Infrastructure and Inequality: Does Transition Matter?

Sumedha Bajar

Assistant Professor

NIAS-UNDP Policy Research Initiative for Inequality and Human Development

National Institute of Advanced Studies

Bengaluru, India

INFRASTRUCTURE & INEQUALITY

- Development of infrastructure increases inequality
  - Bajar and Rajeev (2016), Brekman et al (2002); Banerjee (2004); Khandker et al (2007)
- Impact Not even across types of infrastructure
  - Education and Health reduces inequality
  - Roads and electricity increases inequality
- Also affected by aggregation
  - Rural-urban
    - Village level relation with electricity

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TYPES OF TRANSITION

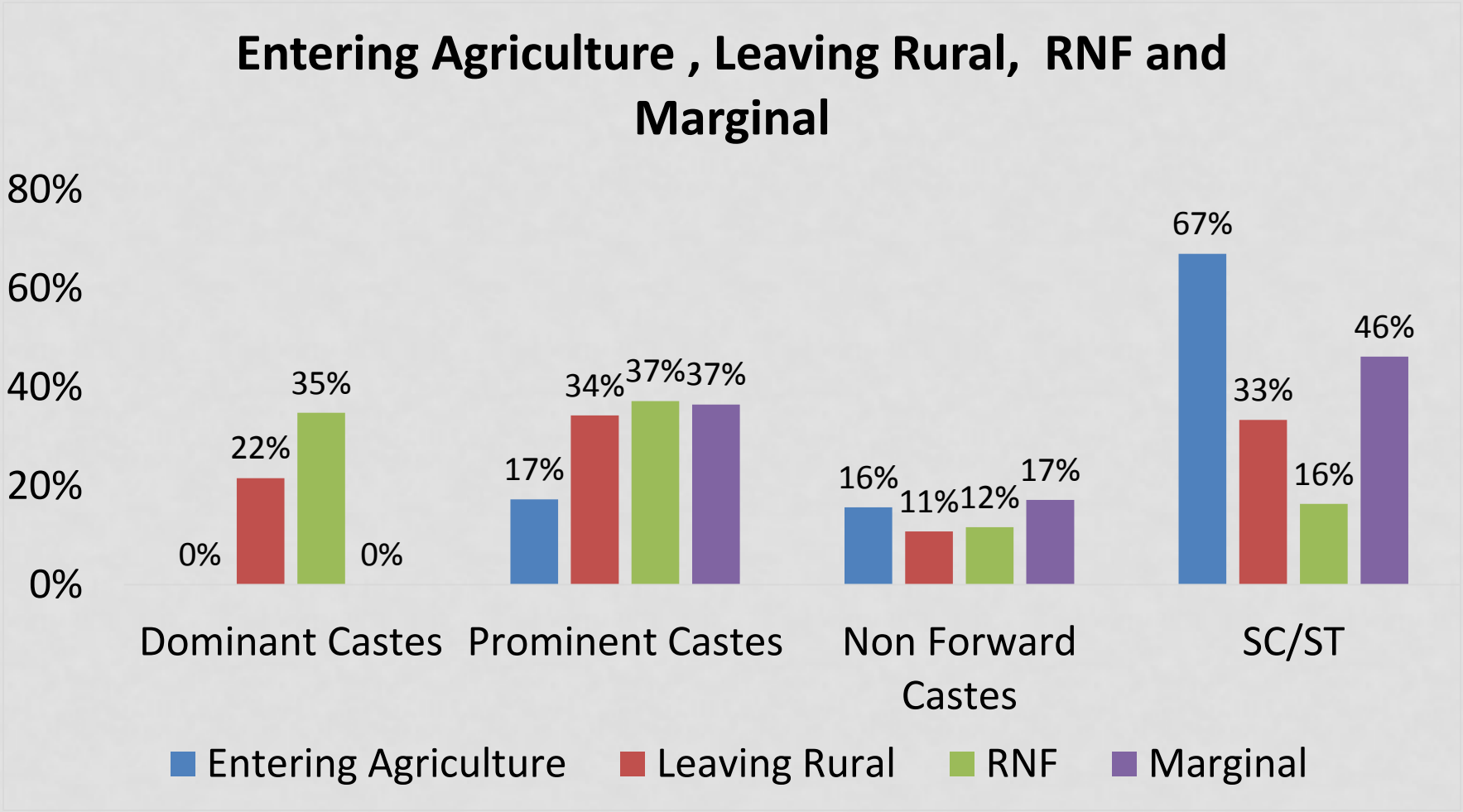
- **Changes in occupational structure***
  - ✓ Entering into agriculture
  - ✓ Movement out of agriculture but working within rural areas – Rural Non-Farm
  - ✓ Movement out of agriculture and rural area
  - ✓ Movement out of agriculture, increase in Marginal workers
- **Regional differences within national picture of movement away from agriculture**
- **Inequality within the transition categories**

*Based on ongoing study sponsored by Tata Consultancy Services

INEQUALITY - DISTANCE FROM POVERTY

Transition Pattern	GINI Index Value	Coefficient of Variation
Entering agriculture	0.74	2.44
Rural Non-Farm	0.58	1.42
Moving Out of rural	0.66	1.72
Increase in Marginal work	0.70	1.90

SOCIO-ECONOMIC INEQUALITIES: CASTE INEQUALITIES

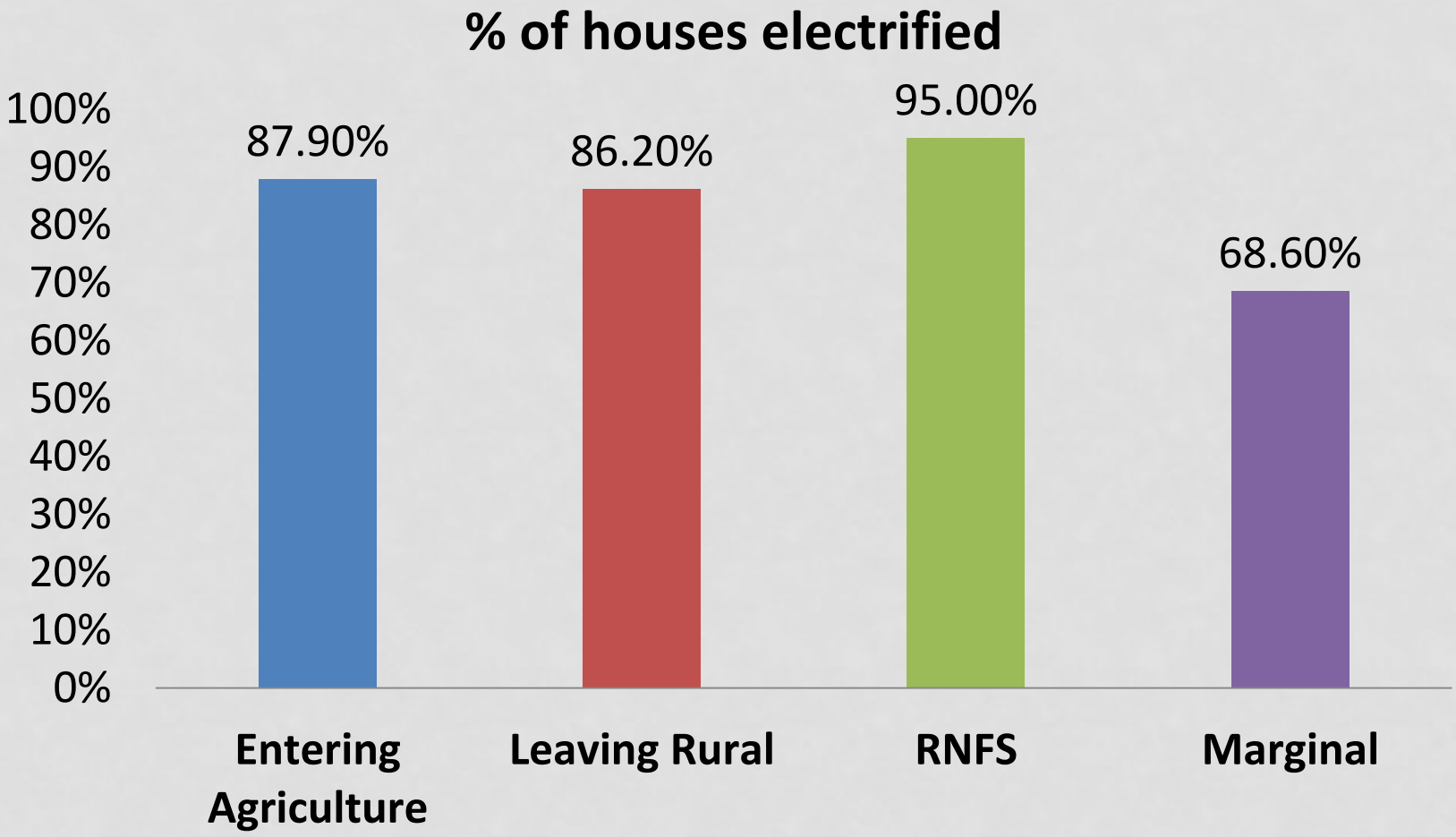


SOCIO-ECONOMIC INEQUALITIES: GENDER INEQUALITIES

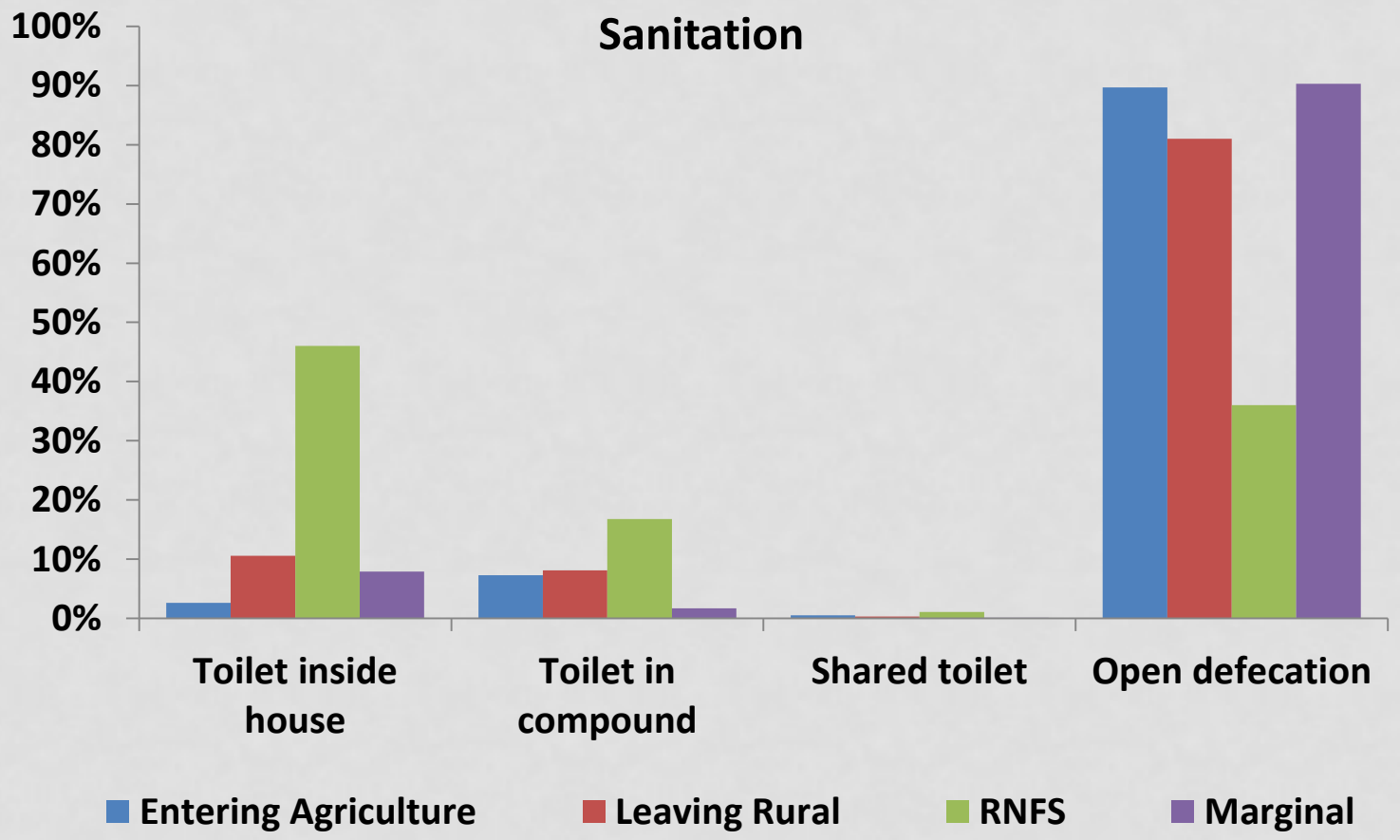
Proportion of Households where women do as well or better than the men

Transition Pattern	Education	Workforce
Entering agriculture	40%	72%
Rural Non-Farm	29%	52%
Moving Out of rural	34%	34%
Increase in Marginal worker	41%	29%

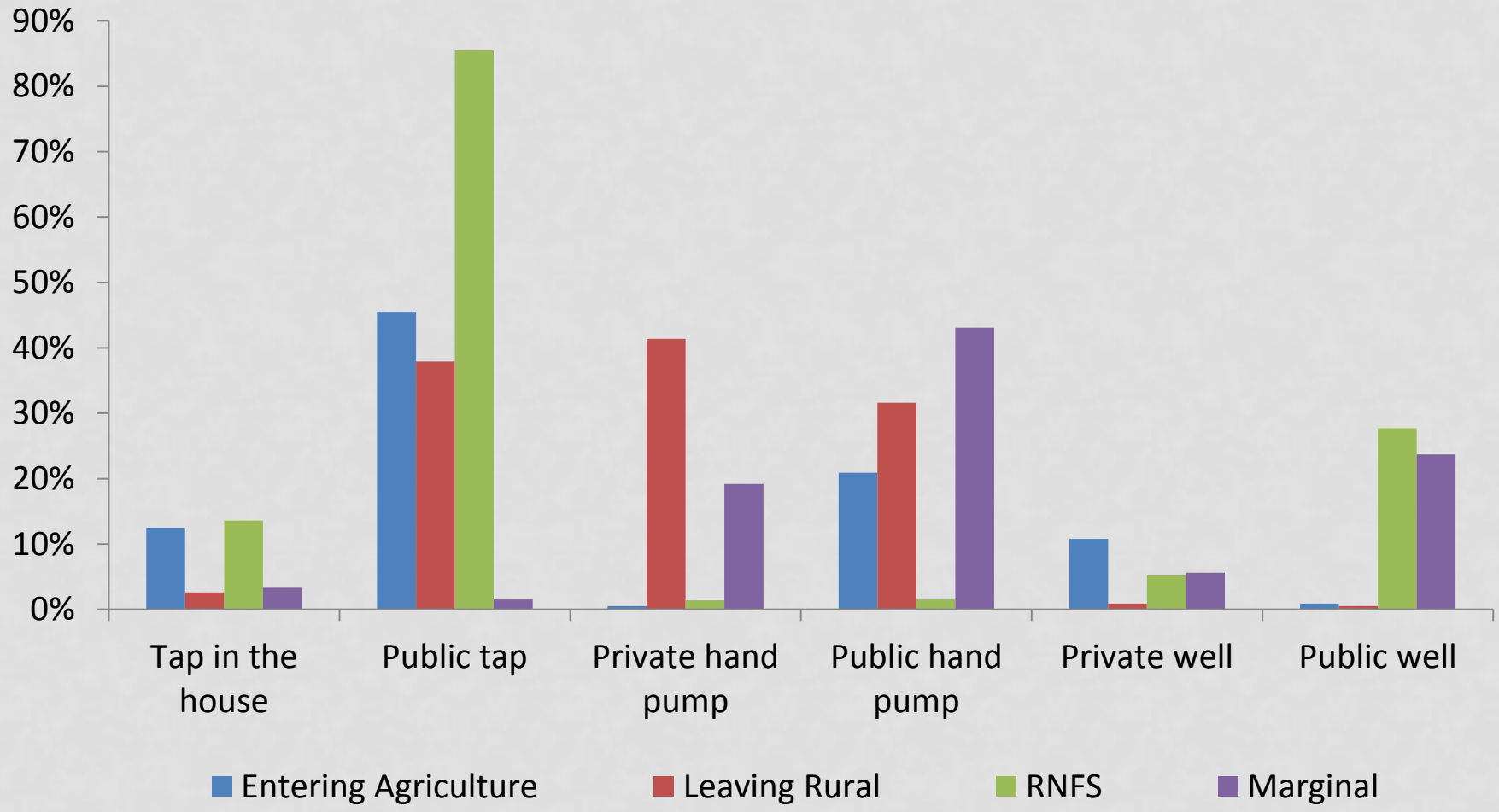
ELECTRIFICATION



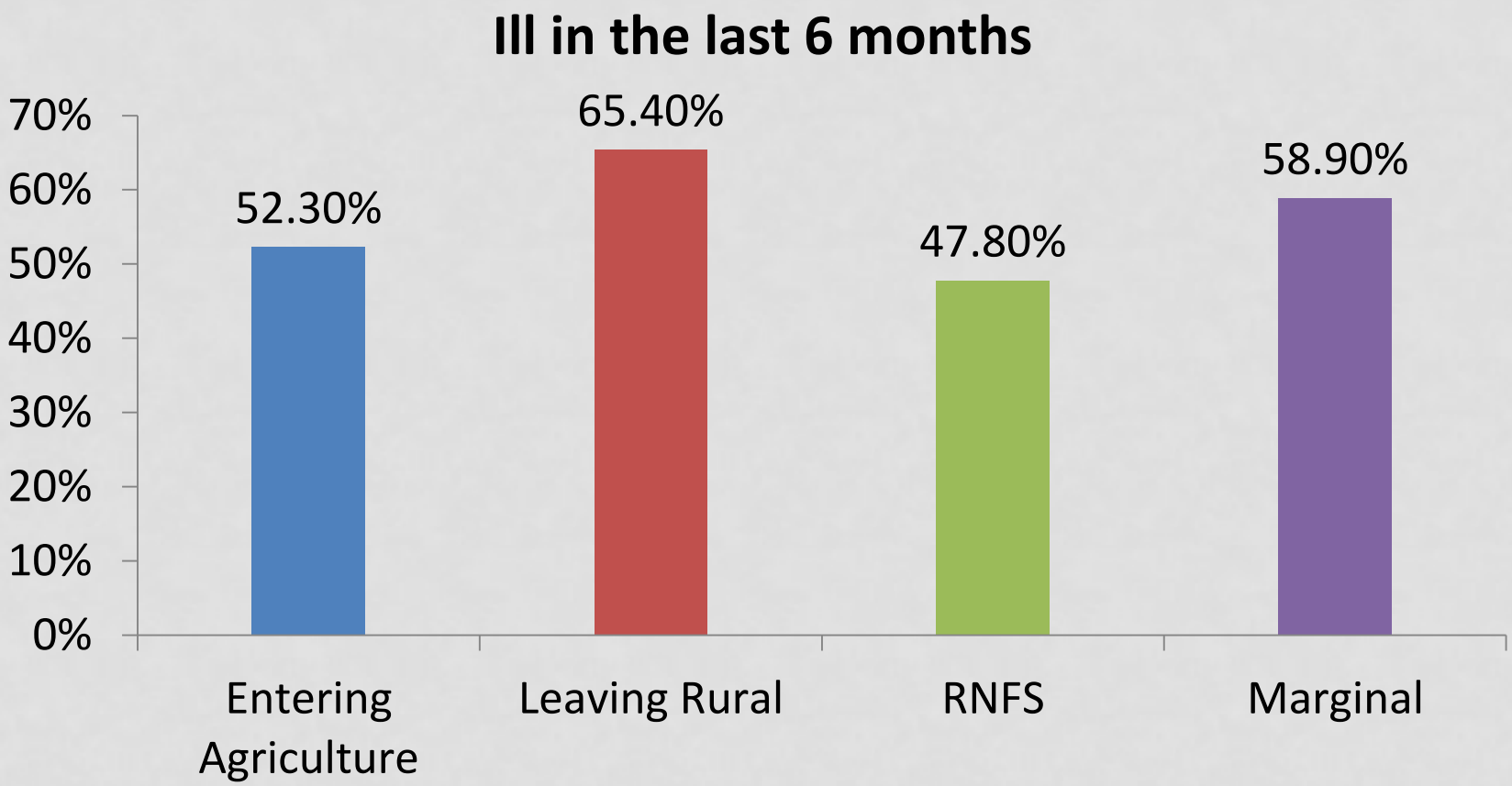
SANITATION


Sanitation
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Toilet inside house
Toilet in compound
Shared toilet
Open defecation
Entering Agriculture
Leaving Rural
RNFS
Marginal

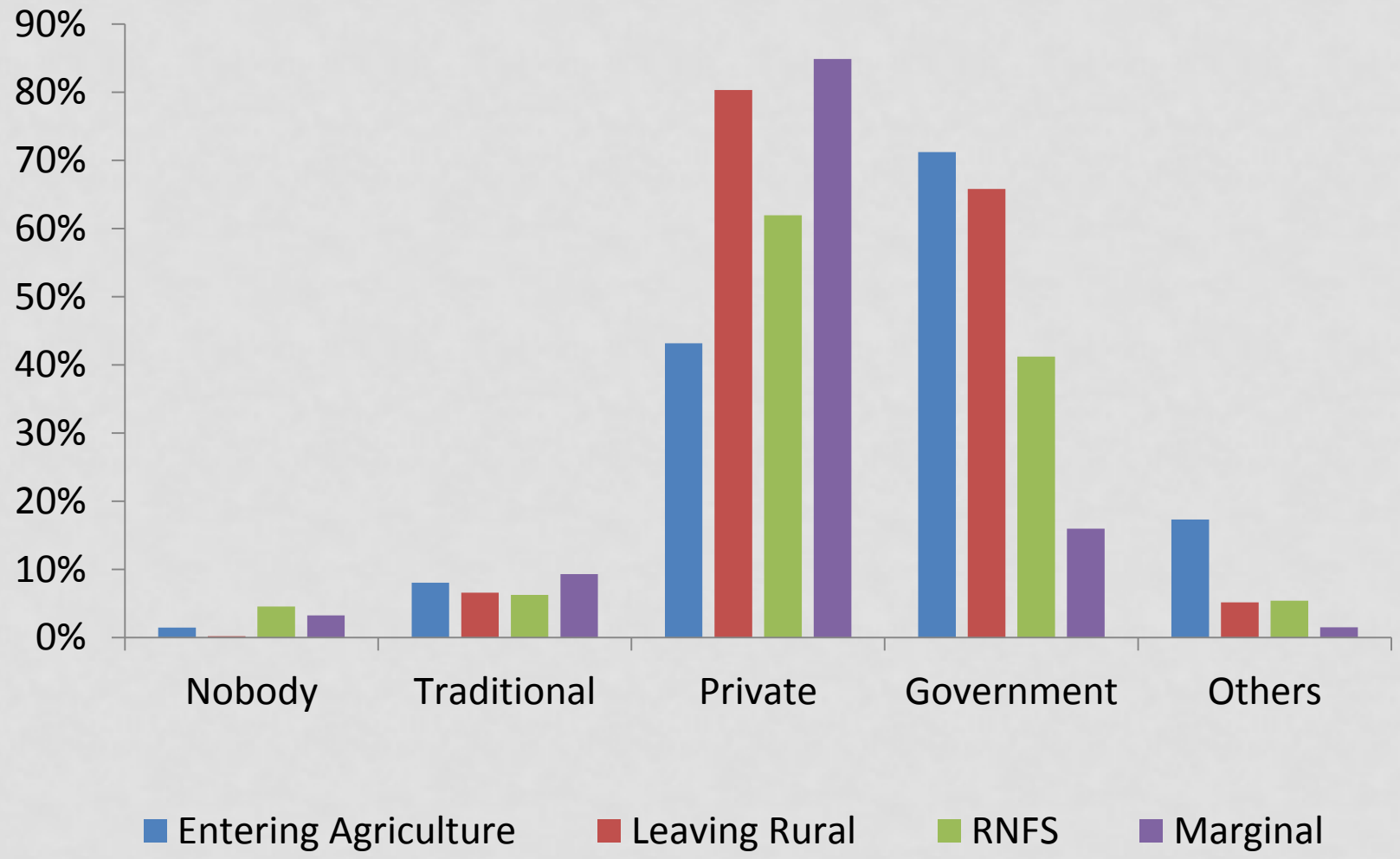
SOURCE OF DRINKING WATER



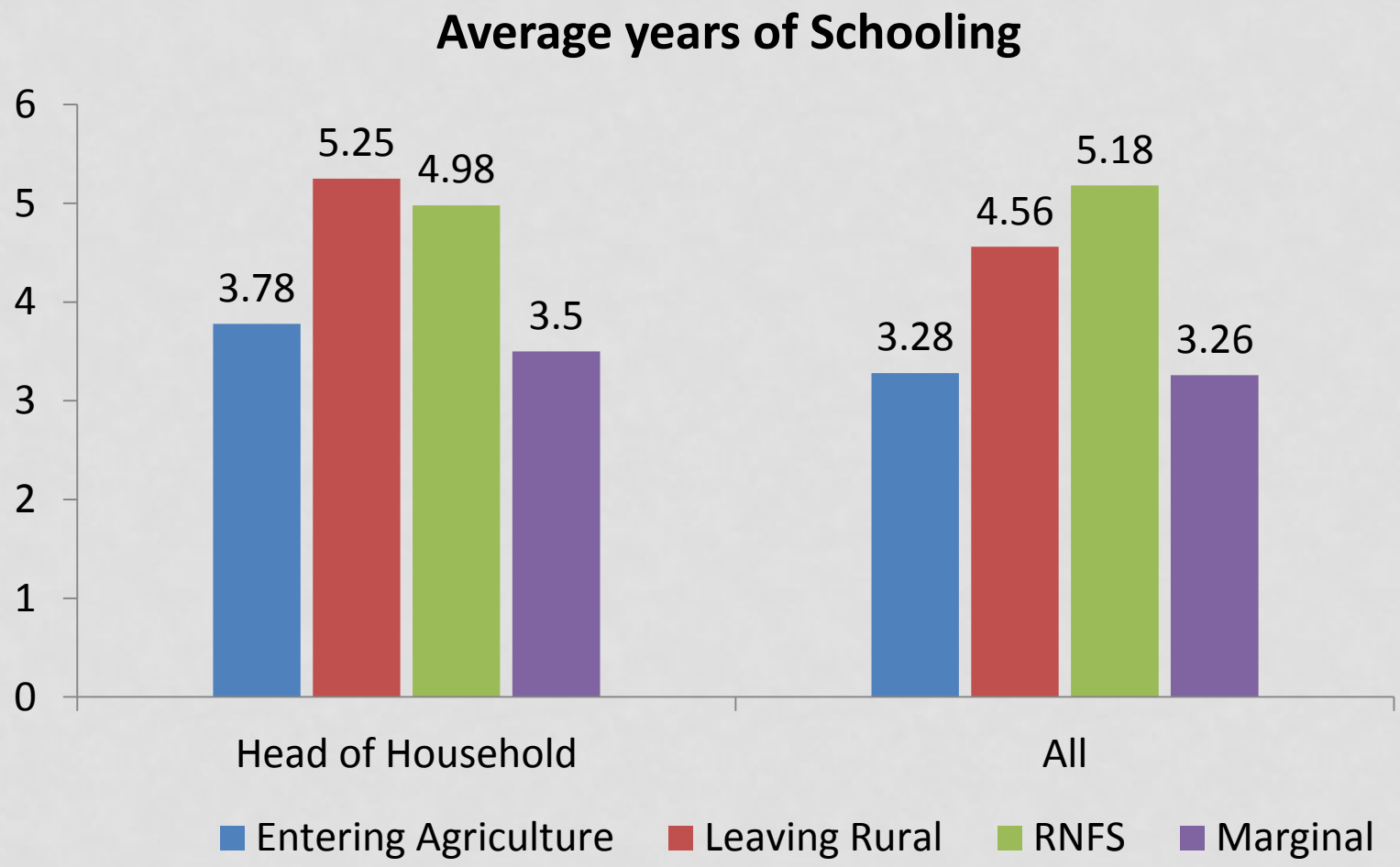
HEALTH


Ill in the last 6 months
70%
60%
50%
40%
30%
20%
10%
0%
52.30%
65.40%
47.80%
58.90%
Entering Agriculture
Leaving Rural
RNFS
Marginal

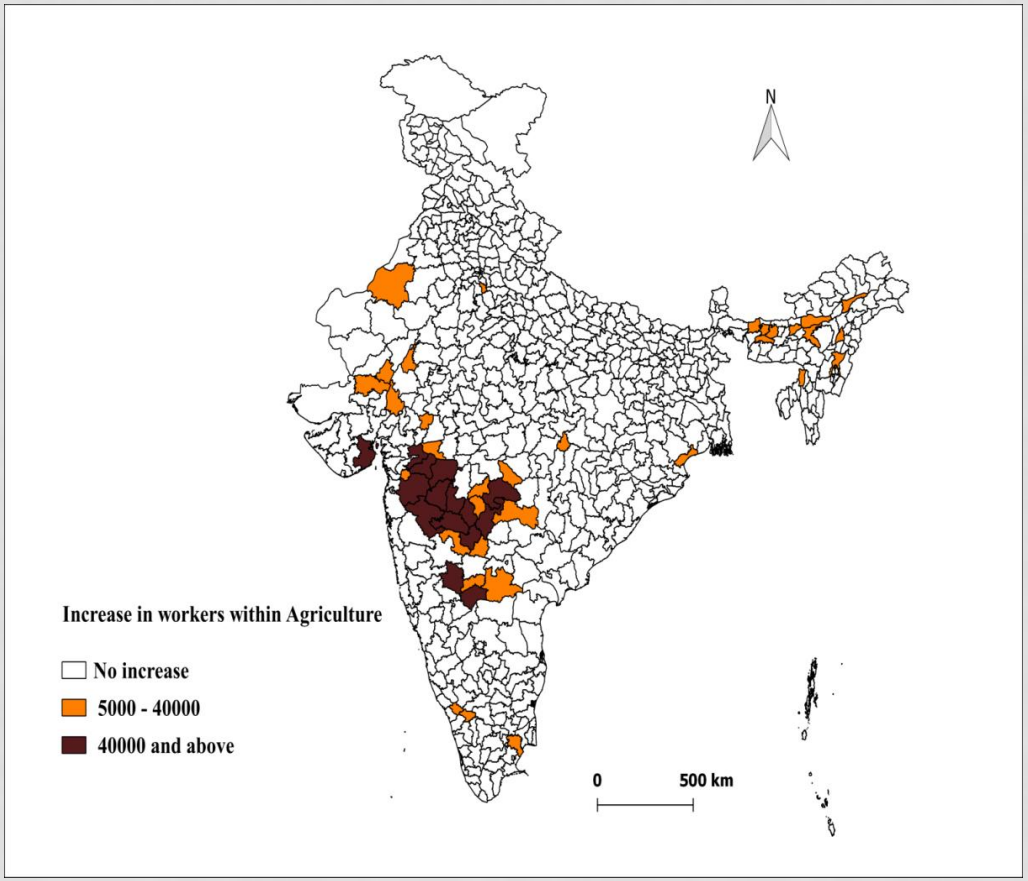
HEALTH


90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Nobody
Traditional
Private
Government
Others
Entering Agriculture
Leaving Rural
RNFS
Marginal

EDUCATION

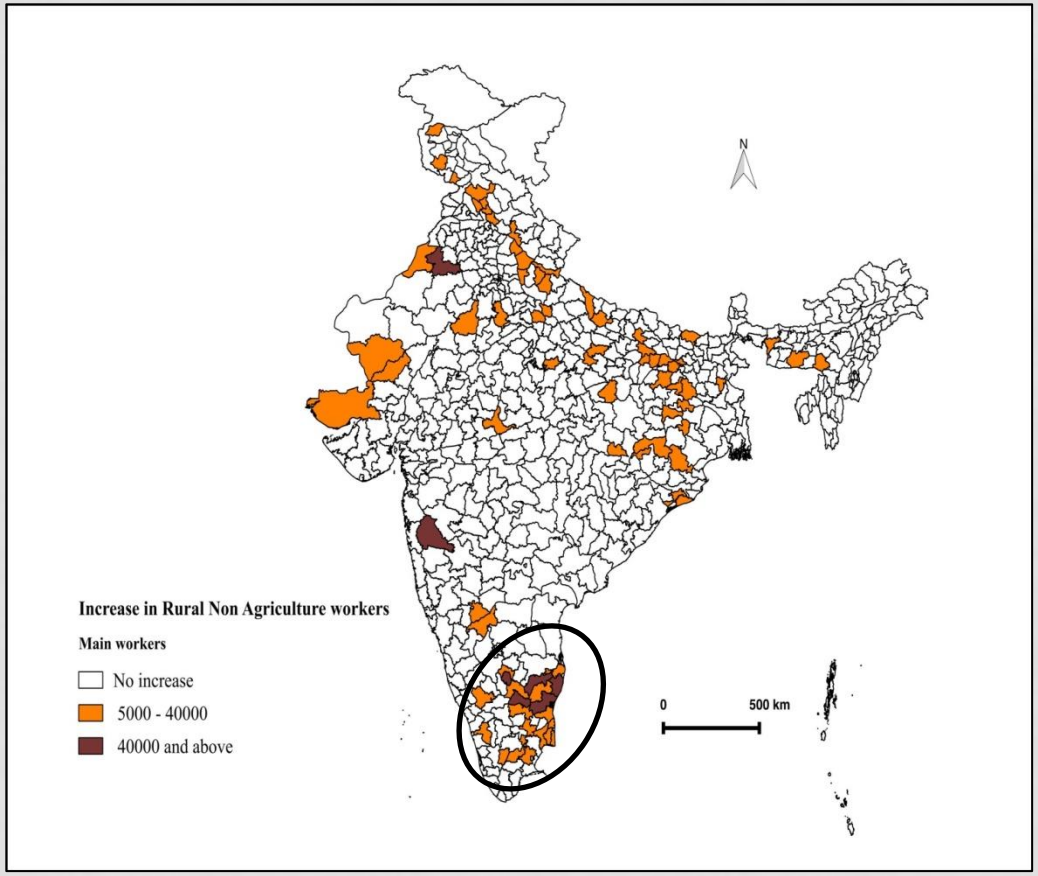

Average years of Schooling
6
5
4
3
2
1
0
3.78
5.25
4.98
3.5
3.28
4.56
5.18
3.26
Head of Household
All
Entering Agriculture
Leaving Rural
RNFS
Marginal

1. MOVEMENT INTO AGRICULTURE



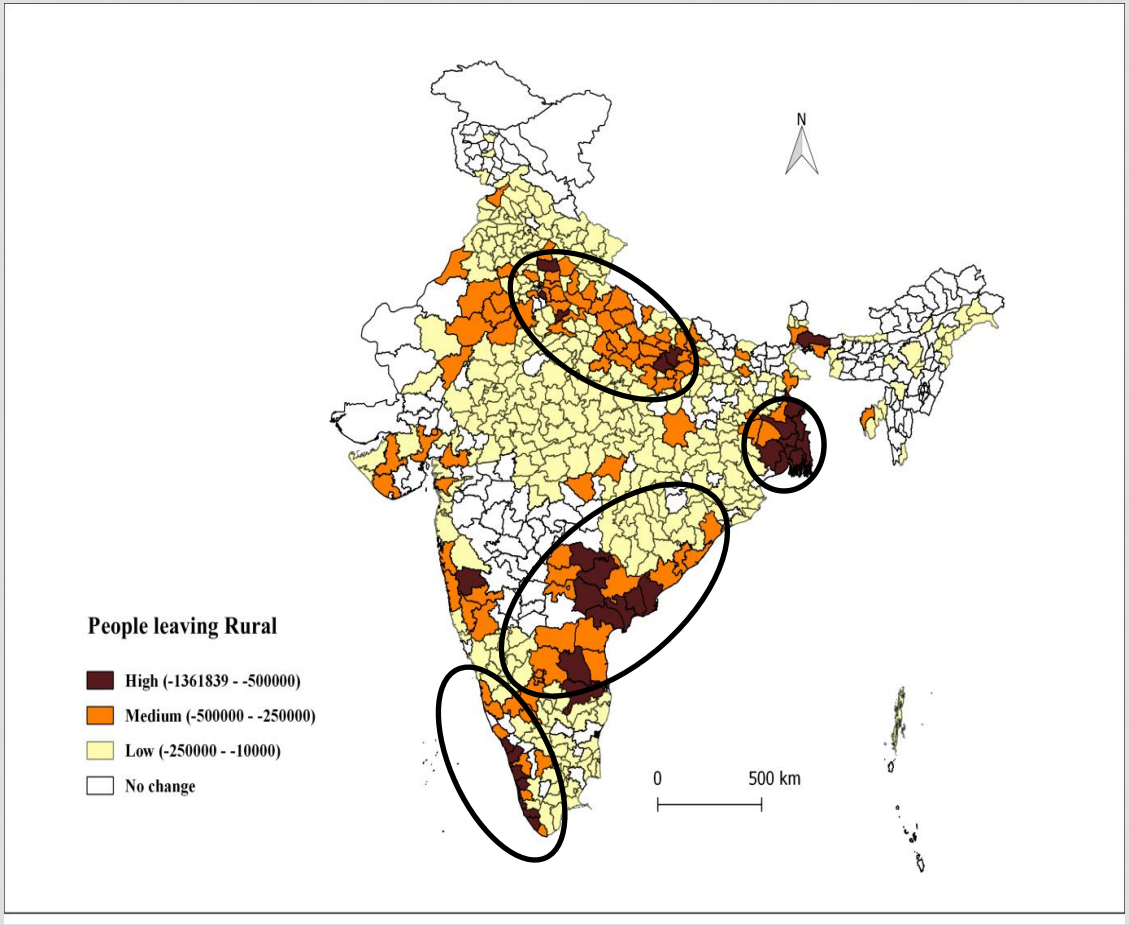
- 48 districts – spread across
- Contiguous area with more than 40,000 workers entered agri
- High inequality -two regions
- Gender : equal workforce participation, low education
- Open defecation
- Use of public tap
- Healthy
- Low schooling

2. MOVEMENT OUT OF AGRICULTURE BUT WORKING WITHIN RURAL AREAS – RURAL NON-FARM



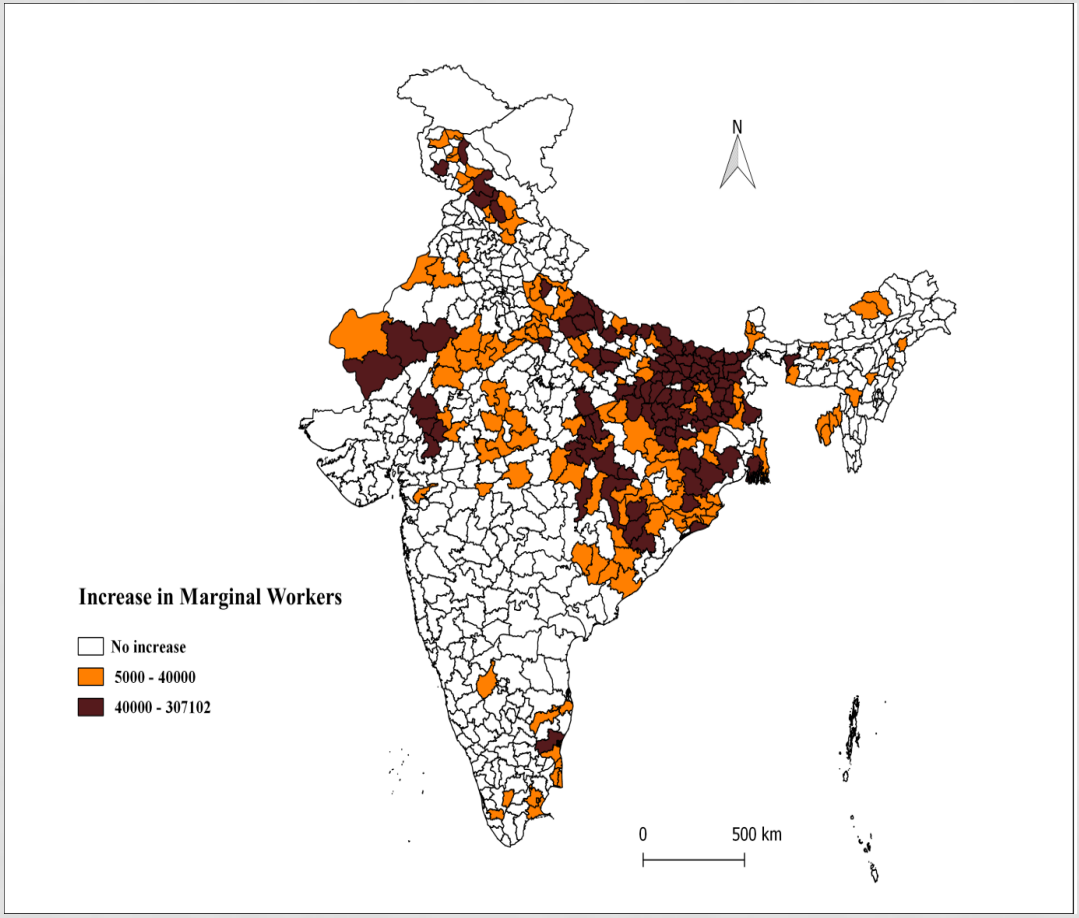
- 78 districts (more than 5000 workers)
- No simple relationship with development
- Lowest inequality
- Infrastructure distribution – best amongst 4

3. MOVEMENT OUT OF AGRICULTURE AND RURAL AREA



- Lower inequality
- Dominant, Prominent castes left behind in village
- Less educated women and less workforce participation
- Open defecation
- Poor health and water

4. MOVEMENT OUT OF AGRICULTURE, INCREASE IN MARGINAL WORKERS



- High inequality
- Infrastructure distribution – poor


THANK YOU

ECONOMETRIC ANALYSIS

- For testing the impact of infrastructure development on inequality in India, Gini coefficient has been used as dependent variable. Panel Data – Random Effects
- As the value of Gini lies between 0 and 1, we calculate the (log) odds ratio of Gini coefficients (as this will give a normal-distribution of the error term)

$$\ln(G) = \beta_0 + \beta_1 X + \beta_2 I + \varepsilon_{it}$$

G represents the odds ratio of Gini coefficient; X represents the matrix of basic controls based on previous work by Calderon and Serven (2004), Chong (2004) and others; and **I** represents the matrix of variable interest for this paper, that is, measures of infrastructure variables

Dependent Variable	LogOdds (1)	LogOdds (2)	LogOdds (3)	LogOdds (4)	LogOdds (5)
lnPCNSDP	-1.75	-1.75	-1.67	-1.82	-1.73
	(0.67)	(0.62)	(0.66)	(0.67)	(0.63)
Sq(lnPCNSDP)	0.10	0.10	0.10	0.10	0.10
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Mod Sec/NSDP	0.67	0.50	0.68	0.75	0.49
	(0.26)***	(0.25)***	(0.26)***	(0.26)***	(0.25)**
lnPCSocX	-0.09	-0.07	-0.07	-0.10	-0.07
	(0.04)***	(0.03)***	(0.03)***	(0.04)***	(0.03)***
Lnelec	0.02				-0.00
	(0.05)				(0.05)
Lnroad		0.10			0.10
		(0.03)***			(0.03)***
LnRail			0.02		
			(0.03)		
lntele				0.01	
				(0.01)	
Constant	6.74	6.56	6.2	7.24	6.47
	(3.31)***	(3.10)***	(3.28)***	(3.39)***	(3.16)***
Observations	85	85	85	85	85
R-squared	0.43	0.52	0.50	0.49	0.52

Infrastructure stocks and Consumption Inequality: For High Income States

Dependent Variable	LogOdds (1)	LogOdds (2)	LogOdds (3)	LogOdds (4)	LogOdds (5)
Mod Sec/NSDP	0.77	0.40	0.66	0.67	0.50
	(0.28)***	(0.30)	(0.32)***	(0.31)***	(0.27)***
lnPCSocX	0.05	0.00	0.03	-0.04	0.06
	(0.04)	(0.02)	(0.03)	(0.05)	(0.03)
Lnelec	-0.06				-0.11
	(0.05)				(0.05)
Lnroad		0.15			0.17
		(0.49)***			(0.05)***
LnRail			0.01		
			(0.06)		
lntele				0.02	
				(0.01)	
Constant	-1.27	-1.95	-1.40	-1.01	-1.34
	(0.15)***	(0.21)***	(0.21)***	(0.23)***	(0.19)***
Observations	45	45	45	45	45
R-squared	0.45	0.50	0.41	0.46	0.61

Table 4: Infrastructure stocks and Consumption Inequality: For Low Income States

Dependent Variable	LogOdds	LogOdds	LogOdds	LogOdds	LogOdds
	(1)	(2)	(3)	(4)	(5)
Mod Sec/NSDP	0.64	0.54	0.66	0.50	0.76
	(0.39)*	(0.36)	(0.38)**	(0.48)	(0.41)**
lnPCSocX	-0.15	-0.05	-0.02	-0.04	-0.21
	(0.06)***	(0.03)	(0.03)	(0.08)	(0.05)***
Lnelec	0.21				0.26
	(0.06)***				(0.04)***
Lnroad		0.11			0.10
		(0.05)***			(0.02)***
LnRail			0.02		
			(0.04)		
lntele				0.01	
				(0.02)	
Constant	-1.44	-1.47	-1.22	-0.97	-1.8
	(0.15)***	(0.19)	(0.17)***	(0.32)***	(0.16)***
Observations	40	40	40	40	40

CHANNELS (Talk about these in that paper in detail)

- Increase access to productive opportunities
- reduces production and transaction costs
- leads to industrial or agro-industrial development
- raises the value of assets of the poor.
- By expanding geographic access, enhances labour mobility
- Communication infrastructure can ease the information flow
- Develop human capital - productivity levels - earning capabilities and social welfare (Agenor and Moreno-Dodson, 2006)
- Electrification programs in rural areas had an impact on employment, especially female employment, was studied by Dinkelman (2011).

Assuming, all sections of populations benefit equally from infrastructure

- Infrastructure built in areas that are already abundant in physical and human capital, which also have a larger potential could then adversely affect inequality. (Brakman. 2002; Banerjee, 2004; Khandker and Koolwal, 2007)

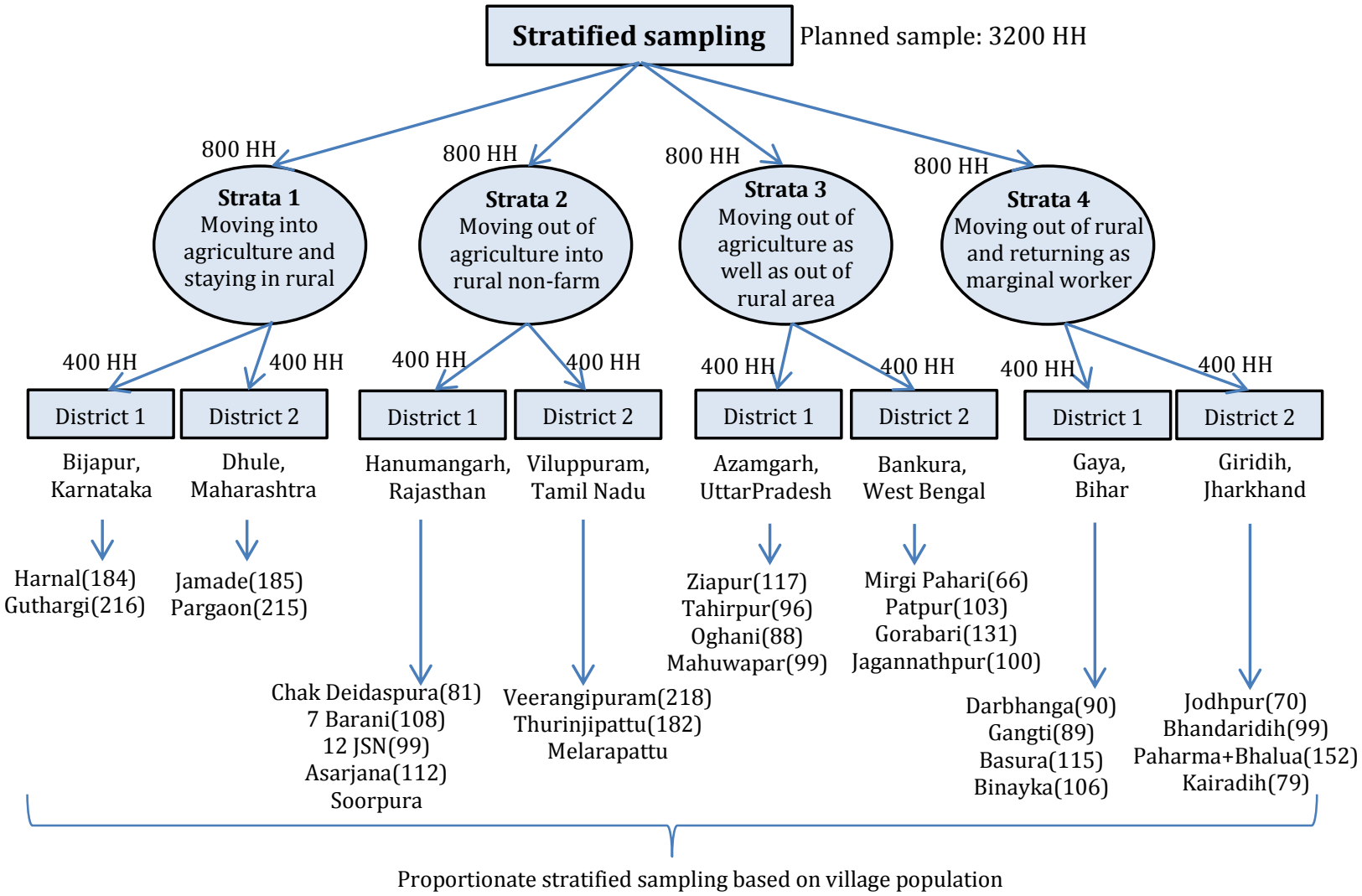
The natural reluctance of private investors in rural infrastructure projects has been based on not only no or low returns to their capital but also uncertainties and delays involved in realising anticipated revenue from the poverty-stricken users. This shying away syndrome of private capital from rural ‘unprofitable’ projects has been observed, in this paper, for such critical sectors as sanitation, drinking water, roads and housing. Whereas the role of the state remains crucial in promoting these sectors

The relative position of the states regarding different infrastructure indices show that the hierarchy has remained fairly similar over time – with the same states retaining the top and bottom positions.

This can be used to explain why we are not undertaking another ecotrx exercise for rural but in fact looking at more dynamic process-transition and considering inequality and infras within that

introduces the Nighttime Lights (NTL) ‘luminosity’ data set (for districts in the 12 largest states in the country), to be used as a proxy for economic activity. Do districts within each state experience income convergence? The paper tests this hypothesis by correlating state luminosity data with state GDP figures (which illustrates posAbstract itive results, as expected) and the Barro and Sala-i-Martin tests show comparable divergence patterns across states using the luminosity data set, as they do with state GDP figures. Further, using luminosity data, it is apparent that intra-state divergence across districts is as significant as inter-state economic divergence. The analysis reveals that the districts of 10 out of the 12 largest states

exhibit divergence within the state.


Stratified sampling
Planned sample: 3200 HH
800 HH
800 HH
800 HH
800 HH
Strata 1
Moving into agriculture and staying in rural
Strata 2
Moving out of agriculture into rural non-farm
Strata 3
Moving out of agriculture as well as out of rural area
Strata 4
Moving out of rural and returning as marginal worker
400 HH
400 HH
400 HH
400 HH
400 HH
400 HH
400 HH
400 HH
District 1
District 2
District 1
District 2
District 1
District 2
District 1
District 2
Bijapur, Karnataka
Dhule, Maharashtra
Hanumangarh, Rajasthan
Viluppuram, Tamil Nadu
Azamgarh, UttarPradesh
Bankura, West Bengal
Gaya, Bihar
Giridih, Jharkhand
Harnal(184)
Guthargi(216)
Jamade(185)
Pargaon(215)
Chak Deidaspura(81)
7 Barani(108)
12 JSN(99)
Asarjana(112)
Soorpura
Veerangipuram(218)
Thurinjipattu(182)
Melarapattu
Ziapur(117)
Tahirpur(96)
Oghani(88)
Mahuwapar(99)
Mirgi Pahari(66)
Patpur(103)
Gorabari(131)
Jagannathpur(100)
Darbhanga(90)
Gangti(89)
Basura(115)
Binayka(106)
Jodhpur(70)
Bhandaridih(99)
Paharma+Bhalua(152)
Kairadih(79)
Proportionate stratified sampling based on village population