



# *Service Gap Analysis of Public Buses with respect to Women Safety*

By:

Meghna Verma<sup>a</sup>, M. Manoj<sup>b</sup>, Nikhita Rodeja<sup>c</sup>, **Ashish Verma<sup>d</sup>**

<sup>a</sup>*Assistant Professor, MS Ramaiah Institute of Management, New BEL Road, MSR Nagar, Bangalore 560054*

<sup>b</sup>*Research Scholar, Department of Civil Engineering, Indian Institute of Science, Bangalore 560012*

<sup>c</sup>*Ex-Project Assistant, IISc Bangalore*

<sup>d</sup>*Associate Professor, Department of Civil Engineering, Indian Institute of Science, Bangalore 560012*

*E-mail address: [ashishv@iisc.ac.in](mailto:ashishv@iisc.ac.in)*

**WHY?**

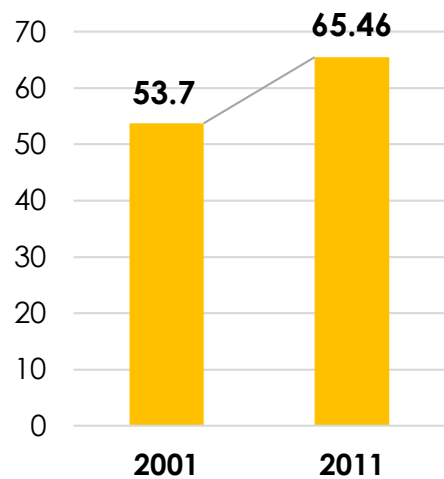
**92%** ▶ feel insecure in all major economic centres in *Indian cities*

**85%** ▶ feel unsafe while travelling in *Bangalore*

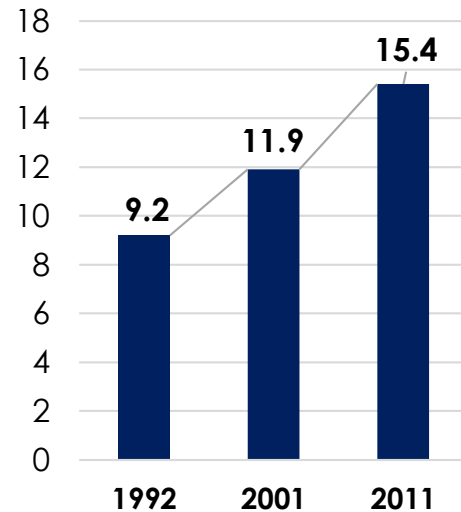
**66%** ▶ sexually harassed while commuting in *Chennai*

“ the more unsafe people feel on public transport the less likely they are to use it. ”

Increasing Literacy Rate



Increasing WFPR



# Objectives

- In India, researchers have been focusing on the overall status of women safety. However, not much research has been done to understand the perception of safety and issues faced by women while travelling in public buses.
- This paper aims to highlight those issues which women encounter while travelling in bus, while waiting at the bus stop and also while boarding and getting off the bus.

# Methodology

- The data sample taken for the study has been obtained by conducting a primary survey among women in the city of Bangalore.
- A well-structured questionnaire comprising questions related to socio-demographics; preferences and satisfaction levels of women travelers about the types of buses, staff's behavior, condition of bus stop and more; perception of safety while travelling in a bus, complaint redressal, image of existing bus service in the minds of the women was used to collect the data.
- Out of the total 503 surveys, some were incomplete and some were filled in an incorrect manner. Excluding these flawed surveys, 494 complete surveys were available to conduct the analysis.
- After data collection, factor analysis was conducted to find the underlying factors. Further logistic regression modeling was done to compare the perception of safety (binary dependent variable) among the study population by investigating the influence of the factors in the presence of several socio-demographic attributes.

# Descriptive analysis

Type of Public bus being used by women	Percentage of women
Ordinary	68 %
Volvo	59 %

Frequency of use of bus	
Daily	23 %
Sometimes	34 %
Once in a while	23 %
Rarely	20 %
Never	1 %

42%

Although Volvo buses are better in quality, more women travelling in ordinary buses feel safe

33%

Women travellers who travel **daily** but feel unsafe

76%

Women feel unsafe at the bus stop

80%

Women feel unsafe while boarding & getting of the bus

- Due to insufficient lighting at the bus stop
- Non-levelling of the footpaths
- Buses don't stop at the bus stops causing a fear of injury

# Descriptive analysis

**51%** Eve teasing at the bus stop

**50%** Eve teasing while travelling

**61%** women who have faced issues still use bus services.

## Why?

- *Women have adapted to such unsafe environments and situations while commuting*  
or
- *Other modes are not accessible/ available to them.*

Only **0.09%** women filed a complaint to the police

**20%** there is no guarantee the complaint will be addressed

# Factor analysis results

## Statements with factor loading > 0.30

## Name of factor

<ol style="list-style-type: none"> <li>1. Bus stops are safe for young mothers and elderly ladies</li> <li>2. Bus stops are safe for girl child</li> <li>3. Bus stops are safe for women</li> </ol>	Safety at bus stop for women of all ages
<ol style="list-style-type: none"> <li>1. Many people end up with various sprains at the time of getting off the bus due to non-levelling of Bus Stops</li> <li>2. Feel unsafe of getting run over by another bus or vehicle if bus doesn't stop at the Bus Stop</li> <li>3. Bus hardly stops at the Bus Stop , hence feel unsafe while getting off the bus</li> <li>4. Feeling unsafe about luggage at the time of getting off the Bus</li> <li>5. Boarding a bus is a challenge , as Buses do not stop exactly at the Bus Stop</li> <li>6. Feel very unsafe while reaching to the door of Bus from the seat</li> </ol>	Lack of safety while getting on and off the bus
<ol style="list-style-type: none"> <li>1. Feel unsafe with drivers and conductors also</li> <li>2. Feel unsafe with co passengers only</li> <li>3. Special seats for Females can't guarantee their safety</li> <li>4. All women Bus cannot guarantee safety of women inside the Bus</li> <li>5. Crimes against women are more in empty buses</li> </ol>	Feeling unsafe among co-passengers
<ol style="list-style-type: none"> <li>1. Bus stops are conveniently located</li> <li>2. Bus information – schedule &amp; route maps are available &amp; reliable</li> <li>3. There is proper light at Bus stops in the night</li> <li>4. Bus information is easily available through calls, SMS's &amp; on the Internet</li> <li>5. Crimes against women are more in empty buses</li> <li>6. Few seats should be reserved only for young mothers or elderly or physically challenged women, not for all women</li> </ol>	Infrastructure/ Convenience



# Factor analysis results

## Statements with factor loading > 0.30

## Name of factor

1. Feel unsafe of getting run over by another bus or vehicle if bus doesn't stop at Bus Stop
2. Don't know with surety if I am getting off at the right bus stop
3. Don't know how safe will be the Bus stop where I am getting down
4. Feel very unsafe while reaching to the door of Bus from the seat

Uncertain about safety at bus stop

1. Crimes against women can be reduced by running special buses for women
2. Crimes against women are less when all get place to sit in a bus
3. Display of information about bus time will reduce the waiting time , that in turn will reduce the crime at Bus Stop

Crime reduction strategies

1. Crimes against women are less when all get place to sit in a bus
2. Crimes against women are more in overloaded buses
3. Few seats should be reserved only for young mothers or elderly or physically challenged women, not for all women

Seating in bus

1. Display of information about bus time will reduce the waiting time , that in turn will reduce the crime at Bus Stop
2. All women Bus cannot guarantee the safety of women at the Bus Stop
3. Computerized ticketing system leaves little scope for cheating & bribing

Technology and Priority

# Factors

- 1** Safety at bus stop for women of all ages
- 2** Lack of safety while getting on and off the bus
- 3** Feeling unsafe among co-passengers
- 4** Infrastructure/ Convenience
- 5** Uncertain about safety at bus stop
- 6** Crime reduction strategies
- 7** Seating in bus
- 8** Technology and Priority

# Logit Regression Model - Results

Perception of safety (safe or unsafe, 1 or 0) is the dependent variable, dichotomous in nature.

$$P_{ni} = \frac{e^{V_{ni}}}{e^{V_{ni}} + e^{V_{nj}}}$$

' $P_{ni}$ ' is the probability that a woman 'n' feels unsafe 'i' from the choice set with two choices of feeling safe or unsafe 'i' and 'j' respectively. ' $V_{ni}$ ' is the systematic component of the utility derived by a woman 'n' when choosing alternate 'i' – which (' $V_{ni}$ ') is estimated by the analyst

# Logit Regression Model - Results

Variable	Estimate (p-value)
Constant	0.792 (0.00)
Age and Qualification	0.0189(0.04)
Age and Occupation	0.0658(0.00)
Qualification and feeling unsafe among co-passengers and staff	0.312 (0.14)
Qualification and uncertain about safety at bus stop	0.406 (0.06)
Qualification and Work Experience	0.545 (0.04)
Occupation and Safety at bus stop for women of all age groups	4.65 (0.00)
Safety at bus stop for women of all ages	0.398 (0.00)
Feeling unsafe while getting on and off the bus	-0.371 (0.00)
Feeling unsafe among co-passengers and staff	-0.292 (0.05)
Infrastructure/Convenience	0.209 (0.04)
Uncertain about safety at bus stop	-0.400(0.02)

---

Initial Log-Likelihood -342.415

Final Log-Likelihood -283.661

Rho-Square 0.172

Sample Size 464

# Conclusions

- Women who are highly qualified and feel safe at the bus stop and are comfortable with co-passengers and bus staff tend to feel safer while travelling in public buses.
- Women who are older and employed feel more comfortable and safer while travelling in the bus.
- The infrastructure is one of the pivotal factors that influence how safe women feel while travelling. Properly lit bus stops, leveled footpaths and security alarms will improve the perception of safety in women's mind.

# Suggestions

- **Drafting stringent rules** which the staff should compulsorily follow at all times.
  - Strict actions or fines should be charged if the drivers who do not follow rules
- **Stringent recruitment and selection policies** for appointing drivers and conductors must be framed
- Background check of drivers and conductors should be carried out properly to minimize crime in the bus.
- **Training and development programs** for the staff must be conducted frequently as per requirement.
- Bus stops should have **proper lighting**
- **Security alarms** should be made available at all bus stops
- Bus stops should be **uniformly leveled**.
- **Destination display systems** should be made available in all buses in order to make the travel convenient and safe.
- The condition of ordinary buses should be improved since a larger percentage of women use it.

if these service gaps keep widening then women might shift to private modes of travel which could be unsustainable.

**Thank you!**