurred by each individual for the respective level of service. When the value is negative (OOP > unit cost), a value of zero is used.
- The BIA is done for the following levels and types of services:
  - All public outpatient visits, primary outpatient and hospital level outpatient visits
  - All public inpatient visits, primary inpatient and hospital level inpatient visits
  - All public deliveries, primary care deliveries and hospital level deliveries
  - Bihar, Uttar Pradesh and Orissa are highlighted in Red.
The following slides show that

- Despite the equality that is shown overall for benefits at the national level, there are large differentials across Indian states.

- Relative national level equality disguises these large differentials across states for inpatient, outpatient and deliveries.

- Outpatient net benefits have a higher number of states that are pro-rich than the data for gross benefits which may reflect a higher burden on the poor of OOP spending on government services.

- Fewer states show pro-rich benefits for inpatient and delivery services, again contrasting with gross benefits results.
Results: Outpatient Net Benefits by State

Negative: pro poor; positive: pro rich

More states (66%) are pro poor for outpatient primary care than for outpatient hospital care (37%).
Results: Inpatient Net Benefits by State

Negative: pro poor; positive: pro rich
More states are pro poor for inpatient primary (77%) than inpatient hospital (60%)
More states are pro poor for inpatient (69%) in comparison to outpatient (54%)
Results: Delivery Net Benefits by State

Negative: pro poor; positive: pro rich
More states are pro poor for delivery care (91%) in comparison to inpatient (69%) or outpatient (54%)

Red: Bihar, Odisha, and Uttar Pradesh
Green: National Level
Some Preliminary Conclusions (1)

• Utilization
  ▪ Public Primary care delivery and inpatient visits are pro-poor when examined nationally and in urban and rural areas
  ▪ Public Outpatient utilization is pro-rich, especially in rural areas

• Gross Benefits
  ▪ Gross benefits are close to equality for all services
  ▪ There are some pro-poor gross benefits trends for national outpatient benefits and deliveries in urban primary care settings
  ▪ Different patterns for utilization and gross benefits suggest some complex interactions between state-specific utilization and cost patterns needing further investigation.
Some Preliminary Conclusions (2)

- Gross Benefits across Indian States
  - National gross benefit trends hide a significant amount of disparity across Indian States
  - While outpatient gross benefits are pro-poor for a number of Indian States, very few Indian states show pro-poor benefits for inpatient and delivery services

- OOP results
  - Almost everyone in India who uses the public sector spends out of pocket to supplement the government services.
  - OOP on government services can be high. The amount paid out of pocket, above and beyond government services, is highest for outpatient and deliveries
  - Aggregate results suggest that government services may, in total, be more costly than private sector services for similar needs. (NB: this does not mean the services are equal in quality)
Some Preliminary Conclusions (3)

- Net Benefits and Net Benefits across Indian States

These results show some differences in distribution patterns with the gross benefits results which needs further investigation.

Generally, the results show slightly more “pro-poor”, less “pro-rich” results with net benefits, suggesting that OOP is slightly less among the poor than the rich.
Further questions (for additional analysis)

• Interpretation of concentration curves and indices, e.g. are differences statistically significant, what size of difference should be considered large or important?

• What would the national curves look like if only calculated for the 16 states with primary/non-primary expenditure data rather than Using average unit costs for states without expenditure data? (see Annex slides)

• What is the effect of using “zero benefits” when OOP costs exceed unit costs?
Additional Analyses (1)

- The slides above have demonstrated some extremely interesting results for both the equality of utilization of public services in India as well as the “benefits” of these services and who they are benefitting
- Based on the above analyses, we envision several key analyses moving forward
  1. Analysis examining the Benefit Incidence Analysis of Public Services examining the key areas where some improvement have been made in India for the poor (deliveries) and some areas where improvements have not been as considerable (rural hospital benefits)
     - This will examine how high levels of out of pocket payments are contributing to the lack of system performance in certain areas
  2. Analysis examining the determinants of inequality in benefits
     - Since we have concentration indices for all states for all types of services, we can combine these figures with other contributing factors to inequality of benefits such as population size, demographics, epidemiology, income, health status to understand the drivers of inequality in benefits
     - This analysis can contribute to future policy decisions on where to target funds to achieve higher equality in public benefits
3. Analysis examining the State Level Benefit Incidence Analysis of Public Services
   - As shown above we have rich data at the national level, but we also have benefit concentration curves and concentration indices for all Indian states
   - This data can be used to conduct a rich state level analysis to understand which states are using public funds to improve equality with regard to different services
Annex Slides
## India NSS has 10 different levels

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Summary</th>
<th>List of Key Variables</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Overall, high level household characteristics</td>
<td>Stratification-related variables, survey-team related variables</td>
<td>65932</td>
</tr>
<tr>
<td>Level 2</td>
<td>Household characteristics</td>
<td>Household type, household size, religion, social group, source for drinking water, type of latrine/drainage, source of energy for cooking, annual medical insurance premium, monthly consumer expenditure, sampling weights</td>
<td>65932</td>
</tr>
<tr>
<td>Level 3</td>
<td>Mortality file characteristics</td>
<td>Sex, age at death, medical attention/hospitalization received before that</td>
<td>2395</td>
</tr>
<tr>
<td>Level 4</td>
<td>Individual characteristics</td>
<td>Sex, age, marital status, general education, resident of a student hostel, whether hospitalized, whether suffering from any ailments, whether covered by scheme</td>
<td>333104</td>
</tr>
<tr>
<td>Level 5</td>
<td>Inpatient visit and ailment-related questions</td>
<td>Age, ailment nature, treatment nature, level of care, type of ward, when admitted/discharged, duration of stay, procedures divided by surgery/medicine/x-ray/other diagnostic tests, treatment before hospitalization, treatment after hospitalization</td>
<td>57456</td>
</tr>
</tbody>
</table>
## Dataset Overview

India NSS has 10 different levels

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Summary</th>
<th>List of Key Variables</th>
<th>N</th>
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</thead>
<tbody>
<tr>
<td>Level 6</td>
<td>Inpatient visit financial information</td>
<td>Whether any visit was received for free, fees paid divided by doctor's fee, medicines, diagnostics, bed charges, other medical expenses, transport expenses, other medical expenses, total amount reimbursed by insurance</td>
<td>57456</td>
</tr>
<tr>
<td>Level 7</td>
<td>Outpatient visit and ailment-related questions</td>
<td>Ailment details (nature, status, duration), nature of treatment, whether hospitalized, level of care, reasons for not seeking government sources, reasons for not seeking care, who was consulted, loss of household income due to disease</td>
<td>37282</td>
</tr>
<tr>
<td>Level 8</td>
<td>Outpatient visit financing-related questions</td>
<td>Whether any service was provided for free, details of services received (surgery, medicine, diagnostics) and expenses related to it, sources of medical expenditures, total amount reimbursed by insurance</td>
<td>33911</td>
</tr>
<tr>
<td>Level 9</td>
<td>Elderly related questions</td>
<td>Number of sons and daughters living, state of economic dependence, number of dependents, perception of health, living arrangement, physical mobility</td>
<td>27245</td>
</tr>
<tr>
<td>Level 10</td>
<td>Pregnancy related questions</td>
<td>Whether pregnant in the past year, whether received tetanus vaccine, whether taken IFA, whether any other prenatal care received, nature of prenatal care, expenditure incurred on prenatal care, outcome of pregnancy, place of delivery, whether any postnatal care received, expenditure incurred on postnatal care</td>
<td>88790</td>
</tr>
</tbody>
</table>
### Sample Summary Statistics: Outpatient

<table>
<thead>
<tr>
<th>Outpatient</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>336,427</td>
<td>28.25</td>
<td>19.97</td>
<td>0</td>
<td>110</td>
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<tr>
<td>Whether any medical advice provided free</td>
<td>35,838</td>
<td>2.556</td>
<td>0.807</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Doctor's/ surgeon's fee (Rs.)</td>
<td>17,057</td>
<td>218.4</td>
<td>1660</td>
<td>0</td>
<td>165000</td>
</tr>
<tr>
<td>Medicines (Rs.): AYUSH</td>
<td>5,234</td>
<td>194</td>
<td>637.8</td>
<td>0</td>
<td>18000</td>
</tr>
<tr>
<td>Medicines (Rs.): Other than AYUSH</td>
<td>30,128</td>
<td>573.8</td>
<td>1156</td>
<td>0</td>
<td>52000</td>
</tr>
<tr>
<td>Diagonistic tests (Rs.)</td>
<td>8,109</td>
<td>351.5</td>
<td>806.5</td>
<td>0</td>
<td>15000</td>
</tr>
<tr>
<td>Other medical expenses (Rs.)</td>
<td>5,651</td>
<td>217.5</td>
<td>881.8</td>
<td>0</td>
<td>25000</td>
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<tr>
<td>Medical expenditure (Rs.): total (items 9 to 13)</td>
<td>32,846</td>
<td>794.8</td>
<td>2130</td>
<td>0</td>
<td>167855</td>
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<tr>
<td>Transport for patient (Rs.)</td>
<td>18,335</td>
<td>123</td>
<td>404.6</td>
<td>0</td>
<td>22000</td>
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<tr>
<td>Other non-medical expenses (Rs.)</td>
<td>10,694</td>
<td>145.4</td>
<td>481.6</td>
<td>0</td>
<td>25000</td>
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<td>Expenditure (Rs.): Total (items 14 to 16)</td>
<td>34,384</td>
<td>870</td>
<td>2373</td>
<td>0</td>
<td>196355</td>
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<tr>
<td>Total amount reimbursed by medical insurance (Rs.)</td>
<td>5,609</td>
<td>57.68</td>
<td>655.6</td>
<td>0</td>
<td>17000</td>
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<tr>
<td>No. of days within the ref. period - ill</td>
<td>37,277</td>
<td>11.17</td>
<td>5.171</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>No. of days within the ref. period - on restricted activity</td>
<td>24,987</td>
<td>3.123</td>
<td>5.031</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>No. of days within the ref. period - confined to bed</td>
<td>22,986</td>
<td>1.347</td>
<td>3.376</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Loss of household income (Rs.)</td>
<td>22,333</td>
<td>597.1</td>
<td>3568</td>
<td>0</td>
<td>300000</td>
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<tr>
<td>Amount of medical insurance premium (Rs.)</td>
<td>306,781</td>
<td>382.2</td>
<td>2966</td>
<td>0</td>
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<tr>
<td>Household usual consumer expenditure (Rs.)</td>
<td>336,436</td>
<td>9634</td>
<td>7205</td>
<td>0</td>
<td>260000</td>
</tr>
</tbody>
</table>
**Sample Summary Statistics: Inpatient**

<table>
<thead>
<tr>
<th>Inpatient</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>340,712</td>
<td>28.34</td>
<td>20.05</td>
<td>0</td>
<td>110</td>
</tr>
<tr>
<td>Whether any medical advice provided free</td>
<td>57,456</td>
<td>2.114</td>
<td>0.971</td>
<td>1</td>
<td>3</td>
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<tr>
<td>Doctor's/ surgeon's fee (Rs.)</td>
<td>29,940</td>
<td>5398</td>
<td>17131</td>
<td>0</td>
<td>1300000</td>
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<tr>
<td>Medicines (Rs.)</td>
<td>43,829</td>
<td>5200</td>
<td>14321</td>
<td>0</td>
<td>1000000</td>
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<tr>
<td>Diagonistic tests (Rs.)</td>
<td>36,437</td>
<td>2494</td>
<td>6646</td>
<td>0</td>
<td>300000</td>
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<td>Bed charges (Rs.)</td>
<td>29,144</td>
<td>3113</td>
<td>7856</td>
<td>0</td>
<td>500000</td>
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<tr>
<td>Other medical expenses (Rs.)</td>
<td>32,253</td>
<td>2257</td>
<td>12552</td>
<td>0</td>
<td>1714000</td>
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<td>Medical expenditure (Rs.): total (items 5 to 10)</td>
<td>53,031</td>
<td>17577</td>
<td>49157</td>
<td>0</td>
<td>3500000</td>
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<tr>
<td>Transport for patient (Rs.)</td>
<td>51,921</td>
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<td>1755</td>
<td>0</td>
<td>101200</td>
</tr>
<tr>
<td>Other non-medical expenses (Rs.)</td>
<td>52,497</td>
<td>1510</td>
<td>3223</td>
<td>0</td>
<td>200000</td>
</tr>
<tr>
<td>Expenditure (Rs.): Total (items 11 to 13)</td>
<td>57,144</td>
<td>18392</td>
<td>49671</td>
<td>0</td>
<td>3540000</td>
</tr>
<tr>
<td>Total amount reimbursed by medical insurance (Rs.)</td>
<td>13,636</td>
<td>5098</td>
<td>47612</td>
<td>0</td>
<td>3540000</td>
</tr>
<tr>
<td>Duration of stay in hospital (days)</td>
<td>57,455</td>
<td>6.37</td>
<td>9.487</td>
<td>0</td>
<td>350</td>
</tr>
<tr>
<td>Reporting of col. 11 to 13</td>
<td>338,305</td>
<td>1.676</td>
<td>0.468</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Household size</td>
<td>338,307</td>
<td>6.11</td>
<td>2.743</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td>Amount of medical insurance premium (Rs.)</td>
<td>308,512</td>
<td>380.3</td>
<td>2980</td>
<td>0</td>
<td>200000</td>
</tr>
<tr>
<td>Household usual consumer expenditure (Rs.)</td>
<td>338,270</td>
<td>9630</td>
<td>7229</td>
<td>0</td>
<td>260000</td>
</tr>
</tbody>
</table>
## Sample Summary Statistics: Delivery

<table>
<thead>
<tr>
<th>Delivery</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>333,378</td>
<td>27.97</td>
<td>19.8</td>
<td>0</td>
<td>110</td>
</tr>
<tr>
<td>Total expenditure incurred on pre natal care (Rs.)</td>
<td>18,218</td>
<td>3,369</td>
<td>7,772</td>
<td>0</td>
<td>675,000</td>
</tr>
<tr>
<td>Whether any post natal care received</td>
<td>18,076</td>
<td>4.314</td>
<td>2.092</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Nature of post natal care</td>
<td>14,778</td>
<td>2.079</td>
<td>0.382</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Expenditure incurred on post natal care (Rs.)</td>
<td>14,457</td>
<td>1.922</td>
<td>3.475</td>
<td>0</td>
<td>85,000</td>
</tr>
<tr>
<td>Household size</td>
<td>333,142</td>
<td>6.124</td>
<td>2.745</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td>Religion</td>
<td>333,142</td>
<td>1.422</td>
<td>1.003</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Social group</td>
<td>333,142</td>
<td>4.393</td>
<td>3.107</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Amount of medical insurance premium (Rs.)</td>
<td>303,669</td>
<td>377.2</td>
<td>2,959</td>
<td>0</td>
<td>200,000</td>
</tr>
<tr>
<td>Household usual consumer expenditure (Rs.)</td>
<td>333,106</td>
<td>9,610</td>
<td>7,188</td>
<td>0</td>
<td>260,000</td>
</tr>
</tbody>
</table>
Methodology: Unit Cost Equations

Primary Care Unit Cost Equation

\[ \text{UnitCost, } PC_j = \frac{PHE_j}{\sum \text{(OP, Util, } PC_{i,j} + IP, Util, PC_{i,j})} \]

The Unit Cost for Primary Care (PC) is the Primary Health Care Expenditure for state \( j \) divided by the sum of reported Outpatient (OP) Primary Care utilization for individual \( i \) in state \( j \) and Inpatient (IP) Primary Care utilization for individual \( i \) in state \( j \) per NSS survey.

Where

PC = Primary Care defined as those who report visiting Level 1 (HSC/ANM/ASHA/AWW) or Level 2 (PHC/Dispensary/CHC/mobile medical unit)

PHE = Primary Health Care Expenditure

OP = Outpatient

IP = Inpatient
Hospital Outpatient Unit Cost Equation

\[ \text{UnitCost, Hosp, OP}_j = \frac{\text{HospE, OP}_j}{\sum \text{Util, OP, Hosp}_{i,j}} \]

The Unit Cost for an Outpatient Visit in a Hospital is the Hospital Expenditure for state \((j)\) divided by the sum of all Outpatient (OP) Hospital Care utilization for individuals \((i)\) in state \((j)\) per NSS survey.

Where

\[ \text{HospE, OP} = (\text{Total Health Expenditure - Primary Health Care Expenditure - Medical Education Spending}) \times 40\% \]

OP = Outpatient

Hosp, OP = Those who report visiting Level 3 (Public Hospital for Outpatient)
Hospital Inpatient Unit Cost Equation

\[ \text{UnitCost, Hosp, IP}_j = \frac{\text{HospE, IP}_j}{\sum \text{Util, IP, Hosp}_{i,j}} \]

The Unit Cost for an Inpatient Visit in a Hospital is the Hospital Expenditure for state \((j)\) divided by the sum of Inpatient \((IP)\) Hospital Care utilization for individuals \((i)\) in state \((j)\) per NSS survey.

Where

\[ \text{HospE, IP} = (\text{Total Health Expenditure - Primary Health Care Expenditure - Medical Education Spending}) \times 60\% \]

\(IP=\text{Inpatient}\)

\[ \text{Hosp, IP} = \text{Those who report visiting Level 3 (Public Hospital for Inpatient)} \]
Benefit Incidence Analysis:
Gross & Net Benefits for 16 States with
Unit Cost Data
Benefit Incidence Analysis – 16 States

BIA Analysis:

• The following three slides use NSS utilization data, unit cost data, and OOP spending data to examine the distribution by income level of the **value of gross and net benefits received**.

• Concentration curves and concentration indices are presented, interpreted as before.

• The value of net benefits received is defined as the unit cost for each type of service (primary care, outpatient hospital level, inpatient hospital level) minus the associated out of pocket expenses incurred by each individual for the respective level of service. When the value is negative (OOP > unit cost), a value of zero is used.

• The value of gross benefits received is defined as the unit cost for each type of service (primary care, outpatient hospital level, inpatient hospital level).

• **Analysis is limited to 16 states from which unit cost information was derived.**

• The BIA is done for the following levels and types of services:
  - All public outpatient visits, primary outpatient and hospital level outpatient visits
  - All public inpatient visits, primary inpatient and hospital level inpatient visits
  - All public deliveries, primary care deliveries and hospital level deliveries
  - All of the above categories are also analyzed for Urban and Rural areas
Results: Public Outpatient Gross Benefits (16 States)

- All Outpatient
- Public Primary Outpatient
- Public Hospital Outpatient

National

- Benefits for All Outpatient Visits: $C = -0.075$
- Benefits for Public Primary Outpatient Visits: $C = -0.005$
- Benefits for Public Hospital Outpatient Visits: $C = -0.070$

Rural

- Benefits for Rural Outpatient Visits: $C = -0.043$
- Benefits for Rural Public Primary Outpatient Visits: $C = -0.001$
- Benefits for Rural Public Hospital Outpatient Visits: $C = -0.082$

Urban

- Benefits for Urban Outpatient Visits: $C = -0.011$
- Benefits for Urban Public Primary Outpatient Visits: $C = -0.036$
- Benefits for Urban Public Hospital Outpatient Visits: $C = -0.034$
Results: Public Outpatient Net Benefits (16 States)

<table>
<thead>
<tr>
<th>Category</th>
<th>All Outpatient</th>
<th>Public Primary Outpatient</th>
<th>Public Hospital Outpatient</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>C = -0.090</td>
<td>C = -0.007</td>
<td>C = -0.061</td>
</tr>
<tr>
<td>Rural</td>
<td>C = -0.049</td>
<td>C = -0.010</td>
<td>C = -0.068</td>
</tr>
<tr>
<td>Urban</td>
<td>C = -0.003</td>
<td>C = -0.014</td>
<td>C = -0.056</td>
</tr>
</tbody>
</table>

Cumulative Sum of Benefits

Cumulative Population by Income Status

Benefits for All Outpatient Visits

Benefits for Public Primary Outpatient Visits

Benefits for Public Hospital Outpatient Visits

Benefits for Rural Outpatient Visits

Benefits for Rural Public Primary Outpatient Visits

Benefits for Rural Public Hospital Outpatient Visits

Benefits for Urban Outpatient Visits

Benefits for Urban Public Primary Outpatient Visits

Benefits for Urban Public Hospital Outpatient Visits
Results: Public Inpatient Gross Benefits (16 States)

**Benefits for All Inpatient Visits**
- National: $C = 0.082$
- Rural: $C = 0.066$
- Urban: $C = 0.049$

**Benefits for Public Primary Inpatient Visits**
- National: $C = -0.025$
- Rural: $C = -0.022$
- Urban: $C = -0.044$

**Benefits for Public Hospital Inpatient Visits**
- National: $C = 0.066$
- Rural: $C = 0.054$
- Urban: $C = 0.042$
Results: Public Inpatient Net Benefits (16 States)

- **All Inpatient**
  - National: C = 0.070
  - Rural: C = 0.051
  - Urban: C = 0.016

- **Public Primary Inpatient**
  - National: C = -0.067
  - Rural: C = -0.053
  - Urban: C = -0.180

- **Public Hospital Inpatient**
  - National: C = 0.054
  - Rural: C = 0.040
  - Urban: C = 0.009
Results: Public Delivery Gross Benefits (16 States)

**All Delivery**

- Benefits for All Delivery Visits
  - National: $C = 0.072$
  - Rural: $C = 0.053$
  - Urban: $C = 0.063$

**Public Primary Delivery**

- Benefits for Public Primary Delivery Visits
  - National: $C = 0.006$
  - Rural: $C = 0.012$
  - Urban: $C = -0.048$

**Public Hospital Delivery**

- Benefits for Public Hospital Delivery Visits
  - National: $C = 0.062$
  - Rural: $C = 0.046$
  - Urban: $C = 0.062$

Cumulative Sum of Benefits vs. Cumulative Population by Income Status

- National
- Rural
- Urban
Results: Public Delivery Net Benefits (16 States)

- **All Delivery**
  - Benefits for All Delivery Visits
  - Cumulative Population by Income Status
  - C = 0.040

- **Public Primary Delivery**
  - Benefits for Public Primary Delivery Visits
  - Cumulative Population by Income Status
  - C = -0.068

- **Public Hospital Delivery**
  - Benefits for Public Hospital Delivery Visits
  - Cumulative Population by Income Status
  - C = 0.031

- **Rural**
  - Benefits for Rural Delivery Visits
  - Cumulative Population by Income Status
  - C = 0.014

- **Benefits for Rural Public Primary Delivery Visits**
  - Cumulative Population by Income Status
  - C = -0.056

- **Benefits for Rural Public Hospital Delivery Visits**
  - Cumulative Population by Income Status
  - C = 0.008

- **Urban**
  - Benefits for Urban Delivery Visits
  - Cumulative Population by Income Status
  - C = 0.042

- **Benefits for Urban Public Primary Delivery Visits**
  - Cumulative Population by Income Status
  - C = -0.155

- **Benefits for Urban Public Hospital Delivery Visits**
  - Cumulative Population by Income Status
  - C = 0.041
Out of Pocket Expenditures: Concentration Curves
Results: Public Outpatient Out-of-Pocket Expenditures

- **All Outpatient**
  - Out-of-Pocket Expenditure for All Outpatient Visits
  - Cumulative Share of Out-of-Pocket Expenditure: $C = 0.066$
- **Public Primary Outpatient**
  - Out-of-Pocket Expenditure for Public Primary Outpatient Visits
  - Cumulative Share of Out-of-Pocket Expenditure: $C = 0.007$
- **Public Hospital Outpatient**
  - Out-of-Pocket Expenditure for Public Hospital Outpatient Visits
  - Cumulative Share of Out-of-Pocket Expenditure: $C = 0.111$
- **National**
  - Out-of-Pocket Expenditure for Rural Public Primary Outpatient Visits
  - Cumulative Share of Out-of-Pocket Expenditure: $C = 0.008$
- **Rural**
  - Out-of-Pocket Expenditure for Urban Public Hospital Outpatient Visits
  - Cumulative Share of Out-of-Pocket Expenditure: $C = 0.168$
- **Urban**
  - Out-of-Pocket Expenditure for Urban Public Hospital Outpatient Visits
  - Cumulative Share of Out-of-Pocket Expenditure: $C = 0.116$

Cumulative Population by Income Status

45 degree line

- Outpatient Out-of-Pocket Expenditure
Results: Public Inpatient Out-of-Pocket Expenditures

- **All Inpatient**
  - National:
    - Out-of-Pocket Expenditure for All Inpatient Visits: C = 0.202
  - Rural:
    - Out-of-Pocket Expenditure for Rural Inpatient Visits: C = 0.140
  - Urban:
    - Out-of-Pocket Expenditure for Urban Inpatient Visits: C = 0.285

- **Public Primary Inpatient**
  - National:
    - Out-of-Pocket Expenditure for Public Primary Inpatient Visits: C = 0.106
  - Rural:
    - Out-of-Pocket Expenditure for Rural Public Primary Inpatient Visits: C = 0.038
  - Urban:
    - Out-of-Pocket Expenditure for Urban Public Primary Inpatient Visits: C = 0.279

- **Public Hospital Inpatient**
  - National:
    - Out-of-Pocket Expenditure for Public Hospital Inpatient Visits: C = 0.193
  - Rural:
    - Out-of-Pocket Expenditure for Rural Public Hospital Inpatient Visits: C = 0.133
  - Urban:
    - Out-of-Pocket Expenditure for Urban Public Hospital Inpatient Visits: C = 0.283
Results: Public Delivery Out-of-Pocket Expenditures

<table>
<thead>
<tr>
<th>Category</th>
<th>Expenditure Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Delivery</td>
<td>Out-of-Pocket Expenditure for All Delivery Visits</td>
</tr>
<tr>
<td>National</td>
<td></td>
</tr>
<tr>
<td>C = 0.122</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>Out-of-Pocket Expenditure for Rural Delivery Visits</td>
</tr>
<tr>
<td>C = 0.113</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>Out-of-Pocket Expenditure for Urban Delivery Visits</td>
</tr>
<tr>
<td>C = 0.121</td>
<td></td>
</tr>
<tr>
<td>Public Primary Delivery</td>
<td>Out-of-Pocket Expenditure for Public Primary Delivery Visits</td>
</tr>
<tr>
<td>National</td>
<td></td>
</tr>
<tr>
<td>C = 0.088</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>Out-of-Pocket Expenditure for Rural Public Primary Delivery Visits</td>
</tr>
<tr>
<td>C = 0.081</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>Out-of-Pocket Expenditure for Urban Public Primary Delivery Visits</td>
</tr>
<tr>
<td>C = 0.106</td>
<td></td>
</tr>
<tr>
<td>Public Hospital Delivery</td>
<td>Out-of-Pocket Expenditure for Public Hospital Delivery Visits</td>
</tr>
<tr>
<td>National</td>
<td></td>
</tr>
<tr>
<td>C = 0.124</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>Out-of-Pocket Expenditure for Rural Public Hospital Inpatient Visits</td>
</tr>
<tr>
<td>C = 0.118</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>Out-of-Pocket Expenditure for Urban Public Hospital Inpatient Visits</td>
</tr>
<tr>
<td>C = 0.122</td>
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</tr>
</tbody>
</table>
Literature Review: Costing Studies
Cost of delivering health care services in seven Primary Health Centers from north India (a).

<table>
<thead>
<tr>
<th></th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
<th>P5</th>
<th>P6</th>
<th>P7</th>
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</thead>
<tbody>
<tr>
<td>Per capita unit cost</td>
<td>141.5</td>
<td>245.7</td>
<td>132.2</td>
<td>200.8</td>
<td>91.0</td>
<td>155.7</td>
<td>228.8</td>
</tr>
<tr>
<td>Per outpatient consultation</td>
<td>83.6</td>
<td>152.3</td>
<td>82.9</td>
<td>219.1</td>
<td>156.2</td>
<td>136.8</td>
<td>142.2</td>
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<tr>
<td>Per bed day hospitalization</td>
<td>329.6</td>
<td>1195.1</td>
<td>193.7</td>
<td>1002.3</td>
<td>732.4</td>
<td>NA</td>
<td>NA</td>
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</tbody>
</table>
Cost of delivering healthcare services in seven Community Health Centers from north India (a).

<table>
<thead>
<tr>
<th></th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
<th>C7</th>
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</thead>
<tbody>
<tr>
<td>Per capita unit cost</td>
<td>111.0</td>
<td>95.2</td>
<td>110.2</td>
<td>285.9</td>
<td>147.4</td>
<td>113.8</td>
<td>270.5</td>
</tr>
<tr>
<td>Per outpatient</td>
<td>101.2</td>
<td>92.5</td>
<td>198.2</td>
<td>197.5</td>
<td>197.2</td>
<td>307.6</td>
<td>112.1</td>
</tr>
<tr>
<td>consultation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per bed day hospitalization</td>
<td>277.0</td>
<td>134.6</td>
<td>2998.4</td>
<td>551.2</td>
<td>216.4</td>
<td>418.2</td>
<td>214.0</td>
</tr>
</tbody>
</table>
Cost of Neonatal Intensive Care at District Public Hospital (b)

- Neonatal costs Rs 4,581 (USD 101.8) per treatment
- Neonatal cost Rs 818 (USD 18.2) per bed-day treatment

Unit Cost of Medical Services at Different Hospitals in India (c)

**Outpatient visit** cost ranged from Rs. 94 ($1.8)(district hospital) to Rs. 2,213 ($42.5) (private hospital).

**Inpatient (stay) visit:**
- Rs. 345 ($6.63) (private teaching hospital),
- Rs. 394 ($7.57) (district hospital),
- Rs. 614 ($11.81) (tertiary hospital),
- Rs. 1,959 ($37.67) (charitable hospital),
- Rs. 6,996 ($134.53) (private hospital).
REFERENCES

(a) Cost of Delivering Health Care Services in Public Sector Primary and Community Health Centres in North India

(b) Cost of Neonatal Intensive Care Delivered through District Level Public Hospitals in India

(c ) Chatterjee S, Levin C, Laxminarayan R (2013) Unit Cost of Medical Services at Different Hospitals in India. PLoS ONE 8(7): e69728. doi:10.1371/journal.pone.0069728