Determinants of Access to Drinking Water in India

Sripad Motiram
Associate Professor, IGIDR
Lars Osberg
Professor, Dept. of Economics,
Dalhousie University

Motivation

- Water is a Basic Good
  - Drinking, Sanitation, Food Preparation
- Requirement
  - UNHCR – 15 liters/person/day
  - UNDP – 20 liters/person/day
- Lack of Universal Access in India
  - 16% (rural), 9.6% (urban) -1999
- Why do these HH not have access and face a burden?

Contributions/Main Findings

- Use ITUS to document burden of fetching water
- Determinants of access to water by controlling for HH and community level variables
- Simulations to assess the relative importance of various variables
- Determinants - Rural
  - MPCEX, Professional Status, Dependency Ratio
  - SC Proportion, Land Inequality, Income Inequality
  - Social Capital (Bridging and Bonding)
- Determinants - Urban
  - MPCEX, Professional Status, Laborer Status, Wealth Status, Dependency Ratio

Contributions/Main Findings

- SC Prop, ST Prop
- Social Capital (Bridging and Bonding)

- Policy Simulations – Rural
  - Land Inequality – biggest impact
  - Social Capital – modest impact
- Policy Simulations – Urban
  - Occup/Wealth Status – biggest impact
  - SC Prop – decent impact
  - Social Capital – modest impact

Time Use Data

- Original focus - Gender Inequalities
- Traditional Gender Division of Labor
  - Males – market work - in GDP
  - Females – HH Prod – No wage – no market value
- Major theme - Valuation of non-market Prod labor

Time Use Data (Continued…)

- Can be an important tool for development analyses
  - Data on market income & spending cannot reveal behavior of children, many women or very poor people
  - Crucial aspects of development process largely occur outside the market economy, but do use time:
    - H. Capital, Basic Goods, Environmental Degradation (Motiram and Osberg, 2008 a,b)
    - Can be linked to geo-coded social, economic and environmental variables

Time Use Data (Continued…)

- Standard Labor Force Survey
  - Retrospective & summative questions asked:
    - “How many hours do you normally work?”
    - Rounding, Anchoring, Inconsistency Problems
    - BUT - Large samples possible, low response burden
- Time Use Survey
  - Interviewer walks respondent through previous random day – in 10-15 minute intervals
    - Narrative spur to recall
      - Multiple activities + social context observable
    - Imposes consistency & completeness
      - Better measures of working hours?
    - Expensive - usually implies small samples
    - Episodic activities probabilistically observed
      - E.g. Expectation (dining out | characteristics)

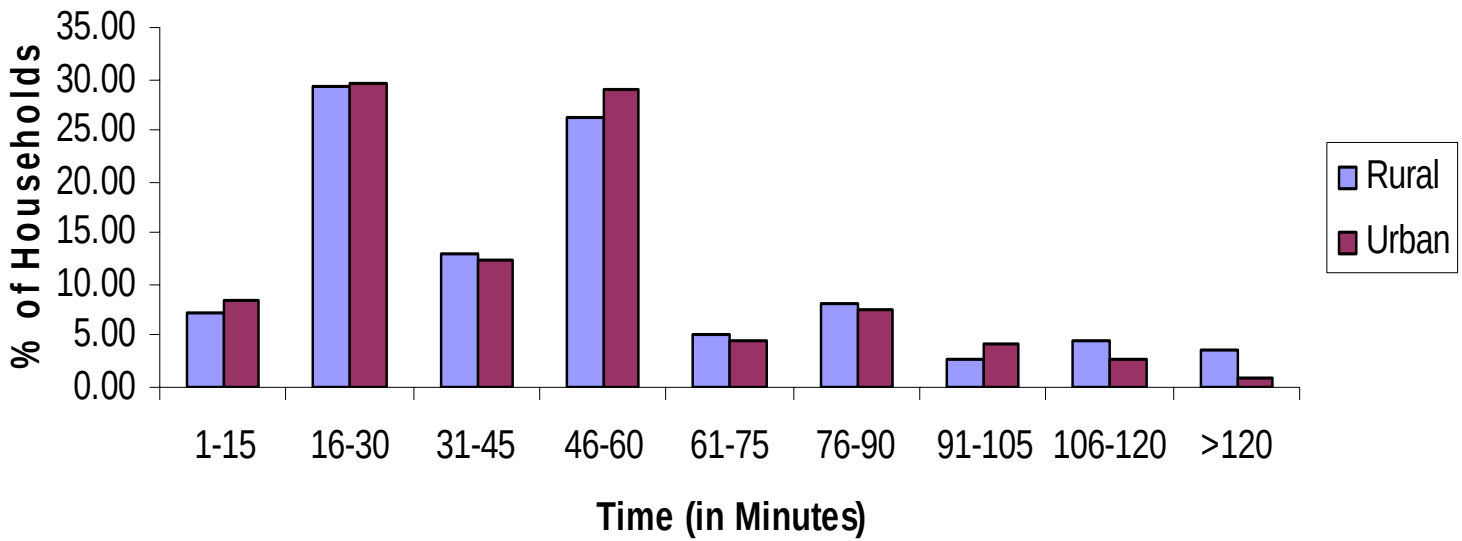
Indian Time Use Survey 98-99 (ITUS)

- Stratified Random Sampling (NSS)
  - 52 districts in 6 states
    - Haryana, Gujarat, TN, MP, Orissa and Meghalaya
    - Stratified by pop density & % SC/ST
- 18,592 Households
    - 12,751 in 1066 rural strata (12/village)
    - 5,841 in 488 urban strata
- 77,593 persons.
  - 53,981 rural, 23,612 urban.

ITUS (Continued…)

- Interview Method
  - 2 person teams of male, female interviewers; village or urban block for 9 days; time diaries for normal, abnormal and weekly variant days.
  - Diary of day's activities for all persons aged 6 and above
  - Comprehensive list of activities

Figure 1: Distribution of Time Spent by Households on Fetching Water



Water Collection Time

	Rural			Urban			
	% of total water collection time	Relative probability of water collection	Average Time if Collected	% of total water collection time	Relative Probability of Water Collection	Average Time if Collected	% of all Rural (urban) Residents
	R1	R2	R3	U1	U2	U3	POP
Age and Gender:							
Boys (6-14 yrs)	1.3%	0.123	48.46	0.4%	0.048	42.19	10 (8.9)%
Men (>14 yrs)	7.0%	0.199	39.96	10.9%	0.278	39.80	41.4 (43.2)%
Girls (6-14 yrs)	4.8%	0.578	50.13	2.0%	0.278	36.03	8.6 (7.8)%
Women (>14 yrs)	86.9%	2.102	47.06	86.7%	2.036	43.06	40 (40.2)%
	100%			100%			100 (100.1)%

Water Collection Time

	Rural			Urban			
	% of total water collection time	Relative probability of water collection	Average Time if Collected	% of total water collection time	Relative Probability of Water Collection	Average Time if Collected	% of all Rural (urban) Residents
	R1	R2	R3	U1	U2	U3	POP
Caste Group:							
Scheduled Tribe	9.1%	0.114	55.17	4.7%	0.823	58.33	17.7 (4.4)%
Scheduled Caste	27.4%	1.020	47.99	8.4%	1.104	38.77	18.1 (9.8)%
Others	63.6%	0.978	45.08	86.9%	0.999	42.30	64.3 (85.9)%
	100.1%			100%			100.1 (100.1)%

Determinants of Access to Water

- HH characteristics
  - e.g. income, caste, wealth etc.
- Community characteristics
  - Alesina and La Ferrarra (2005), Habarimana et al. (2005), Sen and Dreze (2002), Easterly (2003)
  - District level used
  - Discrimination, Collective Action

Determinants (Continued …)

- Social Capital
  - Knack and Keefer (1997), Narayan and Pritchett (1999 a,b)
  - Harriss (2002), Mogues and Carter (2005)
  - Avg. male time/district on socialization, community activities, group activities
- Ground water availability at state level
- Time – an essential input into social capital formation activities

Determinants (Continued …)

- Probit Model of the probability that a HH fetches water
  - Bootstrapping to deal with variability in small samples
- Various Robustness checks
  - Different measures of inequality
  - Different controls
  - Different levels at which community & social capital variables are computed

Determinants (Continued …)

- Rural
  - MPCEX, Professional Status, Dependency Ratio
  - SC Prop, Land Inequality, Income Inequality
  - Soc. Cap
    - Comm Time (Bridging), Group Time (Bonding)
- Urban
  - MPCEX, Professional Status, Laborer Status, Wealth Status, Dependency Ratio
  - SC Prop, ST Prop
  - Soc. Cap
    - Comm Time (Bridging), Group Time (Bonding)

Policy Simulations

- Rural
  - Land Inequality – biggest impact
  - Social Capital – modest impact
- Urban
  - Occup/Wealth Status – biggest impact
  - SC Prop – decent impact
  - Social Capital – modest impact

Policy Simulations

	Rural	Urban
Probability that a household fetches water (in the sample)	0.1858	0.1151
Increase in probability of fetching water due to:		
i) A policy of completely egalitarian land redistribution	-0.081 (43.4%)	Not considered in the regression
ii) Change from non-professional to professional status	-0.032 (17.2%)	-0.027 (23.5%)
iii) Increase in monthly per-capita expenditure		
a) 10% increase	-0.004 (2.05%)	-0.006 (5.47%)
b) 20% increase	-0.008 (4.08%)	-0.012 (10.8%)
iv) Ownership of homestead	Not Significant	-0.101 (88.1%)
v) Change from non-professional to professional status and 20% increase in expenditure and (in urban areas) homestead ownership	-0.039 (20.8%)	-0.117 (101.76%)
vi) Decrease in percentage of Scheduled Caste individuals in the district from median to zero	-0.027 (14.5%)	-0.034 (29.1%)
vii) Decrease in percentage of Scheduled Tribe individuals from median to zero	-0.001 (0.7%)	-0.008 (6.58%)
viii) Doubling the average time spent on social activities	-0.029 (15.68%)	-0.017 (15.04%)
ix) Doubling average time on community organized work	-0.014 (7.43%)	-0.009 (7.71%)
x) Doubling the average time spent on group activities	0.035 (19.18%)	0.014 (12.18%)

Conclusions and Limitations

- Cleavages emphasized in the traditional ("older") development literature matter
- Social capital can go either way
- Were able to obtain district names recently (by using 1991 Census)
  - Can get better estimates using these.
- Proof of causality? very hard in non-experimental life
    - cross-sectional correlations "*are consistent with*

Thank You