

Understanding the Pattern of Work Travel in India using the Census Data

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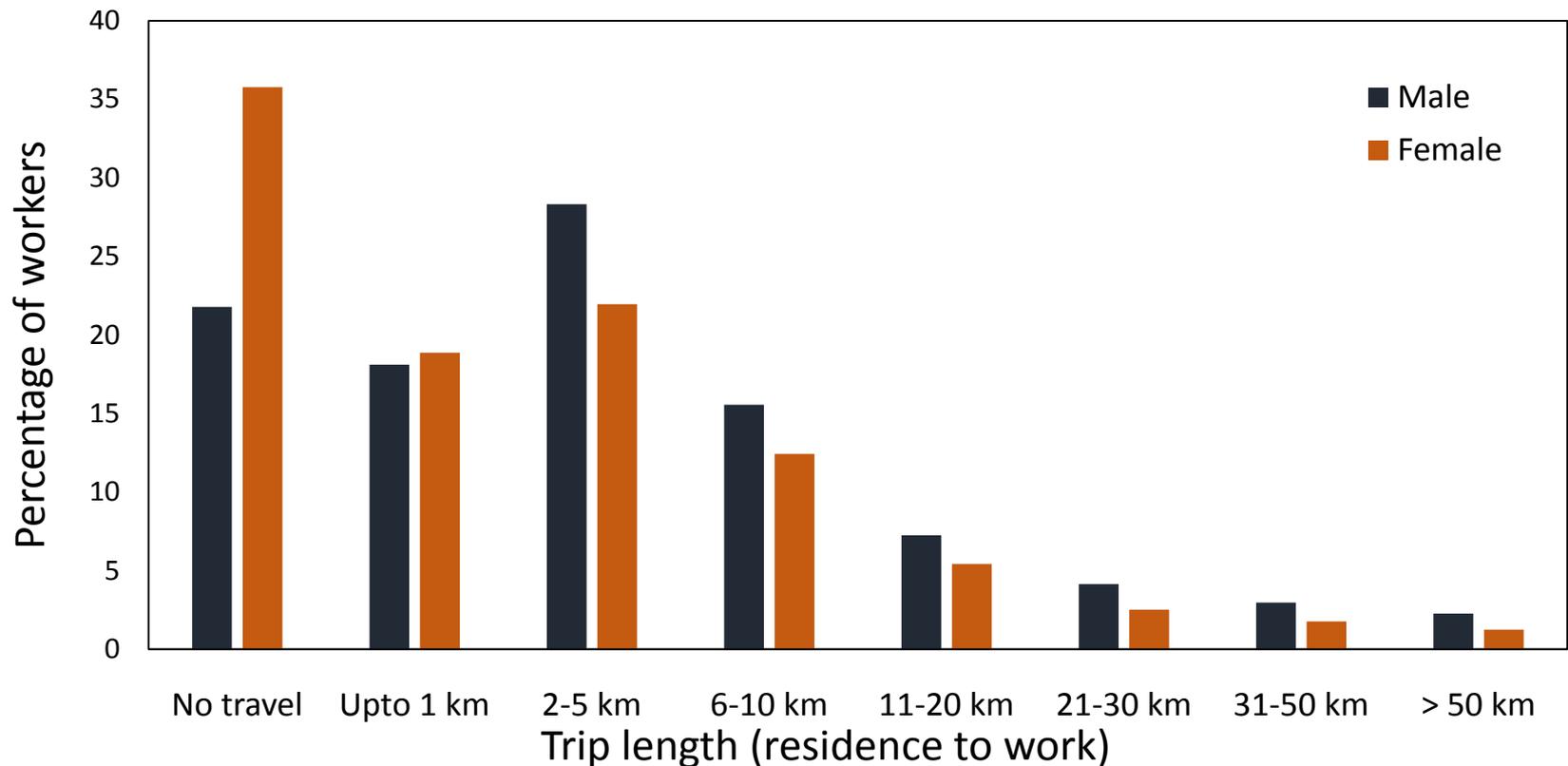
Context

- Much of the current understanding of how people ‘regularly’ travel in India is **mere speculation**
 - Issues of range, reliability, and representativeness
 - Unavailability of good data- a major (but not the only) restraint in dealing with India’s urban transport crisis
- Work travel data by the Census of India (2011)- a significant progress
 - Commute to work is one of the most regular trips on a daily basis
 - Central to the accessibility and the ecological problems of transportation
- The two questions
 - How do workers reach to their place of work – **mode** of travel
 - How far do the workers travel to access the job – **trip length**

Note: Only the trips undertaken by ‘other workers’ from home to work are recorded. The Census of India defines the ‘other workers’ as “workers other than cultivators, agricultural laborers or workers in Household Industry”.

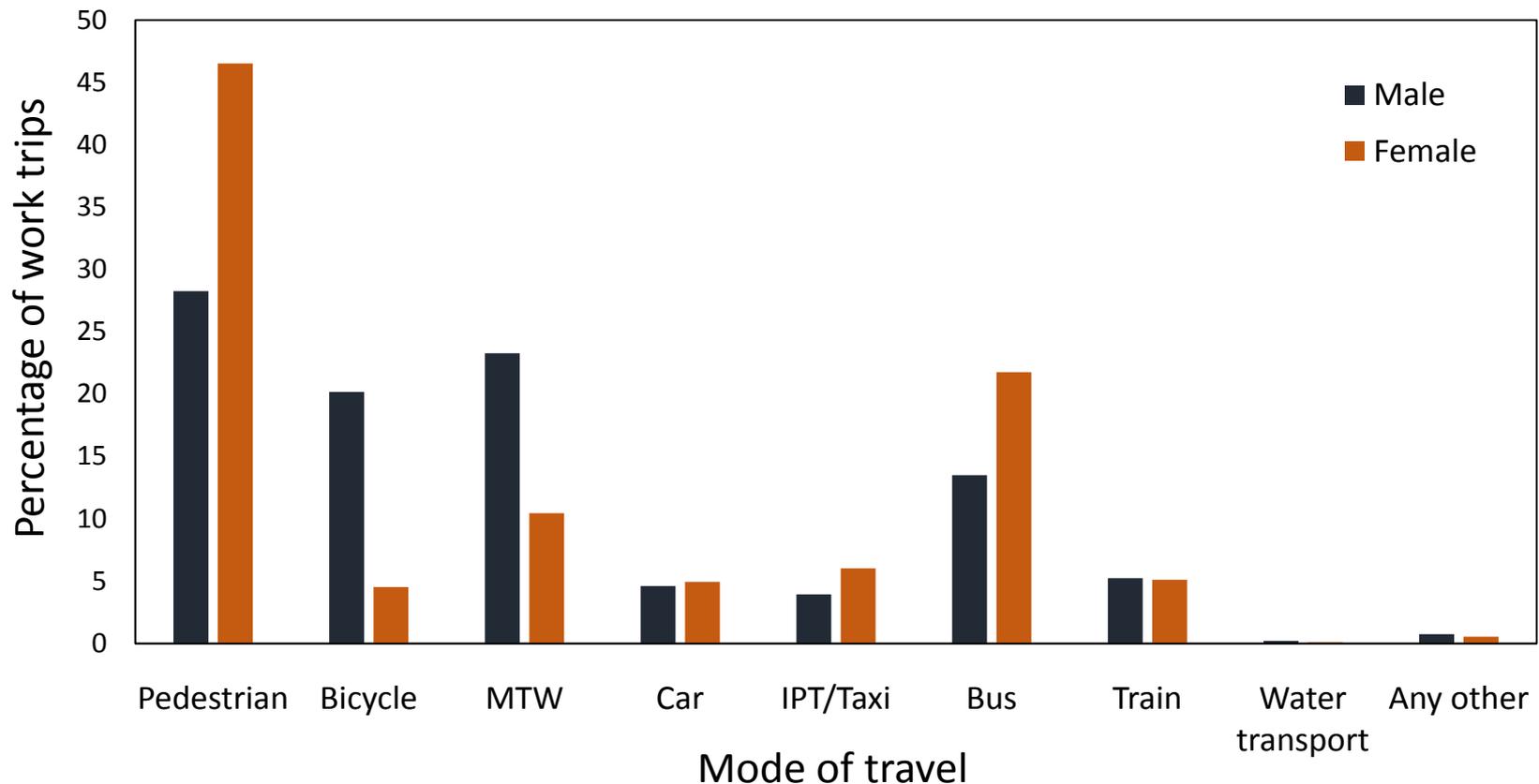
Broadly the Pattern (Urban India)

- 24.5 percent workers in urban areas **do not travel** at all for work
 - Nearly one-fifth of male workers and one-third women workers
- Proportion of workers who travel but not more than 5 km is 70%



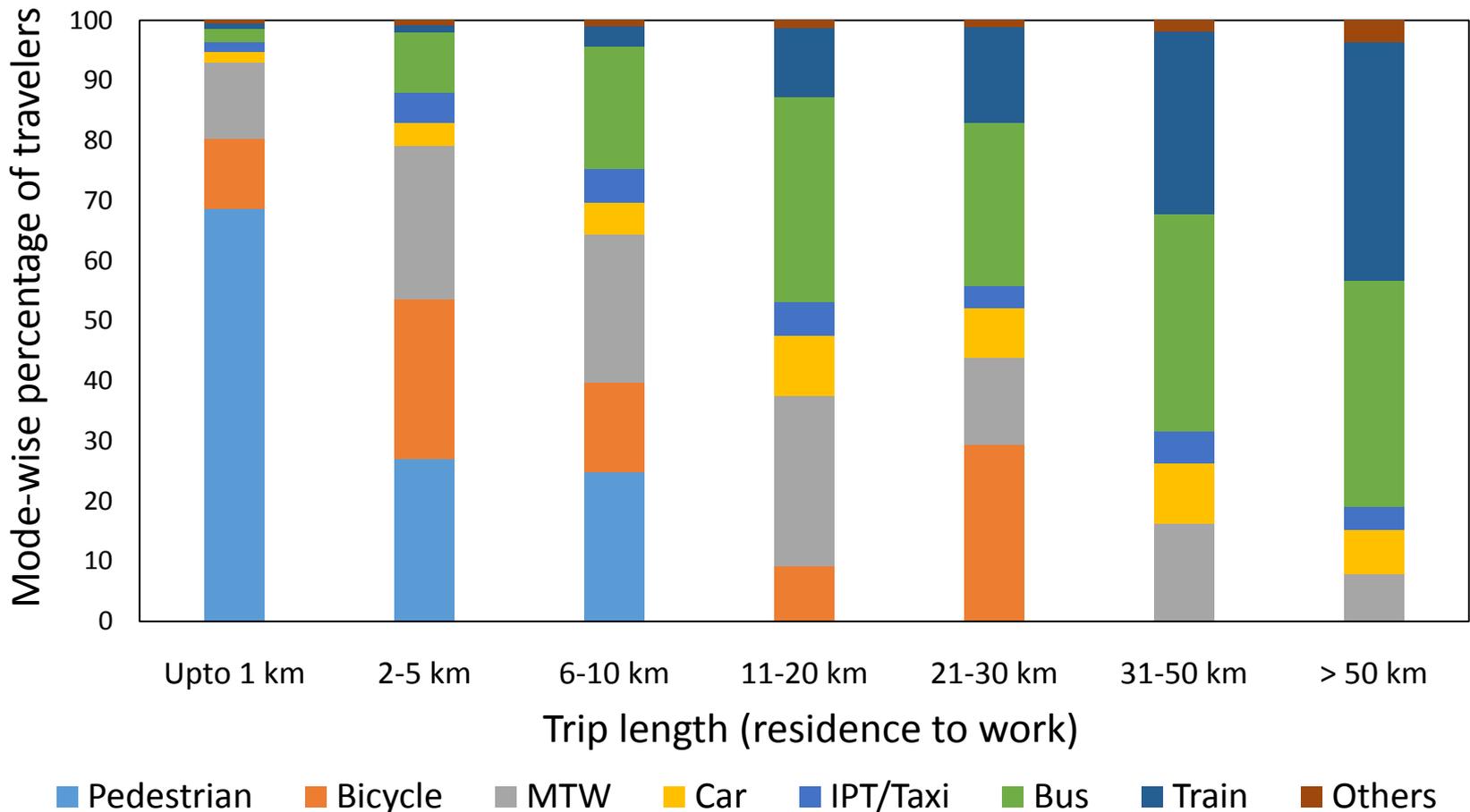
Broadly the Pattern (contd..)

- The largest fraction of workers is traveling on foot or by bicycle
- 49% do not use motorized transport; 20% use MTW; only 5% use car



Broadly the Pattern (contd..)

- NMT (walking, bicycling) is dominant mode for shorter distances
- Public transport (bus, train) dominates the longer distances



Dissected Travel Pattern: Size, Density, Gender

Size →

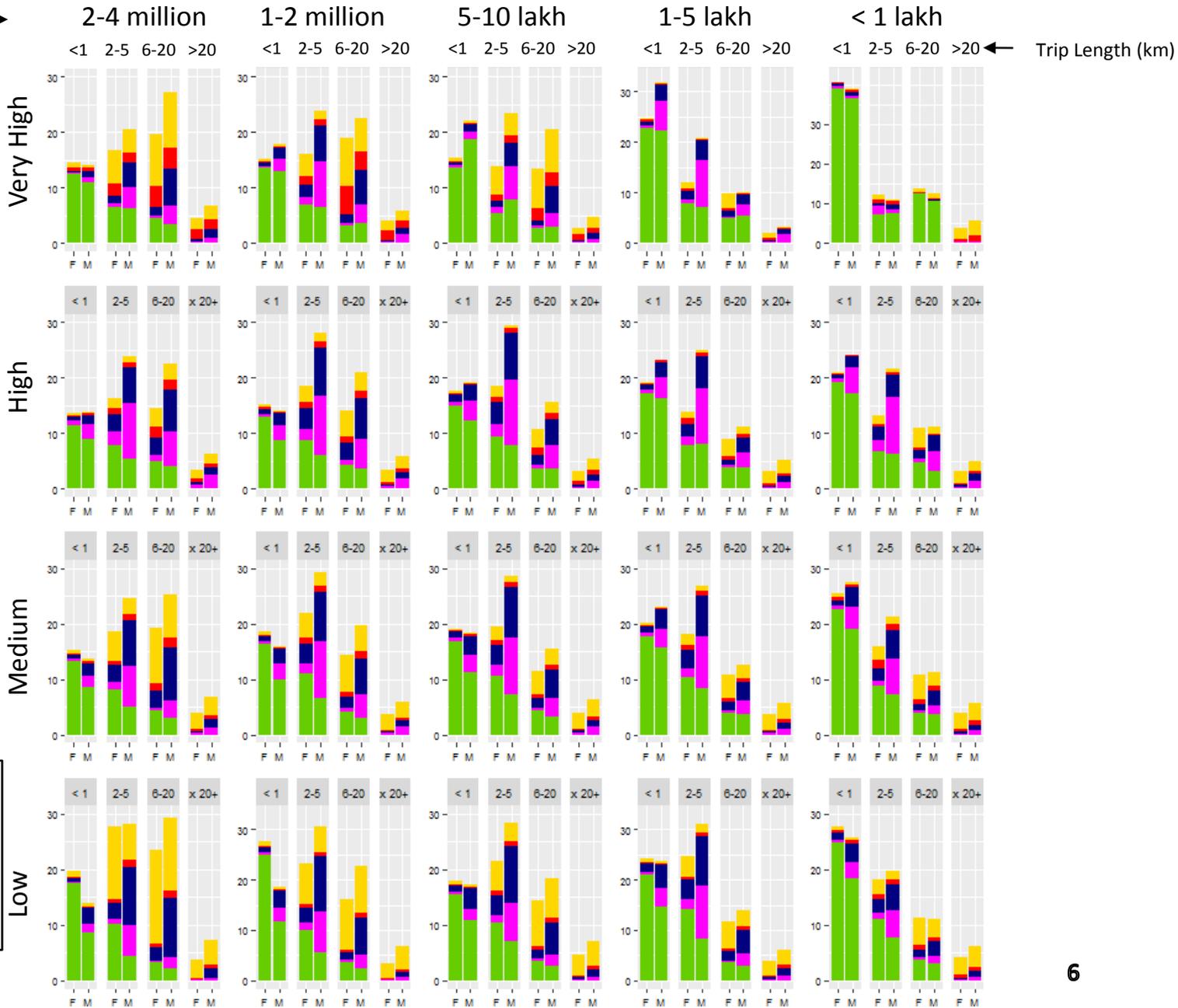
Density ↓



F- Female
M- Male

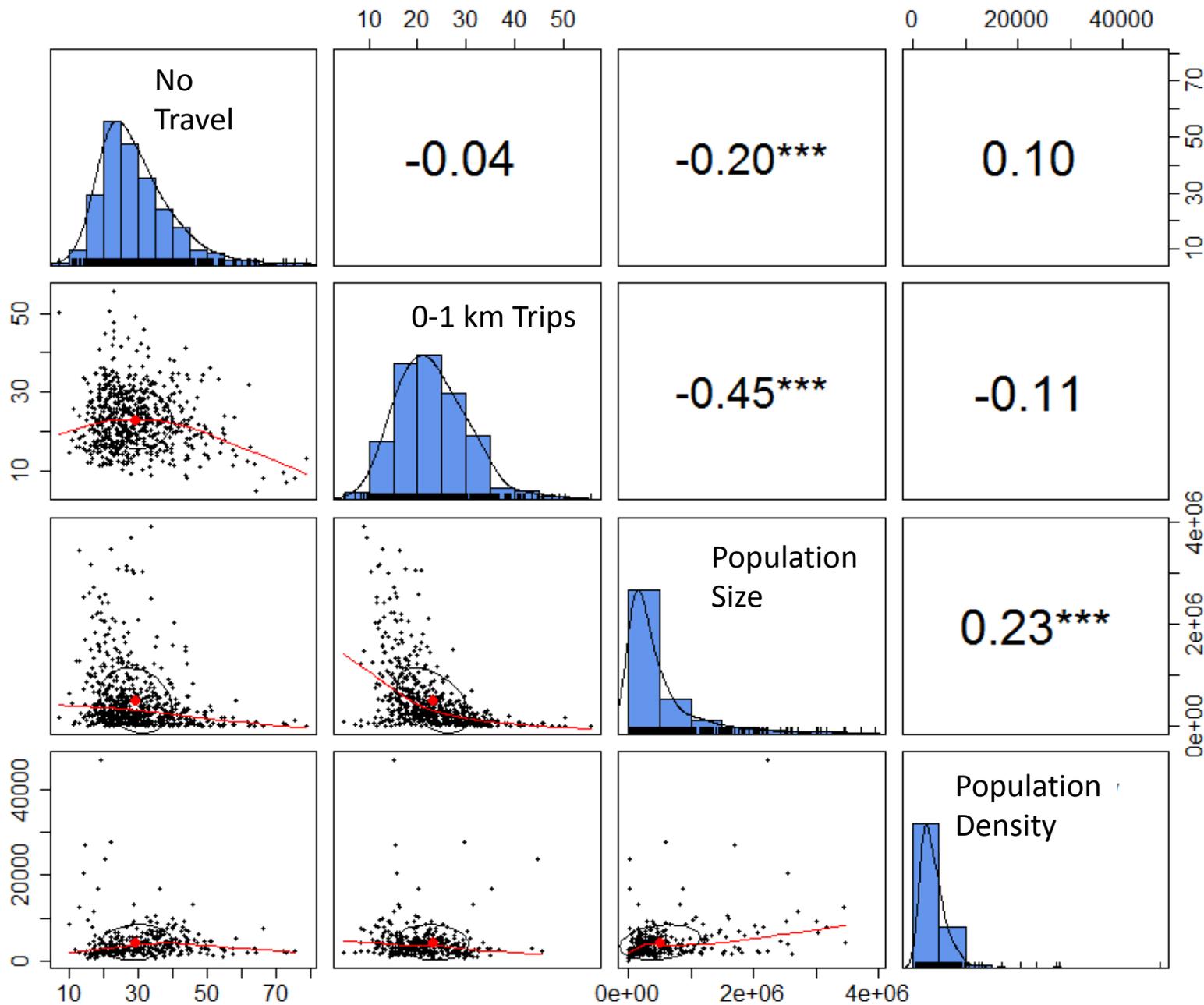
Density (1000 p.p.s.k)

0-2 : low
2-5 : moderate
5-10 : high
> 10 : very high



Dissected Travel Pattern (contd..)

- **Observation-1** Size ↓ <-> very small trips (0-1 km) ↑
 - Kendall's tau = -0.32 [p-value < 0.005]
 - Spearman's rho = -0.45 [p-value < 0.005]
- Especially in the **very high** density districts, 40% trips are **very small** trips (in the smallest districts); **> 90% of them by walking**
- **Observation-2** Density doesn't have as much influence as population size on the length of travel
 - Problem of categorization: 'low' may not be really a low density ?



***Spearman's correlation rho with p-value < 0.01

Dissected Travel Pattern (contd..)

- **Observation-3 (a)** Relationship of trip length with density has gender differential

Table: Correlation between density and trip length- gender difference

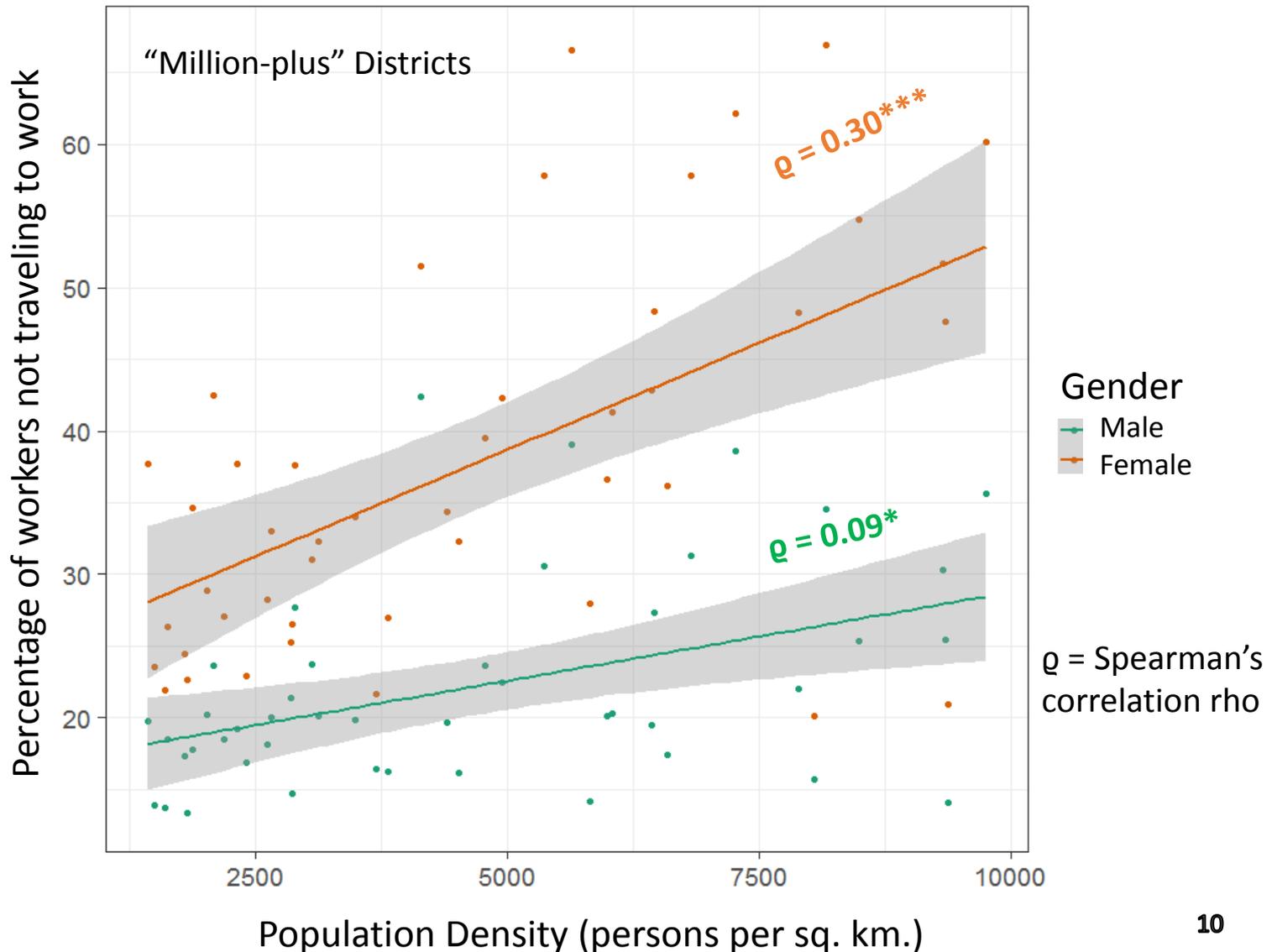
Trip Length Category	Spearman's rho	
	Female	Male
Very small (0-1 km)	-0.39***	-0.11**
Small (2-5 km)	-0.24***	-0.06
Medium (6-10 km)	-0.10 **	0.05
Medium-long (10-20 km)	-0.18***	-0.11*

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

- More female workers 'travel to work' in low-density districts

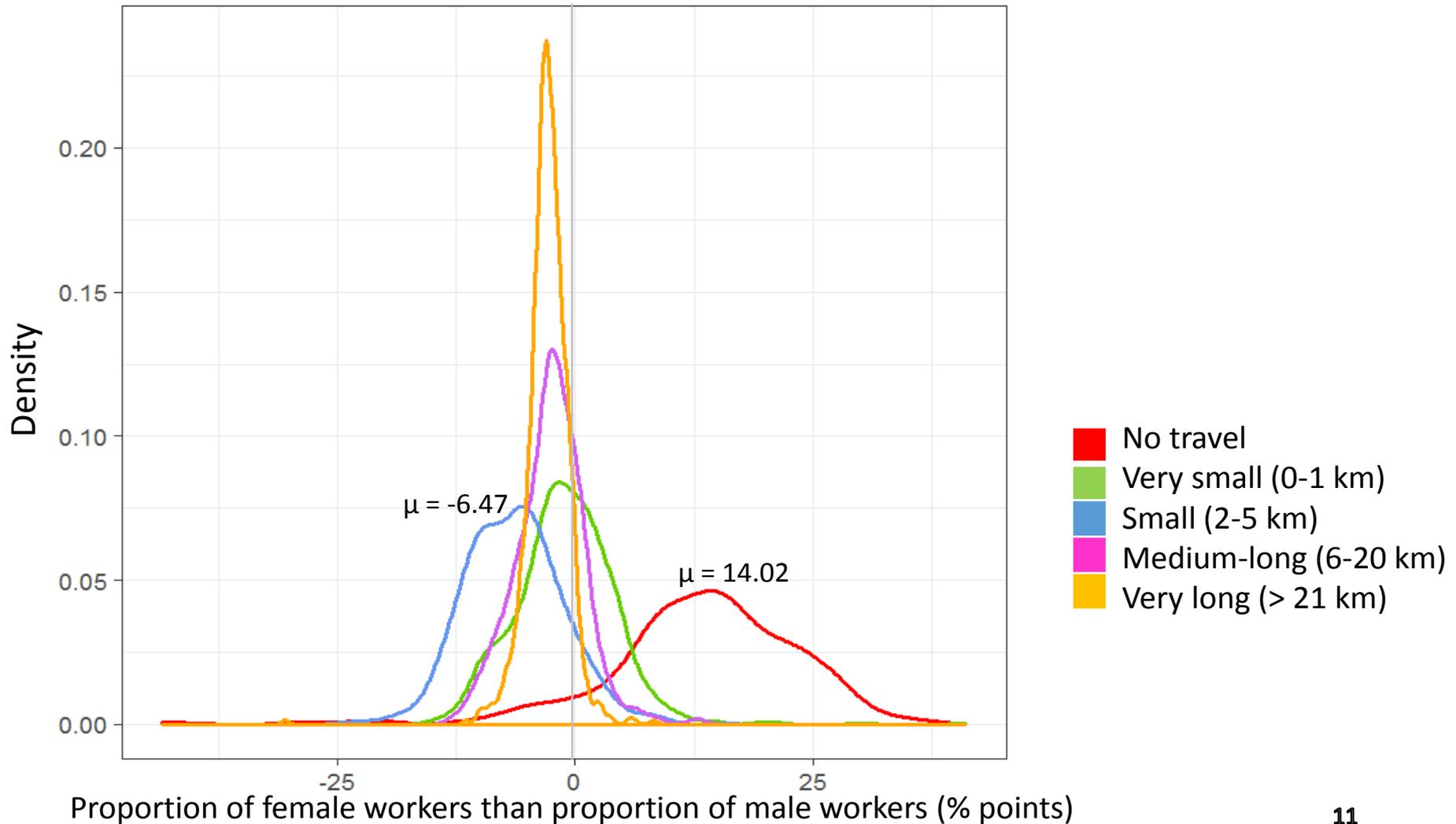
Dissected Travel Pattern (contd..)

- **Observation-3 (b)** Gender gap smaller in low density districts



Dissected Travel Pattern (contd..)

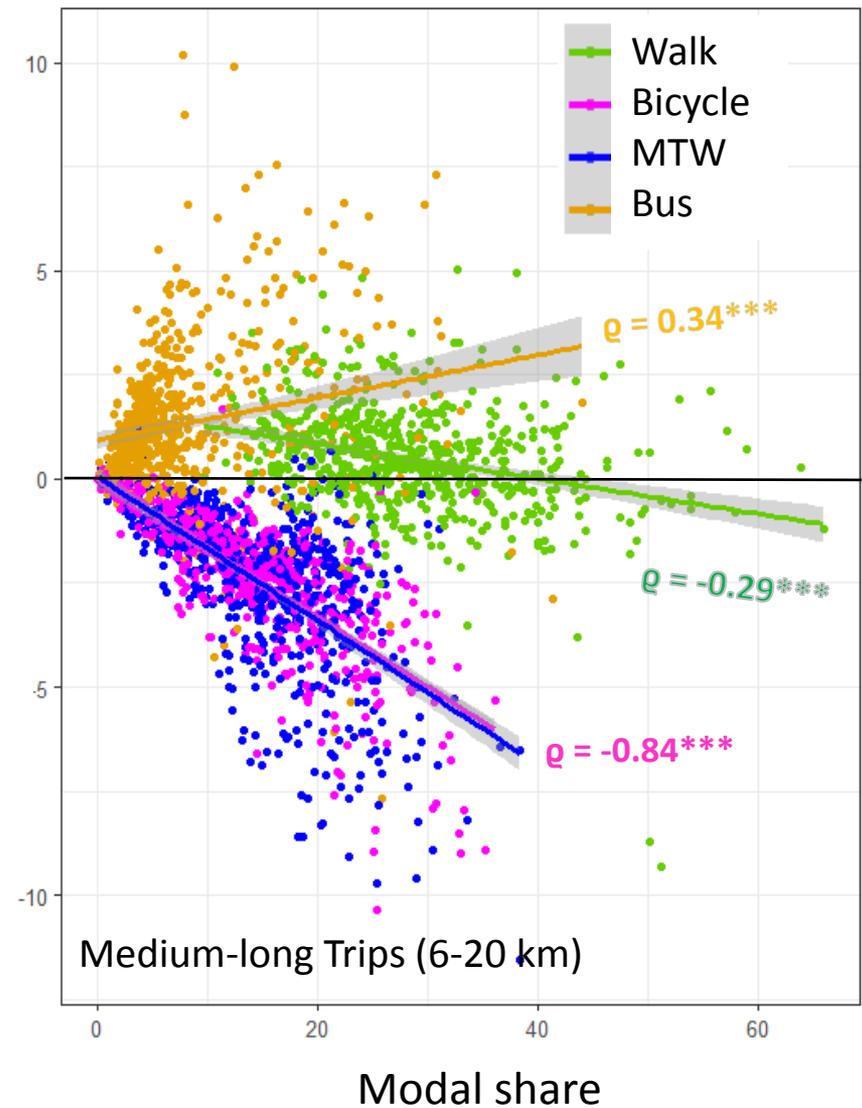
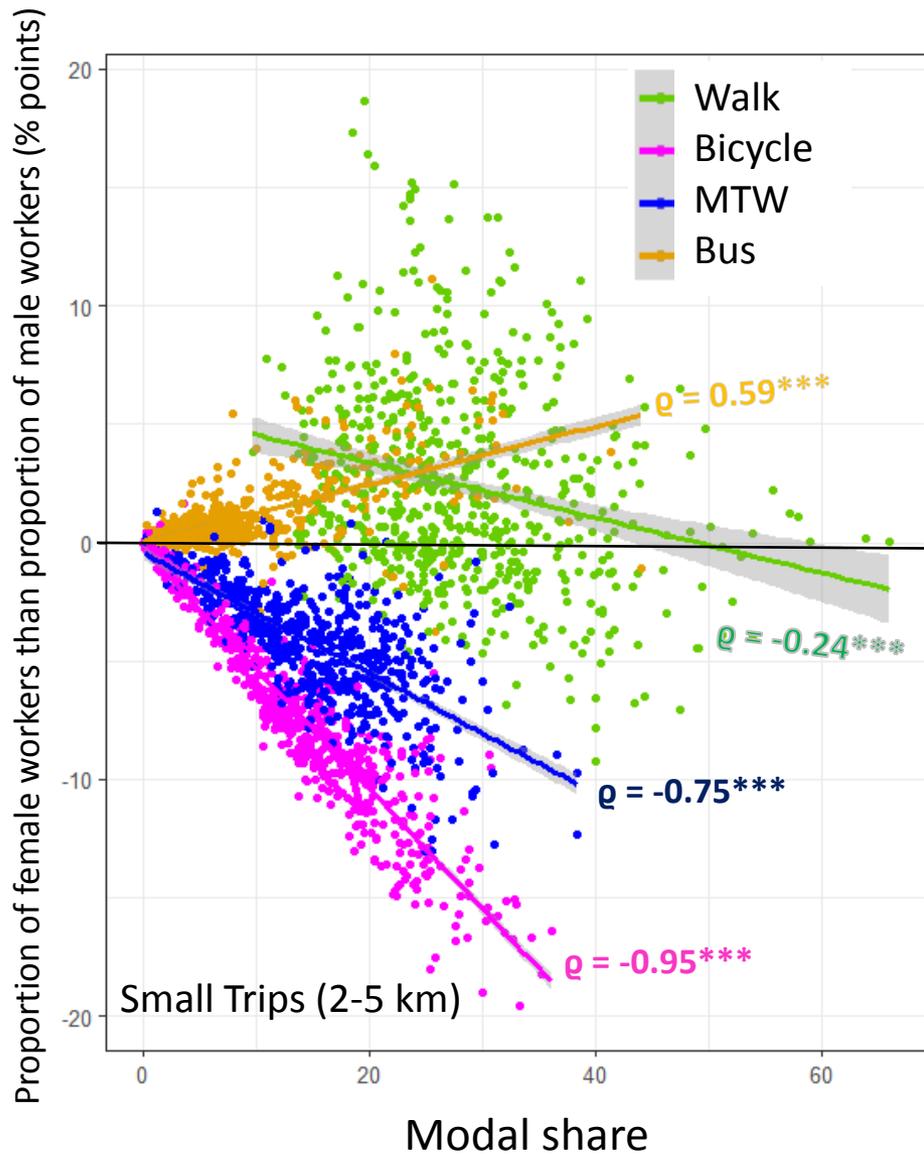
- **Observation-4** Women don't have consistently shorter trips



Dissected Travel Pattern (contd..)

- **Observation- 5(a)** Modal share of two-wheelers (MTW + bicycle) is inversely related with % of women traveling
- **Observation- 5(b)** 'Walking' and 'Bus' are the great equalizers
- **Observation- 5(c)** Walking among the female workers is higher than that among the male workers for "very small trips" (0-1 km)

Dissected Travel Pattern (contd..)



Probing ‘no-travel’

- No-travel is generally higher among the men where it’s higher among women
- Women have generally higher percentage of no-travel than the male workers
- No-travel is not affected as much by population size as by population density

Correlation analysis of no-travel and other variables at the district level

	No-travel (male)	No-travel (female)	Population Size	Population Density	Bicycle ownership	MTW ownership	Car ownership
No-travel (male)	1.00	0.63*	-0.26*	0.06	-0.30*	-0.45*	0.02
No-travel (female)		1.00	-0.12**	0.17*	0.17*	-0.26*	-0.28*
Population Size			1.00	0.18*	0.02	0.24*	0.16*
Population Density				1.00	0.01	0.10	0.18*
Bicycle ownership					1.00	0.41*	-0.30*
MTW ownership						1.00	0.33*
Car ownership							1.00

Note: *p < 0.001; **p < 0.01

Probing 'no-travel'

- Only in 26 of all 640 districts, the percentage of men workers not traveling to work is at least 5 percent higher than that of women.
 - Only one (Bijapur, Maharashtra) is **not** located in a **hill state**
- No-travel does **not** necessarily mean **immobility**
 - Positive if : decent work available at home or in neighborhood
 - But perhaps :
 - Economic circumstances force the women to sell their labor but **access to good and diverse set of employment opportunities** remains restricted (Chattopadhyay et al., 2013)
 - Lack of mobility is caused due to unchanging household roles and employment disparities (Rosenbloom, 2004)
 - Or, "location of different types of employment opportunities is likely to play a role in the occupational segregation of women" (Hanson & Johnston, 1985)

Conclusions

- Patterns of work travel shaped by
 - spatial distribution of employment and residential opportunities (nature of economy)
 - Transport infrastructure and vehicle availability/usage (nature of mobility)
 - Significantly different for different social groups
- **Size has impact on the trip length distribution**, while population density has yet weak impact on modal shares
- Mode share as well as distance in work travel has **gender divide**
- Gender gap seems to '**mediate**' the relationship of travel pattern with size and density
- Research need to focus on '**gender-employment-transport**' linkage
- **Data collected is very limited**, aggregated at district-level

References

- Chattopadhyay, M., Chakraborty, S., & Anker, R. (2013). Sex segregation in India's formal manufacturing sector. *International Labour Review*, 152(1), 43–58.
- Hanson, S., & Johnston, I. (1985). Gender Differences in Work-Trip Length: Explanations and Implications. *Urban Geography*, 6(3), 193–219.
- R Core Team (2017). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <http://www.R-project.org>
- Rosenbloom, S. (2004). Understanding Women's and Men's Travel Patterns. In *Research on Women's Issues in Transportation* (pp. 12–13). Chicago, Illinois: Transportation Research Board.
- Singh, N., & Tiwari, G. (2017). *How do workers travel to job in India? Getting answers from the Census 2011*. Unpublished manuscript, Transportation Research and Injury Prevention Programme (TRIPP), New Delhi.

Thank You!

For more information about the research :

Singh, N., & Tiwari, G. (2017). *How do workers travel to job in India? Getting answers from the Census 2011*. Unpublished manuscript, Transportation Research and Injury Prevention Programme (TRIPP), New Delhi.

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