

Analysis of Passenger Trips by Public Transport – Bus Transit in West Zone of Ahmedabad

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ABSTRACT

People make trips for different purposes like work, education, social, shopping, and another general. The mode of transport available is used for performing various activities in daily life. Walking and cycling are eco-friendly modes of transportation. Public transportation is used by captive riders regularly as they have no choice of the vehicle other than the bus. Captive riders have no vehicle ownership. The passengers who have private vehicle ownership are known as choice riders. Choice riders may use public transport (PT) for limited purposes and specific reasons. This study focuses on the use of bus transport within the urban area for different purposes. Public transport, bus transit provided by local authority i.e. city bus is used by gender-wise and age-wise is analyzed here. The choice of mode also depends upon the income of family and individual to make trips. The choice of the bus as a mode of public transport is also affected by boarding alighting comfort in the bus from bus stands. Availability of seat and convenience along with safety in the bus is affecting the use of buses. This analysis is useful to know the percentage of total trips made by public transport in an urban area. To implement traffic management tools, it is required to know traffic composition and trips made by different modes of transportation. It is observed that more the use of public transport, it becomes easier to manage urban transport issues.

Keywords

Bus transport, Bus transit, Captive riders, Public transport, Trip purpose

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Introduction

Public transport (PT) also known as public transportation, public transit, mass transit, or simply transit is a system of transport. There are two types of public transport: Rail transit and Bus transit. It is for group travel systems available for use by the general public. It is managed on a schedule and operated on established routes.

Mass transit usually refers to a specific type of public transport system, intended to move a very large number of people for relatively short distances such as high-frequency railway services within cities. Public transport bus transport is more accessible in a large urban area. It can provide connectivity to small congested pockets of the city by minibus. It can have a greater number of stops and connectivity. Bus transit is cheaper than rail transit. Rail transit depends upon bus transit as a feeder system. Any local authority as a first step prefers to provide bus transit. With the time there is an increase in population and migration to urban areas from surrounding rural area, hence, the number of buses, frequency, routes connectivity is required to enhance. Increase in education and employment opportunity lead to activity-based trips in an urban area. Dedicated lanes are provided on wider roads of urban areas for the rapid movement of buses on road networks in urban areas.

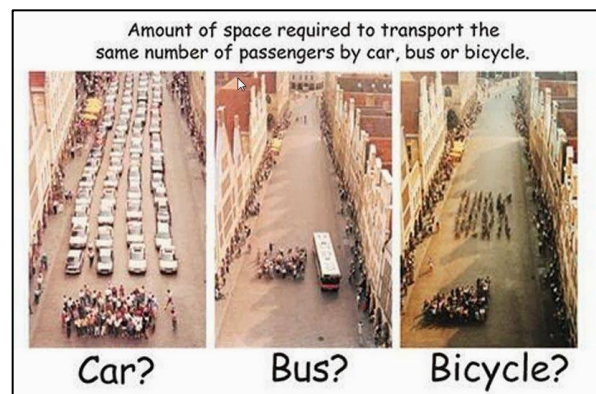


Fig. 1 Importance of public transport vehicle Bus

Study Area

For study purpose selected area is Ahmedabad. It is the largest city of Gujarat state on the bank of the Sabarmati River in north-central Gujarat.

For administration, it has been divided into 6 zones namely - North zone, South zone, East zone, West zone, Central zone, and New west zone. For data collection, the area is cordoned to the west zone. West zone includes 9 wards as per electoral list and administration purpose. Paldi, Vasna, Navrangpura, SP Stadium, Naranpura, New Vadaj, Sabarmati, Ranip, and Chandkheda.

Ahmedabad has a hot, semi-arid climate, apart from the monsoon season, the climate is extremely dry. The total area of the west zone, Ahmedabad city is 65.68 km² and the total population is 7,87,753 as per census 2011.

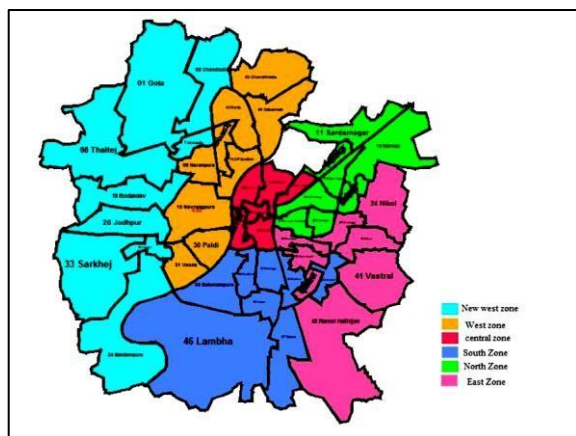


Fig. 2 Study area: Map of Ahmedabad city

There are mainly two public transport systems that exist in Ahmedabad which are: Bus transit

- Ahmedabad Municipal Transport Service (AMTS)
- Bus Rapid Transit System (BRTS)



Fig. 3 Bus Transit in Ahmedabad (AMTS & BRTS)

The AMTS has maximum coverage in all the zones of the city. The average bus stop spacing is 410 meters. At every 400 m, a bus stop is available to catch a public transport vehicle. It operates on numerous routes traversing through the entire city of Ahmedabad. Specified route numbers assigned to the entire city with extra circular and anti-circular routes. Night bus services between 10.30 PM and 1 AM are provided from Lal Darwaja and Kalupur bus terminus to specified areas and in the early morning 5.00 AM also the service is provided from certain areas. The minimum fare is Rs.3 for travel up to two km and Max. fare is Rs.25. Service-oriented approach, night and morning service for textile workers, special routes from Government Colonies to the secretariat and new civil hospital, special concession rates for children and students, free pass scheme for the blind, and concessional pass for professional and medical postgraduate students are key features of AMTS. BRTS is also known as Janmarg in Ahmedabad, operated by Ahmedabad Janmarg Limited, a subsidiary of AMC and others. Designed by CEPT University and inaugurated in October 2009. The project was sanctioned by the Ministry of Urban Development under the JNNURM program in 2005. The network expanded to 89 km by December 2017

with a daily ridership of 3,49,000 passengers with air-conditioned and non-air-conditioned buses. As of June 2018, currently, operational routes are eleven in both directions and two in a circular direction with serving 149 BRTS stations and cabins at extended routes. The minimum fare is Rs.4 for travel up to two km and Max. fare is Rs.36. The key features of BRTS are effective speed, reliability, capacity and cost, station design, intelligent transport system (ITS) application and fare collection, environment-friendly, dedicated lanes, platform-level boarding. Frequency of both services AMTS and BRTS are different in each route according to passenger traffic and operational conditions. ICICI Bank and AMC have introduced Janmitra - smart city card which can be used for AMTS and BRTS and is a first of its kind, a prepaid, reloadable card which is designed for Convenience and flexibility. The card offers exciting features and a host of benefits for all payment needs within the city of Ahmedabad. To attract children to make a trip by public transport, the cartoon painted buses are introduced at the Kankaria lake view area. This will increase the use of PT buses by children along with their parents for recreation purposes.

The mass transit metro system (Rail Transit), for the cities of Ahmedabad and Gandhinagar is under construction since March 2015. The North-South and East-West corridors are expected to complete. People of Ahmedabad are more dependent on private transportation. About 78% of trips were made by private modes from the total motorized trips in 2011 as per the household survey data sets.

Data Collection

By personal interview at bus stops in wards of the west zone of Ahmedabad data has been collected. Passengers waiting for buses at these stops are noted as per gender, age, and purpose of the trip. The details of the ward name, ward number, number of bus stops are as shown below. Table I shows the number of persons interviewed at AMTS bus stops. Table II shows the number of persons interviewed at BRTS bus stops.

Table I. Number Of People Interviewed At Amts Bus Stops

Passengers Surveyed at AMTS Stops in West Zone					
Sr. No.	Ward Name	Ward No.	Total Stops	Surveyed Stops	No. of Passengers Interviewed
1	Paldi	7	25	12	558
2	Vasna	8	11	7	326
3	Navrangpura	10	19	10	476

4	SP Stadium	11	2	2	96
5	Naranpura	12	8	8	390
6	New Vadaj	13	14	8	364
7	Sabarmati	15	13	8	400
8	Ranip	45	20	11	458
9	Chandkheda	57	19	11	531
Total			131	77 (58.78%)	3599

Table II. Number Of People Interviewed At Brts Bus Stops

Passengers Surveyed at BRTS Stops in West Zone					
Sr. No.	Ward Name	Ward No.	Total Stops (SAP)	Surveyed Stops	No. of Passengers Interviewed
1	Paldi	7	3	0	0
2	Vasna	8	1	0	0
3	Navrangpura	10	12	12	1121
4	SP Stadium	11	2	2	203
5	Naranpura	12	5	5	533
6	New Vadaj	13	2	2	207
7	Sabarmati	15	6	6	394
8	Ranip	45	1	0	0
9	Chandkheda	57	6	6	404
Total			37	33 (89.19%)	2862

Data Analysis

Trips made by public transportation vehicles in the study area are surveyed by interview method at bus stops. There are passengers at AMTS stand on roadside and BRTS stands at the dedicated lane on the midway of road. Both modes of public transport have their pros and cons. Both have advantages as well as limitations.

By interview survey at bus stops the collected information is tabulated as below in Table III. Data are tabulated by bifurcating total persons interviewed 3599 from AMTS bus stops and 2862 from BTRs bus stops.

Table Iii. Total Number Of Trips Made By Buses In

Study Area

Ward	Social	Work	Shopping	Education	Other
Paldi	108	240	100	89	21
Vasna	71	144	53	47	11
Navrangpura	85	196	65	92	38
SP Stadium	20	40	15	16	5
Naranpura	95	182	46	43	24
New Vadaj	72	167	43	53	29
Sabarmati	86	163	59	70	22
Ranip	91	194	85	70	18
Chandkheda	122	183	81	105	40
AMTS	750	1509	547	585	208
West Zone	Social	Work	Shopping	Education	Other
BRTS	178	1497	60	1020	107
Total (Combined)	928	3006	607	1605	315

For different purposes, people make trips in buses provided by the local authority as shown in Table IV. Purpose wise distribution of trips made by bus passengers is as shown in the pie chart in Fig. 4 below.

Table IV. Purpose Wise Trip Distribution In Pt Bus

Trip Purpose	Combined (AMTS+BRTS) % Trips
Social	14.36
Work	46.53
Shopping	9.39
Education	24.84
Other	4.88

Other includes trips for swimming, temple, Satsang, just for fun, medical, license, banking, document collection, to pay school fees, to collect donations/charges/funds, to go for LIC policy work, going to bus stop for village visit etc.

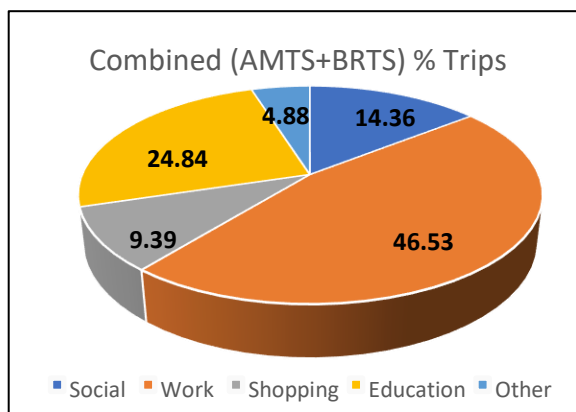


Fig. 4. Purpose wise trip distribution in Public Transport bus

For different purposes, trips made by male passengers in the study area by using public transport vehicle bus is as shown in Table V and Fig. 5 below.

Table V. Purpose Wise Trip Distribution In Pt Bus By Male Members

Trip Purpose	Combined % Trips made by Male
Social	8.40
Work	34.10
Shopping	3.45
Education	15.15
Other	1.84
Total	62.95

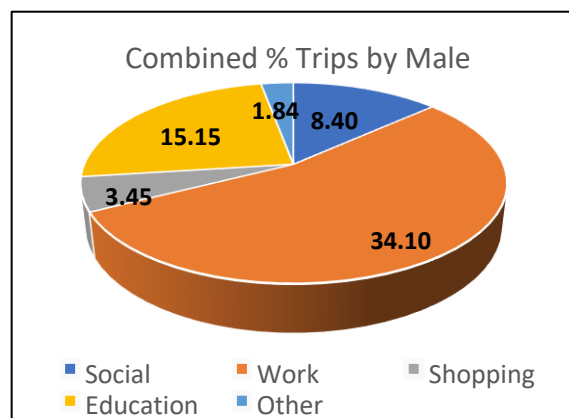


Fig. 5 PT bus trips by male passengers as per the trip purpose

For different purposes, trips made by female passengers in the study area by using public transport vehicle bus is as shown in Table VI and Fig. 6 below.

Table Vi. Purpose Wise Trip Distribution In Pt Bus By Female Members

Trip Purpose	Combined % Trips by Female
Social	5.96
Work	12.43
Shopping	5.94
Education	9.69
Other	3.03
Total	37.05

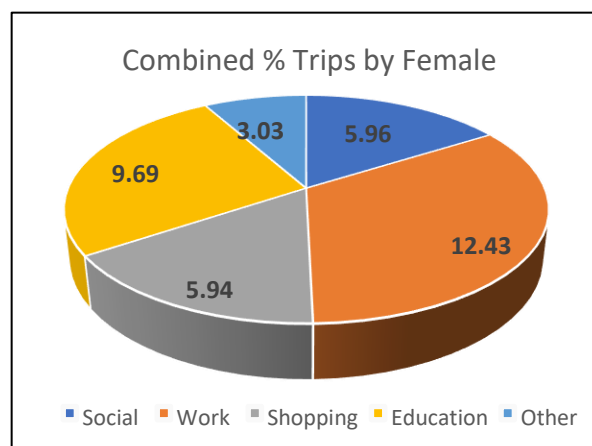


Fig. 6 PT bus trips by female passengers as per the trip purpose

Users of AMTS & BRTS - bus transport - public transport is interviewed at bus stops while waiting for connecting buses

in the study area. 18% of passengers are not getting seats in the bus while they board in the bus as shown in Fig. 7.

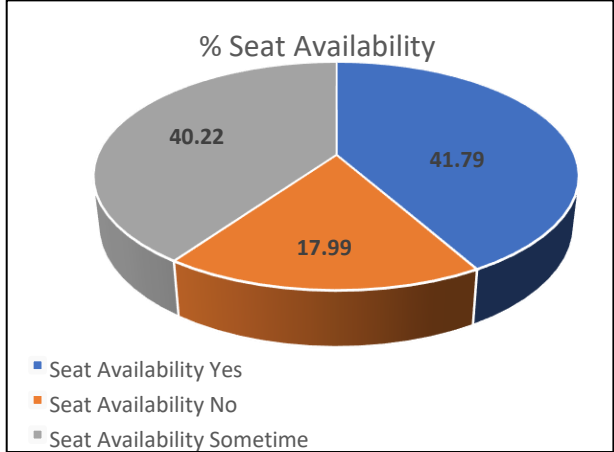


Fig.7 Seat availability scenario in PT bus

To travel in any atmospheric and health condition, standing in a moving bus on road is painful. The jerks at several stops while stopping and starting of the bus at stops are uncomfortable specifically for women, children, and senior citizens. On collision points in heterogeneous traffic sudden brake application, deceleration and acceleration are also unsafe in standing position in absence of seat availability.

The comfort of users is presented in three categories as shown in Fig. 8 by asking questions to the passengers at bus stops in the study area. Comfort is again the status of the mind and thought process of a human being. It is also affected by certain physical and psychological characteristics of humans.

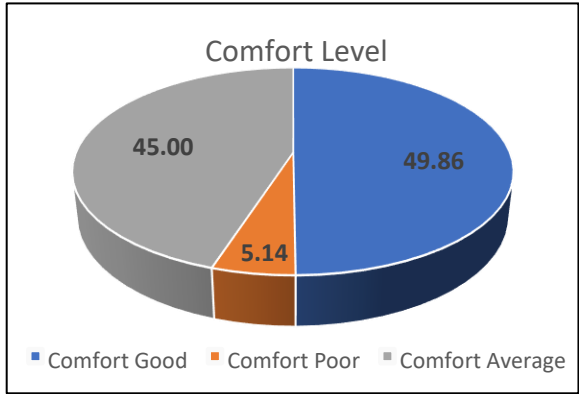


Fig. 8 Comfort of passengers in PT bus

Almost 50 % of passengers are traveling with average comfort. It is recommended to increase comfort by clean and noiseless buses-electrical vehicles. BRTS stands provide bus stops with ramps and buses which are also on a high floor, which are comfortable for boarding and alighting. The information system at the bus stop and GPS based bus tracking system increase the comfort of users. Audio information systems provide comfort to blind and lesser alert passengers. Video and LCD provide information to hearing impaired passengers and give quick information at a glance.
Age-wise distribution of PT users is as shown in Fig. 9.

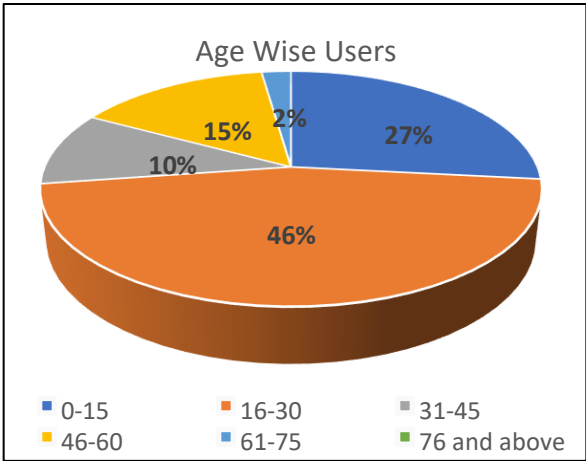


Fig. 9 Age-wise distribution of passengers in PT buses

The majority of bus passengers are in the range of 16 to 30 years of age. A passenger of 60 and more years prefers less to travel. Only 2% of total bus passengers are of 60 and more age.

The income group is divided into four classes as per the urban development and housing Department as shown in Table VII. It is expressed as a Yearly Income in Rupees. (Source: Urban Development and Urban Housing Department, Gujarat) Under Mukhyamantri GRUH (Gujarat Rural Urban Housing) Yojana-2014 (Five - year plan).

Table VII. Income Categorization

Income Group	Income
Economically Weaker Section	< 1 Lakh
Low Income Group	1 Lakh to 2.5 Lakh
Middle Income Group	2.5 Lakh to 5 Lakh
Higher Income Group	>5 Lakh

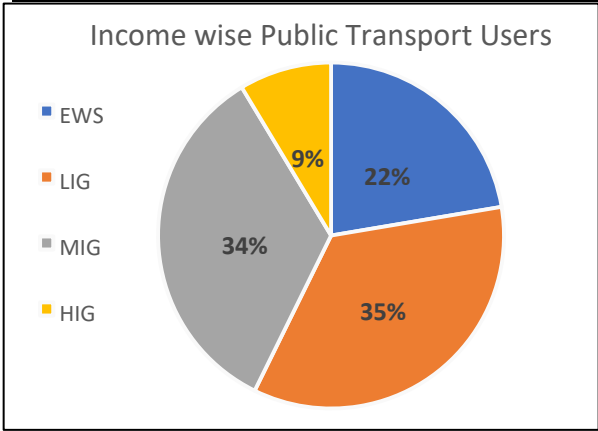


Fig.10 Income-wise distribution of PT bus passengers

Passengers belonging to LIG and MIG income groups prefer to use public transport buses more. 35 & 34% of total bus users belong to low-income and middle-income groups respectively. 5 lacs and more annual income families do not

prefer to use the bus, only 9% of users have income more than 5 lacs.

Conclusion

PT bus is used maximum for a work trip. 47% of total trips by bus has work purpose. 25% of the trip maker's purpose in using the bus is study/education. Users going to school/ college/ university/ coaching class use bus transit facilities provided by the local authority for the economy and student concession benefit. 27% of total bus trips are in the age group 15 years and less indicating either trip is made with elder family members or for study purposes by bus. Male users of PT buses are more than female users as passengers. 67% of total trips are made by males and the remaining 37% by females for different purposes of trips.

As per the home interview study conducted for the study area, 11% of the population is choosing PT bus as their mode of travel. By interview method at the bus stand, it has been observed that income is an affecting parameter for the use of buses in Ahmedabad. There are less comfort and seat availability in the PT bus. 69% of bus users are from low-income and middle-income groups. Only 9% of the total passengers belong to the high-income group. Executive buses with high fare can attract them to use public transport for their daily and regular trips. AC buses with allocated seats can increase % users of PT bus with a reduction in the personalized vehicle.

The percentage share of public transport trips needs to be increased to reduce air pollution, noise pollution, traffic congestion, delay, and accidents. To increase public transportation Ahmedabad is introducing Rail transit which is a positive step in the direction of progress and prosperity. The frequency of bus and facilities for comfort, conveniences, and fast movement of passengers is highly urged in Ahmedabad.

To increase the use of PT buses, provide comfortable boarding alighting in AMTS. Provide adjustable, foldable, sustainable, the ramp from wooden, steel, fiber-reinforced plastic material at AMTS bus stops for convenience of senior citizens, disabled, pregnant women, passengers with luggage and children. There is wheelchair accessibility in BRTS. The same can be provided for AMTS by such ramps. The electric bus is now introduced in Ahmedabad public transport system. More and more use of the Electric bus and replacing diesel buses is recommended to reduce pollution.

Cycle stand, parking frame, and hooks to hang cycles to be provided in bus and bus stand to promote eco-friendly sustainable transportation system. Free and rented cycles can be provided by the authority to reach to the desired destination from bus stands.

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