



Delhi Water Supply & Sewerage Services : Coping Costs, Willingness to Pay and Affordability

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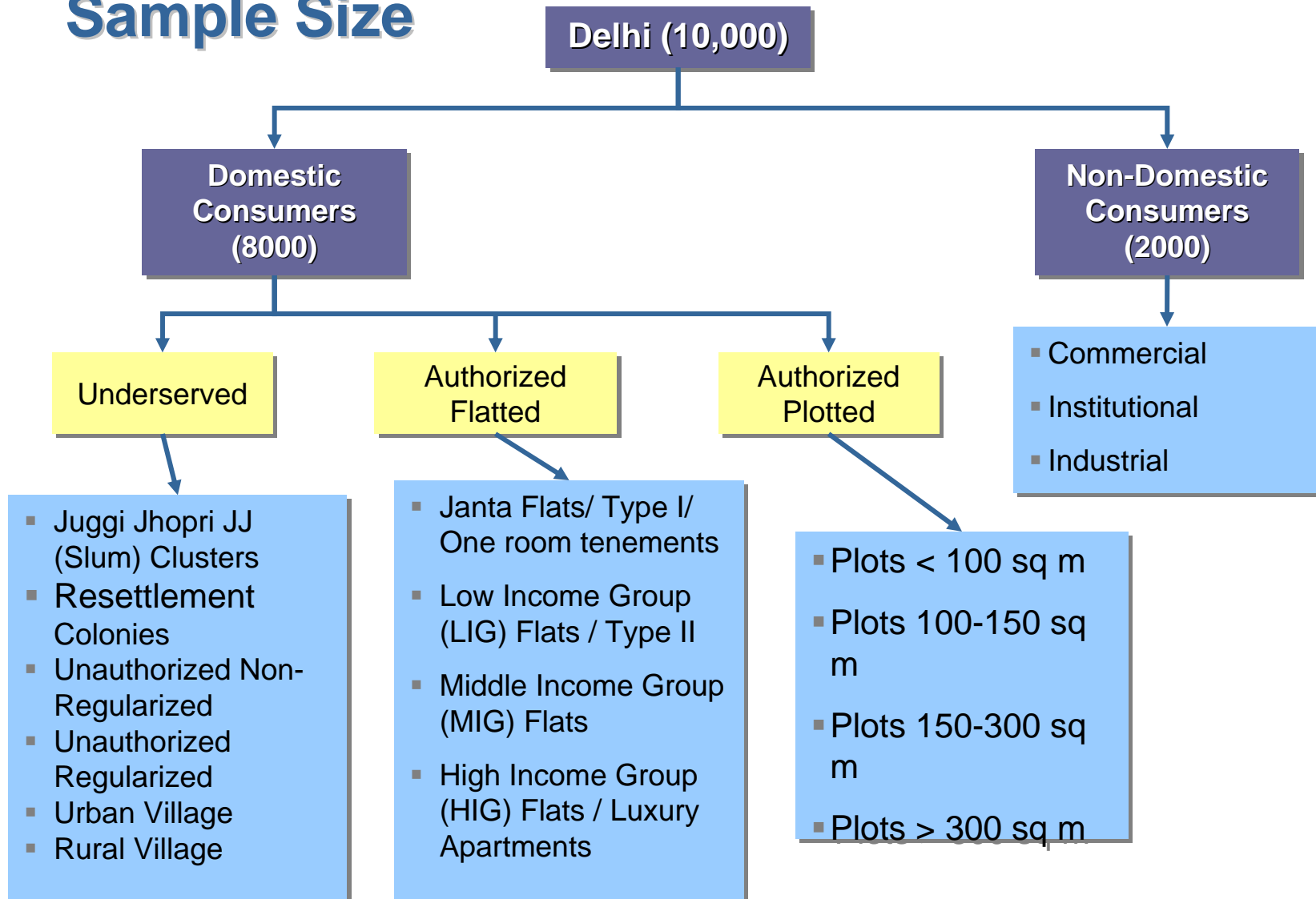
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Overall Study Objectives

- To understand Water Supply & Sewerage (WSS) conditions and preferences of representative consumers
 - Quantity & quality of water consumed
 - Coping strategies (including use of groundwater) and cost
 - Demand & preferences for water supply services
 - Affordable contributions for preferred options

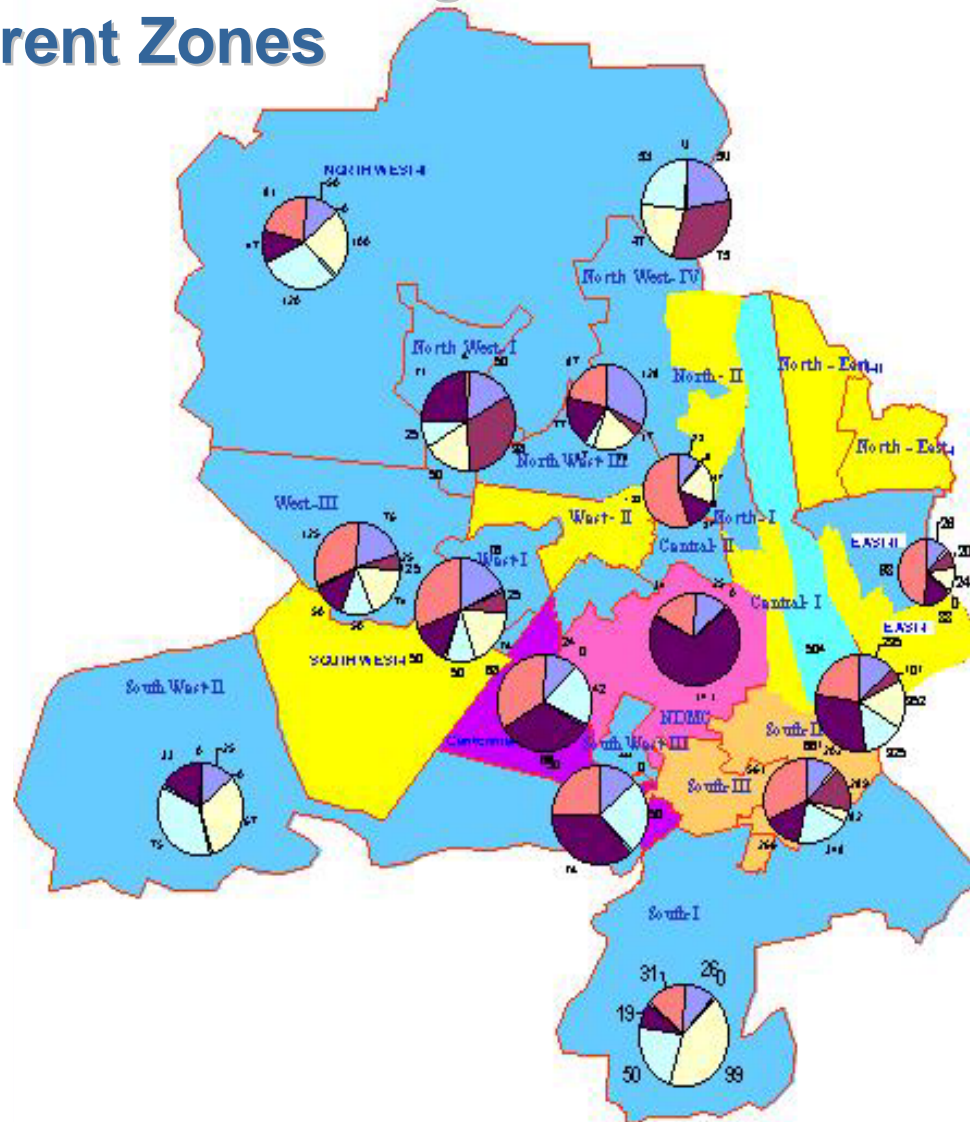
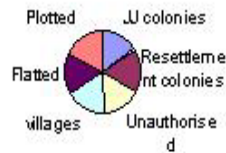
Sample Size



Representative Consumer Categories Surveyed in Different Zones

LEGEND

- Sample DJB Zone
- NDMC Area
- South-Iland South-III
- Cantonment Area
- DJB Zone Boundary
- Water Body
- Non-Sample DJB Zone





Sampling Design: Domestic Consumers

- Multi-stage stratified random sampling methodology (Voter List)
 - Stage I: Zones
 - Stage II: Colonies
 - Stage III: Households
- Sampling separately undertaken for:
 - Delhi Jal Board (DJB) Pilot Project in South 2 & 3 zones
 - Rest of Delhi under DJB, New Delhi Municipal Corporation (NDMC) & Delhi Cantonment Board (DCB)



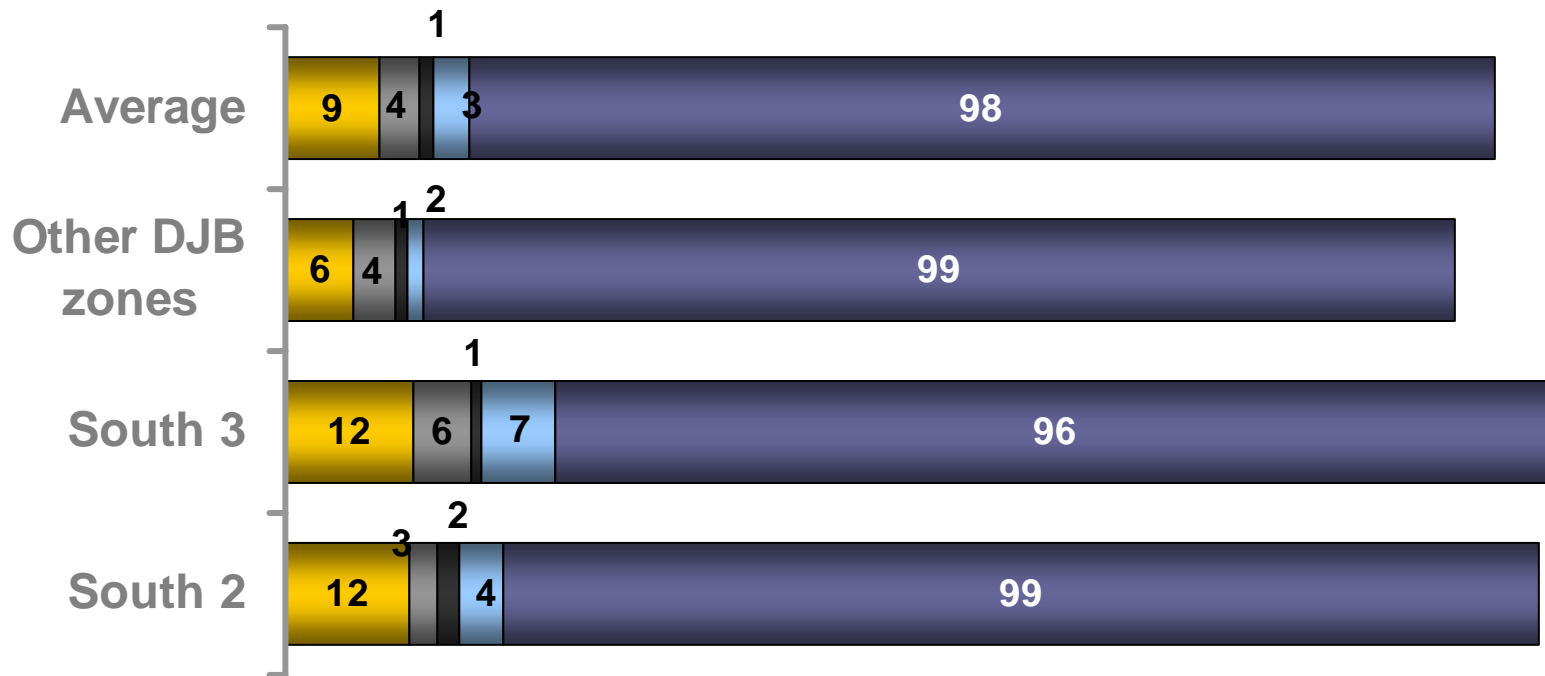
Structure of this Presentation

- **Existing Water Supply Arrangements; Compulsions for Coping Strategies and Costs**
- **Willingness to Pay for Improvements in WSS Services**
- **Affordability Analysis**
- **Key Findings**



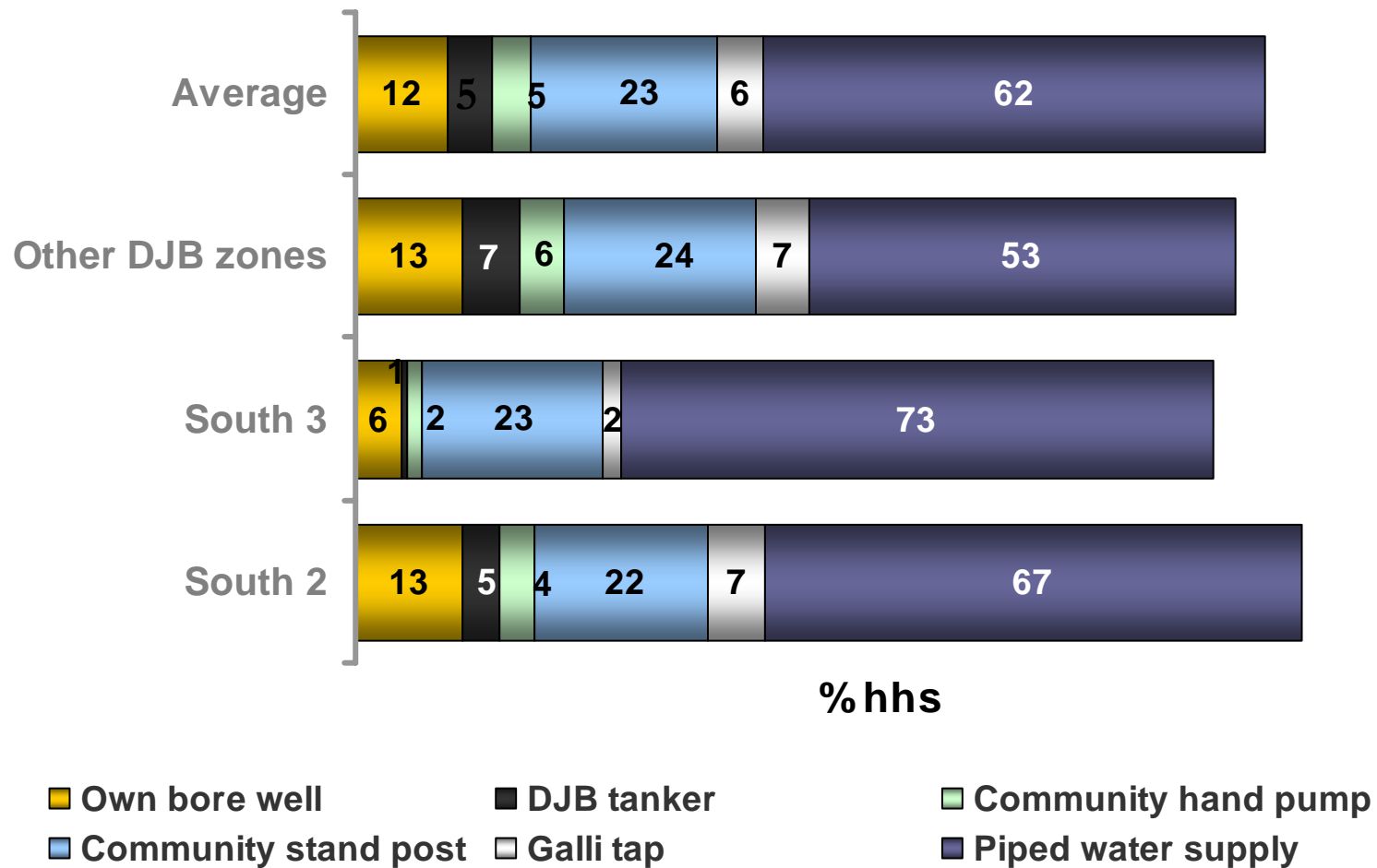
**Existing Water Supply Arrangement ...
Authorised Colonies**

Sources of Water Supply by Zones – Authorised colonies

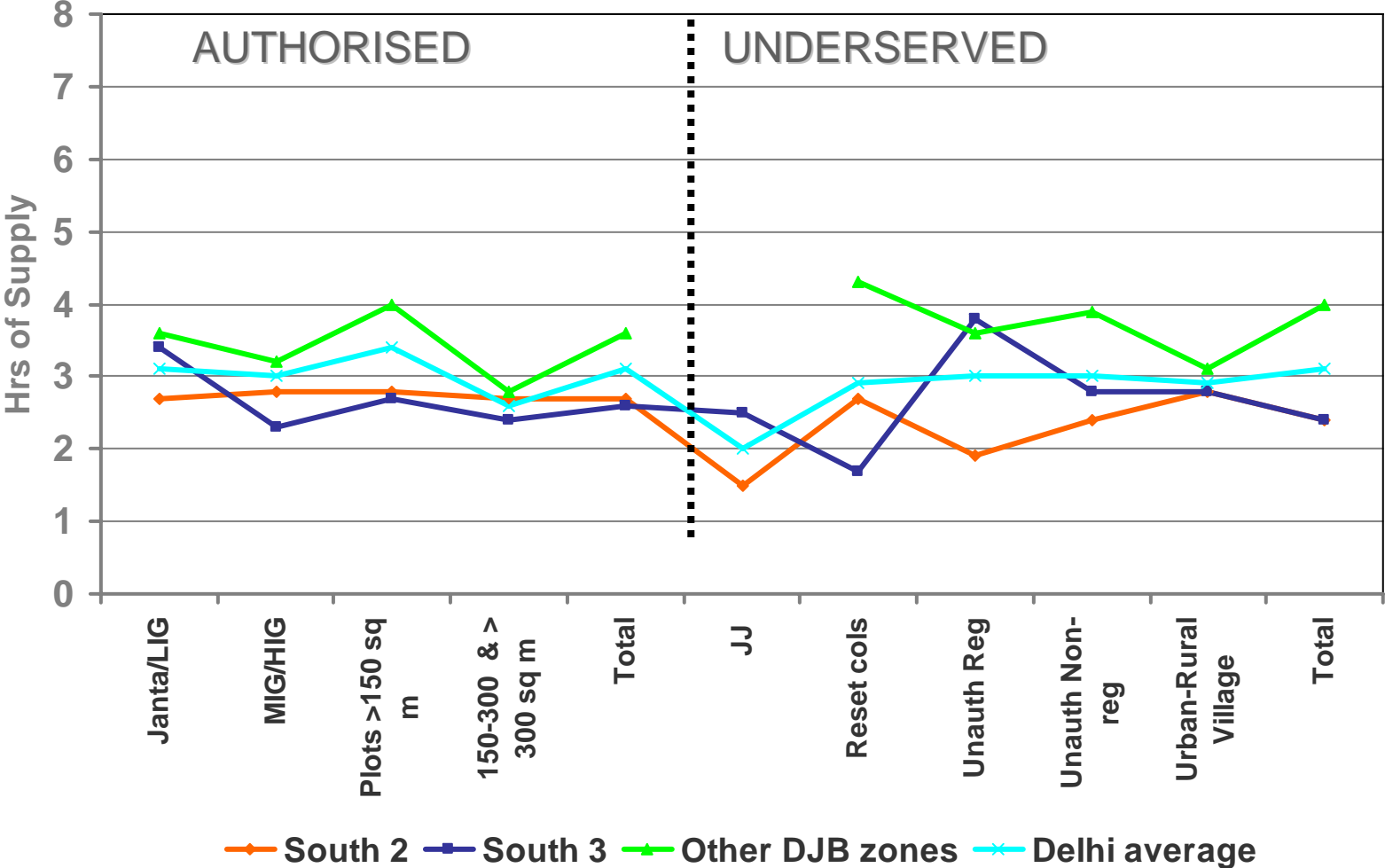


- % hhs**
- Own bore well
 - Housing society bore well
 - DJB tanker
 - Bottled water
 - Piped Water Supply

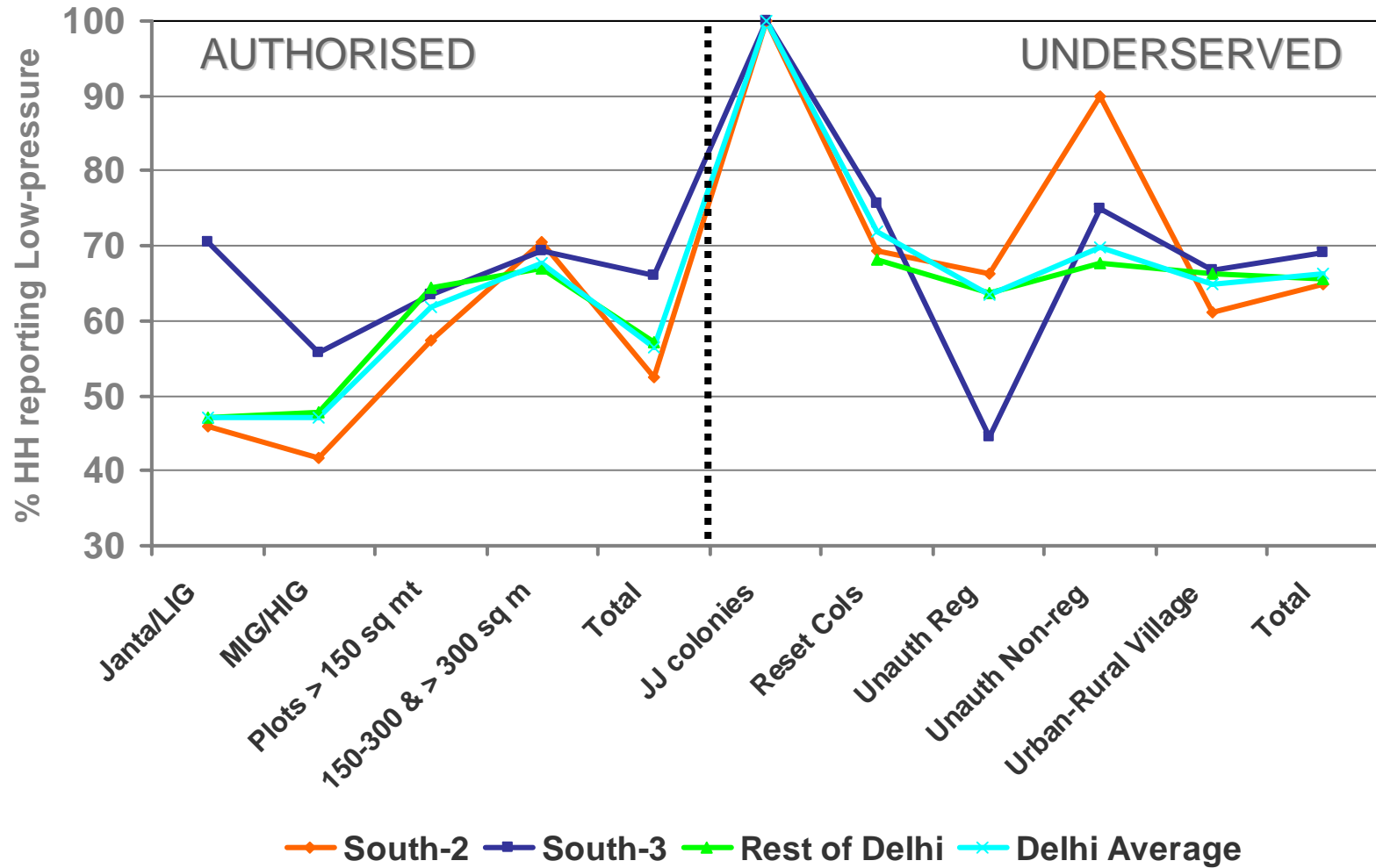
Sources of Water Supply by Zones - Underserved



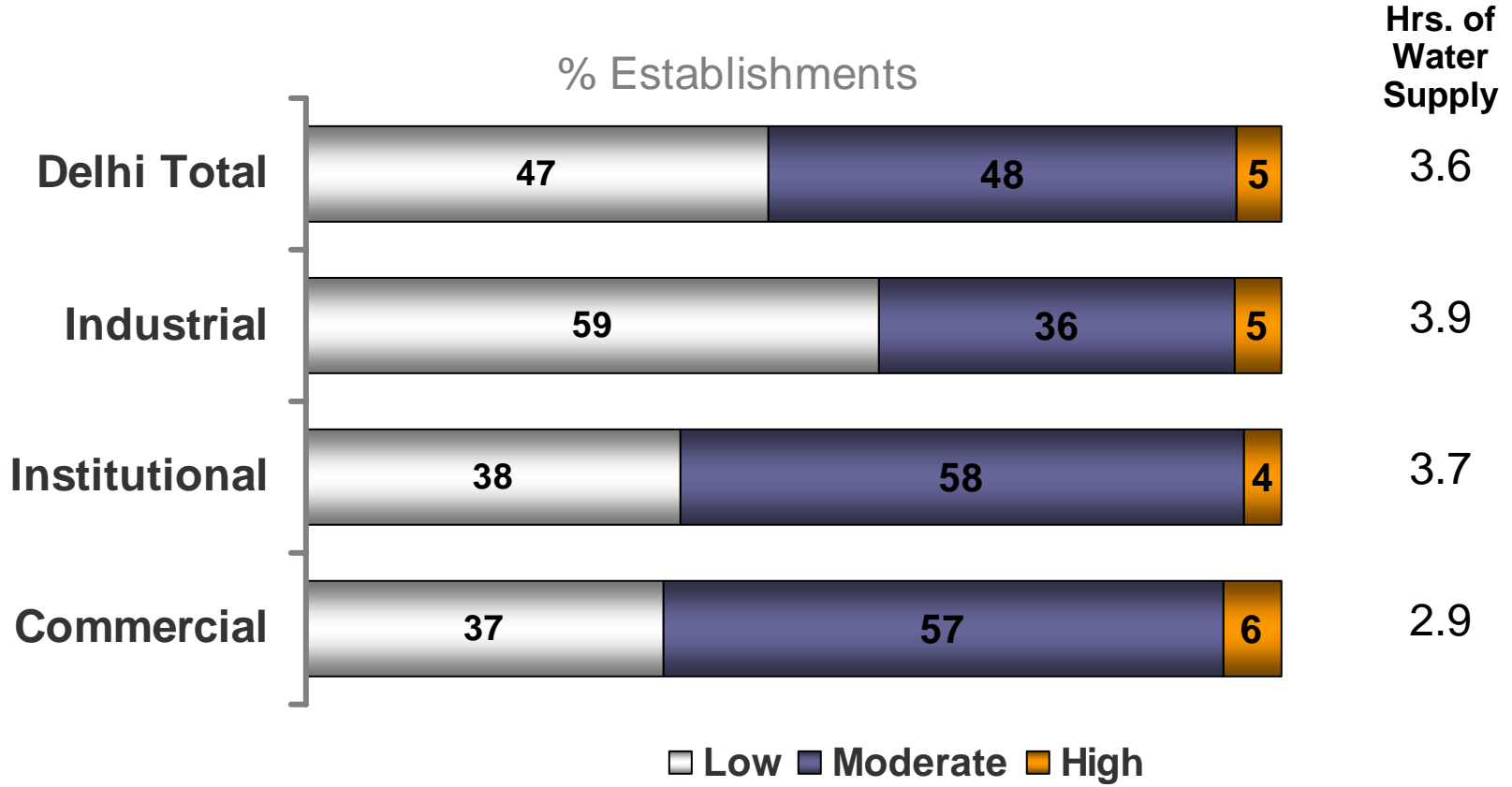
Average Hours of Water Supply - Domestic



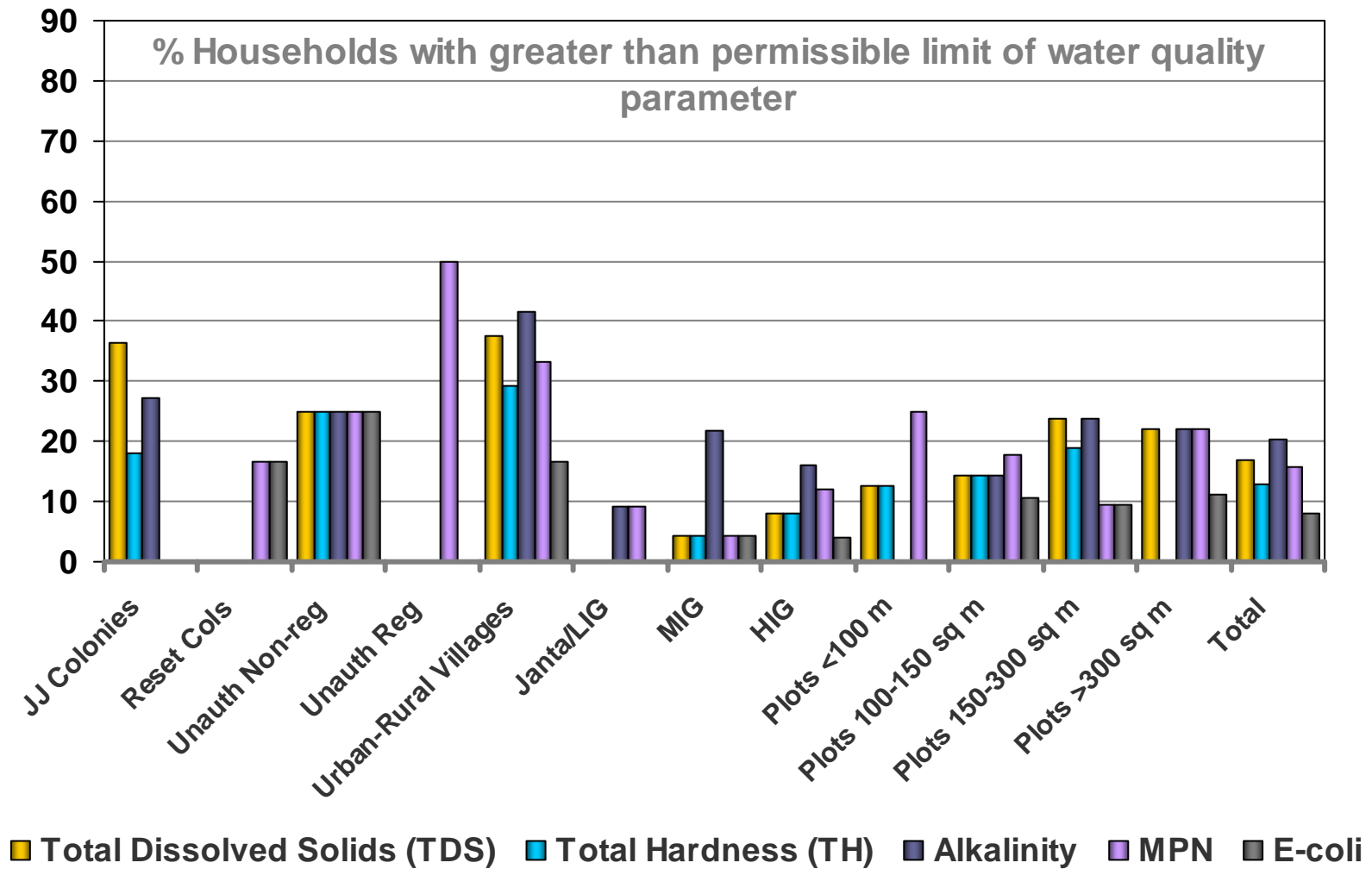
Water Pressure - Domestic



Water Pressure- Non Domestic



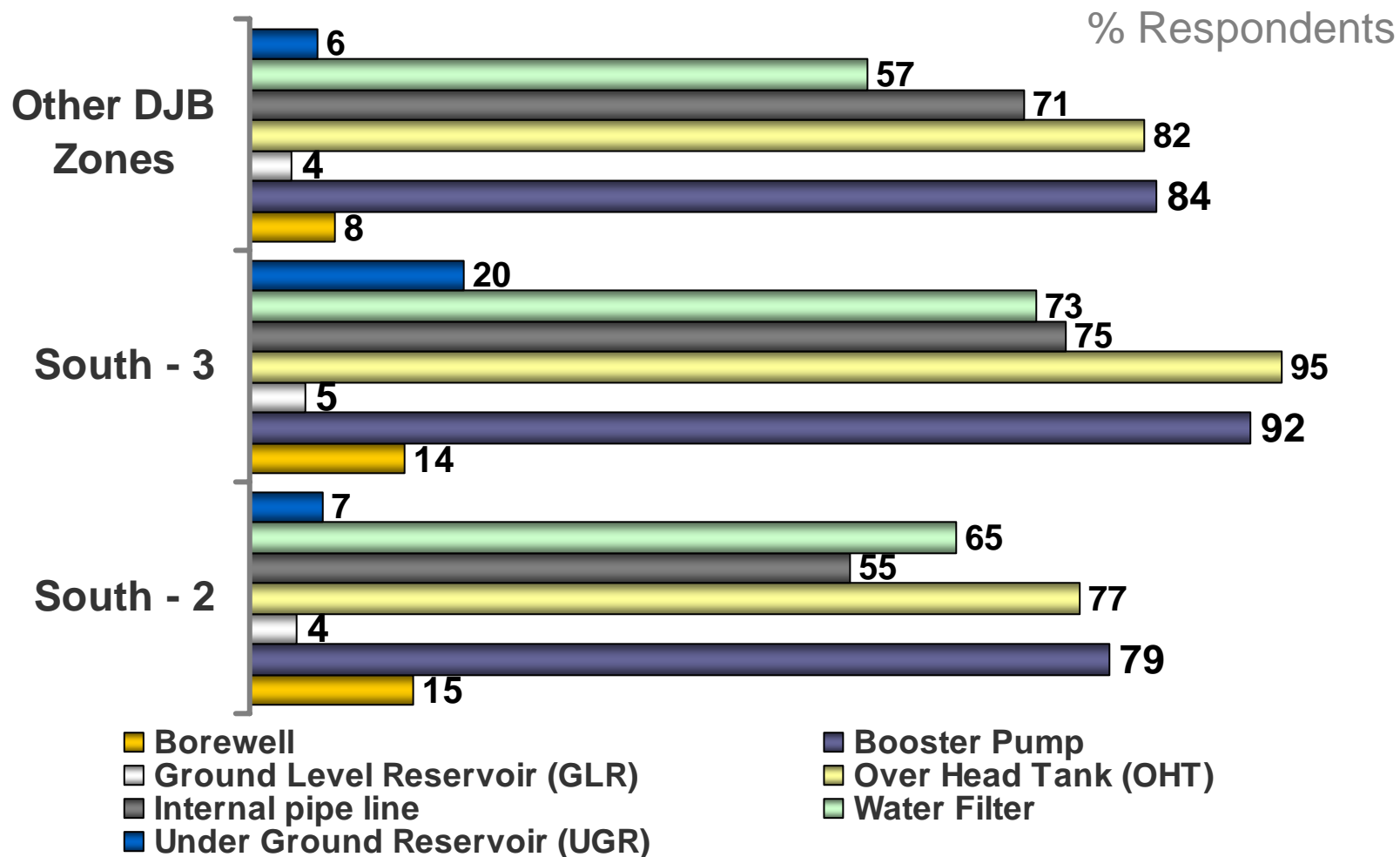
Water Quality





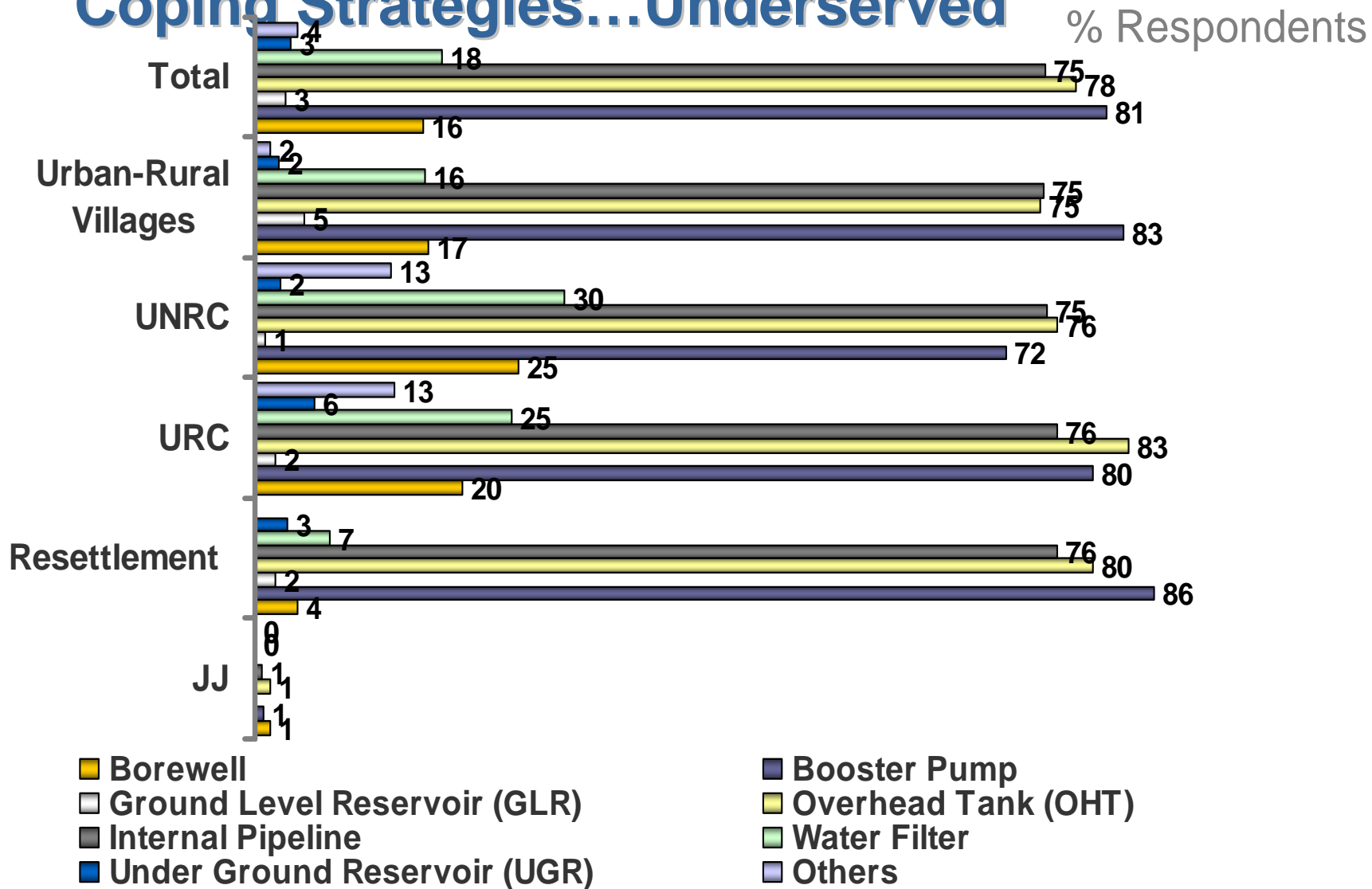
Coping Strategies...

Coping Strategies ...Authorised Colonies

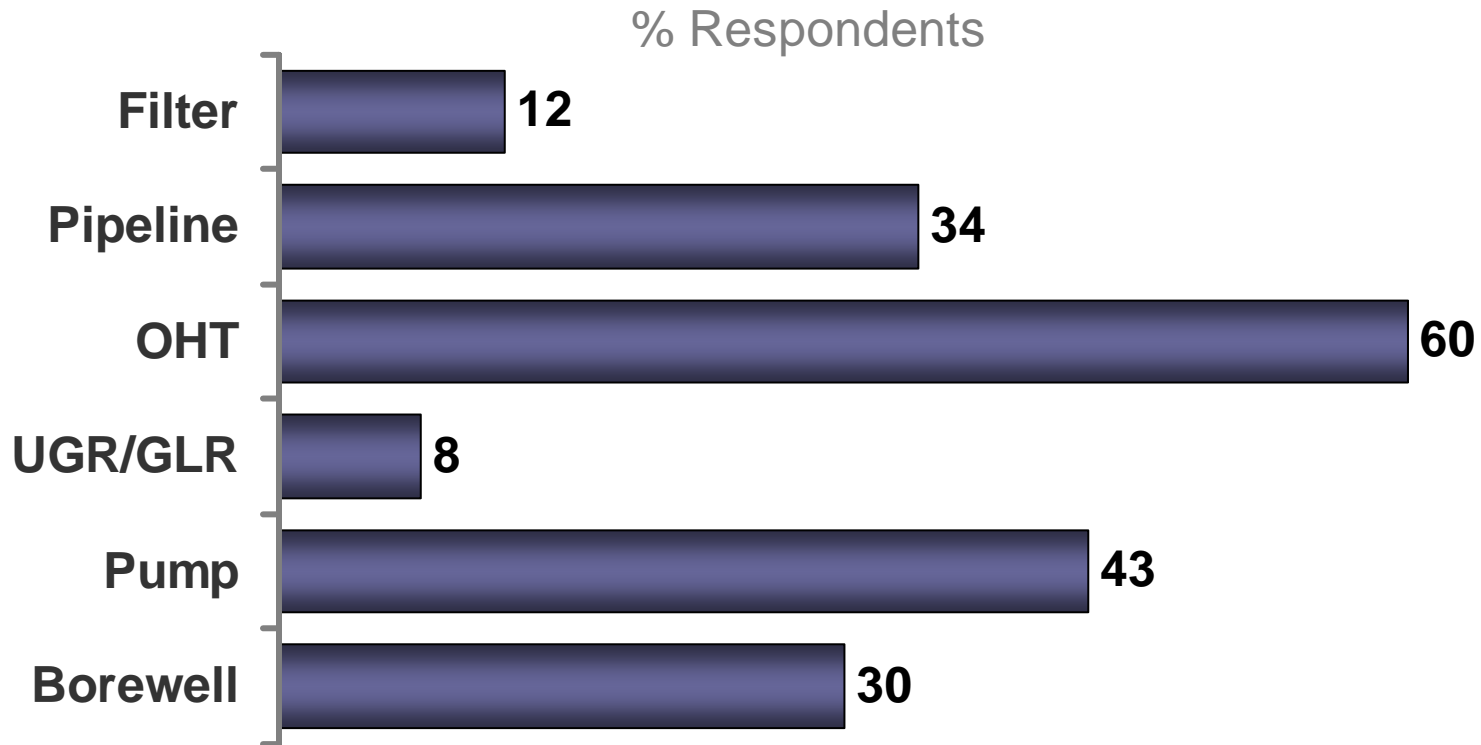


Coping Strategies...Underserved

% Respondents



Coping Strategies - Non Domestic





Findings – Coping costs



Coping Cost for Households in Authorized Colonies

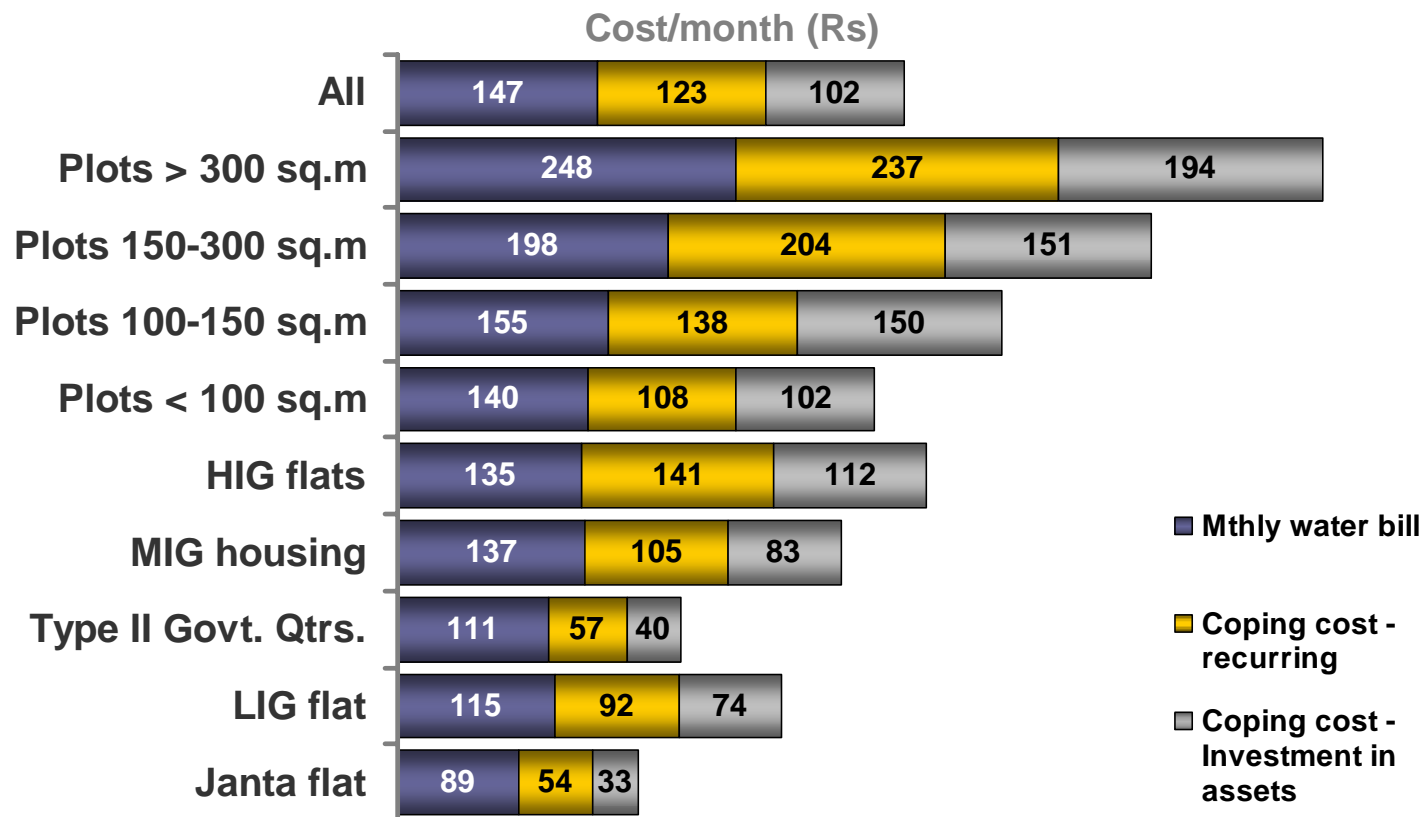
Water Consumption per HH per month (KL)	22
Investment per HH (Rs)	6829
Capital cost per HH per month (Rs)	102
Recurring cost per HH per month (Rs)	124
Total coping cost per HH per month (Rs)	226
Coping cost per KL of water consumed (Rs)	10.3



Coping Cost for Households in Underserved Colonies

Total Number of Households Surveyed	4355
Average Consumption of Water/month/HH (KL)	17.7
Average investment in water assets per HH (Rs)	3259
Capital cost per month per HH (Rs)	49
Recurring expenses per month per HH (Rs)	73
Capital Cost + Recurring expenses/month (Rs)	122
Time spent on water collection/day/HH (hours)	0.6
Opportunity cost of time/month/HH (Rs)	59
Total coping cost per month per HH (Rs)	181
Average coping cost per KL of water consumed	10.2

Water Expenses in Authorized Colonies





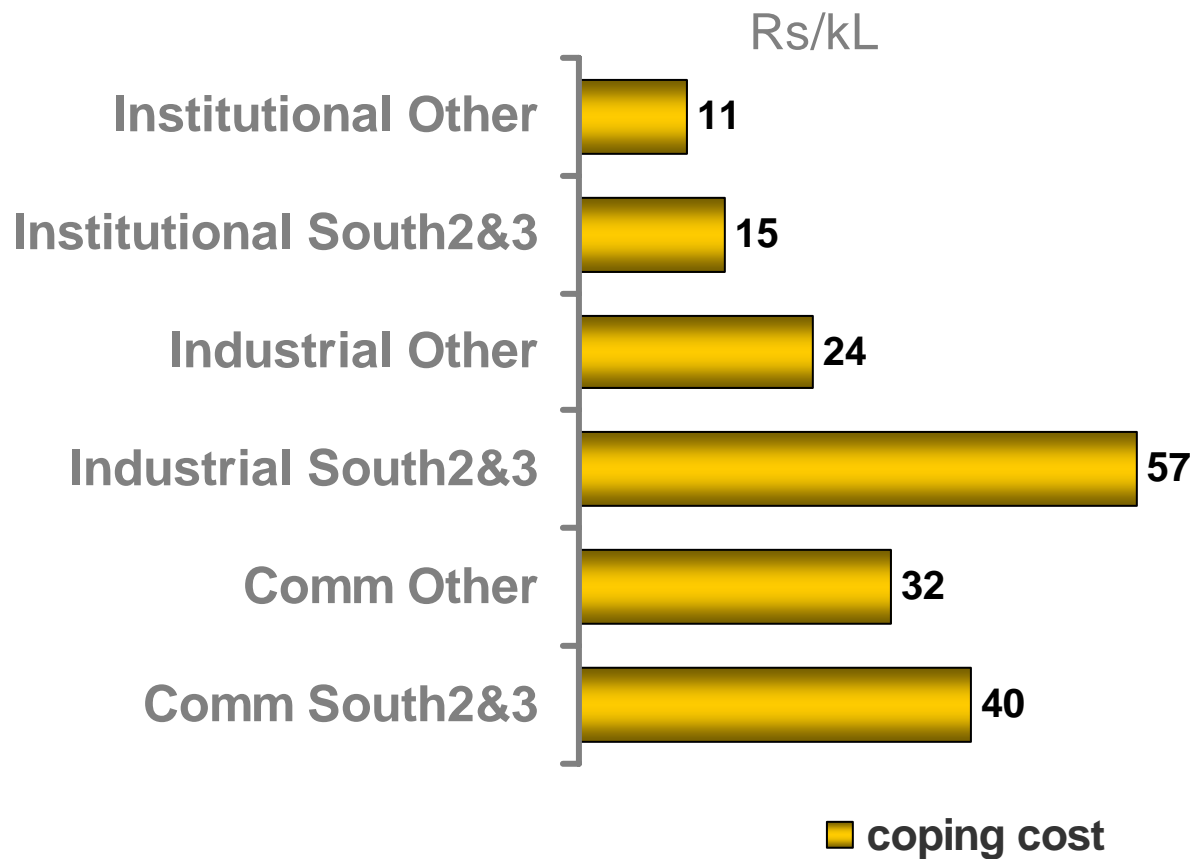
Coping Cost Estimates – other key findings

- Coping costs of domestic consumers in **authorized colonies** are about **Rs 10 per KL** of water used
- Coping costs of domestic consumers in **underserved areas** are about **Rs 10 per KL** of water used if cost of time spent for water collections is included and **Rs 7 per KL** of water used if time cost is not included.
- Coping costs of **non-domestic consumers** are about **Rs 12-39 per KL** of water used
- These estimates of coping costs of consumers are close to or higher than the **cost of supply**, estimated at about **Rs 9.5 per KL** (including interest and depreciation)

Coping Cost for Non-domestic Consumers

	Commercial	Industrial	Institutional
Number of Consumers surveyed	534	961	505
Average Water consumption per consumer per month (KL)	10	19	31
Average Investment per consumer (Rs)	3375	6974	5768
Capital cost per consumer per month (Rs)	51	105	86
Recurring expenses per consumer per month (Rs)	309	636	298
Total coping cost per consumer per month (Rs)	360	741	384
Average coping cost of Water/KL (Rs)	36	39	12

Coping Cost - Non-domestic Consumers



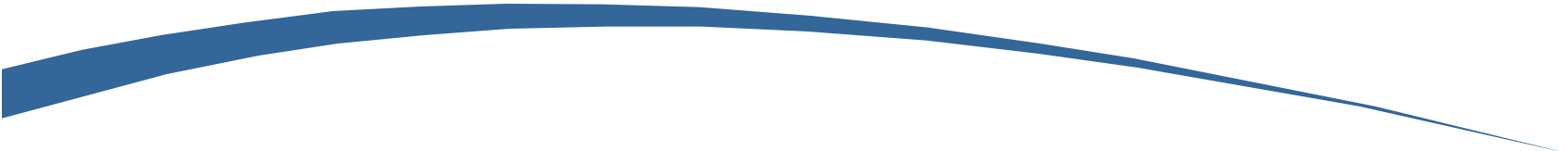


Willingness to Pay for Improved Water Services...

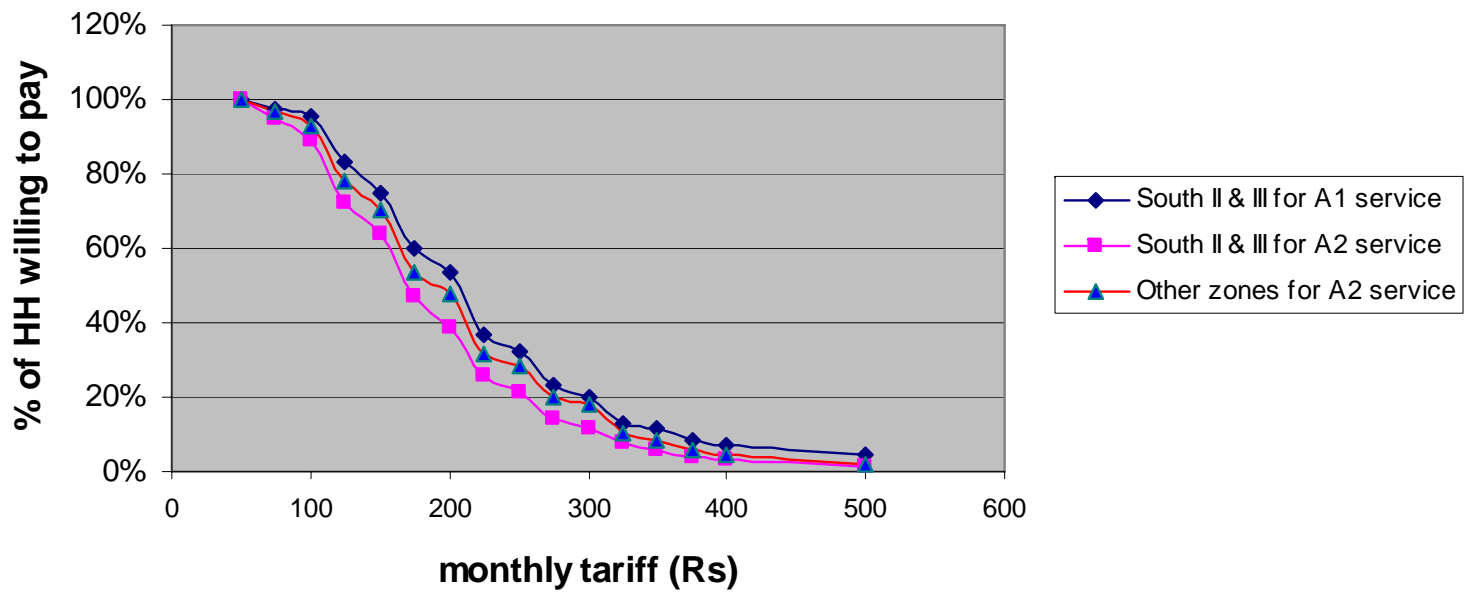


Analysis of WTP in this study - methodology

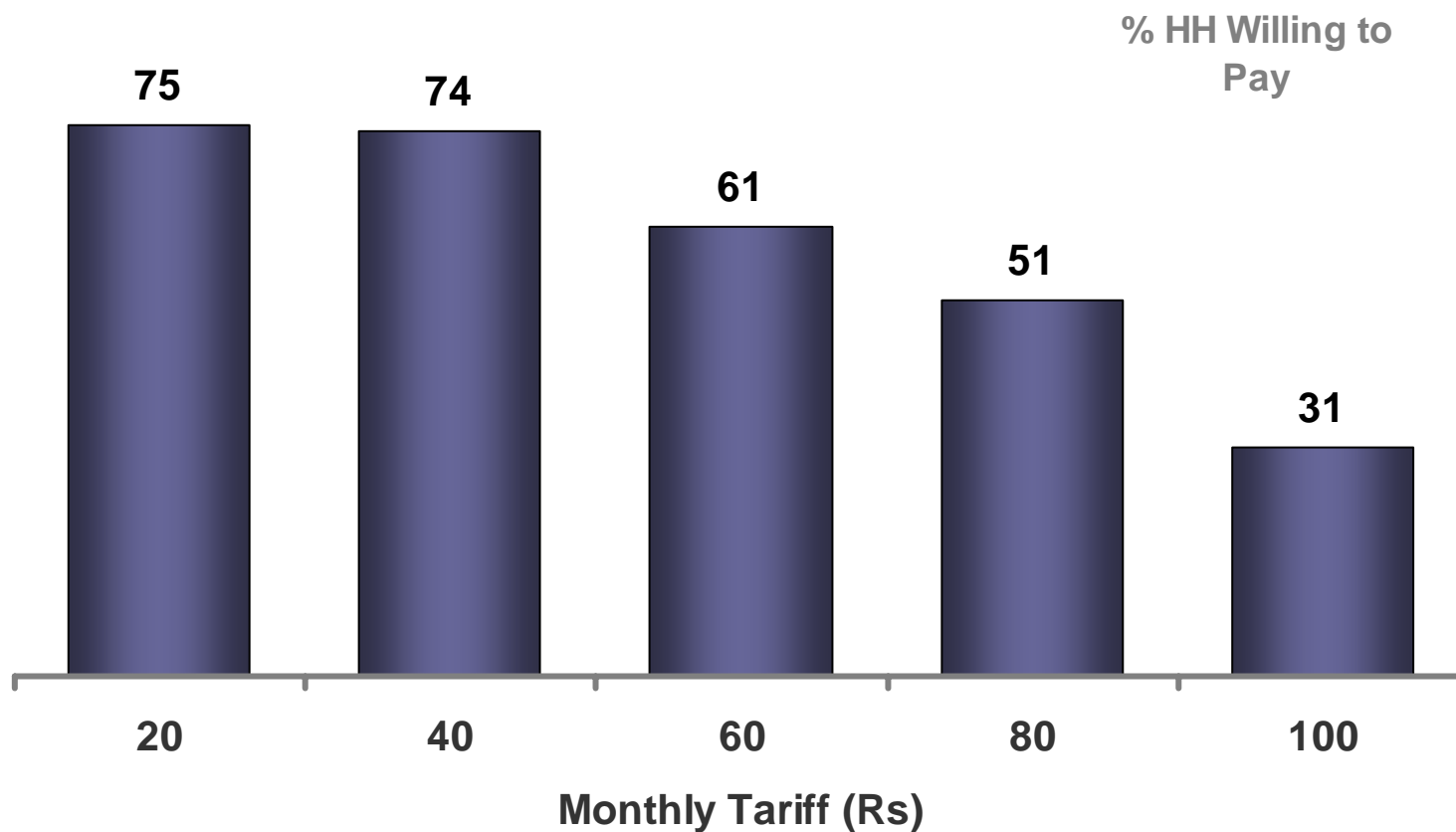
- Contingent valuation method has been applied
- Care has been taken to minimize biases by appropriate scenario building and choice of value elicitation format
- For value elicitation, the payment card method is used: likely improvement in water and sewerage services are explained to the respondents (consumers) who are then asked to indicate acceptable monthly water bill (including sewerage charges) out of a list of possible payments shown to them.



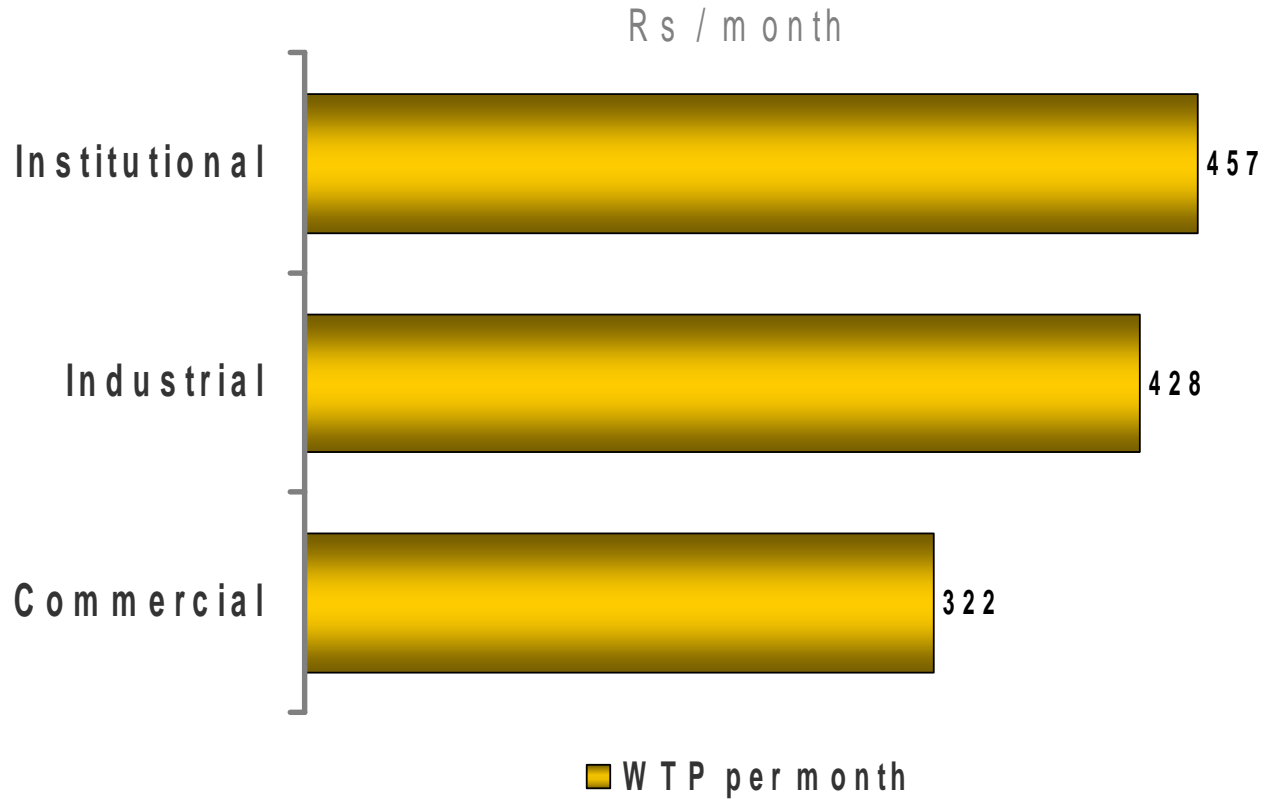
Willingness to pay for improved services, by zone and service level



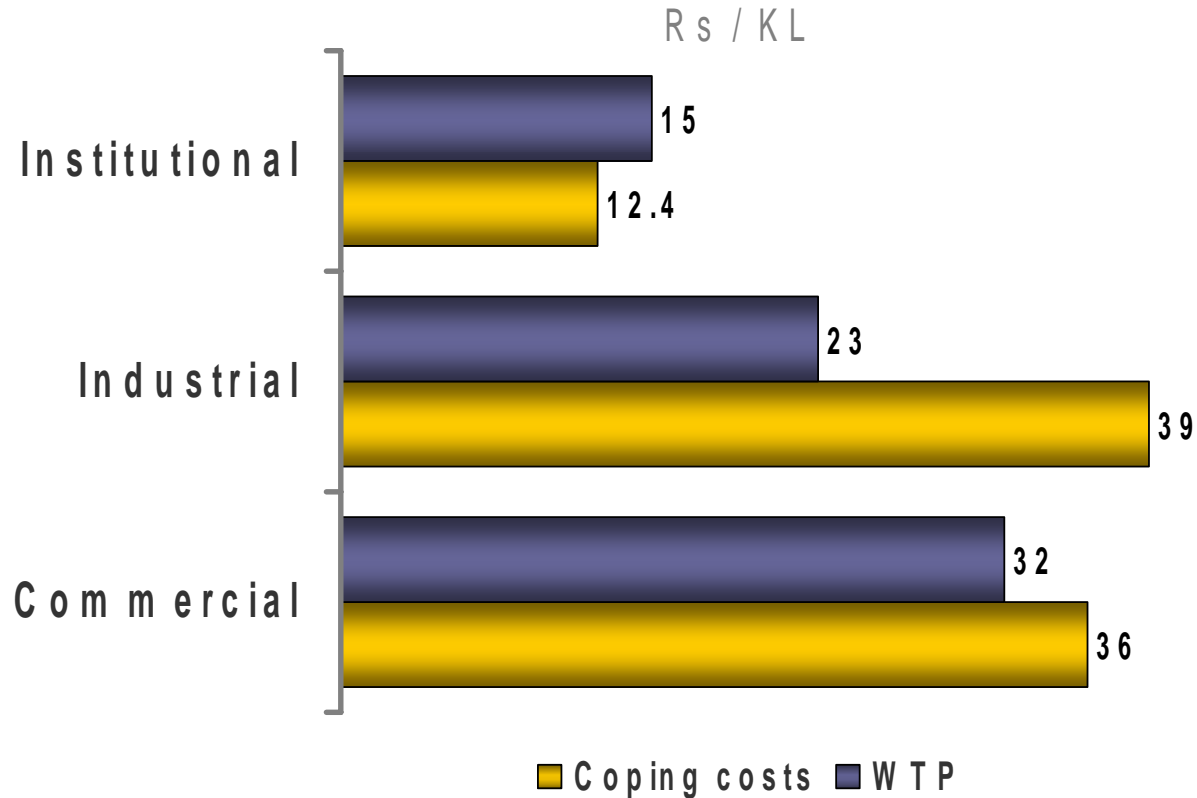
% HH in JJ cluster WTP for Group Connection (mean = Rs 64 to 78 per month)



Estimated Mean WTP of Various Non-Domestic Consumers for Improved Water Supply



Comparison of Coping Costs and WTP for Improved Services - Non-domestic Consumers





Factors influencing households' willingness to pay for improved services

- Econometric analysis points out some of the important factors that influence WTP:
 - Income
 - Household size
 - Education of respondent
 - Coping cost currently being borne, particularly electricity charges for booster pumps, maintenance of large storage, repair and maintenance of filter, and expenditure on purchase of water
 - Perception factor: if the respondent perceived a marked improvement in supply after the project is implemented

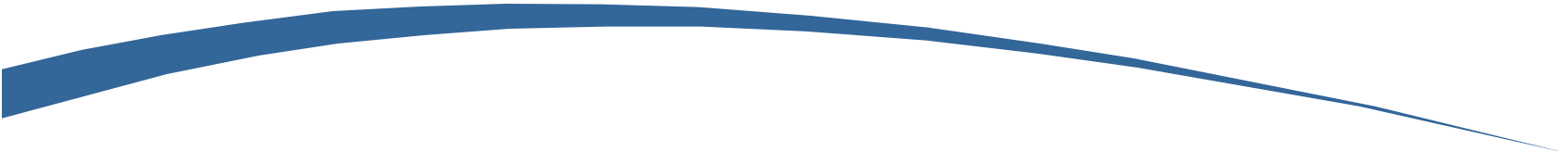


Factors influencing households' willingness to pay for improved services

- Other important factors influencing WTP:
 - Quantity of water consumed (higher water requirement, higher WTP)
 - Whether the respondent is the owner rather than tenant (WTP more for owners)
 - Whether current supply is adequate (WTP more if supply inadequate)
 - Whether the household is incurring expenses for maintenance of pipeline (WTP more for households incurring such expenses)
 - **Whether the household has invested in a borewell (low WTP if invested in borewell)**
 - Whether the household is currently getting water at high pressure (low WTP for improved services, if getting water at high pressure)

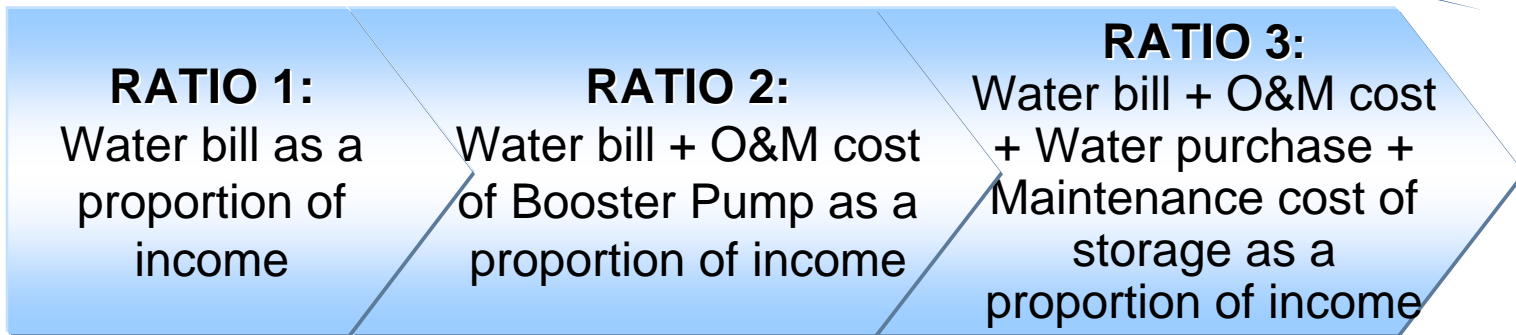


Affordability Analysis ...



Considerations underlying determination of affordability (continued)

- Major difficulty in applying this approach to Delhi is that a significant proportion of low income households are not paying any water bill
 - because they collect water from public sources, or
 - because they have their own source of water
- Therefore, to ascertain affordability, *80th percentile of the ratio in question among low income households (up to Rs 7000/month, accounting for 38% of sample)* has been taken.



POSSIBLE SCENARIOS:

Water supply improvements do not lead to savings in HH coping costs (eg. Continue to use Booster Pumps)

Water supply improvements enable most HHs to save O&M cost (electricity charge) of Booster Pumps

Improvements in water supply enable HHs to save O&M cost of Booster Pumps, cost of water purchased and maintenance cost of large storage



80th Percentile

(Low-income HHs): 2.4%

3.3%

3.7%



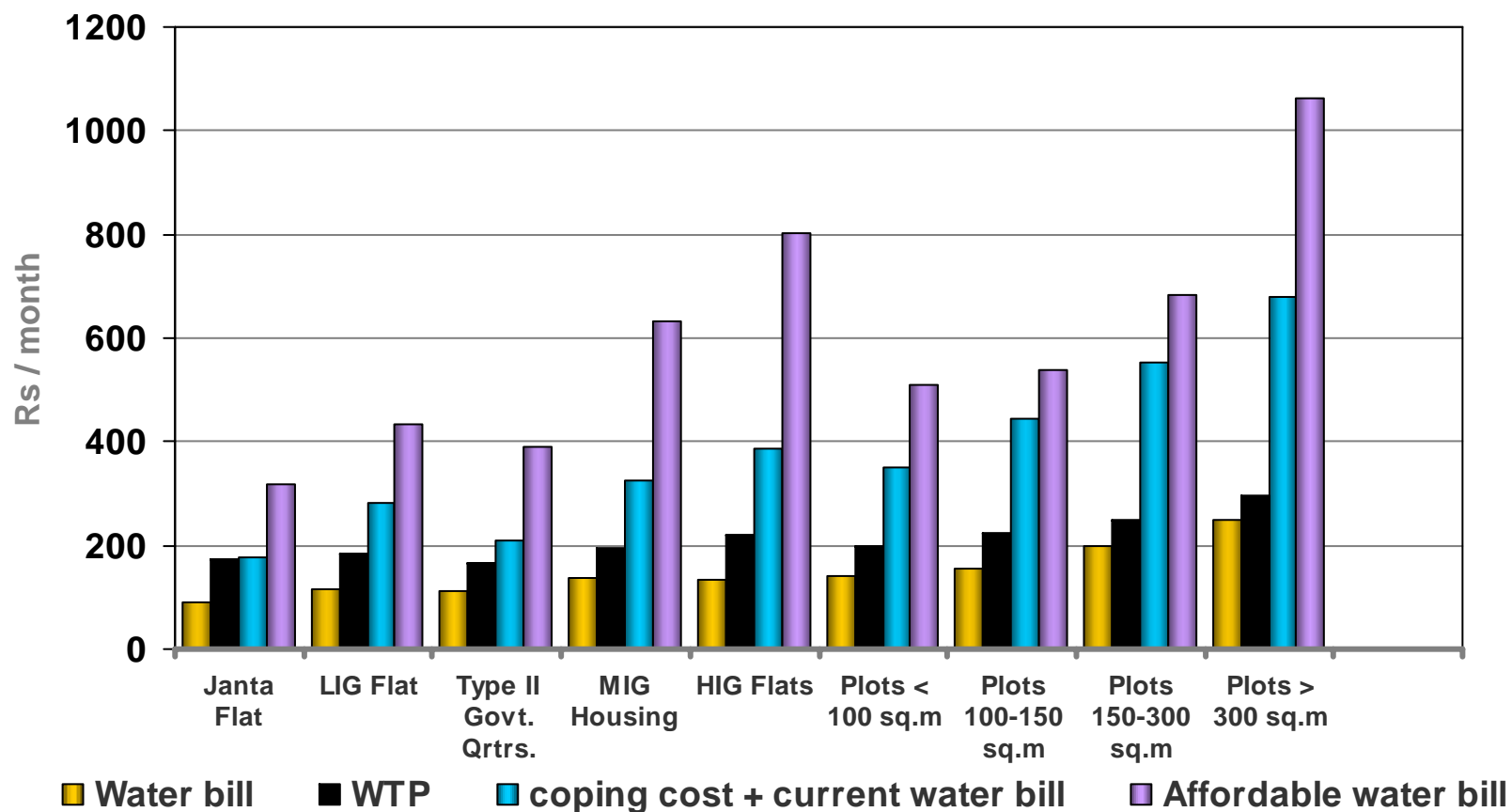
Findings of affordability analysis

- Among medium and high income households almost all can afford to pay water tariff high enough to cover cost of operations, interest and depreciation.
- Among low income households, about 68% can afford to pay water tariff of Rs 4/KL (+50% sewerage charge) which is high enough to cover operating cost.
- About 44% of low income households can afford to pay water tariff high enough to cover operating cost, interest and depreciation.

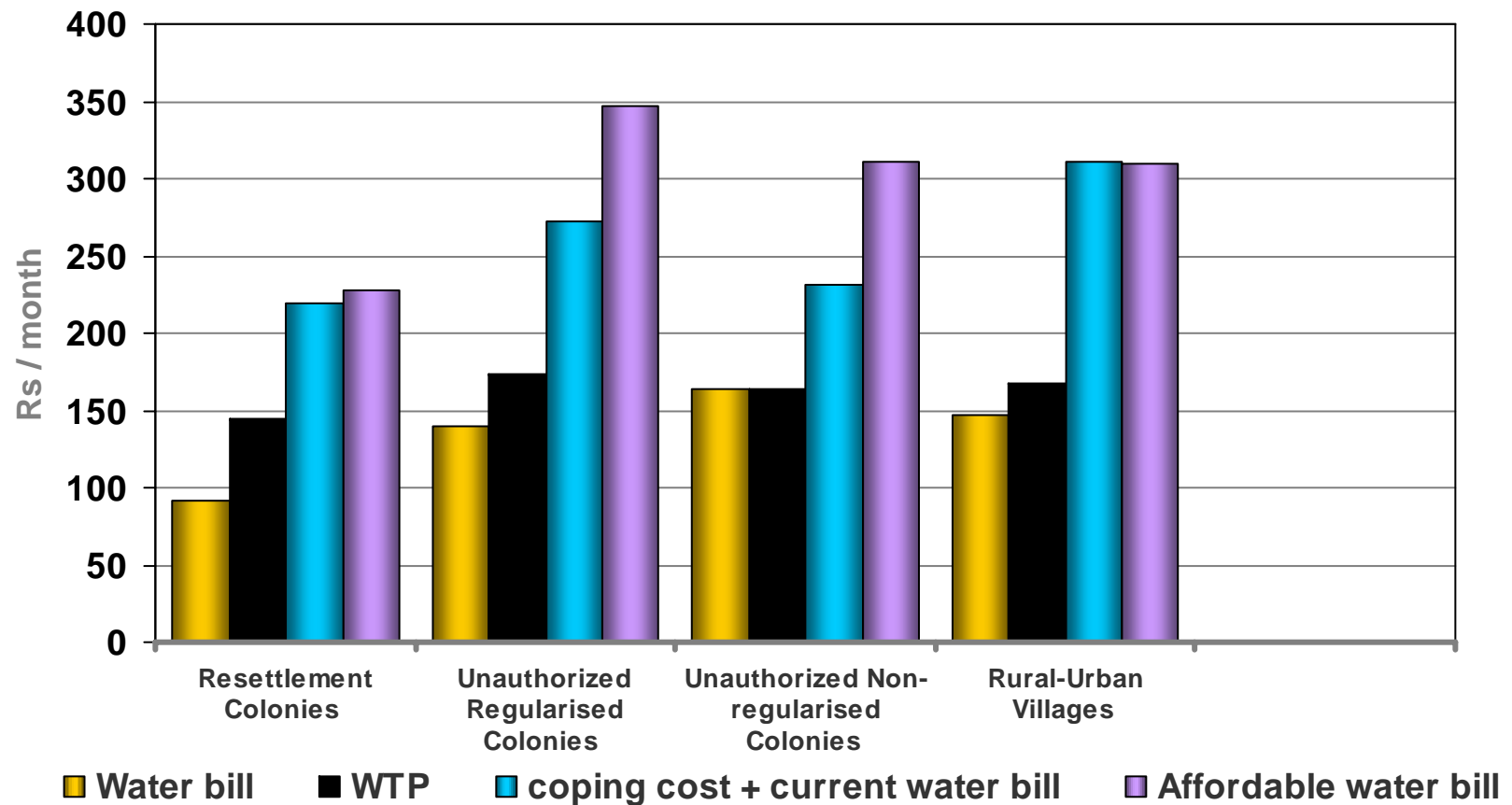


Key Findings ...

Comparison of Average Coping Cost, WTP and Affordability by household category, authorized colonies



Comparison of Average Coping Cost, WTP and Affordability by household category, underserved colonies





Recommendations to Delhi Jal Board

- Use of Survey information to design consumer feed-back indicators for monitoring improvements in DJB service performance
- Use of Coping Cost, WTP and Affordability information for Design of Tariffs
- Use of tariffs to reduce groundwater (borewell) consumption