Gender-Based Mobility of Urban Poor- A case of Patna

RS-UMI2024 Submission 0180

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ABOUT URBAN POOR

Urban Poor: Those living below the urban poverty line as defined from time to time. (SJSRY 1997,2009)

INR 1000 Per Capita Per Month

Tendulkar committee (2011-12)
Niti Ayog (2019)

INR 1407 Per Capita Per Month

Rangarajan committee (2014)

$2.15 Per Capita Per Day

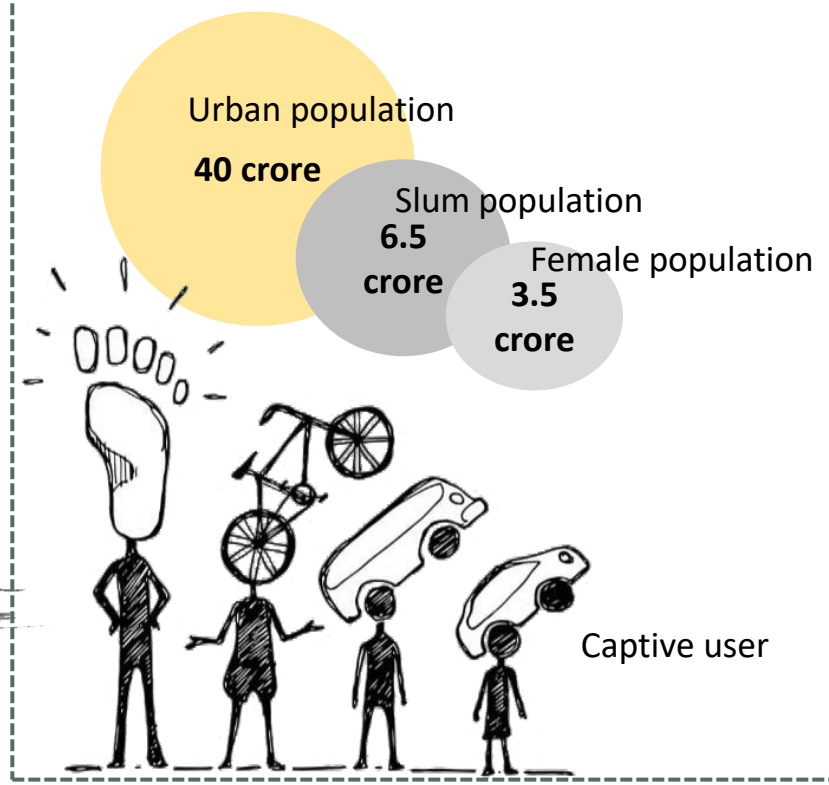
World Bank (2022)

Urban Poor- Interchangeably used with the followings-

Seasonal migrants | EWS | LIG | Slum Dwellers ← Selected for further study

PMAY(U)- 2021, SJSRY-2009

300 population or 60-70 households poorly built with inadequate basic facilities and infrastructure *(PMAY-U)*



Slum population contributes 7.5% of the country's urban GDP

Slum household
- 41% earns- 5k-10k
- 26.5% earns- <5k

Workforce Participation Rate
- Male- 73.5%
- Female- 31.4%

Poverty is not just about lacking money

Food access | Housing with Sanitation | Health care | Education | Social support

Transportation

Determines access to all other essential services

Food 39-42% < **Transport Expense** 10-15% HH income < **Rent** 6-8% < **Health** 6-8%

AIM, OBJECTIVE & METHODOLOGY

Societal norms often consider men as primary breadwinners, giving them an advantage in mobility, while women compromise on distance and mode choice.

Women account for 70% of the world's poor *(Source: UNDP)*
Limited choice available to Urban poor women, confined them in home restricting their economic and social participation

AIM: To study gender-based mobility patterns of the urban poor.

Objectives

1. To identify the mobility patterns of urban poor women
2. To investigate the types of livelihood opportunities available to urban poor women
3. To understand how the available mode impact their access to livelihood opportunities.
4. Recommendations for improved mobility choices for access to better economic opportunity.

METHODOLOGY

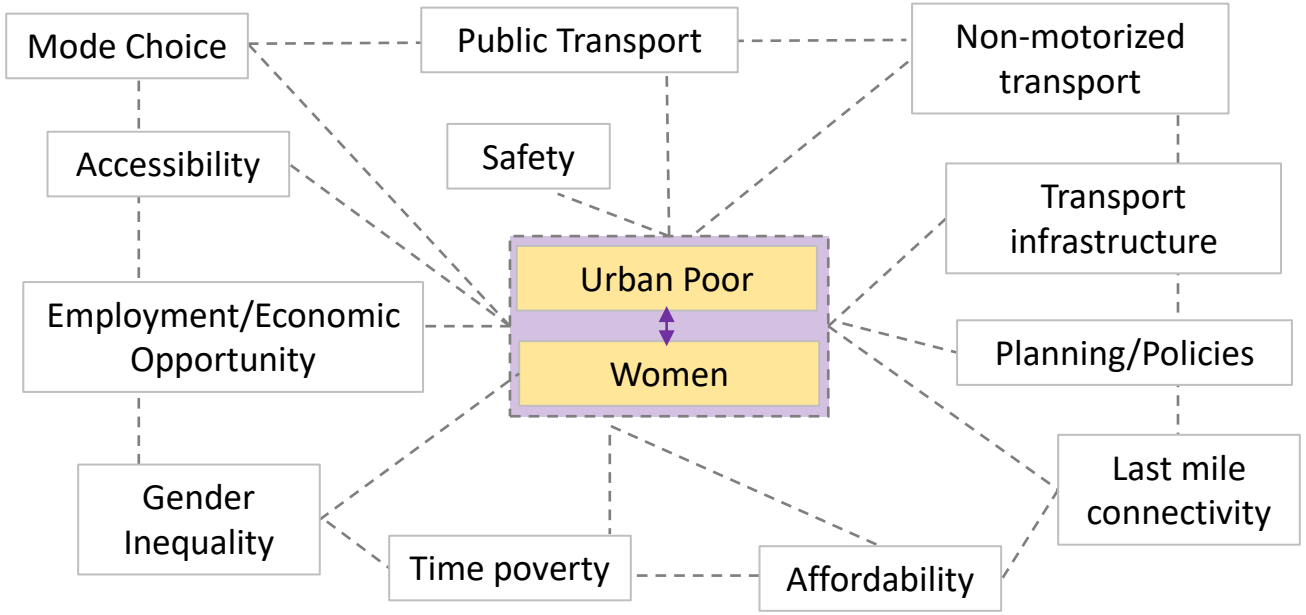
- Problem Identification and Literature study
- Research Design
  - Defining Aim and objectives
- Study area selection
- Recce Survey → Identifying survey locations
- Data collection
  - Mixed Method Approach
    - Quantitative
    - Qualitative
  - Primary & Secondary source
- Analysis & Evaluation
  - *Travel pattern*
  - *Relation of transportation & economic opportunity*
  - *Mode choice- Discrete choice modelling*
- Conclusion & Recommendation
  - *Highlighting the area of Improvement*
  - *Suggestive measures*

LITERATURE STUDY

Transport studies as a research discipline is majorly concerned with the design and operations of transport systems

Travel Pattern ⟷ Livelihood

Domain was more common for anthropologists, psychologists, and human geographers and less explore in terms of transportation



Existing studies often focus on cities like Delhi, Chennai, Mumbai, Ahmedabad, Pune etc.

18.6%

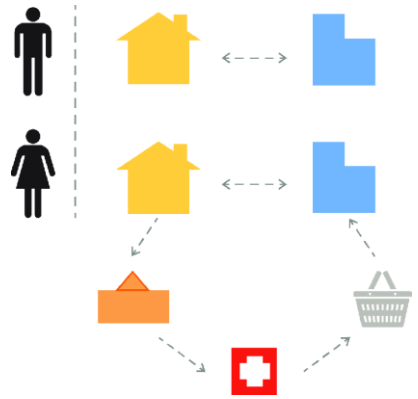
of the entire female population in India resides in urban slums, with the highest proportion found in Bihar (37.9%) and the lowest in Himachal Pradesh (2.3%). *(Source: NFHS-5, 2019-20)*

70% commuters Less than 30 mins

Travel to place of work from the slum
PT > Walk > 2W > Cycle > Auto > Car

Source: Urban Poverty Study, Internal paper, 2012, CSTEP

Journey purposes are restricted to
- Journeys to work
- Journeys to health
- Journeys to education



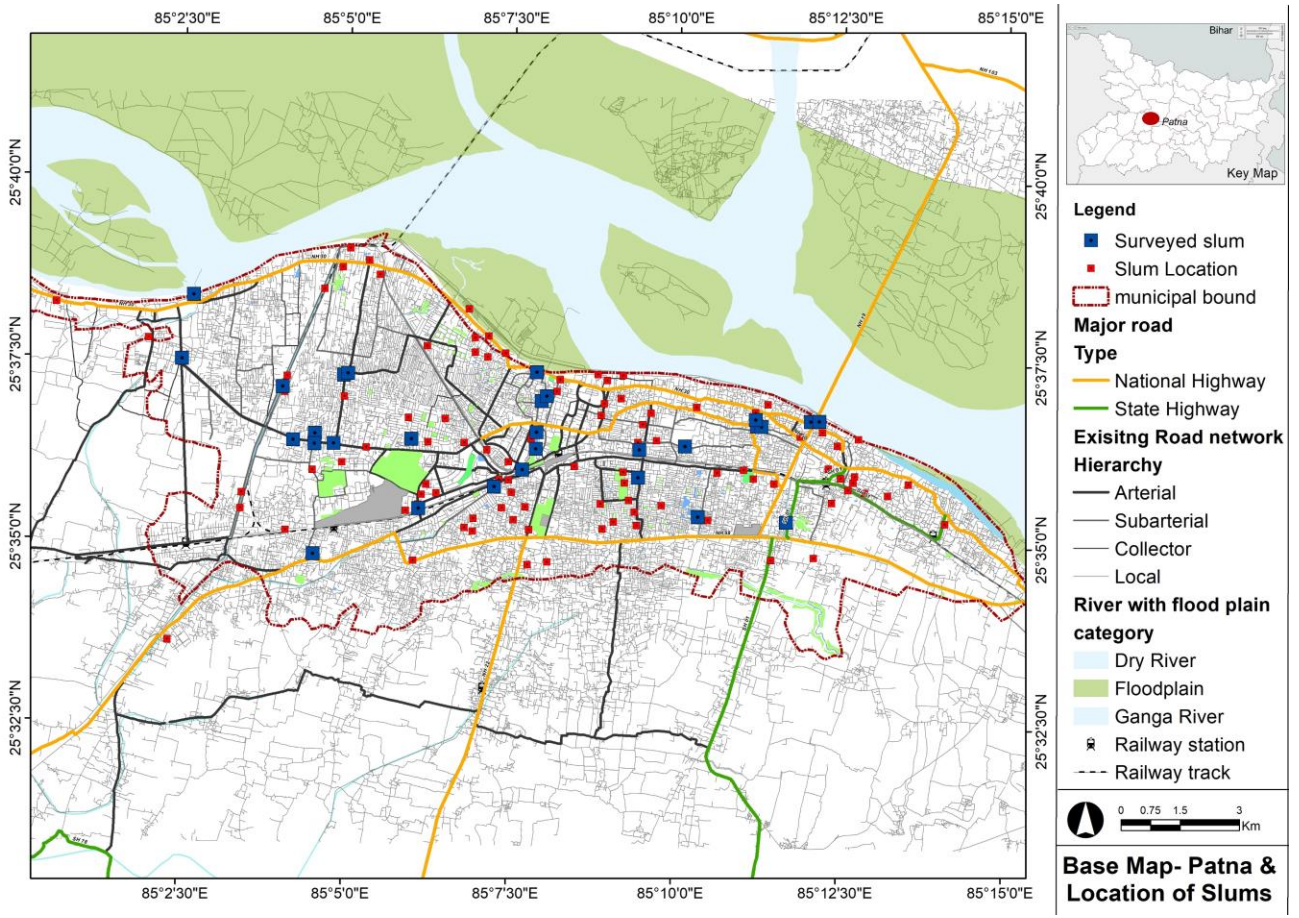
Trip chaining among Female commuters compared to male commuters

Viewed as 'disadvantaged citizens' rather than 'disadvantaged commuters'

STUDY AREA AND SURVEY

- **Patna** is capital city of Bihar located on south bank of Ganga river
- City Population- 20.4 lakhs (2011)
- 17.5% lives in slum
- 116 notified slums

City area- 109.28 sqkm
75 wards



Survey Methodology

On site Survey

Survey Location

Selection Parameters

- Spatial location- core, periphery, transition
- Duration of existence
- Location from PT routes

30 identified location

Off site Survey

- **Government body-** PMC, Smart city, BSRTC
- **NGO**- Diksha Foundation, Bal sanskar shala
- **Media Person-** Amrit Nidhi news

Primary Survey

Household survey- 634 Samples

- Questionnaire
- Observation

Interview

- Focus group- Activity mapping of female members
- Perception survey

Survey Questionnaire

Demographic data
- HH size
- Age
- Gender

Travel data
- Mode chosen
- No of trips
- Travel Cost
- Travel time
- Purpose

Socio-economic data
- Education
- Occupation
- HH characteristics
- Vehicle ownership

Perception data
- Willingness to travel for new job role
- Willingness to chose bus in case of improved services.

STUDY AREA- INTRODUCTION

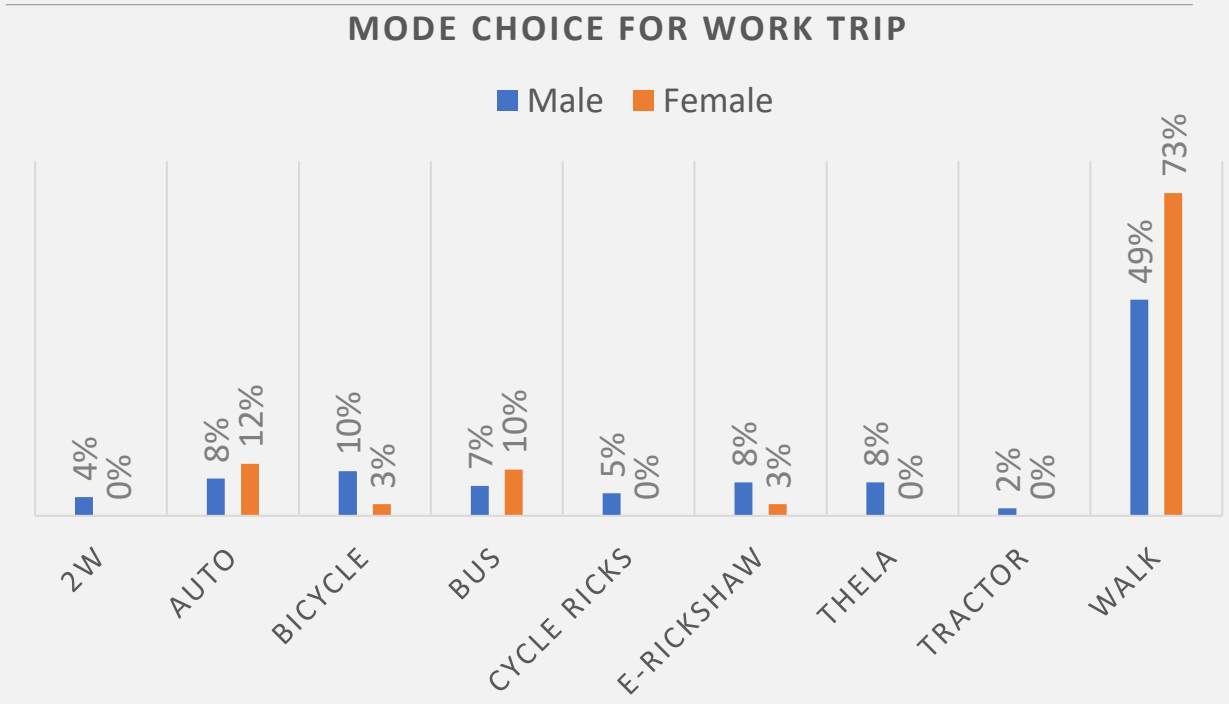
Average family size- 6

Literacy- 42%
- Male- 47%
- Female- 40%

Migration- 28%
- Job- 64%
- Relocation- 36%

Average HH income- INR 7567

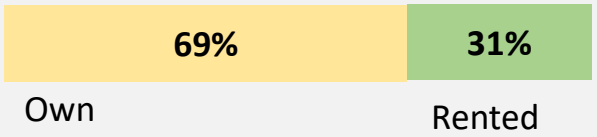
Unemployment
Female- 54%
Male- 8%



Socio-economic profile
- Female-Employed- 46%
- Male employed- 92%

Vehicle ownership
19% household own vehicle
4% 2W 10% Bicycle
5% Cycle rickshaw

Housing ownership



Trip characteristic

Work trip distance (avg.)
- Female- 1.12 km
- Male- 2.5 km

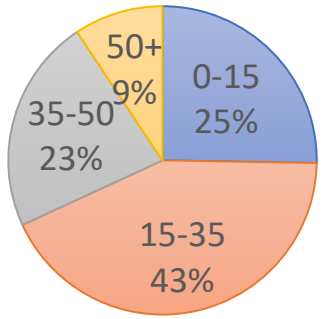
Non-work trip distance (avg.)
- Health facility- 2 km
- Shopping/grocery- 1 km
- Recreational- 2.9 km

Per capita Trip rate-
- Average- 0.61
- Female- 0.42
- Male- 0.8

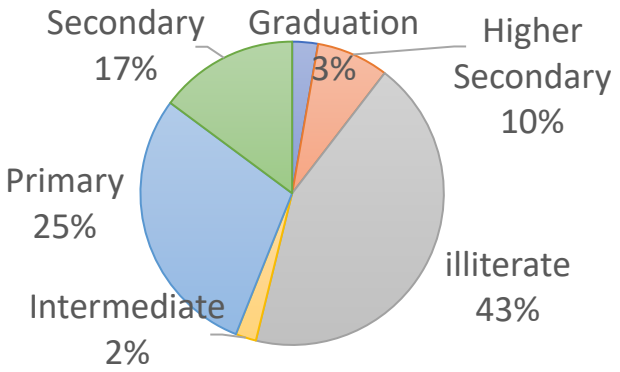
Mode choice for Non-work trip
- Walk
- Auto
- E-rickshaw

DEMOGRAPHY

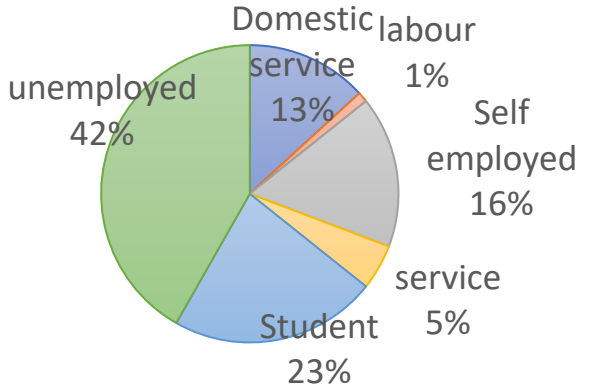
Age composition



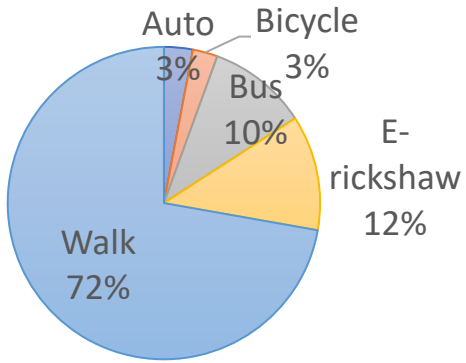
Education Level



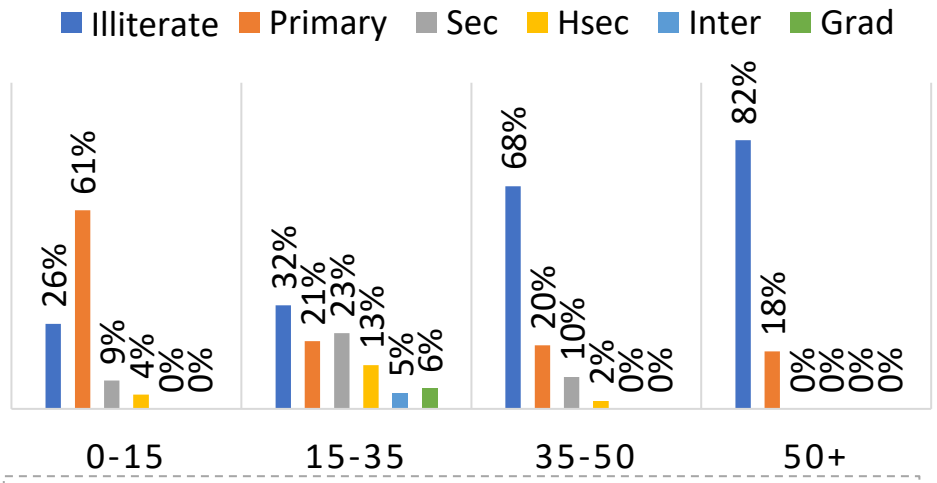
Work profile



Mode share

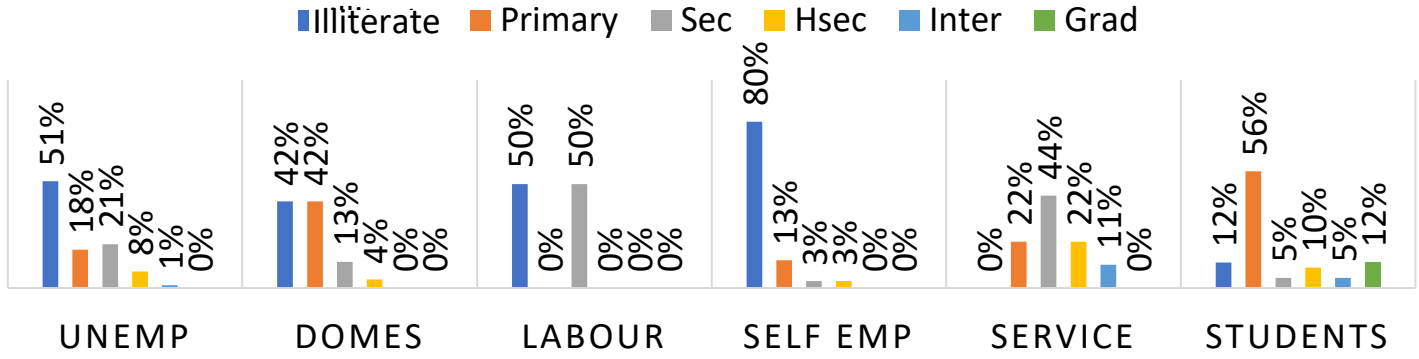


Education level vs age grp



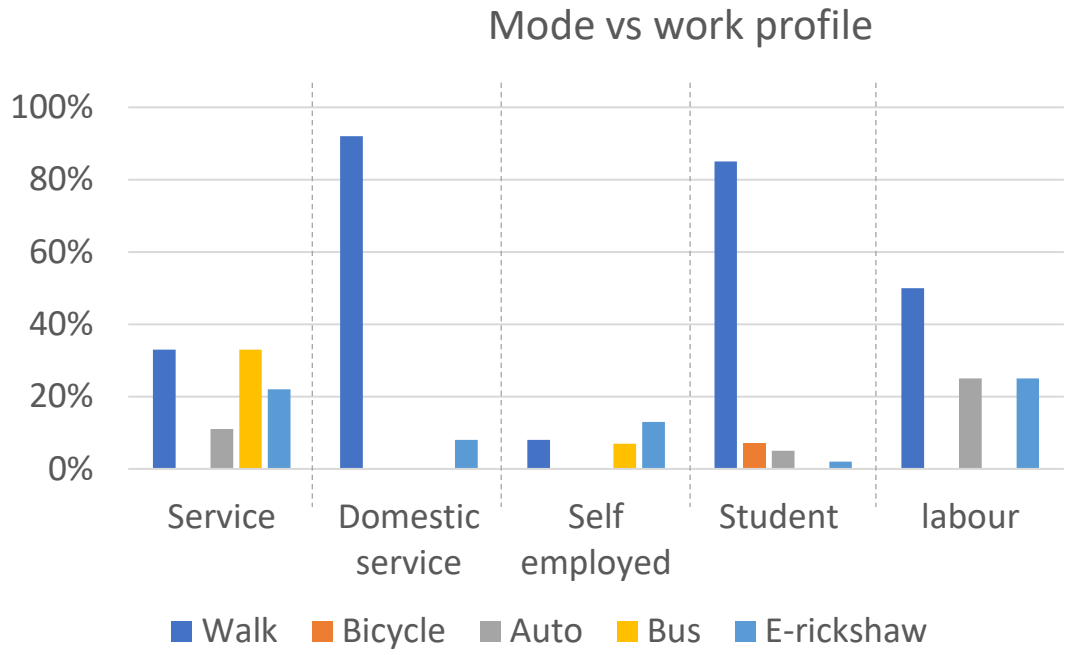
Illiteracy is highest among 35-50 and 50+ age group. Literacy level is high among 15-35 age group (68%).

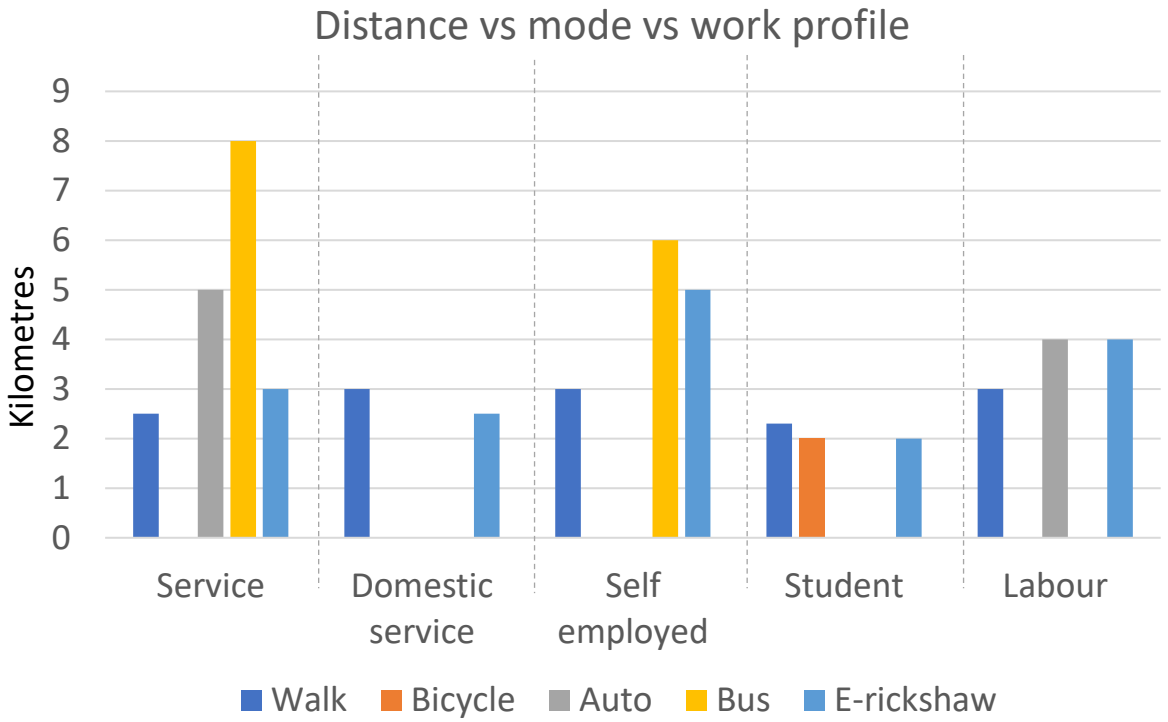
Education vs work profile



Illiteracy is highest among self-employed group.

TRAVEL CHARACTERISTICS





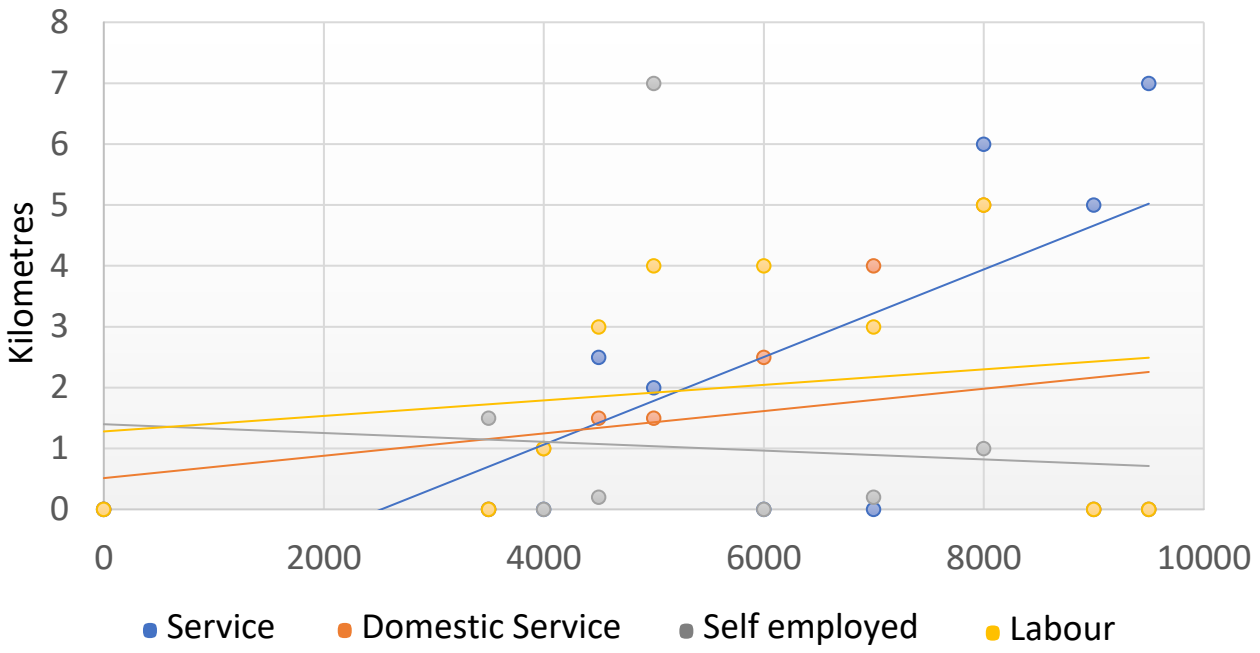
- Usage of Bus was more among service and working self-employed.
- Walk was significantly high among domestic worker and students.

Work type	Avg. dist. travel
Service	4.875 km
Domestic service	2.75 km
Self employed	4.5 km
Student	2.1 km
Labour	3.6 km

- Average trip length of employed women- 3.4 km
- Average trip length (employed +unemployed) women - 1.12 km
- Walk trip of an average of 2 km was found among all the working group

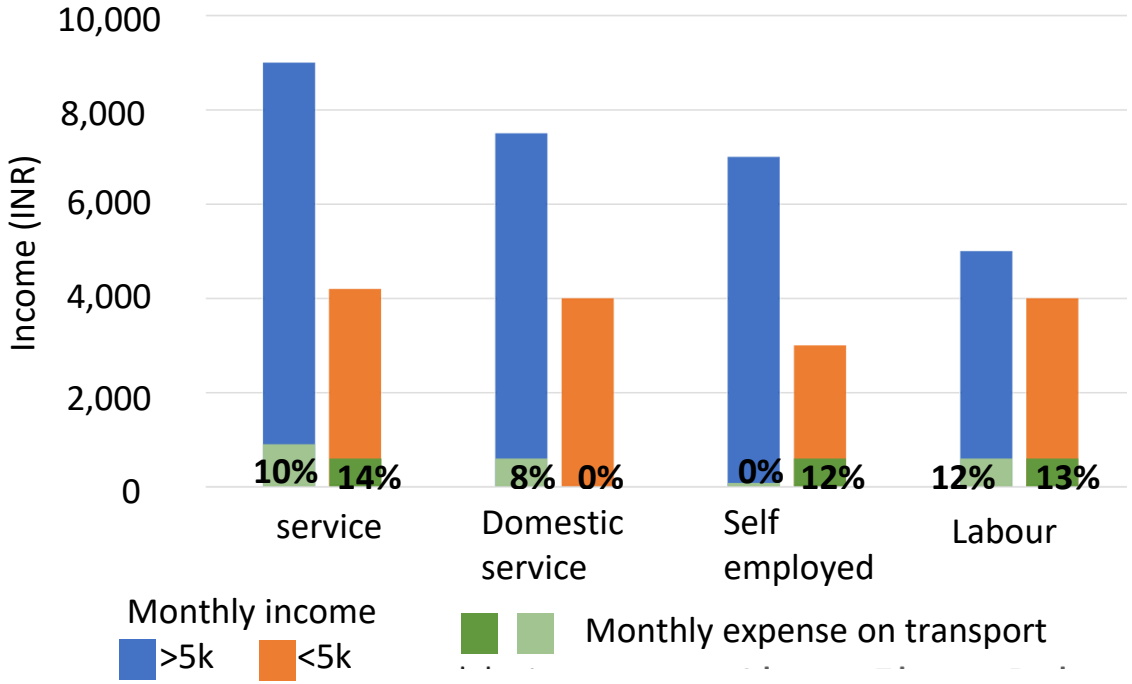
EARNING AND EXPENSE

Distance vs work profile vs monthly earning



For women in service, domestic, and labor sectors, income tends to rise as commuting distance increases.

Income Vs Transport expense (monthly)



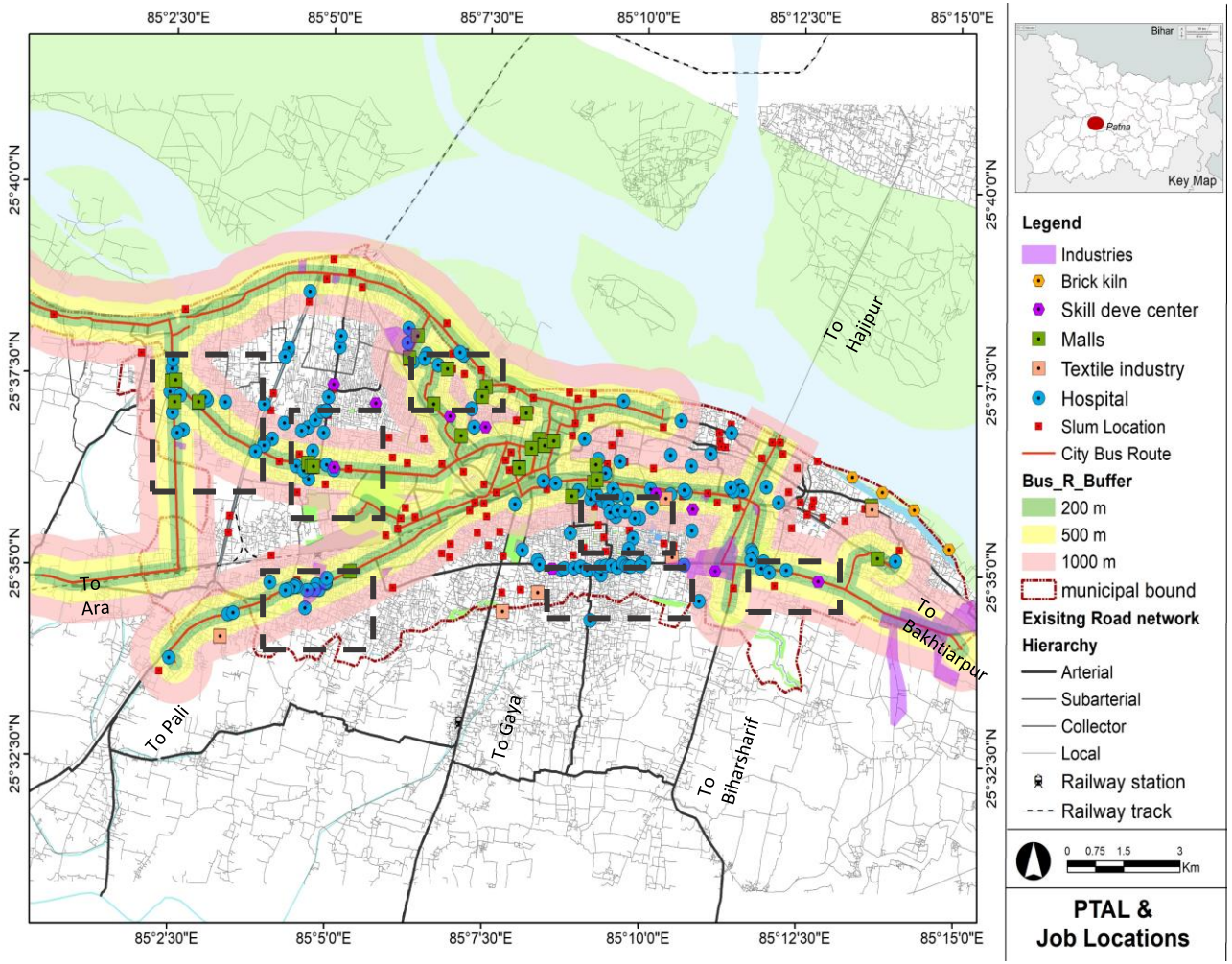
Women employed in labor and service sectors tend to have a high ratio of transport expenses to income. This ratio becomes even more significant when their monthly earnings are low.

- Average income for trip length 2.5km= 4000-300= 3700 INR
- Average income for trip length 5 km= 6500-900= 5600 INR
- Increased earning= 1900 INR

New skill set that can be introduced (As per survey data)

- Home-based business
- Beauty and wellness
- Health care
- Industrial Sewing Machine Operator
- Computer operator

EXISITNG TRANSPORT INFRASTRUCTURE



Formal PT

- BSRTC Buses
- Local train

Informal PT/IPT

- Private city bus
- Bikram
- Autorickshaw
- E-rickshaw

Frequency

Bus – 15-20 min
Auto- 2-5 min
E-rick- 5 min

PT and IPT run on **Hail and ride system**

17 Bus routes
Bus Fare-
min- INR 6 Max- INR 33

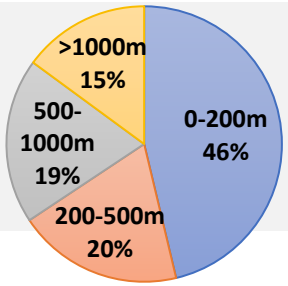
IPT runs on same routes
IPT Fare
Min.- INR 10 Max- INR 40

Informal PT	*E-rickshaw*	*Formal PT*	*Autorickshaw*
Scope for negotiation in fare	*Prefer while carrying goods*	*For long distance*	*If no option available*
INR 1.8/km	INR 4.5/km	INR 1.9/km	INR 3.6/km

Average Fare per km

Slum Location from PT routes

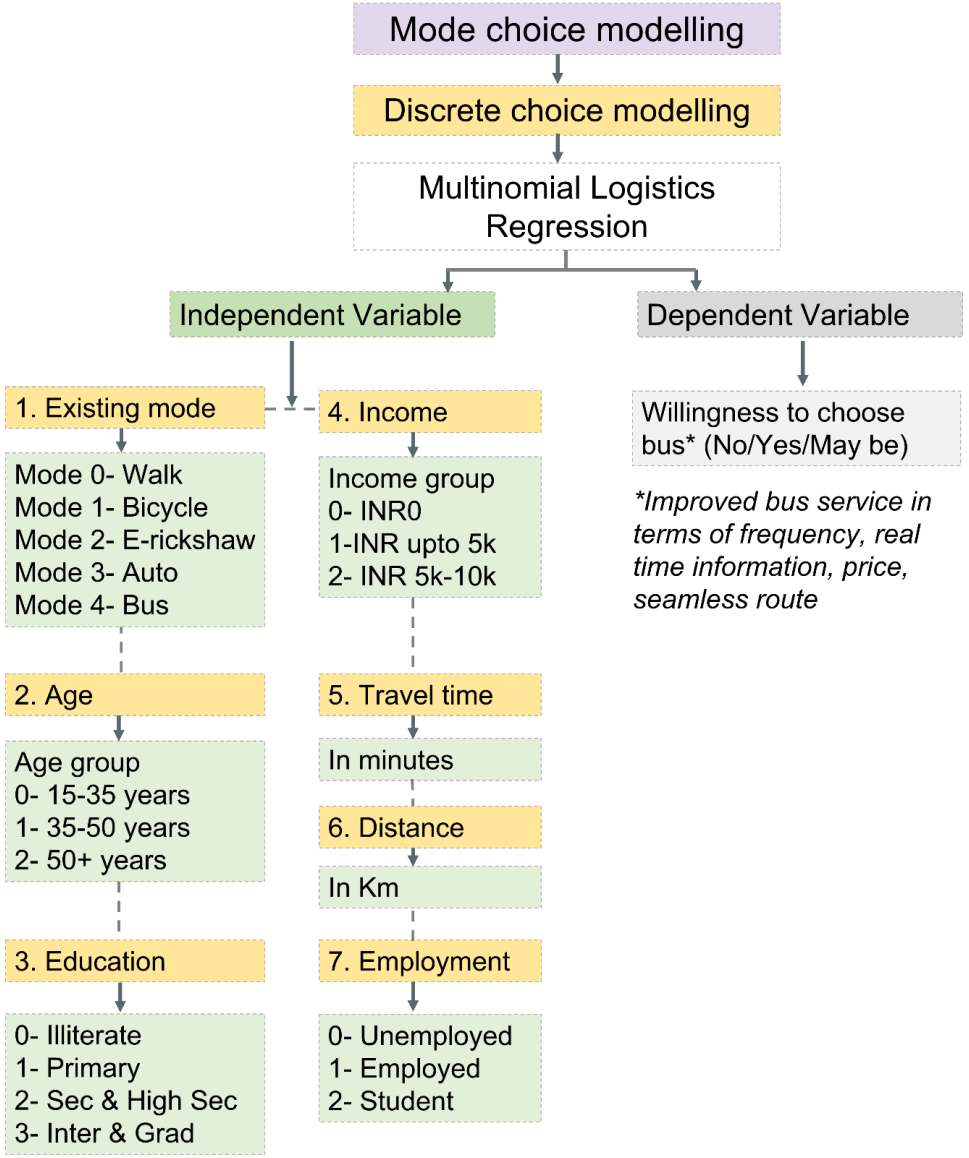
80% of slums are located within walkable distance from PT route



Issues with existing PT

- Many interchanges
- Not affordable for short-distance trips
- Inconvenient while carrying a load
- Long wait time
- Congestion
- Route missing in core and at location of major establishments.

MODELLING



Model Fitting Information						
	Model Fitting Criteria			Likelihood Ratio Tests		
Model	AIC	BIC	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	373.753	380.747	369.753			
Final	306.382	425.285	238.382	131.371	32	0.000

If ***p*(sig.)** is **LESS THAN .05**, then the model fits the data significantly better than the null model. Continue with interpreting the results.

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	189.156	188	0.463
Deviance	178.388	188	0.681

Pseudo R-Square	
Cox and Snell	0.416
Nagelkerke	0.475
McFadden	0.258

If ***p*(sig.)** is **LESS THAN .05**, then we reject the null hypothesis- model is adequately fit. Here value is above 0.05. Continue with analysis.

Independent variable how much showing variation in dependent variable. Value lies between 0 & 1. 0 means no variation and 1 means perfect variation

MODELLING

Likelihood Ratio Tests						
	Model Fitting Criteria			Likelihood Ratio Tests		
Effect	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	306.382	425.285	238.382[a]	0.000	0	
Mode	373.753	380.747	369.753	83.100	8	0.000
Income (monthly)	301.559	406.474	241.559	3.177	4	0.529
Age group	322.016	419.937	266.016	27.634	6	0.000
Time (in mins)	300.298	398.219	244.298	5.916	6	0.433
Distance (in Km)	334.091	432.012	278.091	39.709	6	0.000
Eduaction	294.825	392.746	238.825	0.443	6	0.998
Employment	298.814	403.729	238.814	0.432	4	0.980

If ***p*(sig.)** is **LESS THAN .05**, then that variable has a significant overall effect on the outcome.

Inferences

- Person willingness to choose bus is 2.7 times over walk, 1.7 times over E-rickshaw and 18.18 times over Autorickshaw
- Person willingness to choose bus is 2.1 times more in age group 15-35 and 2.8 times more in age group 50+ compared to person below age 15 years over option No.

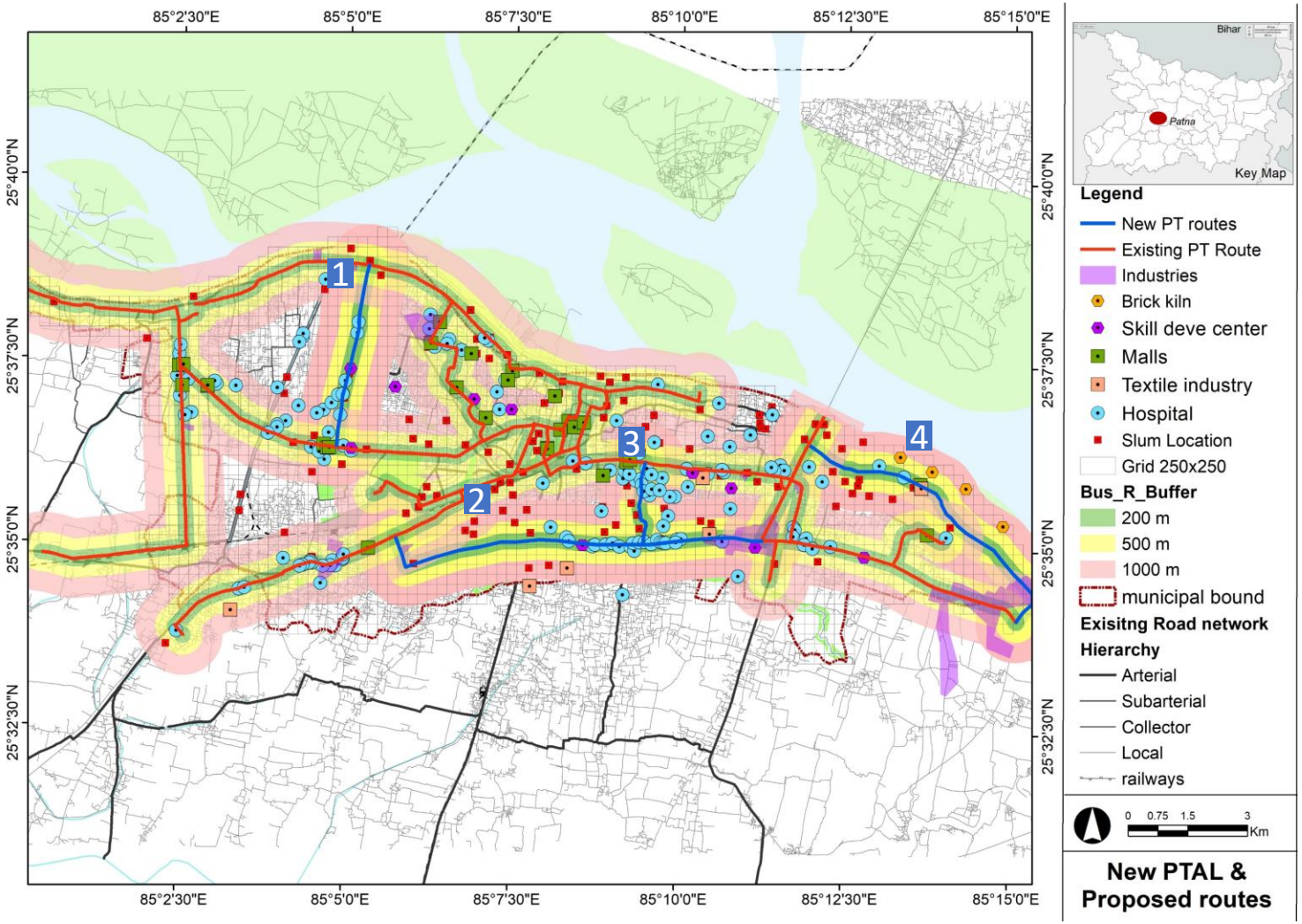
Parameter Estimates						
1_Willingness no/yes/maybe[a]		B	Std. Error	Wald	df	Sig.
Yes	Intercept	2.890	0.726	15.829	1	0.000
	[Mode =0]	2.740	0.756	13.143	1	0.000
	[Mode =1]	2.485	1.167	4.537	1	0.033
	[Mode =2]	-1.738	0.864	4.042	1	0.044
	[Mode =3]	18.180	8126.221		1	0.000
	[Mode =4]	0[b]			0	
	[Age group=0]	2.137	0.859	6.180	1	0.013
	[Age group=1]	1.499	0.995	2.269	1	0.132
	[Age group=3]	2.892	1.032	7.857	1	0.005
	[Age group=3]	0[b]			0	
	[Distance (in Km)=0]	-19.449	4618.506	0.000	1	0.997
	[Distance (in Km)=1]	-16.658	4618.507	0.000	1	0.997
	[Distance (in Km)=2]	-1.149	5178.902	0.000	1	1.000
	[Distance (in Km)=3]	0[b]			0	
may be	Intercept	-17.700	4400.463	0.000	1	0.997
	[Mode =0]	18.143	4400.463	0.000	1	0.997
	[Mode =1]	-1.859	0.000		1	
	[Mode =2]	17.700	4400.463	0.000	1	0.997
	[Mode =3]	18.020	0.000		1	0.000
	[Mode =4]	0[b]			0	
	[Age group=0]	19.590	0.693	799.025	1	0.000
	[Age group=1]	20.439	0.748	747.459	1	0.000
	[Age group=2]	20.653	0.000		1	
	[Age group=3]	0[b]			0	
	[Distance (in Km)=0]	-1.055	6106.238	0.000	1	0.348
	[Distance (in Km)=1]	-1.567	6106.238	0.000	1	4.790
	[Distance (in Km)=2]	-1.151	6803.192	0.000	1	0.316
	[Distance (in Km)=3]	0[b]			0	

The reference category is: no.

RECOMMENDATION

Recommendation 1- Missing Links

Locations were identified where major establishment are located but not connected to PT routes



1. Ashiana More to Digha- 5km

2. Anishabad more to Zero mile- 10.2 km

3. 90 Feet to Rajendra Nagar- 2.5 km

4. Gai Ghat to Deedarganj- 9 km

Integrating these areas into the public transport network would enhance the city's Public Transport Accessibility Level (PTAL) and improve access to healthcare services and job opportunities.

RECOMMENDATION

Recommendation 2- Fare Free Public Transport (FFPT)

Trip chaining travel pattern makes the available transport system unaffordable for females living in slum

Source: Impact of Incentivizing Public Transport System for Women Case Study Pink Slip Scheme – Delhi by Shirish Mahendru

- Various cities of Europe and America have adopted Free Fare ride in Public Transportation to encourage the movement of people through public transport within cities.
- Tallinn, Estonia became the first country to provide Fare Free Public transport to its citizen in 2013

Financial Sustainability

Measures used by different countries and implementing agencies to make the FFPT financially sustainable are-

- **France**- charges a small percentage of the wage bill as transportation taxes from all employers.
- **USA**- levies a gasoline tax of 18 cents-a-gallon and uses part of this collection towards public transport operations
- **Colombia**- levies a land-value tax on people owning property near mass-transit systems
- **Olympia**- dedicated sales and property taxes for funding transportation projects.

Source: https://www.nagrika.org/nagrikalarticles/farefreepublictransport

RECOMMENDATION

Recommendation 2- Fare Free Public Transport (FFPT)

Fare Free Public Transport in India						
State/city	Scheme/program	Launch Year	Vision/objective	Target group	Achievement	Implementing agencies
Tamil Nadu	Free Bus Travel scheme	May 2021	Safe & efficient public transport	Women	Increase in ridership from 40% to 68%. Avg. saving of 11.4% of monthly income	Social welfare and women empowerment dept. Govt of TN
Delhi	Pink ticket scheme	October 2019	Economics & safety concerns	women	Increase in ridership from 25% to 33%	Delhi government
Trivandrum district	Samudra scheme	Aug 2021	To address travel woes of fish vendors	Women fish vendors		KSRTC & Dept. of fisheries
Punjab	Free Bus Travel for women	April 2021	Women empowerment	Women	2 times increase in number of female user	Dept. of social security, women and child develop.
Uttarakhand	Uttarakhand Free Bus Travel Scheme	Dec 2021	To make commute easier for students in hill districts	College students (esp. female)		Transport Corporation Limited (STCL)
Bangalore	Free Bus Pass	Jan 2022	Women empowerment	Garment factory Women workers		BMTC & Labour dept. Govt of Karnataka
Puducherry		March 2023	To promote safe travel	Women		

Source: Govt. department of different states

In Case of Patna

- Perception survey result results shows that 32% of female respondents are willing to travel longer distances for better economic opportunities.
- The Social welfare department, Govt. of Bihar and Bihar State Road transport Corporation can come together as implementing agencies scheme of Fare Free Public Transport for women.

Vision 2030 of Social Welfare department, Govt. of Bihar

"To achieve gender equality and empower all women and girls by eradication of all structural and institutional obstacles and an equitable bias free society, discrimination and fear of violence."

Benefits

Economic Rate of Return	Environment Rate of Return	Social Rate of Return
Increased workforce participation	Reduced emission	Improved family income, quality of life and access to services.

THANK YOU

17th Urban Mobility India Conference & Expo 2024